



## Dutch import of biomass

*Producing countries' point of view on the sustainability of biomass export*



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### Project:

Dutch import of biomass – producing countries' point of view on the sustainability of biomass exports

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### Contact persons:

CREM BV, Victor de Lange, delange.vpa@crem.nl

Both ENDS, Paul Wolvekamp, pw@bothends.org

### Project partners:

Both ENDS

Stichting Natuur en Milieu

COS Nederland

### Executing partners:

Núcleo Amigos da Terra (NAT) and Vitae Civilis Institute [Brazil]

Biodiversity Foundation Kehati, in co-operation with Sawit Watch, Social  
Economic Institute (INRISE), Bogor Agricultural University and  
Media Indonesia Group-Daily Research and Development [Indonesia]

Ms Gwynne Foster [South Africa]

CREM BV

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CREM BV  
Spuistraat 104d  
1012 VA Amsterdam  
telefoon: 020-6274969  
fax: 020-6266539  
e-mail: [office@crem.nl](mailto:office@crem.nl)  
website: [www.crem.nl](http://www.crem.nl)



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The project team,

Both ENDS, Stichting Natuur en Milieu, COS Nederland, Núcleo Amigos da Terra (NAT), Vitae Civilis Institute, Biodiversity Foundation Kehati, Sawit Watch, Social Economic Institute (INRISE), Bogor Agricultural University, Media Indonesia Group-Daily Research and Development, Ms Gwynne Foster and CREM BV,

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# Executive summary

## Introduction to the project

In the Netherlands, biomass is expected to play an increasingly significant role in view of the 'greening' of electricity production and transport fuels pushed by implementation of an EU Biofuels Directive. Studies indicate that the Netherlands and many other western countries do not have enough potential to be self-sufficient and meet their own bioenergy targets. Consequently, a rapidly growing amount of biomass imports is expected to take place. Massive imports can have large positive and/or negative impacts on producing countries, both from an environmental as well as from a socio-economic point of view. In this respect it is important that the input from stakeholders in producing countries is brought into the debate in the Netherlands. *How do they feel about the rising popularity of their resources?*

For the purpose of this project, research into three specific product/country combinations has been carried out. The combinations chosen are sugar cane (Brazil), palm oil (Indonesia) and maize (South Africa). A key element of this project is that the assessment of the sustainability issues related to these flows has been undertaken by stakeholders in the producing countries themselves.

*Part of this project has run parallel to the development of criteria for sustainable biomass production by the Cramer Commission\*. In order to explicitly serve as input for the final composition of such criteria, the report reflects a comparison between results derived from this project and the criteria proposed by the Commission.*

## Summary palm oil/Indonesia case study

Indonesia is the second-largest palm oil producer in the world, after Malaysia. The characteristics of palm oil – a very high energy potential – add to its popularity by being a very suitable source for bioenergy. This case study served to collect opinions from Indonesian stakeholders in respect of the sustainability issues related to the ongoing expansion of palm oil plantations in Indonesia.

### *Introduction Indonesia & palm oil*

Not only the Dutch Government seeks to find biomass resources for bioenergy, the Indonesian Government wishes to reduce its dependency on fossil fuels as well. The Government regards palm oil as the most feasible option for renewable energy in Indonesia, as it has been industrialized for a long time. An increase in global and domestic demand will considerably add to the existing plantations, which cover over 5 million ha (2006). Although already 20 million ha of land has been deforested to give way to plantations, new plantations tend to be developed on forested land because of the earnings derived from the sale of wood.

### *Results of the stakeholder forum*

While the NGOs blame the industry for deforestation and a lack of attention for local communities' welfare, the industry claims that the industry cannot be held solely responsible for the taking up of land. They respond to a global demand, so 'anyone who buys chocolate, crisps, bread cakes, tooth-pastes, lipstick is causing the extinction of the orang utan'.

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\* A project has been initiated through the Ministry of Economic Affairs to develop sustainability criteria with respect to the import of biomass. The committee working on this project (referred to as the 'Cramer Commission') has drawn up and publicized criteria to prevent the production of biomass from impacting nature and people in July 2006.

Opinions in respect of sustainability issues in the palm oil industry differ, but include:

- Optimizing the palm oil industry can be done by using the existing plantations and increase their yields, revitalizing old plants or expanding the area of the existing plantations (preferably using marginal land over taking natural forests).
- Palm oil is very important for Indonesia in view of the creation of jobs and its contribution to the Gross Domestic Product.
- Competition may arise amongst the demand for domestic palm oil (as edible oil and biofuel) and export of palm oil to target countries such as the Netherlands.
- Natural forest land is converted for the expansion of palm oil plantations → high incidence of forest fires, notably on peat lands, with resulting CO<sub>2</sub> emissions.
- Concerns exist that the number of plantations owned by foreign parties is growing.
- There is no fair distribution of benefits throughout the supply chain: while the market price of palm oil has increased over the past period, this has hardly had any ripple effects throughout the production chain.
- The position of the local communities is often not taken into account when expanding plantations. While the local communities often face that their customary land rights are not formally recognized, the Government grants licenses to palm oil operations which take the land used by communities.
- Position of smallholder palm oil growers deserves special attention.

The industry indicated that it starts trying to apply the Roundtable on Sustainable Palm Oil principles and criteria for sustainable production to counteract negative impacts on society and the environment following oil palm production.

#### **Summary sugar cane/Brazil case study**

Brazil is one of the largest sugar cane producers in the world. The sugar cane serves the production of both sugar and ethanol for national and international markets. The sugar cane industry intends to increase its production with 40% by 2010. More energy efficiency and a slightly rise in yield may improve the productivity, though many new hectares under cultivation will be necessary to achieve such an increase (from the current 6 million ha to at least 9 million ha by 2010). According to the industry, expansion is said to take place in areas that are currently used for extensive cattle farming. However, local NGOs are concerned about the possible expansion into the Cerrado biome and furthermore state that cattle farming often shifts to new areas of high biodiversity value (e.g. the Amazon forest).

The sugar cane sector generates about 3.6 million direct and indirect jobs, delivers technical development and is very important for Brazil from a socio-economic point of view. However, it is generally cultivated as large-scale monocultures, causing major impacts –according to NGOs and social movements – including:

- illegal deforestation in order to enable the establishment of new plantations;
- expulsion of small farmers from their land;
- intensive use of agrochemicals;
- contamination of soil, rivers and ground water;
- high water use and waste water containing a high level of organic material → best practices include closed water circulations when producing ethanol and the use of waste water as fertilization water;
- the use of fire prior to harvesting in 80% of the sugar cane plantations (creating health problems for workers and air pollution in the field and in adjacent villages);
- rural and urban poverty – apart from the expulsion of small farmers from their lands, monoculture practices hardly create jobs;



- conflicts between 'local' workers and migratory workers;
- a dilemma between the advantages of mechanization (improving environmental and working conditions) and the disadvantage (a vast reduction in the number of employees required).

NGOs regard potential sustainability criteria imposed by importing countries as an opportunity to increase the sustainability level of the sugar cane production sector. The industry believes that long-term delivery contracts are likely to offer the best possibility to agree on such criteria. However, the views of the different stakeholders on the current sustainability level of sugar cane production are often conflicting. Monitoring of sustainability criteria should therefore preferably take place in co-operation with different stakeholders.

### **Summary maize/South Africa case study**

The Southern African region as a whole has significant possibilities for the production of biomass for bioenergy export purposes. The fact that the industry is at an early development stage provides an opportunity to start up this industry in a sustainable manner, to the benefit of local country economies and communities.

This case study looked into the feasibility of a South African ethanol industry from maize (corn), and the sustainability issues related hereto from a producing country's point of view. Interviews with stakeholders in South Africa revealed many, often conflicting, opinions with regard to a potential South African ethanol industry. The main conclusions are:

- Ethanol Africa is the main driver of ethanol production in South Africa. It intends to construct 8 ethanol plants (the input for which will be maize), of which construction of the first has just been started. Plans exist to largely expand ethanol production to other Southern African regions as well within 3 to 4 years.
- The production of ethanol in South Africa is rather controversial. Some parties believe that the production of ethanol in South Africa can never be feasible in view of the low yield per hectare (compared to other maize producing countries), the low energy-efficiency of maize and the fact that the high maize prices prevent an ethanol plant from being profitable. Other parties believe that yield can still further increase and that, given the demand for ethanol and the high oil prices, such production can well be profitable.
- A critical issue is the fact that maize is the staple food of millions of South Africans. Farmers are expected to conclude contracts with ethanol plants that wish to ensure their supplies. In bad production years, this could result in a shortage of maize being available for local food markets (which may cause a rise in maize prices for local people).
- South Africa is one of the largest producers of GM maize. Ethanol production stimulates the use of GM maize, inter alia because the maize is not destined for human consumption. NGOs fear that more and more GM maize will unnotedly enter the food supply chain, especially considering the fact that by-products are used as feed. Also the impact on biodiversity may be larger than thought of.
- Most stakeholders expect South Africa to issue legislation in view of mandatory ethanol blending with gasoline. The demand following such legislation will create such a domestic use of ethanol that export is not expected to take place by South Africa on the longer term. However, South African investments in ethanol production in other Southern African countries could result in large-scale ethanol production destined for the export market.

- Sustainability in South Africa is mostly regarded from an economic point of view. Decreased production following land reforms and a huge unemployment rate form a greater concern than working conditions and decreasing water levels. NGOs can use strengthening to draw attention on the other aspects as well, especially in view of the expected expansion of the industry in the larger region.
- In view of the conflicting opinions, it is likely that monitoring of sustainability will involve stakeholder consultation by the buyer and/or external auditing.

### **Conclusions**

Based on the input from the South, the Dutch members of the project team have drawn the following conclusions.

#### *Case studies*

Governments and industries in the three producing countries studied generally seem anxious to meet the growing demand from developed countries and focus on the opportunities given. Indeed, such demand offers several opportunities, though these will not self-evidently be exploited. A critical role is often to be played by local NGOs, trying to balance economic benefits with social and environmental costs. As regards economic benefits and opportunity costs, questions emerge: 'who gains and who loses, specifically from a local perspective', issues surface pertaining to dependency on a monoculture crop economy and the option for economic diversification. Overall concerns which can be picked up from the case studies are:

- the trend to turn biomass into a commodity mainly competing on price and quality, hardly addressing sustainability issues;
- the trend to cultivate biomass as a large-scale monoculture, leaving little land for local food production, subsistence farming and economic diversification;
- the lack of spatial planning in most developing countries, enabling the monoculture trend to occur.

Taking a helicopter point of view, the NGOs in the three countries studied had one thing in common: they cannot keep up with the pace of the current developments resulting from the 'western' drive to import biomass. They are especially struggling to find an answer to the question 'how to ensure a minimum sustainability level for the production of biomass?', also given the fact that enforcement of (inter)national environmental and social legislation in the countries studied is weak.

#### *Comparisons of field research results with the Cramer Commission criteria*

The majority of issues put forward by the stakeholders in the South is dealt with in the criteria. These criteria will be further worked out in indicators and protocols by the Cramer Commission. Following the insights gained from the case studies, points deserving extra attention in this process should be:

- potential ripple effects on the price of food products;
- the development of monocultures to serve biomass demand;
- the social and environmental history of a production location;
- construction of infrastructure potentially impacting biodiversity;
- distribution of benefits;
- compliance with national and international legislation;
- gender issues; and
- social impacts of (im)migrant labour.

It is clear that compliance with the criteria demands investments in time, resources and capacity by the purchaser and also requires patience to give producing countries time to adjust production to comply with sustainability criteria.

Also more attention should be given to the interconnectivity of sustainability issues. An issue like 'land use' impacts social, environmental and economic circumstances. It is important to acknowledge this linkage in order to regard the criteria in the proper context.

#### *The use of biomass as a renewable energy source*

Important notes in respect of the potential benefits/opportunities of biomass as a renewable source of energy are:

- Contributing to a reduction in greenhouse gas emissions → In principle, the use of biomass would reduce greenhouse gas emissions significantly compared to the current use of fossil energy sources. Many stakeholders in biomass supply chains are not aware of the fact that biomass growing and farming practices potentially nullify the reductions gained, such as the clearance of natural vegetation.
- Providing opportunities for socio-economic development → Creating jobs and offering trade opportunities and scope for diversification of crops and sources of income, are valuable and potentially interesting developments that can thrive on the introduction or intensification of a biomass export sector. However, the case studies teach western players that the expected beneficial aspects of such a sector do not occur 'automatically' for those needing it the most.
- Attributing value to and opportunity to restore degraded areas → Numerous studies point to the global availability of degraded areas which, supposedly, could be used to cultivate biomass for energy generation. However, degraded and deforested areas in practice often seem to lack attractiveness to be developed for the purpose of biomass production.

In conclusion, there *is* a potential value in using (imported) biomass as a source of energy that should be treasured and aimed for. However, *attention should be duly paid to the risks associated with large-scale biomass production*. In this respect, specific attention should be paid – from a sustainability point of view – to the local needs.

#### **Recommendations**

It is acknowledged that stakeholders in the Netherlands cannot be held solely responsible for the sequence of events following the international, increased interest in biomass. However, the current developments at least demand efforts from such stakeholders to address sustainability issues signalled and to work in this field in joint co-operation with governments, NGOs and local people – both in the importing as well as in the producing countries. For ensuring and enhancing the beneficial aspects of a biomass supply chain it is recommended to:

- optimize the Cramer Commission criteria;
- ensure a valid tracking & tracing system for biomass resources;
- enhance attention for sustainability in the supply chains;
- introduce sustainability verification systems;
- support capacity building in the South;
- invest in new energy technologies;
- encourage energy savings in western countries;
- enter into multi stakeholder partnerships to help enhancing the sustainability level;
- conduct pilot projects, e.g. testing the draft Commission Cramer criteria and suggested additions.

Chapter 6 extensively elaborates on the suggested recommendations.

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ANNEX I: SUSTAINABILITY ASSESSMENT FRAMEWORK

## Introduction

### 1.1 The Netherlands and biomass

Bioenergy concerns a renewable source of energy derived from biomass, being organic materials from forestry (processing residues), agricultural crops and residues, municipal/industrial waste and oil-bearing plants. This study focuses on the sustainability issues pertaining to the Dutch imports of biomass for bioenergy generation.

Bioenergy seems like a *magic* word these days, gaining support on the global energy market as a substitute for fossil energy. A rising demand for and international trade in bioenergy is predicted in numerous studies and is in fact already occurring. Meanwhile, biomass is being cultivated on a growing scale for bioenergy, debates between opponents and advocates are becoming more intense, investments are booming and countries not having prepared any legislation on bioenergy feel committed to do so being surrounded by a huge number of countries setting targets in this field. Oil prices over US\$ 70 a barrel, worries on the safety of nuclear energy and concerns about global warming are driving this shift. Advancing knowledge and techniques add to the popularity of bioenergy by offering more and more opportunities to efficiently and effectively produce this kind of energy.

In the Netherlands, biomass is expected to play an increasingly significant role in view of the 'greening' of electricity production and transport fuels pushed by implementation of an EU Biofuels Directive<sup>1</sup>. This process is stimulated on the basis of governmental policies and instruments, such as:

- *Energy Transition*

The Dutch Energy Transition aims for the provision of sustainable energy within 50 years. Taking this goal into consideration, biomass should contribute 30% to the national energy production (including fuels) and 20-45% to the provision of raw materials destined for the chemical industry by 2040<sup>2</sup>.

  - In view of the Transition, a project has been initiated through the Ministry of Economic Affairs to develop sustainability criteria with respect to the import of biomass. The committee working on this project (referred to as the 'Cramer Commission') has drawn up and publicized criteria to prevent the production of biomass from impacting nature and people in July 2006. The government wishes to use these criteria amongst other things for the allocation of MEP subsidies (see below).

<sup>1</sup> For example: the European Commission has issued a Biofuels Directive (2003/30/EC) with targets and adopted an ambitious biomass and biofuels action plan in December 2005. The plan includes reviews of how fuel standards could be improved to encourage the use of biomass for transport, heating and electricity generation; investment in research, in particular in making liquid fuels out of wood and waste materials, and a campaign to inform farmers and forest owners about energy crops. In 2003 already, a minimum proportion of 5.75% biofuels in the conventional fuel was set for 2010 ([http://europa.eu.int/comm/energy/res/biomass\\_action\\_plan/green\\_electricity\\_en.htm](http://europa.eu.int/comm/energy/res/biomass_action_plan/green_electricity_en.htm), [http://ec.europa.eu/energy/res/legislation/doc/biofuels/en\\_final.pdf](http://ec.europa.eu/energy/res/legislation/doc/biofuels/en_final.pdf))

<sup>2</sup> Ministry of Economic Affairs, "Energietransitie: stand van zaken en het vervolg (Innovatie in het energiebeleid)", April 2004.

- One of the themes within the energy transition is 'green raw materials'<sup>3</sup>. A platform has been set up in this respect, aiming to start off the sustaining of Dutch raw material use and to demonstrate best practices.
- *Biodiversity Transition*  
The Biodiversity Transition aims to support and provide input to the sustainable development of developing countries' economies while paying attention to the conservation and sustainable use of biodiversity. A few themes have been chosen within this Transition to translate the term 'transition and biodiversity' into practice. Pilot projects in this respect concern fish, oil-bearing crops and biomass. Important starting points within these projects are 'chain management' and 'competing claims'.
- *Implementation of the EU Biofuels Directive in Dutch law*  
Pursuant to the EU Biofuels Directive being implemented in the Netherlands, an obligation to blend gasoline and diesel with 2% biofuels will become effective in 2007. The Ministry of Housing, Spatial Planning and the Environment intends to apply sustainability criteria for biofuels, but is awaiting the final results from the Cramer Commission.
- *Subsidy*  
The government has created a subsidy – MEP – to stimulate the production of electricity derived from sustainable sources. MEP means 'Milieukwaliteit ElectriciteitsProductie', i.e. environmental quality electricity production. Most of the times, producing *sustainable* energy is still more expensive than producing mainstream energy. The imports of wood pellets, agricultural residues, palm oil, etc. as a biomass source would therefore not be attractive compared to fossil fuels without the existence of MEP. Through this financing mechanism, biomass can compete with fossil fuels<sup>4</sup>.

The basis on which this subsidy is being granted, is currently under discussion. Following the report of the Cramer Commission, it may well be that biomass flows need to comply with certain sustainability criteria in order to be eligible for subsidies in 2007.

## 1.2 Project

This project is undertaken by three Dutch NGOs, i.e. Both ENDS, Stichting Natuur en Milieu and COS Nederland, in co-operation with consultancy firm CREM B.V. and counterparts in biomass producing countries. It is carried out with funding from the Dutch Ministry of Housing, Spatial Planning and the Environment.

<sup>3</sup> [http://www.senternovem.nl/energietransitie/groene\\_grondstoffen/](http://www.senternovem.nl/energietransitie/groene_grondstoffen/)

<sup>4</sup> The MEP contributions to support sustainable electricity production have recently been lowered, while at the same time the European Commission questions whether MEP is permissible from a European competitive point of view. This may influence future attractiveness of biomass (imports) as an energy source [J. Koppejan, P.D.J. de Boer-Meulman, SenterNovem, De verwachte beschikbaarheid van biomassa in 2010, October 2005, [www.senternovem.nl/mmfiles/Verwachte%20beschikbaarheid%20biomassa%202010\\_tcm24-175482.pdf](http://www.senternovem.nl/mmfiles/Verwachte%20beschikbaarheid%20biomassa%202010_tcm24-175482.pdf)].



Studies indicate that the Netherlands and many other western countries do not have enough potential to be self-sufficient and meet their own bioenergy targets. The Netherlands lack space to cultivate the huge quantities of biomass needed<sup>5</sup>. Consequently, a growing amount of biomass *imports* is expected to take place. It is believed that (future) biomass imports to the Netherlands (and Europe) will mainly be sourced from developing and Central and Eastern European countries. Such imports will partly concern agricultural and forestry (processing) residues, though at this stage the amount of residues is unlikely to be sufficient to meet the increased international biomass demand. In the short term, cultivating biomass for the purpose of bioenergy will get more attention.

As far as the potential of biomass sources is concerned, many studies indicate that the regions with the highest potentials to produce and export bioenergy are vested in the Caribbean & Latin America<sup>6</sup>, sub-Sahara Africa<sup>7</sup>, the former transition economies<sup>8</sup> and Asia<sup>9</sup>. In view of the numerous assessments of global biomass potentials, each having different starting points and using different calculations and criteria, it is not feasible to give a detailed overview of biomass sources allocated to specific producing countries.

In view of the intended growth in the use of bioenergy, the biomass flows to be imported may be quite high. Massive imports can have large positive and/or negative impacts on producing countries from an economic, environmental as well as from a social point of view. In particular NGOs in these countries are concerned that the international demand for and shortage of biomass sources can create local dilemmas, such as land claims and deforestation, and may seize valuable land destined for e.g. food production or biomass production to meet local/domestic energy requirements. It is important that the input from stakeholders in producing countries is brought into the debate in the Netherlands. *How do they feel about the rising popularity of their sources?* Hence this project has served this purpose.

'Energy and Environment: unprecedented crisis, unprecedented challenge.'

BirdLife International, 7 June 2006, Biofuels Conference

### **Project focus**

This project has focused on biomass produced in *developing* countries. Such focus coincides with the Dutch government's expectations that Dutch biomass imports will mainly be sourced from these countries.

For the purpose of this project, research into three specific product/country combinations has been carried out, i.e. three distinct biomass flows which are or could potentially be imported by the Netherlands from three different countries. These product/country combinations have been studied to discover the sustainability aspects (both beneficial and adverse) involved with these flows. A key element of this project is that the assessment of the sustainability issues related to these flows has been undertaken by stakeholders in the producing countries themselves. Local parties have organized stakeholder meetings to gather facts, figures and opinions, identify opportunities, etc., with respect to the local environmental and socio-economic impacts resulting from increased biomass exports.

<sup>5</sup> Ministry of Economic Affairs, "Visie op biomassa: de rol van biomassa in de Nederlandse energievoorziening 2040", August 2003.

<sup>6</sup> Caribbean, Central America and South America.

<sup>7</sup> West Africa, Central Africa, East Africa and Southern Africa.

<sup>8</sup> East Europe, C.I.S. and Baltic States.

<sup>9</sup> E. Smeets, A. Faaij, I. Lewandowski, A quickscan of global bio-energy potentials to 2050, March 2004 ([www.chem.uu.nl/nws/www/publica/e2004-109.pdf](http://www.chem.uu.nl/nws/www/publica/e2004-109.pdf))

Novem (executed by Utrecht Centre for Energy Research), Beschikbaarheid biomassa voor energie-opwekking, GRAIN: Global Restrictions on biomass Availability for Import to the Netherlands, August 2000

## Objectives

The objectives of the project read as follows:

- 1 To gather opinions, arguments and facts from stakeholders in biomass producing countries concerning the export of biomass flows. The information collected serves as input for social and political discussions in the Netherlands on i) the question whether the import of specific biomass flows can in any way be considered 'sustainable' and ii) sustainability criteria to be applicable for imported biomass flows.
- 2 To gather information on risks and opportunities resulting from the export of three distinct biomass flows which are or could potentially be imported by the Netherlands from the three different countries.
- 3 To offer opportunities for facilitating further debate among stakeholders in producing countries and to look towards capacity building of organizations in the South to get them engaged in the debates.

***Part of this project has run parallel to the development of criteria for sustainable biomass production by the Cramer Commission. In order to explicitly serve as input for the final composition of such criteria, the report reflects a comparison between results deriving from this project and the criteria proposed by the Commission.***

## Methodology

To start with, CREM BV, with input from the other project partners and an Advisory Group (see below), drew up an extensive list of potential biomass flows, ranging from the more known biomass sources to very innovative sources such as salt water agriculture. Criteria have been applied by the project team and the Advisory Group to select the three case studies for this project. Given the time frame and objectives, it was not advisable to pick a product/country combination that had hardly been subject to any research before and/or hardly knows any stakeholder involvement on the local level at this stage. The combinations chosen are sugar cane (Brazil), palm oil (Indonesia) and maize (South Africa), the main reasons for which are being:

- *Sugar cane (Brazil) / palm oil (Indonesia)*  
These case studies have a linkage with existing relevant expertise/information and debates both in the Netherlands and abroad. They can deliver a meaningful contribution to the current debates by sharing the views of the stakeholders in the producing countries themselves. In addition, an obvious reason is the existing and fast growing, significant biomass volume of both commodities in terms of export opportunities to the Netherlands, which bring along economic, social and environmental impacts in the producing countries.
- *Maize (South Africa)*  
Although Africa in general is targeted to be a huge, future biomass exporter according to many studies, it has so far received less attention in the (inter)national arena. This case study therefore has a more innovative character and may provide new information relevant for the development of the bioenergy sector in sub-Saharan Africa.

Since South Africa is considered *the frontrunner for the entire sub-Saharan area*, knowledge derived from this study could assist stakeholders in the sector to engage in a socially and environmentally responsible manner when expanding the industry in this region.

Based on the network of the project team in the three case study countries, the following local partners were selected:

- Núcleo Amigos da Terra (NAT) and Vitae Civilis Institute– Brazil  
This combination of NGOs is specifically addressing the sustainability issues linked to bioenergy in Brazil. They form part of the Energy Working Group of the Brazilian Forum of NGOs and Social Movements for the Environment and Development (FBOMS).
- Kehati – Indonesia  
Kehati is an Indonesian Biodiversity Foundation working with the government, the private sector and NGOs to increase sustainability in Indonesian production chains. For the purpose of this project, Kehati has led a research team consisting of experts from Sawit Watch, Social Economic Institute (INRISE), Bogor Agricultural University and Media Indonesia Group-Daily Research and Development.
- Ms Gwynne Foster – South Africa  
Gwynne Foster is an independent consultant working on a variety of (sustainability) issues in the food industry, specialized in the theme of traceability (especially in relation to emerging black farmers being excluded from the supply chains).

The three local partners carried out field research by meeting a wide *selection* of stakeholders and gathering data and opinions on sustainability issues in the respective supply chains, using the Sustainability Assessment Framework drawn up for this project (see chapter 2/Annex I), as a guidance. The output of the field research, including a list of stakeholders approached, has resulted in a separate report for each of the case studies. These findings form the basis of this report and its conclusions and recommendations.

→ When the case studies were carried out, the Cramer Commission criteria had not yet been published. Hence, the criteria were not available for the stakeholder discussions conducted by partners in the three selected producing countries. The Cramer Commission criteria as such, consequently, have not been reflected in the case study reports.

In order to serve as a valuable contribution to the finalization of the Cramer Commission criteria, the set-up of *this* report deviates from the set-up of the case study reports. The Sustainability Assessment Framework formed the basis for the case study reports, while the field findings have been compared with the Cramer Commission criteria in this report.

To share the results of the project and to ask Dutch experts involved in this field for input to finalize the report, Both ENDS, Stichting Natuur en Milieu, COS Nederland in co-operation with CREM organized a conference on biomass. The debate, held in Akantes, Amsterdam, on the 18th of October 2006, was not fuelled by topics put forward by speakers from the *North*.

The project partners from the *South* were given the floor to share their concerns about the impact of the increasing demand for biomass on the socio-economic and ecological sustainability in the producing countries<sup>10</sup>. Are costs and issues being shifted to developing countries or does such demand create a valuable (sustainable) development? The conference delivered a lively debate amongst NGOs, industry, research institutes and governmental representatives.

*It should be noted* that the purpose of this project has neither been to present a thorough research on all ins and outs linked to the biomass flows selected nor to cover each and every single sustainability issue from each perspective. The project team could not allocate sufficient time to the local partners for such an extensive research. Issues not put forward by the local stakeholders are by no means issues that do not matter! Apart from this, the variety in opinions within different stakeholder groups is such, that few statements can be considered the 'voice' of a specific group. There is no such thing as *the* opinion of *the* NGOs, *the* industry or *the* ministerial departments. However, that does not detract the merits and value of this report. The project team has given the floor to 'the South' and listened to the main issues they brought up. Each voice in its own has contributed to our understanding of the mix of feelings existing in the biomass producing countries and the fulfilment of the purpose of this project.

#### **Advisory Group**

The project team has co-operated with a multi-stakeholder Advisory Group set up for the purpose of this project. The Advisory Group has shared its opinions, views and choices in respect of the selection of case studies and has assessed and given input to the preliminary project results.

The Advisory Group consisted of representatives from the following organisations: IUCN National Committee of the Netherlands, WWF Netherlands, Stichting Milieu Keur, Elektrabel, Essent, Dutch Ministry of Foreign Affairs (international co-operation), Dutch Ministry of Housing, Spatial Planning and the Environment and SenterNovem.

### **1.3 Reader**

This report has been structured as follows.

#### **Chapter 1 Introduction**

Chapter 1 offers the reader background information on the grounds and intentions of the project carried out.

#### **Chapter 2 Sustainability in biomass supply chains**

Chapter 2 provides a short description of the potential sustainability issues connected to biomass flows and an explanation of the Sustainability Assessment Framework used for the purpose of this study.

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<sup>10</sup> In preparation of the debate in the Netherlands, the partners from the South were briefed on the contents and status of the Cramer Commission report.

**Chapter 3 Case study palm oil from Indonesia**

Chapter 3 gives an overview and analysis of the main findings on the palm oil case study carried out by the Indonesian counterpart (Kehati, in co-operation with Sawit Watch, Social Economic Institute (INRISE), Bogor Agricultural University and Media Indonesia Group-Daily Research and Development).

**Chapter 4 Case study sugar cane from Brazil**

Chapter 4 gives an overview and analysis of the main findings on the sugar cane case study carried out by the Brazilian counterpart (Núcleo Amigos da Terra and Vitae Civilis Institute).

**Chapter 5 Case study maize from South Africa**

Chapter 5 gives an overview and analysis of the main findings on maize case study carried out by the South African counterpart (Ms Gwynne Foster).

**Chapter 6 Conclusions and recommendations**

Chapter 6 offers conclusions and recommendations for governmental institutions, NGOs, businesses and research institutes involved with bioenergy.

**Annex** The Sustainability Assessment Framework drawn up for the purpose of this project has been attached to this report as Annex I.

**The underlying report, the three separate case study reports as well as a report on the seminar held on the 18th of October 2006 in Amsterdam, The Netherlands, are made available through the website of Both ENDS ([http://www.bothends.org/project/project\\_info.php?id=41&scr=st](http://www.bothends.org/project/project_info.php?id=41&scr=st)).**



# 2

## Sustainability in biomass supply chains

*“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”*

*[Report of the Brundtland Commission, ‘Our Common Future’, 1987]*

### 2.1 Introduction

The opponents and advocates in bioenergy debates usually fight over the *sustainability* of the biomass supply chains, the use of bioenergy in itself and the feasibility of *importing* biomass. It hereby pays to make a distinction between small scale biomass production for local energy uses and large scale monoculture biomass production, either for domestic purposes or export. Some may think that biomass is ‘automatically’ sustainable since being a renewable source of energy. In practice, though, this proves not always to be the case and production and imports may raise questions such as:

- Which are the social-economic effects of biomass trade on the local populations and stakeholders, e.g. creation of jobs, competition with local food production, rural development or conflicts over access to land?
- Which are the environmental and biodiversity impacts involved with the production of biomass in the short and longer term (this notably also includes the CO<sub>2</sub> balance)?

This chapter shortly elucidates on the contents of the bioenergy debates. It thereupon continues explaining the Sustainability Assessment Framework that has been developed and used for this project to assess the sustainability level of the bioenergy sources studied.

### 2.2 Supporters and opponents of biomass for energy generation

Search machines on the internet will show you endless lists of research done in the field of bioenergy. Many studies present different outcomes based on different assumptions, different reference cases, etc. They contradict as to the fact whether or not the current focus on bioenergy is the *right* way to deal with our fossil energy and global warming concerns.

Table 2.1 below gives an overview of the different arguments brought up by supporters and opponents with respect to the potential advantages/benefits and disadvantages/risks attached to (the import of) biomass for energy generation<sup>11</sup>:

**Table 2.1: Perceptions on pro's and cons of (the import of) biomass for energy generation**

<b>Advantages/benefits</b>
<ul style="list-style-type: none"> <li>• Benefits rural communities by creating jobs and enhancing rural economic development.</li> <li>• Contributes to poverty alleviation by enhancing economic growth in developing countries.</li> <li>• Has the potential to reduce demand for costly fossil fuel imports.</li> <li>• Improves/increases economic and political security.</li> <li>• Has the potential to address environmental problems ranging from desertification to climate change by offering an important low-carbon alternative to fossil fuel.</li> <li>• Provides an opportunity for developing countries to restore land resources, notably if monocultures can be avoided.</li> <li>• Provides an opportunity for developing countries to attract new investments.</li> <li>• Possibility for developing countries to accelerate their sustainable development process.</li> <li>• Environmental benefits from the recuperation of soil productivity and use of degraded land.</li> <li>• Additional demand for agricultural products may increase revenues for farmers (also small farmers), employment and wages in the agricultural sector.</li> <li>• Especially developing countries could position themselves as a leader in an emerging technology market.</li> <li>• Improves access to and quality of energy services for rural communities in developing countries.</li> <li>• Opportunities for the use of GMOs for non-food purposes (e.g. varieties with a high cellulose contents).</li> </ul>
<b>Disadvantages/risks</b>
<ul style="list-style-type: none"> <li>• Speeds up development of monocultures (which are non-productive in the sense of biodiversity value and therefore endanger the provision of ecosystem services).</li> <li>• Large scale clearance of forests has a huge negative impact on biodiversity, and violates local/indigenous people's rights and access to natural resources and produces huge volumes of greenhouse gasses (the latter is also due to the widespread use of fire and the burning of crop residues).</li> <li>• Occurrence of land shift: expansion of energy plantations on cattle grazing or agricultural areas moves farmers who will start encroaching new forest areas.</li> <li>• New activities in forests (due to land clearance) open up area for further activities such as agriculture and logging.</li> <li>• Causes land use competition (cattle, food, forestry, biomass), affecting local food security.</li> <li>• Causes land degradation, e.g. erosion due to land clearance, soil exhaustion due to intensive farming, lowering of ground water due to irrigation, contamination by agrochemicals, air pollution due to burning and loss of ecological connectivity.</li> <li>• First bioenergy generation will not be sustainable enough. Should wait for "second generation" technologies which could take organic waste such as wood chips, chicken litter or straw.</li> <li>• Production set up to serve export market rather than national energy needs; while many rural people lack access to energy, their sources are taken for our needs.</li> <li>• Large-scale monoculture schemes are often generating more severe poverty and turns rural communities (share croppers, tenants, small land owners) into labourers.</li> <li>• Uneven distribution of benefits from bioenergy developments throughout the supply chain.</li> <li>• Many bioenergy crops take more energy to produce the bioenergy (to grow, process, transport, deliver) than is being returned when burning it or transforming it into biofuels (consequently, often no/low energy and greenhouse savings).</li> <li>• Low level of law enforcement in many biomass producing countries, resulting in illegal production of bioenergy due to violation of social and environmental laws.</li> <li>• Long term consequences of GMOs uncertain for nature and humans. Supply chains for energy and food not 100% separated (e.g. in storage rooms), so food may be contaminated with GMOs.</li> <li>• Bioenergy has become part of the commodity market, a market known to be volatile and price-competitive only; social and environmental costs are not incorporated in the price.</li> </ul>

*'In the absence of governmental constraints, the rising price of oil could quickly become the leading threat to biodiversity, ensuring that the wave of extinctions now under way does indeed become the sixth great extinction.'*

*Lester Brown, President of the Earth Policy Institute, 'No Rainforest Destruction for Biofuels'*

<sup>11</sup> Sources used to draw up this table: Biomass-upstream Stuurgroep studies, CURES-bioenergy network mailings, University Utrecht studies on biomass and 'Biomassa Risico's en Kansen', publication by Milieudéfensie, Both ENDS, Greenpeace, Natuur en Milieu, Nederlands Centrum voor Inheemse Volken, OxfamNovib and Wereld Natuur Fonds (April 2006).



## 2.3 Sustainability Assessment Framework

In practice, many companies, NGOs, research institutes and governmental organizations see a challenge in both benefiting from the opportunities provided by (the import of) biomass for energy generation and preventing that nature and society are negatively impacted at the same time. How can energy needs be met in a *sustainable* way by using (imported) biomass? The case studies carried out for the purpose of this project have served to deliver input to answer this question. Is there a way and, if so, which way?

Guidance for the field research has been given by the *Sustainability Assessment Framework*, which has been attached to this report as Annex I. This Framework has been drawn up for the purpose of this project and has been composed on the basis of:

- **Input from table 2.1**

Table 2.1 touches upon the different sustainability aspects relevant to the bioenergy sector and helped to distil the main sustainability topics linked to the production of biomass.

- **Input from recognized sources**

Information has been extracted from recognized sources, such as the ILO Conventions and the OECD Guidelines.

- **Input from the Biodiversity Assessment Framework<sup>12</sup>**

The Biodiversity Assessment Framework – developed by CREM BV and SevS and commissioned by the Dutch Ministry of Housing, Spatial Planning and the Environment – has been used to give input to the *biodiversity part* of sustainability.

### Reader

The Sustainability Assessment Framework has been structured according to the social, environmental, economic and political dimensions of sustainability. It gives an overview of the potential sustainability issues linked to the production of biomass for the purpose of energy generation, being:

**Table 2.2: Headlines of the Sustainability Assessment Framework**

Social issues	Environmental issues	Economic issues	Political issues
Land use	Land use	Land use	Governance
Working conditions	Biodiversity	Energy	Participation
Training	Land degradation	Financial aspects	Communication
Living conditions	Waste	Governance	
	Energy		

Each issue is elucidated in the Framework. The interconnectivity and complexity of a sustainability issue like land use is clearly shown in this framework, reverting under social, environmental as well as under economic issues (identical issues have been given the same colour in table 2.2). A social aspect of land use concerns for example the land rights of local people, with particular attention to vulnerable or marginalised groups such as women and indigenous/tribal peoples.

<sup>12</sup> Slootweg en van Schooten/CREM, Biodiversity Assessment Framework, April 2004. A biodiversity assessment according to the steps of this framework identifies the main positive or negative impact on biodiversity resulting from a specific supply chain.

One of the environmental aspects of land use relates to land clearance practices (slash and burn, deforestation), while one of the economic aspects of land use addresses the caloric value and yield of the potential flow (GJ per hectare).

The Sustainability Assessment Framework has been finalized with the assistance of the local partners identified for this project. For the field research, it has served as a basis to recognize and elaborate on the level of sustainability of the biomass flows studied.

# 3

## Case study palm oil from Indonesia

*'(...) He also mentioned the threat of Europe's thirst for biofuel, which would promote more conversion of forests to oil palm plantations. 'The fact is, only one day after European governments announced that they would subsidize biofuel, many foreign businessmen went to Kalimantan and Papua to offer investment in oil palm plantations', he said. 'Do you think such investment will not cause any harm to our environment?', he asked.*

*[M. Ahmad of the World Wide Fund for Nature Indonesia interviewed by Tb. Arie Rukmantara, The Jakarta Post, 8 August 2006]*

### 3.1 Introduction case study

Currently, Dutch biomass imports primarily concern wood pellets (mainly from Canada and Russia), liquid vegetable oils (e.g. palm oil from Asia), agricultural residues (e.g. palm kernel shells from Malaysia, cocoa shells from Africa) and ethanol (from Brazil). The imports desired to comply with our biomass needs are expected to be increasingly covered by palm oil. The estimated amount of palm oil imported for energy generation is expected to rise from 90 kton in 2004 to an estimated 1,000 kton by 2010 (accounting for almost half of the estimated total biomass to be imported by the Netherlands)<sup>13</sup>.

A short overview of product issues related to palm oil is given in table 3.1.

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<sup>13</sup> J. Koppejan, P.D.J. de Boer-Meulman, SenterNovem, De verwachte beschikbaarheid van biomassa in 2010, October 2005, [www.senternovem.nl/mmfiles/Verwachte%20beschikbaarheid%20biomassa%202010\\_tcm24-175482.pdf](http://www.senternovem.nl/mmfiles/Verwachte%20beschikbaarheid%20biomassa%202010_tcm24-175482.pdf)

**Table 3.1: Overview of palm oil product issues**

Biomass flow	Use of product	Product issues
Palm oil	<ul style="list-style-type: none"> <li>- Ingredient for soap, cosmetics, shampoos, etc.</li> <li>- Food industry</li> <li>- Cooking oil</li> <li>- Used in oil-fired power plants</li> </ul>	<p>A future increase in Dutch biomass imports is expected to rely to a significant extent on palm oil in view of its high caloric value and attractive price level (low in relation to e.g. rapeseed oil). Most governments in palm oil producing countries are stimulated by such foreign demand to support the expansion of palm oil tree plantations.</p> <p>Palm oil is the second largest liquid vegetable oil produced with a global production of approximately 28 Mton/year (versus soy oil 31 Mton/year and rapeseed oil 13 Mton/year<sup>14</sup>). Apart from vegetable oil, palm oil trees deliver wood and kernels as potential biomass resources as well.</p>

### Execution of the case study

Kehati has been given the assignment to carry out the palm oil case study and deliver the perspectives of different stakeholders on current palm oil developments in Indonesia.

## 3.2 Results of field work and desk research

Following field research and exploring interviews, a Multi-Stakeholder Discussion was organized by Kehati on the 8<sup>th</sup> of August 2006 to give the floor to a variety of stakeholders and learn their perspectives on the palm oil industry. Several Ministries, financial institutions, NGOs, research institutes, newspapers, smallholder producers and the Palm Oil Industrial Association were represented during that day. The results of the Multi-Stakeholder Discussion, additional interviews and internet research have been processed in a report, the main findings of which are given in this paragraph.

*The stakeholders were actively involved during the workshop. While the NGOs blamed the industry for deforestation and a lack of attention for local communities welfare, the industry states that 'people who are supposed to be well educated and highly civilized are naming palm oil with foul language' to an extent that 'plantation operators may be brought to a guilty feeling syndrome'. It furthermore claims that the industry cannot be held solely responsible for the taking up of land. They respond to a global demand, so 'anyone who buys chocolate, crisp, bread cakes, tooth-pastes, lipstick is causing the extinction of the orang utan'.*

*Reflection of Multi-stakeholder Discussion, Jakarta, 8 August 2006*

<sup>14</sup> J. Koppejan, P.D.M. de Boer-Meulman, SenterNovem, De verwachte beschikbaarheid van biomassa in 2010, October 2005, [www.senternovem.nl/mmfiles/Verwachte%20beschikbaarheid%20biomassa%202010\\_tcm24-175482.pdf](http://www.senternovem.nl/mmfiles/Verwachte%20beschikbaarheid%20biomassa%202010_tcm24-175482.pdf)

### 3.2.1 Characteristics of Indonesian palm oil supply chain

Indonesia is the second-largest palm oil producer in the world, after Malaysia. These countries together produce over 80% of global palm oil supplies<sup>15</sup>. The case study results show that Indonesia has known an exponential growth in palm oil production over the last decades, which is reflected in table 3.2.

**Table 3.2: Indonesian palm oil production over the years**

Year	Production area (ha)	Production Crude Palm Oil (ton)	Yield (ton/ha)
1970	133,298	216,827	1,6
1980	294,560	721,172	2,4
1990	1,126,677	2,412,612	2,1
2000	3,046,000	7,000.000	2,3
2006	5,200,000	15,000,000	2,9

*'The privileges and support given by the government to the palm oil plantations are astonishing in comparison to the same government measures to other plantations such as cacao, rubber, coffee and pepper.'*

*Kehati, field research 2006*

The palm oil industry is important for Indonesia in view of its contribution to the Gross Domestic Product and the creation of jobs, both directly (those who work on the plantation and in related industries) and indirectly (spin off effect). Export seems to take up an increasing part of the total palm oil production. The latest figure available shows that 71% of total Crude Palm Oil production was exported in 2002 (from 44% in 1995). In 2005, the export of Crude Palm Oil products amounted to 2% of Indonesia's total export with a value of around 3.8 billion US Dollar.

Sumatra bears at least 70% of Indonesian palm oil production, especially in the provinces of North Sumatra and Riau with areas of 1,093,033 ha and 1,486,989 ha respectively. Millions of hectares of tropical rainforest have been cleared to become production areas. Further expansion is expected to take place on Sumatra and Kalimantan in particular. In the province of West Kalimantan, for instance, an area of 1.5 million ha has been earmarked for the development of palm oil plantations. The planned production expansion will cover increased demand for palm oil as a source of renewable energy, both in Indonesia and globally.

### 3.2.2 Sustainability issues

*Who benefits most from the development of palm oil plantations and processing industry in Indonesia? Is it the government of exporting countries, importing countries, estate plantations, smallholder producers or the community? And who is actually bearing the biggest burden?*

Table 3.3 summarises the above and other main sustainability issues linked to Indonesian palm oil production, by reflecting the 'voices from the South' (i.e. the stakeholders in producing countries interviewed for the purpose of this project). The results deriving from the research conducted by Kehati (and the research team involved) have been inserted and compared with the Cramer Commission criteria to signal the overlaps and potential gaps.

<sup>15</sup> The Jakarta Post, 'Criteria set for palm oil production, WWF says', by Tb. Arie Rukmantara, 28 November 2005, [http://www.rspo.org/PDF/Press/Criteria%20set%20for%20palm%20oil%20production,%20WWF%20says%20\(28%20Nov%202005\).pdf](http://www.rspo.org/PDF/Press/Criteria%20set%20for%20palm%20oil%20production,%20WWF%20says%20(28%20Nov%202005).pdf)

**Table 3.3: Comparison of Cramer Commission criteria with Indonesian palm oil sustainability issues**

Cramer Commission Criteria as from 2007	Issues identified during field research by Kehati
<p><b>Greenhouse gas balance</b> A net reduction in emissions of at least 30% (inclusive of application) compared with fossil reference.</p>	<p>In developing biodiesel from materials such as palm oil, the forming of new CO<sub>2</sub> in the atmosphere is predicted to be almost non-existent. The combustion result of CO<sub>2</sub> from biodiesel will be reconsumed by new plants for their photosynthesis needs. Observation results also show that the emission degree of exhaust gas, such as CO, CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub> and hydrocarbon from palm diesel mixture was lower compared to pure diesel fuel. [Oil Palm Research Center] But many people consider the environment friendly and greenhouse gas reduction issues a latent campaign to justify a huge palm oil expansion, whereby the issues potentially nullifying the CO<sub>2</sub> gain (such as deforestation) are being ignored.</p>
<p><b>Competition with food, local energy supply, medicines and building</b> No shortage of food, local energy supply, medicines and building materials on the local level due to biomass production.</p>	<p>The Indonesian government has adopted a policy, Presidential Decree Number 5 Year 2006, to secure future domestic energy supply. One of its goals is to establish a primary energy mix in 2025, whereby biomass and biofuel should contribute more than 5% to the goals set. Meanwhile, the Minister of Agriculture has set targets for palm oil production as far as the production per ha and the overall production are concerned. Research has not made clear which part of the allocated 6 million ton palm oil for domestic use (out of a total production of 15.3 million tons) should serve to achieve the Indonesian bioenergy target; data on the demand and allocation of palm oil is lacking, even in governmental programmes. GAPKI (Association of Oil Palm Industries) estimates that the demand for biofuels is around 600,000 ton yearly up to 2007, without mentioning the allocation or indicating whether the biofuels will be produced in Indonesia or abroad. [<a href="http://www.bisnis.com">http://www.bisnis.com</a>] It claims that adequate amounts of palm oil will continuously be delivered to the Indonesian market to meet society's needs.<sup>16</sup></p> <p>Over the years to come, it will become clear which demand will be served first in case global demand outreaches global supply: <i>Indonesian local demand or global demand?</i> NGOs claim that the supply for domestic edible palm oil should first be ensured prior to exporting palm oil products.</p> <p>Until recently, palm oil plantations were not destined to produce oil for fuel. Current developments have changed this prospect and involve an important aspect: the price of edible palm oil rises these days due to increased biomass demands. This especially impacts the poorer people.</p>

<sup>16</sup> During a meeting of the Roundtable on Sustainable Palm Oil in November 2006, it was circulating that as much as 40% of the palm oil production would be allocated to the production of biofuels. Such a percentage would have tremendous consequences for the additional palm oil required to meet all demands, taking into account the already increasing demand by the food industry. If sustainability is not taken into account as a condition for production, it may be feared that extra millions of hectares of rainforest will be cut to make way for plantations.

<b>Cramer Commission Criteria as from 2007</b>	<b>Issues identified during field research by Kehati</b>
<p><b>Competition with food, local energy supply, medicines and building</b></p> <p>No shortage of food, local energy supply, medicines and building materials on the local level due to biomass production.</p> <p>(cont'd)</p>	<p>Apart from the competition between palm oil for fuel and palm oil for food, land use competition exists between land dedicated to palm oil production and land dedicated to other food production. The monoculture set-up of the palm oil industry has significantly reduced other agricultural production (e.g. to serve local market supplies) and subsistence farming.</p> <p><i>Since March 2005, residents of Siju Village and Talang Nanka Village in district of Pampanggan, Ogan Komering Ilir, South Sumatra have been struggling to refuse the conversion of their paddy rice field into palm plantation by PT Patri Agung Perdana. For generations, the land in the area has been cultivated by the local community to grow padi sonor or tebar<sup>1</sup> for food supply. The unplanted lands are being used for raising fish to serve own use or to be sold to the market. Smallholders and the local people council have finally succeeded in halting the conversion plan.</i></p>
<p><b>Biodiversity</b></p> <p>No deterioration of protected areas or valuable ecosystems.</p>	<p><i>For developing the existing 5 to 6 million hectares of palm oil plantations, 20 million hectares of forested land was cleared. Thus up to present, there are more than 14 to 15 million hectares of land allocated to and cleared up for the development of palm oil plantations, that have not been planted yet. Although there is a vast amount of non-forested land available for palm oil production, the development of new palm oil plantations tends to be directed to forested lands. [Kehati]</i></p> <p>The clearance of tropical rainforest for the benefit of plantations not only has a huge impact on biodiversity, though directly affects local communities by taking away their access to food sources, medicinal plants and other non-forest products<sup>17</sup>.</p> <p>Responding to (inter)national concerns on deforestation, the Indonesian GAPKI (Association of Oil Palm Industries) is trying to apply the RSPO (Roundtable on Sustainable Palm Oil) principles and criteria for sustainable management (e.g. contributing to biodiversity conservation and stop converting natural forested land into palm oil plantations as from November 2005).</p> <p>Lacking policies to appropriately address environmental concerns, the deputy for the Coordinating Minister of Economy recommended that <i>all of us should continuously advocate for no forest conversion. [Multi-Stakeholder Discussion, 8 August 2006]</i></p>
<p><b>Economic prosperity</b></p> <p>Insight into possible negative effects on the regional and national economy.</p>	<p><i>The future of this industry is very good. As evidence, contribution of palm oil to national export reaches 6%. Moreover, palm oil is on top of Indonesia plantation production with an 8% share. We estimate that, in 2010, palm plantations could absorb up to 500,000 units' work force and produce 2.7 million fresh fruit bunches per year (bisnis.com, 14 September 2006). [Indonesian Palm Oil Commission]</i></p>

<sup>17</sup> The 14 to 15 million ha of idle land is under claim by the companies having received the concession for these areas. Local governments could play their part in enforcing compliance with the concession issued (i.e. to plant oil palms), but in practice this rarely is the case. New investors or communities cannot start a production site on this land.

Cramer Commission Criteria as from 2007	Issues identified during field research by Kehati
<p><b>Economic prosperity</b> Insight into possible negative effects on the regional and national economy.</p> <p>(cont'd)</p>	<p>The Minister of Agriculture strongly supports the development of palm oil plantations. It is aimed for palm oil agribusiness to always be developed with the objectives: (1) to stimulate rural development, create jobs and increase livelihood standards; and (2) to stimulate the establishment of processing and supporting industries. In addition, he aims smallholders' income to increase to around US\$ 1,500-2000 per household, per year (target date not clear). The development is facilitated by banks, since they have allocated large funds to fund the palm oil industry. Investing in palm oil development is promising: the return on investment, without taking into account the value of wood from the permit to clear the land, reaches around 26%. [Manurung, 2005]</p> <p>However, the profits may not be equally dispersed throughout the supply chain. The structure of the Indonesian palm oil industry is called a monopsony. One processing plant, with or without owning any plantation, collects or buys fresh fruit stems from farmers (in Indonesia, there is a large category of smallholder palm oil growers, mostly indigenous people whose lands were expropriated by palm oil plantation concessions; in return they receive 2 hectares of land by the companies involved to grow palm oil – this group is referred to as plasma smallholders)<sup>18</sup>. The processing plant has the 'power' when it comes to the final determination of the price paid to the farmers and receives the greater part of the added value. <i>A research conducted by the World Bank in 1996 showed that through direct ownership and affiliation there are 5 business groups that dominate more than 60% of processing capacity and dominate marketing network and brands.</i> [Larson] Especially the small farmers lack the power to bargain on the price. While the price of palm oil has increased over the last period, this has hardly had any ripple effects on the farmer income (even though the Minister of Agriculture has issued a formulation to relate those prices). [Kehati]</p> <p>A current trend is vertical integration, whereby the processing plant has its own plantations. Consequently, smallholders face even more difficulty in getting market access, lacking favourable infrastructure and supportive post-harvest technology.</p> <p>From a job creation point of view, it appears that local communities do not always benefit from palm oil production. Local communities may have a culture and independence that conflict with the desired working attitude and, therefore, labourers are often imported. Labourers that come from far places have a higher dependency towards the company compared to locals. As a result, plantation management has a better bargaining position and more power to control the labourers, the working environment and wages. [Kehati]</p>

<sup>18</sup> Background information on this topic can be found at:  
→ Promised Land. Palm Oil and Land Acquisition in Indonesia: Implications for Local Communities and indigenous Peoples. By: Marcus Colchester, Norman Jiwan, Andiko, Martua Sirait, Asep Yunan Firdaus, A. Surambo, Herbert Pane; Forest Peoples Programme, Perkumpulan Sawit Watch, HuMA and the World Agroforestry Centre, 2006.  
→ Ghosts on our own Land. Indonesian Oil Palm Small Holders and the Round Table on Sustainable Palm Oil. By: Marcus Colchester and Norman Jiwan; Forest Peoples Programme and Perkumpulan Sawit Watch, 2006



Cramer Commission Criteria as from 2007	Issues identified during field research by Kehati
<p><b>Well-being</b></p> <p>No negative effects on the social well-being of the workers and local population, taking into account:</p> <ul style="list-style-type: none"> <li>• working conditions of workers</li> <li>• human rights</li> <li>• property rights and rights of use</li> <li>• insight into the social circumstances of local population</li> <li>• integrity</li> </ul>	<p>The plasma smallholders in Indonesia, amounting to over 2 million households (approximately 10 million people), feel the full brunt of palm oil plantation expansion as their customary lands were or are being appropriated. Extensive research shows that many plasma smallholders face a lifelong indebtedness and face repression and exploitation. They have lost their customary lands and mostly have no access left to rivers, lakes and streams to fall back upon to provide for basic needs. Hundreds of communities are engaged in struggles to defend their land or at least find compensation for loss of property. [NGO]</p> <p>Based on monitoring by Sawit Watch, 140 conflicts have been counted in the areas of Sumatra, Kalimantan and Sulawesi up to 2003. The size of the conflicted areas amounts to 236,265.25 ha. Sawit Watch: Conflicts between communities and palm oil companies in the end always seem to disadvantage communities. <i>The communities that previously owned and managed their land are fallen into stratified disadvantages by losing their production equipment, decreasing livelihoods, being put into jail for suing back their land, becoming the victims of terror and violence and experiencing disasters such as floods or smokes as a result of the large-scale development of palm oil plantations.</i> [Kehati]</p> <p>On a meeting with local representatives of communities in Kalimantan, Kehati was informed that land is mostly state-owned in Indonesia. While the local communities often have no official land rights, the government grants licenses to palm oil operations for the land used by communities. This deprives local communities of opportunities for subsistence farming and forces them to change their livelihoods to accepting low-paid jobs at plantations. The land left for cultivation mostly does not support production quantities that are sufficient to get market access (one unit of enterprise needs 500-6000 ha).</p> <p>Communities may also regard palm oil as a way to get a job and earn a living. Social conflicts therefore also occur on a different level: between local community members that support the use of lands for palm oil and those who resist this and wish to keep the land.</p> <p>Based on a 2003 Ministerial Decree, state-owned companies (BUMN) are required to enter into environmental management programs by setting aside 1 to 3% of their net profit to Community Development activities (usually geared towards charity). There is no government policy or regulation for private plantation companies, except for a statement that Community Involvement activities must be carried out prior to obtaining a permit. Publicly listed companies, such as Astro Agro Lestari, are generally more sensitive towards Community Development, as a conflict may affect stock prices.</p>

<b>Cramer Commission Criteria as from 2007</b>	<b>Issues identified during field research by Kehati</b>
<p><b>Well-being</b></p> <p>No negative effects on the social well-being of the workers and local population, taking into account:</p> <ul style="list-style-type: none"> <li>• working conditions of workers</li> <li>• human rights</li> <li>• property rights and rights of use</li> <li>• insight into the social circumstances of local population</li> <li>• integrity</li> </ul> <p>(cont'd)</p>	<p>With respect to the working conditions, Kehati states: <i>With low bargaining position, the workers only receive a very low quality working environment and wages. As a result, just in order to meet their basic needs, the workers have to let their whole family work to raise their income. The consequence is the creation of child labour. This is the situation of 'labourers give birth to labourers' that traps them in the structural poverty that is commonly found in and around large plantations.</i></p> <p>Health conditions in palm oil plantations are often dismal: notably women are spraying with hazardous pesticides and are subject to (sexual) harassments.</p> <p>Corruption and bribery with respect to the issue of permits are not uncommon in Indonesia. Illegal logging and palm oil are also often intertwined.</p>
<p><b>Environment</b></p> <p>No negative effects on the local environment. This relates to:</p> <ul style="list-style-type: none"> <li>• waste management</li> <li>• use of agrochemicals (including fertilizers)</li> <li>• insight into the prevention of erosion and soil exhaustion, and conservation of the soil fertility level</li> <li>• insight into the conservation of quality and quantity of surface and ground water</li> <li>• emissions to air</li> </ul>	<p>Although it has been prohibited, fire is still being used to clear the land, causing air pollution and respiratory diseases. It also obstructs air and water transportation in Sumatra and Kalimantan. <i>A result from the thick smog due to forest fires was the 50 to 300 meters view distance, which in turn disrupted air travelling. For example, on 3 October 2006, a Mandala airplane skidded outside of the runway as it landed due to being clouded by the thick smog. (...) Currently, October 2006, the community requests for masques to prevent smoke induced asphyxia. [Indonesian news, October 2006]</i></p> <p>Greenpeace news release, 5 October 2006: <i>Smog repeated to cover South East Asia due to the failure of the government of Indonesia in stopping forest conversion.</i></p> <p>Fires are most common in the dry season. WWF watched the cases of forest fire last summer and noted thousands of fire hotspots throughout Sumatra and Kalimantan. <i>The mastermind behind the land fire always gets away, while the government pretends to be busy fighting the fire. Legal action is only applied to the ones who conduct the burning in the field.</i></p> <p>Additional environmental problems linked to palm oil production are soil erosion, spills, dumping of Palm Oil Mill Effluents and poorly controlled/documentated use of agro-chemicals. [AIDEnvironment/Sawit Watch]</p>

### 3.2.3 Opportunities for improved sustainability performance in the supply chain

Different stakeholders have different interests and *sustainability* will play a different role for each of the parties involved with the palm oil industry. Recommendations to improve the sustainability in the supply chain very much depend on the background and field of interest of the referee. Kehati identified the stakeholders<sup>19</sup> and the options they have for improving sustainability performance in the palm oil supply chain.

#### **Environmental groups**

The message from most environmental groups is short and clear: stop conversion of natural forests for the benefit of plantations and start developing plantations on land already cleared and allocated to palm oil. Another point of attention is the use of fire. Although this practice is prohibited by law due to air pollution and health problems, it is commonly used to clear land.

*Roles to play:*

- *empowering local communities and farmers*
- *monitoring plantation management practices*
- *promoting public education and consumer awareness*

#### **Local communities**

Having a relation with the land for many generations, many local communities have spiritual and social feelings of ownership of *their* land. Usually, they do not have formal prove of ownership and loose their fights against investors who hold formal permits from the government. A compromise is often reached whereby locals receive a compensation for their willingness to let the company use their lands under HGU (a form of legal rights to conduct business on a piece of land). It remains unsure for the local people who are in charge of the land upon expiration of the HGU scheme. A solution therefore suggested by local communities is the 'scheme of pinjam-pakai', where a party borrows land from another party for a limited amount of time and locals are in control.

*Roles to play:*

- *participating in spatial planning*
- *building capacity to monitor palm oil plantation practices*
- *participating actively in decision-making processes concerning the development of palm oil plantations*

#### **Palm oil smallholders**

The most important concern for plasma smallholders is the price they receive for their fresh fruit bunches. From their point of view, the price received for fresh bunches is not responsive enough to increases in palm oil prices on the international markets. Improvements could be achieved, should the ownership of processing plants gradually be transferred to the farmers. A government programme exists to put this into practice, though it has not yet been implemented. Redistribution of the benefits of palm oil could also be accomplished when the price of the fresh fruit stems would be correlated to the international market prices for Crude Palm Oil, as formulated by the Minister of Agriculture. Plasma producers require intensive assistance to enhance their livelihood security, including land tenure security, bargaining position and avoidance of debt trap, and to improve their position on the market.

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<sup>19</sup> It should be noted that the stakeholders have been grouped on a general level. Kehati recognizes that a variety of opinions will occur within the stakeholder groups identified and that – within this research – only the general tendencies in the different stakeholder groups could be discerned.

*Roles to play:* → *empowering institution of smallholders*  
→ *improving plantation management capacity*  
→ *developing productive off-farm activities*

### **Palm oil large-scale holders**

From an economic sustainability point of view, obviously, the price is also very important for the large-scale holders. *Palm oil is important to Indonesia because it influences societal welfare. Would the price decrease, tax contributions to the state would reduce and people may get fired.* [GAPKI – Association of Oil Palm Industries] The industry is aware of the fact that foreign buyers pay increasing attention to a wide spectrum of sustainability issues, thus GAPKI is trying to apply the principles and criteria of the Roundtable on Sustainable Palm Oil (see box below).

*Roles to play:* → *running the plantation business in accordance with existing regulations and laws*  
→ *developing improvement initiatives in plantation management addressing social, environmental and economic issues*  
→ *developing conflict models*  
→ *offering incentives for sustainably produced palm oil*

### **Investors**

Investing in the Indonesian palm oil industry is lucrative and promising for the future. Nevertheless, licenses obtained for the set-up of a palm oil plantation are not all being used for this purpose. Such license includes an Izin Pemanfaatan Kayu – a permit to harvest wood from logged-over forest. This permit is the primary reason for certain investors to apply for a permit and explains the large, non-used, deforested 'plantation' areas. Sustainability would be improved if investors could be selected on (1) the level of attention that would be paid to environmental and social issues and (2) the *true* reasons for land clearance.

*Role to play:* → *assuring that laws and regulations are followed*

### **Government**

Central and regional governments are in charge of issuing permits. Generally, they promote the opening up of new plantations to serve the creation of jobs, regional development, export opportunities, etc. Also, palm oil is needed to serve the national bioenergy plans. However, it cannot be denied that corruption is sometimes strongly intervened with the official permit procedure. An interview with a plantation owner confirms the illegal fees which had to be paid.

The research also revealed that tax revenues from the palm oil industry are mainly cashed by the central government. This would encourage regional and local governments to otherwise obtain funds. The issuing of new concessions is an important source of income.

*Roles to play:* → *re-examining inactive plantation concessions*  
→ *ratifying and implementing international conventions applicable to the palm oil industry*  
→ *implementing law enforcement*

*'The price of palm oil, another edible oil widely used in food as well as in cosmetics, has risen by more than 20 per cent in the past two months on news that Malaysia and Indonesia plan to set aside 40 per cent of their palm oil crop to produce biodiesel.'*

*Carl Mortished,  
7 August 2006,  
The Times*

Apart from opportunities at the local level, a global initiative – the Roundtable on Sustainable Palm Oil (RSPO) – is a strong effort by industry, NGOs, investors and research institutes to implement sustainable business practices. Information on the structure of the Roundtable and criteria determined can be found at <http://www.rspo.org>.

### 3.2.4 \_\_\_ Necessary tools

The RSPO is a positive effort to integrate sustainability into business practices. Apart from the RSPO, various tools can be developed at the local level to improve sustainability, including:

- **Regional spatial planning**  
Regional planning should involve community participation based on the principle of free, prior and informed consent (as referred to, for example, in the RSPO) and be open to the public, as required by law<sup>20</sup>.
- **Land certification**  
Land certificates will enhance the bargaining position of local communities and protect (customary) rights they may have.
- **Reform of the structure of the palm oil industry**  
A programme giving more ownership of processing plants to farmers has been designed, as the added value generates more money than the production of fresh fruit bunches. Efforts to integrate smallholders with large-scale plantation companies need to be implemented by government policies and supported by incentives to really change the structure of the palm oil industry.
- **Price**  
Compliance with a formulation of the Ministry of Agriculture to strongly correlate production prices to the prices internationally paid for palm oil would increase farmers' income.

### 3.2.5 \_\_\_ Monitoring of sustainability level of imported biomass

The field research by Kehati identified a major role to play by importing parties, i.e. *assuring that the imported goods are produced in a sustainable manner by rewarding the same with a premium price and encouraging the Indonesian government to assure that benefits of palm oil are shared more fairly in the supply chain*. Monitoring of the sustainability level of palm oil production is thought to be possible, but may face resistance from several stakeholders, such as investors.

Importing parties should learn to understand the background and difficulties of the producing countries and thereupon use their power to enforce changes in the supply chains. NGOs and research institutes in Indonesia believe that any premium paid by importing parties to producers will be passed on to the final consumers. Therefore, they feel it is important that not only importing parties, but consumers are confronted with the social and environmental aspects of producing palm oil as well.

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<sup>20</sup> Law of Spatial Planning No. 24, 1992.

### 3.3 Analysis: how *sustainable* is Indonesian palm oil?

Sustainability is about attention for *people*, *planet* and *profit*. Taking this into account, how sustainable is Indonesian palm oil? The field research pertaining to this topic by Kehati, in co-operation with the research team, revealed significant input. Analyzing the results delivers the following observations:

- **Sustainability**

Sustainability can be regarded both on the level of the importing country as well as on the level of the producing country:

→ *Importing country*

Governments such as the Netherlands, are under pressure. Biomass targets have been set and the energy sector should be stimulated in a way that compliance with the targets is within reach. Biomass is generally considered sustainable from the perspective of the importing country, contributing to a reduction in its greenhouse gas emissions. However, it is recognized by an increasing number of parties that a huge demand for biomass *can* involve negative socio-economic and ecological consequences. Not only in the Netherlands – which resulted in the Cramer Commission criteria – but also for example in Great Britain, Belgium, Germany and on an EU-level the sustainability aspect of biomass is under debate.

→ *Producing country*

From a producing country point of view, palm oil production entails several positive sustainability aspects: it generates jobs, brings foreign exchange currencies and stimulates foreign investments. However, the current supply chain has major negative implications as well, such as land shift, violation of human rights and land rights, a loss of biodiversity, increased prices for edible palm oil and an increase in greenhouse gas emissions due to rainforest clearances.

It makes sense to state that the *entire* supply chain should be brought to a minimum sustainability level and that negative impacts in specific parts of the chain should be counteracted jointly. The Cramer Commission criteria, for example, therefore address the entire chain from production to consumption.

- **Voices from the South**

At this stage, specific characteristics of the palm oil supply chain, such as the clearance of tropical rainforest and the frequent occurrence of social conflicts, mark this chain a rather unsustainable one at some points. Indonesian stakeholders from different stakeholder groups acknowledge delicate issues; a representative of the Indonesian Ministry of Economy called upon all to join the fight against rainforest conversion and industry members have decided to join RSPO to start producing more sustainable palm oil.

When generalizing voices from the South, they sound like: NGOs being supportive towards the use of bioenergy but opposing the *current* palm oil production from an environmental and social point of view, local communities at one point embracing local development and on the other one fighting companies for taking *their* land, industry responding to the global demand by increasing its production and the government seeming to regard the palm oil sector as a useful engine to Indonesian society and, consequently, support the expansion.

The field research suggests allocating a role to importing parties, such as the Netherlands, to reflect more on the pro's and cons and to put more pressure on suppliers with respect to aspects of sustainability. The current Cramer Commission initiative is therefore welcomed.

- **Cramer Commission criteria**

The results of the field research have been compared with the Cramer Commission criteria. It can be said that the Commission criteria mostly cover the main sustainability issues put forward by the stakeholders in Indonesia, though some criteria might need to be considered in a broader perspective:

*Competition with food*

Even if there would be no shortage of local supplies as a result of the export of biomass (as referred to in the criterion), an undesirable, potential side-effect could be the rise in the price of food products. Even though this may mean a higher income for some parties in society, the poorer people could be unevenly affected. The popularity of palm oil for energy purposes propels the price of edible palm oil. This effect feeds the discussion on the *sustainability* of using food products for generating energy, as such interconnectivity is difficult to control.

Moreover, there is a significant competition with food on land use level. The continued expansion of palm oil monocultures deprives local populations of opportunities for subsistence farming and agricultural production for (local) markets. Although palm oil offers income generating opportunities for local people, there seems to be too little attention for the opportunity costs of palm oil.

*Economic prosperity*

This criterion asks for insight in potential negative and positive impacts on the regional or national economy. How to measure these impacts? And who receives possible benefits? Are such benefits really shared with all stakeholders in the chain? The current expansion of palm oil generally does not seem to benefit local people who make a living from subsistence farming and agricultural and horticultural production for (local) markets or who depend on the forest for hunting, and gathering – e.g. notably the often valuable non-timber forest products. Bringing sustainability in the biomass debate offers a chance to encourage parties to address poverty-related issues.

*Well-being*

Reference could be made to the history of the production or processing site. For example, a palm oil plantation may *now* comply with this criterion, but on which grounds has the plantation been established? Have the permits to start the plantation been granted in a proper manner? How has been dealt with customary rights of local people and still unresolved conflicts over land and compensation? Similar questions can be posed when it comes to the environmental history of the plantation. With reference to the RSPO Principles and Criteria, it is crucial to address unresolved conflicts, e.g. resulting from expropriation in the past. Although the past cannot be changed, it deserves attention to find out whether any legislation has been violated in the past and which countermeasures could be adopted to compensate for this. If there has been a change in ownership, it depends on the willingness of the new owner whether or not compensating measures will be adopted.

Specific reference could also be made to the position of women. Women are often specific targets of exclusion, sexual harassments, under payment, hazardous conditions, etc.

*Environment*

An important aspect is the compliance with (inter)national legislation. Many countries have proper environmental legislation (in this case study, for example, with respect to burning), though the enforcement is often weak or absent. This issue is applicable to legislation in the social field as well. Compliance with legislation therefore requires attention from purchasing parties. The fact that certain legislation is in place, does not automatically involve that this legislation is duly enforced and/or complied with.



# 4

## Case study sugar cane from Brazil

*'It takes about three days to transform a burnt and bruised branch into the clear liquid which Brazilians can put in their tanks.'*

*'It's a big, dirty, smelly plant, and it stands out on a landscape that is otherwise dominated for miles but beautiful fields of cane.'*

*'But it's a huge local employer and there's tremendous potential for the industry. Jose Marcio de Oliveira is proud of what they're doing here. "My country is leading the world", he says, with a smile.'*

[By Guto Harri, BBC North America business correspondent in Sao Miquel dos Campos, Brazil, 15 February 2006]

### 4.1 Introduction case study

"We started our ethanol program in the '70s because of the oil crisis in the '70s... And so we had to survive", according to William Bernquist of the Sugar Cane Technology Institute in Brazil. The oil crisis marked the start of a tremendous growth in and development of the ethanol industry in Brazil. 30 years later, the *Western* world, driven by many challenges, turns its focus on biofuels as well (the expected joint demand of the United States of America, the European Union Member States and Japan amounts to 26 billion litres of ethanol in the short term [case study research]). Most legislation setting bioenergy targets addresses an obligatory blending of fossil fuels with biofuels. In view of its wide expertise and being internationally considered the leader of production and efficiency in the sugar/ethanol industry, many importing parties are likely to turn to Brazil to help them meeting their targets. Anticipating the demand, Brazil is preparing itself for a massive increase in ethanol production.

A short overview of product issues related to sugar cane in Brazil is given in table 4.1.

**Table 4.1: Overview of sugar cane product issues**

Biomass flow	Use of product	Product issues
Sugar cane	<ul style="list-style-type: none"> <li>- Food industry.</li> <li>- Bio transport fuel (ethanol).</li> </ul>	<p>Brazil is the largest producer/consumer and has great potential for expansion. Considering the huge demand for ethanol created by legislation prescribing the blending of fossil fuels with biofuels, concerns exist about the social and environmental directions ethanol production is taken. Contrary to the Round Tables for Soy and Palm Oil, no such initiative has been set up to date for sugar cane production.</p> <p>Sub-Saharan countries have been identified as potentially large contributors to biomass production. Ethanol production may be an option in view of existing sugarcane production, especially for South Africa/Swaziland and Zimbabwe (which already export ethanol). Lessons learned in Brazil can be taken into account in Africa.</p>

#### **Execution of the case study**

Núcleo Amigos da Terra (NAT) and Vitae Civilis Institute<sup>21</sup> have been given the assignment to carry out the sugar cane case study and deliver the perspectives of different stakeholders on current sugar cane developments in Brazil.

## **4.2 \_\_\_ Results of field and desk research**

For the purpose of this project, NAT and Vitae Civilis have organized and conducted interviews with a large variety of stakeholders to obtain insight in various perspectives on the sugar cane industry, e.g. a bank, the largest labour union, the industry association, farmers and researchers. The results of the interviews and additional desk research have been compiled in a report, the main findings of which are given in this paragraph.

### **4.2.1 \_\_\_ Characteristics of Brazilian sugar cane supply chain**

Today, Brazil is the major sugar cane producer in the world, followed by India, Thailand and Australia. Moreover, Brazil is responsible for 45% of the world's ethanol production. A short overview of the specifics pertaining to the Brazilian sugar cane production and processing sector follows in table 4.2.

<sup>21</sup> NAT and Vitae Civilis Institute are part of the Energy Working Group of the Brazilian Forum of NGOs and Social Movements for the Environment and Development (<http://www.fboms.org.br>).

**Table 4.2: Specifics of Brazilian sugar cane industry**

<b>Topic</b>	<b>Specifics</b>
2005/2006 sugar cane harvest	Over 388 million tons of sugar cane
Sugar/ethanol ratio of sugar cane harvested	50.5% serves the manufacturing of sugar, 39.6% the ethanol production and the remaining 9.6% is for other objectives such as cachaca, seeds, animal ration and brown sugar.
National sugar production (2005)	24 million tons of sugar
National ethanol production (2005)	14.5 billion litres
Export of sugar (2005)	14.3 million tons of sugar
Export of ethanol (2005)	Over 2 billion litres
Sugar cane plantation area (2005)	About 5.7 million hectares (over 16% of current total area used for agriculture in Brazil)
Sugar cane regions	The Mid-South and the Northeast of Brazil are the main sugar cane producing regions. The Southeastern region, especially Sao Paulo state, yields 89% of the sugar cane harvested, 89% of the ethanol produced and 90% of the sugar produced.
Estimation of 2006/2007 sugar cane harvest	412.9 million tons – to be achieved by an increase of 4.2% in planted area and of 2.1% in productivity (the yield is not expected to grow significantly anymore over the years).
Future estimated ethanol production	30 billion litres (2015) – this is based on growth expectations of 1.5 billion litres per year in domestic consumption (expressed in the 2005 National Policy of Agro-energy).
Future estimated sugar cane harvest	690 million tons
Future estimated production area	About 8 to 9 million hectares
Areas of sugar cane expansion	Mainly the state of Goías, the western part of Mato Grosso do Sul and the southeastern part of Minas Gerais.
Public/private	The production and processing of sugar cane are exclusively in the hands of the private sector.
Competitiveness	The Brazil sugar cane and ethanol sector is highly efficient and competitive, having the lowest production and processing costs in the world.
GM sugar cane	Currently in Brazil, there are four applications for GM seeds of sugar cane. However, there are no plantations of genetically modified sugar cane yet.
Employment	The sugar cane/ethanol sector includes 72 thousand agricultural properties and 334 mills and distilleries. It employs directly approximately one million people, of whom 511,000 work in agricultural production, mainly sugar cane cutting. Almost 80% of the Brazilian sugar cane harvesting involves manual labour. Including direct and indirect employments, the sector generates about 3.6 million jobs.
Contribution to Gross Domestic Product	R\$ 40 billion annually (over 12.5 billion Euro), equal to 2.35% of the GDP.

#### 4.2.2 Sustainability issues

Table 4.3 summarises the main sustainability issues linked to Brazilian sugar cane and ethanol production, by reflecting the 'voices from the South'. The results deriving from the research conducted by NAT and Vitae Civilis have been inserted and compared with the Cramer Commission criteria to signal the overlaps and potential gaps.

The western region of Sao Paulo and its neighbour states Mato Grosso do Sul, Goiás and Minas Gerais) include both the larger sugar cane production areas as well as the predicted areas for expansion of sugar cane for export purposes. Consequently, the study on the various aspects of sustainability issues related to the sugar cane industry in Brazil has focused on data relating to these regions.

**Table 4.3: Comparison of Cramer Commission criteria with Brazilian sugar cane sustainability issues**

<b>Cramer Commission Criteria as from 2007</b>	<b>Issues identified during field research by NAT and Vitae Civilis</b>
<p><b>Greenhouse gas balance</b> A net reduction in emissions of at least 30% (inclusive of application) compared with fossil reference.</p>	<p>NAT and Vitae Civilis have presented an energy balance table produced by Maçedo (2004). In the table, energy input involves the consumption of diesel in transportation, the equivalence of fossil energy present in chemical fertilizers used and the fossil energy used in relation to the construction of infrastructure and equipment. The output involves the equivalence of energy present in the ethanol produced and in the sugar cane bagasse used to generate electricity and heat for the process and commercial excess. The result is strongly positive: while the industry of petroleum spends practically one unit of energy for every unit of energy produced, one can obtain around ten units of energy for each unit of fossil energy used by using sugar cane ethanol.</p> <p><i>It is important to note that the output of renewable energy can fall to 5-6:1 when an analysis of the life cycle includes the transportation to and consumption in Europe.</i> [EKOS Brazil, 2006] Direct conversion of new natural areas into sugar cane fields (or indirect conversion of natural areas through land shift) can have a huge negative impact on the output as well.</p> <p>There is potential for improving the energy balance by way of optimizing the use of bagasse and sugar cane straw to generate energy [NAT and Vitae Civilis].</p>
<p><b>Competition with food, local energy supply, medicines and building</b> No shortage of food, local energy supply, medicines and building materials on the local level due to biomass production</p>	<p>Growth in sugar cane production is mainly concentrated in the mid-southern region. <i>'We have monitored the expansion of sugar cane and seen which activities have been substituted. Basically, they are cattle-raising areas. And where does the cattle go? We have observed that cattle-raising has been intensifying. Translated this means that there is no pressure on the production of food or the migration of economic activities to other areas.'</i> [Secretariat of the Environment, Sao Paulo]</p> <p>However, estimates of agricultural production for the state of Sao Paulo in the 2005/2006 harvest point to the reduction of tomato crops, peanuts and oranges, all of which are being substituted by sugar. NAT and Vitae Civilis claim that these data show that contrary to what is affirmed by industry and government, the amplification of sugar cane directly influences and imposes restrictions upon the production of food crops locally.</p>

Cramer Commission Criteria as from 2007	Issues identified during field research by NAT and Vitae Civilis
<p><b>Competition with food, local energy supply, medicines and building</b> No shortage of food, local energy supply, medicines and building materials on the local level due to biomass production</p> <p>(cont'd)</p>	<p>International demand for ethanol as a substitute for fossil fuels and the high oil prices have a linkage with the availability and price of ethanol on the Brazilian domestic market. In Brazil, the prices of fuel alcohol have been liberated since the de-regulation in this sector in 1997. During the entire first semester of 2006 the price of alcohol oscillated upward, triggering a reduction in internal consumption. Meanwhile, its relation to the volumes allocated for export in this period, as well as future estimates, are still quite uncertain because they involve a complexity of factors.</p> <p>Apart from a governmental requirement to blend a minimum of 20% ethanol with gasoline, no measures have been taken by the government to stimulate/enforce further use of bioenergy for local purposes. Foreign demand accelerates export businesses, both for ethanol and for sugar.</p> <p>What about the availability of sugar cane for sugar production? In February 2006, there was a scarcity in sugar cane in the Sao Paulo mills, causing the price to go up 7%, which made the government temporarily determine to reduce the mixture of anhydrous alcohol in the gasoline from 25% to 20%. Among the reasons explaining the sugar shortage were unfavourable climatic conditions in some states and the increase in consumption motivated by the new flex cars. A direct relationship between the ethanol export market and sugar market demands has never been mentioned.</p>
<p><b>Biodiversity</b> No deterioration of protected areas or valuable ecosystems.</p>	<p>Sugar cane production has contributed to the huge destruction of the Atlantic forest in the past (today less than 7% of its original size), especially in the northeast region.</p> <p>Nowadays:</p> <p><i>Sugar cane is not going to new areas. Logistically, it is not possible for the areas to expand. What has happened is only a conversion, not very significant, of pasture land to cane, since cattle-raising has become more intense. [UNICA, association of sugar cane producers] As a matter of fact, according to some authors, the substitution of pasture land and annual crops by sugar cane had a beneficial influence on biodiversity.</i></p> <p>However:</p> <p><i>The new impetus of growth of emerging productions in the first years of the 21<sup>st</sup> century and the search for new productive areas in Sao Paulo and vicinity and also in Maranhao could provoke the direct occupation of new natural areas and the displacement of part of the cattle ranches and agricultural production to agricultural frontier regions, with the consequent destruction of habitat and impact on biodiversity.</i></p> <p>A strong interrelation exists between sugar cane and soy. When the price of soy is decreasing, sugar cane production is expanding to transformed soy areas. New demand for soy will often be met by expansion to the Amazon area, where the price of land is cheap due to the lack of infrastructure. [NAT and Vitae Civilis]</p> <p>Apart from a potential impact on biodiversity directly resulting from the expansion of sugar cane production and processing to new areas, the accompanying infrastructure to ensure transport to and from these sites could locally impact biodiversity as well (e.g. construction of terminals and pipes to the coastal areas for shipment overseas). [NAT and Vitae Civilis]</p>

Cramer Commission Criteria as from 2007	Issues identified during field research by NAT and Vitae Civilis
<p><b>Biodiversity</b> No deterioration of protected areas or valuable ecosystems.</p> <p>(cont'd)</p>	<p><i>A polemic issue in the regions of consolidated production of sugar cane is the 20% of the biodiversity reserve which Brazilian legislation obliges each piece of agricultural land to have. [NAT and Vitae Civilis] This law is not always obeyed to in sugar cane plantation areas.</i></p> <p>The wish for additional production could be slightly reduced if increased efficiency can be accomplished. Since 1975 technological advances corresponded to 33% of the increase of productivity, 8% of the increase of sugar and 14% of the increase in the conversion of sugar cane to sugar and alcohol [NAT and Vitae Civilis]</p> <p>Finally, biodiversity may be affected by a decreasing availability of water. The sector has a high water use: 1 litre of ethanol requires 7 to 8 litres of water. Best practices include closed water circulations to reduce the amount of water required<sup>22</sup>.</p>
<p><b>Economic prosperity</b> Insight into possible negative effects on the regional and national economy</p>	<p>The sugar cane sector generates many jobs and investments. For example: statistics state that in 2006 there are 89 projects for new mills in the works with predicted investments totalling US\$9 billion. Some state governors seem open to expansion of sugar cane as a source of economic development. The secretary of Production and Tourism of Mato Grosso do Sul justified a proposal on the installation of ethanol mills, saying that the alcohol distilleries would be the only solution to economically develop the municipalities of the Pantanal surrounding areas. The project was strongly protested (successfully) by social movements and environmental organizations which worked together in the campaign called 'No alcohol mills in Pantanal'.</p> <p>A down side of the proposed developments in the sector is the current strong tendency towards consolidation, mergers and acquisition. The land market represents an important component in the expansion of monocultures and pressure on small and medium sized rural property: the expansion of the sugar cane monoculture is made easier by a land market with very little legal or social structure that attracts positive reactions in production costs of the sector, while at the same time concentrating properties and making family subsistence farming infeasible. [NAT and Vitae Civilis]</p> <p><i>The absence of an efficient judicial classification concerning the Brazilian land ownership structure, capable of regulating the uses and determining the limits of properties, associated to the possibilities of cheap available manpower has contributed to the expansion of monoculture areas. [Guedes et al, 2006]</i></p> <p>A researcher linked to the State Secretariat of Agriculture affirmed that 'the monoculture could raise the agricultural revenue of the municipality but at the same time reduce agriculture activity without creating regional development'.</p>

<sup>22</sup> During the UN-climate Conference in Nairobi, Kenya, on the 7th of November 2006, the virtual water content of one litre of biofuel and the huge impact such water use may have, were also brought to the attention.

Cramer Commission Criteria as from 2007	Issues identified during field research by NAT and Vitae Civilis
<p><b>Well-being</b></p> <p>No negative effects on the social well-being of the workers and local population, taking into account:</p> <ul style="list-style-type: none"> <li>• working conditions of workers</li> <li>• human rights</li> <li>• property rights and rights of use</li> <li>• insight into the social circumstances of local population</li> <li>• integrity</li> </ul>	<p>A symbolic issue related to the sugar cane sector in Brazil is the high rate of employment of migrant manpower. NAT and Vitae Civilis: <i>The option to use migrant worker manpower represents a strategy of the sector, considering that hiring is done without legal labour registration or by illegal contract mediators called 'gatos'.</i></p> <p>Conflicts exist between local workers, often members of labour unions, and migrant workers who accept most working conditions without any protest. Migrant workers also affect local traditions.</p> <p><i>'Migrant workers are not unionized, they agree with 5:1 (five days of work for each rest day) because they do not have families with whom they can spend their weekends, they do not organize themselves to negotiate with their companies, they dismember the unions, cut more cane because they come to make more fast money and go home.'</i> [Seminar Açúcar Ético]</p> <p>Sugar cane cutters mostly receive a fixed salary, incremented by cutting more sugar. The constant pressure to increase productivity in the field has provoked enormous health problems for the worker. [Gonçalves]</p> <p>Today, a cane cutter earns an average of 1.5 x minimum wage. However, most job positions are maximum 8 months a year, so wage needs to be re-allocated over 12 months.</p> <p>NAT and Vitae Civilis: <i>'The precarious conditions of manual cane cutting as well as threats to the environment and human health resulting from pre-burnings, have propelled the debate in favour of the adoption of mechanized cane cutting.'</i> However, mechanization provokes discussions, as it deepens the level of unemployment and it has not eliminated burnings (since yields of harvesting machines increase with burnt cane).</p> <p>Especially migrant workers experience low-level living conditions. The so-called city-dormitories grow in the region of the cane fields. These units are where the migrant workers live in hives, huts or pension houses which, despite their precarious situation, are more expensive than the average prices paid by the population in general. [Rede Social e CPT 2006] The majority of 'hunters' of migrant workers is also responsible for loans, transport and the acquisitions of groceries, thus creating a cycle of indebtedness and overexploitation.</p> <p>The production level requirements have diminished the participation of women in cane cutting activities.</p> <p>A decline in child labour has been observed over the last decade thanks to intensified inspections. However, child labour still occurs; sometimes children are even integrated into the workforce by their own parents to reach production quotas defined. Also, cases of slave labour are registered. <i>'An operation of the Labour Ministry found 430 cane cutters working in precarious conditions in the Bauro, Sao Paul region. A few days before, inspectors had freed 249 workers in slave-like conditions in Campos de Julho, Mato Grosso.'</i> [Correio Brasiliense Newspaper, 26 August 2006]</p>

Cramer Commission Criteria as from 2007	Issues identified during field research by NAT and Vitae Civilis
<p><b>Environment</b></p> <p>No negative effects on the local environment. This relates to:</p> <ul style="list-style-type: none"> <li>• waste management</li> <li>• use of agrochemicals (including fertilizers)</li> <li>• insight into the prevention of erosion and soil exhaustion, and conservation of the soil fertility level</li> <li>• insight into the conservation of quality and quantity of surface and ground water</li> <li>• emissions to air</li> </ul>	<p>NAT and Vitae Civilis have described potential impacts on the environment, including:</p> <ul style="list-style-type: none"> <li>• isolated cases of contamination of soil and water resources due to agrochemicals (although tendency to diminish the use thereof in view of costs, monocultures generally require substantial amounts of agrochemicals and fertilizers) and improper disposition of waste;</li> <li>• emissions of effluent liquids to water (even though they can be used as fertilizers in the sugar cane fields);</li> <li>• emissions to air: in Brazil, traditionally, the harvesting of sugar cane occurs after the burning of the fields. The impact on health and the environment caused by emissions from burning is strongly negative;</li> <li>• residue - the ethanol production industry seems quite advanced in the recycling area.</li> </ul> <p>The legislation in Sao Paulo estate prescribes that burning is no longer allowed on areas suitable for mechanized harvesting in 2021 and on areas not suitable for mechanized harvesting in 2031.</p>

#### 4.2.3\_\_\_ Opportunities for improved sustainability performance in the supply chain

The field research conducted by NAT and Vitae Civilis delivers a wide range of opportunities to counteract undesirable sustainability issues linked to the production and export of sugar cane/ethanol. The opportunities provided are divided into two groups: *priority and feasible actions in short and long term periods* and *complementary actions* which, despite being feasible, demand greater investments in research on alterations. This report shortly elaborates on several priority actions identified.

##### **Priority and feasible actions**

- *Mechanization of the harvest and the end of crop burning*  
This action is accepted and recommended by almost all stakeholders. NGOs claim that it is strongly delayed by the producers due to the increase in costs in relation to the manual harvest. Producers themselves point to the resulting unemployment upon mechanization. From a social point of view, indeed, the total mechanization of the harvest would dispense a large group of unqualified manpower, requiring action on the part of the government and the producers (land reform and rural social inclusion).
- *Compliance with the Brazilian Forest Code*  
In traditional regions of sugar cane production, the legal areas of reservation are practically non-existent and the areas of permanent preservation are quite below the legal requirements. Part of these sugar cane areas were planted in areas degraded by cattle farming and other economic activities in times of non-existence of the Forestry Code (a group of laws to regulate the occupation and use of the nation's forests, implemented as from 1965), while part also resulted from illegal deforestation of areas protected by the Forestry Code in the wave of the expansion of the Pro-alcohol program (since 1975).



Pursuant to the Forestry Code, the mills and distilleries in these areas have an 'environmental debt' that should be steadily regularized. In Sao Paulo state, the Secretariat of Environment is developing a process of discussion with the producers to overcome the deadlock and to create an agreement to compensate or restore these areas.

- *Closure of water-processing circuits*  
Mills and distilleries are huge water consumers, though a significant part of the plants installed in the Southeast shows that it is profitable and feasible to close the circuit and reduce water consumption by more than 90%. This concept could be multiplied.
- *Use of cane straw for electricity generation*  
The harvesting and usage of sugar cane straw vats improve the energy balance of ethanol production even more as well as its competitiveness by enlarging economic gains through the sale of exceeding electricity production to the grid.
- *Formalization of labour relationships*  
All workers in the sugar cane/ethanol supply chain should be legally employed and have their rights respected as established by the Consolidation of Labour Laws.

*'Our interest is that many countries produce and consume ethanol and biodiesel as fuels. We want the commodization of these products.'*

*Robert Rodrigues,  
ex-Ministry of  
Agriculture in Brazil*

A standing opportunity identified in the case study is the role of international stakeholders. They can deliver a meaningful contribution to an increased sustainability in the supply chain as follows:

- *Commitment to the reduction of energy consumption*  
Biofuels could have an important role to fulfil in the mitigation of climatic changes and in the security of the supply of energy over the next decades. However, many stakeholders in Brazil believe that the *first* commitment of international stakeholders should be a reduction in the level of domestic energy consumption and to raise awareness in this respect with governments and consumers.
- *Criteria for the sustainability of biofuel production*  
An international label for ethanol and other biofuels with criteria agreed upon by governments and NGOs of producing and importing countries and producer companies would demand necessary conditions for independent sustainability monitoring and verification by third parties. It gives emerging countries the opportunity to greatly develop in the field of sustainability, though it must be ensured that criteria are not to be used as a tool to perpetuate global inequalities and draw up commercial barriers.
- *Avoid the commoditizing of the ethanol market*  
Importing countries should buy ethanol through specific contracts which progressively incorporate actions identified to promote the sustainability of biomass production.

- *To push for a positive agenda*  
International and national stakeholders could reward the implementation of good practices and better projects of biofuels production for local development. Good practices include diversification and social & environmental control and management (for instance, identifying, subsidizing or promoting projects that fit the sustainability criteria presented by the Energy Working Group of the Brazilian Forum of NGOs and Social Movements).
- *To enhance capacity and technology transfer for land use planning*  
The monoculture structure of sugar cane production can have developed in its current format due to the fact that Brazilian municipalities – which are responsible for spatial planning – do not have instruments which impede the takeover of whole municipalities by agricultural monocultures. International stakeholders could pay efforts to enhancing capacity with governmental offices and industry and transferring technology for land use planning. Empowering and supporting Brazilian civil society in this field is also an option.

The purchasing power of importing countries can be used to enforce the implementation of actions identified when dealing with traders and producers.

#### 4.2.4 \_\_\_ **Monitoring of sustainability level of imported biomass**

##### **How to monitor the level of sustainability?**

There are diverse challenges to conquer for stakeholders wishing to monitor the level of sustainability. To begin with, there are contradictory data on sustainability issues – like the substitution of rural activities by sugar cane or the advance of the agricultural frontier on natural areas – amongst the productive sector, municipal and state governments, labour unions and NGOs. Moreover, data are interpreted differently by the various stakeholders. Finally, the sector cannot be generalized as *one* and differences and inequalities throughout the sector should be taken into account.

Considering the above, two Brazilian stakeholders have the following opinions as to the monitoring of the sustainability level of ethanol:

*‘Brazil negotiates almost 15 billion litres of ethanol annually, 0% in the form of contracts. Contracts don’t even exist to guarantee the internal market. It is possible to aggregate value and social and environmental criteria. Having a clear and open contract of purchase we can place all the criteria and social and environmental guarantees we feel necessary’.* [UNICA, association of sugar cane producers]

*‘What guarantees? There has to be other channels of negotiations. The unions are interested but they want to participate in the negotiations from day 1. The more actors participating in this process, the more guarantees one will have that the process will last.’* [Feraesp, labour union]

### **Role of international actors to guarantee sustainable imports of biomass**

A role can be allocated to international actors wishing to ensure imports of *sustainable* sugar cane. Suggestions given in the case study include the conclusion of middle-term purchasing contracts between buyers and sellers in which sustainability criteria have been incorporated: the buyer has the advantage of being able to influence the product he purchases, while the seller has the advantage of assured sales. Some stakeholders in Brazil argue that the compliance with criteria set is dependent upon the interest and monitoring capacity of local actors. International actors can play a role in supporting the strengthening of their skills and their participation.

## **4.3 Analysis: how *sustainable* is Brazilian sugar cane?**

Sustainability is about attention for *people*, *planet* and *profit*. Taking this into account, how sustainable is Brazilian sugar cane? The field research pertaining to this topic by NAT and Vitae Civilis revealed significant input. Analyzing the results delivers the following observations:

- **Sustainability**

Sustainability can be regarded both on the level of the importing country as well as on the level of the producing country:

→ *Importing country*

Having a future sustainable energy consumption in mind, the Netherlands have set ambitious targets for their use of bioenergy. The most pressing targets set in this field concern biofuels. The Dutch government for example demands fossil fuels to be blended with biofuels (2%) in 2007. The Netherlands can meet their aim thanks to the import of biomass. Sustainability plays an increasingly important part in the discussion on imports, which is shown – amongst other things – in the incorporation of the Cramer Commission.

→ *Producing country*

Many parties wishing to buy biofuels presumably will turn to Brazil in first instance. It is renown for its cost-efficient ethanol production and large production capacity. However, at which costs is ethanol being produced? On a sustainability level, there are pro's and cons to consider when buying ethanol from Brazil. It cannot be ignored that the sugar and ethanol industry has delivered Brazil a substantial number of jobs, foreign currencies and rural development – earnings that have been used to invest in health care, efficiency technologies, education, protecting biodiversity, etc. Still, the development of such a monoculture branch of industry definitely knows its disadvantages. Chances are that natural resources are being overexploited, the level of biodiversity decreases, food security and small farmers are affected locally and working conditions are harsh.

Responsibility is to be taken by stakeholders in the supply chain to ensure that a minimum level of sustainability is achieved throughout the supply chain, from the producing up to and including the consuming parties. The Cramer Commission criteria, for example, therefore address the entire chain from production to consumption.

- **Voices from the South**

There is a wide gap in opinions on the level of sustainability that can be attributed to current sugar cane production between the different stakeholders. While the environmental NGOs fear violation of natural areas due to increased ethanol demand, the industry sends out the comforting message that only pasture land will be used for expansion. While the industry is proud of being a sector paying above minimum wage and respecting the rights of labour unions, the labour union describes detrimental working conditions for those active in the sugar cane sector.

The conflicting opinions on such significant sustainability issues make it difficult for parties to currently assess to which extent importing ethanol from Brazil can be considered sustainable. It mainly supports ideas that importing parties should play an active role in ensuring that imports can be considered *sustainable*, to which both industry and NGOs seem to be open.

- **Cramer Commission criteria**

The results of the field research have been compared with the Cramer Commission criteria. The topics put forward by the Brazilian stakeholders are – in outlines – covered by the Commission criteria. However, some criteria might be considered in a broader perspective:

*Competition with food*

An undesirable, potential side-effect is the rise in the price of sugar due to the overwhelming demand for sugar ethanol. As one reporter said: *'Poor sugar cane farmers will belong to the past'*. This effect feeds the discussion on the *sustainability* of using food products for generating energy, as such interconnectivity is difficult to control.

*Biodiversity*

Indirect impacts as a result of land shift by other activities (e.g. cattle farming moving to the Amazon rainforest as a result of soy or sugar cane expansion) have been covered by the Cramer Commission criteria. An indirect impact on biodiversity can, however, also be effectuated by the construction of infrastructure. This has not explicitly been taken into account in the criteria. Apart from potentially taking up valuable land, it may open up previously closed areas to other new activities.

A general issue put forward by Brazilian stakeholders is efficiency. Efficient production can improve the energy balance, reduce the use of water and slightly minimize additional land use. It can be argued that efficiency should play a role in assessing the sustainability level of a supply chain, however, this may accelerate the taking up of the most fertile areas for the purpose of biomass production.

*Economic prosperity*

This criterion asks for insight in potential negative impacts on the regional or national economy, though what about positive impacts? And who receives these benefits, are they shared throughout the chain? It will be very difficult to express general statements on this topic, however, monoculture activities generally do not benefit those being dependent on the natural sources of the area in which they live. Keeping this in mind is important when purchasing biomass from large-scale plantations.

Indirect impacts deserve attention as well, e.g. subsistence farmers whose land has been taken by plantations and who are lacking new opportunities to make a living.

*Well-being*

No specific reference is made to the position of women. Some conventions of the International Labour Organizations specifically address women, since the position of female workers is often worse than that of male workers.

*Environment*

An important aspect is the compliance with (inter)national legislation. Many countries have proper environmental legislation (Brazil for example has the Forestry Code as mentioned in paragraph 4.2.3), though the enforcement is often weak or absent. This issue is applicable to legislation in the social field as well. Compliance with legislation therefore requires attention from purchasing parties. The fact that certain legislation is in place, does not automatically involve that this legislation is duly enforced and/or complied with.



## Case study maize from South Africa

*Farmer Johan Hoffman, involved in drawing up detailed plans for the ethanol plants, said each would likely consume 370,000 tonnes of maize a year, totalling 2.96 million tonnes if all eight plants were built, and producing 1.2 billion litres of ethanol. The plants would each cost around 350 million Rand<sup>23</sup>.*

*"Farmers do not have the money but they have maize", he said. "You can borrow money on that. By 2050 there will be no oil left in the world and the next thing is (renewable) fuels. This is the future for South Africa and the rest of the world."*

[Story by Peter Apps, Planet Ark, 15 March 2005]

### 5.1 Introduction case study

Africa is being regarded a continent with a large biomass resource potential. Table 5.1 reflects results from a 2000 study showing that its potential is thought to be even larger than, for example, Latin America. Currently, this potential is mainly used by local people, since 9 out of 10 people in sub-Saharan Africa use biomass, such as wood or left-overs, for lighting, cooking and heating<sup>24</sup>.

**Table 5.1: Results of biomass resource potential in EJ/yr**

Region	Energy crops	Crop residues	Forest residues	Dung	Total residues	Total
World	266.90	13.70	12.50	5.10	31.30	298.20
Former USSR	46.50	2.00	0.90	0.40	3.30	49.80
Latin America	51.40	1.20	2.40	0.90	4.50	55.90
Africa	52.90	1.20	0.70	0.70	2.60	55.50
China	16.30	0.90	1.90	0.60	3.40	19.70
Other Asia	33.40	2.20	3.20	1.40	6.80	40.20

Source: Novem (executed by Utrecht Centre for Energy Research), Beschikbaarheid biomassa voor energie-opwekking, GRAIN: Global Restrictions on biomass Availability for Import to the Netherlands, Appendix B7, August 2000

<sup>23</sup> October 2006: The costs have increased to 700 million Rand per plant.

<sup>24</sup> African Development Bank and OECD Development Centre, African Economic Outlook (2003/2004), updated 2005.

South Africa is leading the development of bioenergy in Africa. Like Brazil, Indonesia and other developing countries, developing a bioenergy industry is a priority for the South African government and agricultural sector, offering opportunities for rural development, job creation and improving the quality of life of millions of inhabitants. The biofuels sector is therefore targeted to be a key contributor to the 'Accelerated and Shared Growth – South Africa' programme (ASGISA), which aims to halve poverty and unemployment by 2014. Sugar cane and maize receive the major part of biofuels attention. In view of climatic circumstances, maize has a larger potential in South Africa and is therefore chosen to be subject for this research.

#### **Execution of the case study**

Gwynne Foster has been given the assignment to carry out the maize case study and deliver the perspectives of different stakeholders on current maize/ethanol developments in South Africa.

## **5.2 Results of field and desk research**

Meetings have been held with a broad selection of stakeholders, including NGOs, prospective ethanol producers, industry associations, fuel companies, universities and governmental representatives. The results of these interviews and additional internet research have been processed in a report, the main findings of which are given in this paragraph.

A question underpinning the investigation has been whether or not South Africa might be a source of sustainable supply for biomass or biofuels to the Netherlands. The considered answer of all consulted in South Africa is that – provided government requires mandatory blending – the levels of biomass that South Africa is likely to be able to produce would be absorbed by domestic demands. However, Southern African countries collectively offer opportunities for biomass production, which might be exploited as export industries. South Africa is well placed to contribute to the development of those opportunities, either privately, as commercial ventures, or within NEPAD (NEw Partnership for Africa's Development).

### **5.2.1 Characteristics of South African maize supply chain**

Maize is the most important grain crop in South Africa and is produced as a dryland crop throughout the country. In South Africa, it has replaced sorghum as the staple food. In the past, subsidy programmes stimulated South African farmers to cultivate maize on around 4.5 million ha. These programmes have reduced progressively during the past 20 years and South African farmers are no longer subsidized in any way. Over the years, the area of maize under plantation has significantly reduced to a 2006 level of 1.5 million ha.

In July 2006, Ethanol Africa launched South Africa's first (out of 8) large-scale bioethanol production plant, which is scheduled to be in production by the end of 2007. Ethanol plants will provide maize farmers with another channel for their products, along with food and feed and the commodities market. This is expected to stimulate additional production.

A short overview of the South African maize industry follows in table 5.2.



**Table 5.2: Specifics of South African maize industry**

Topic	Specifics
2005 production area	2.8 million ha
2006 production area	1.5 million ha
Potential production area	4.5 million ha
Production average	6-9 million tons of maize per annum (2-3% of the USA production)
2006 production	Approximately 6 million tons
Production potential	On the assumption that previously farmed land be brought back into production (to 4.5 million ha in total), the potential is considered to be 14-16 million tons per annum.
Production locations	Most maize production is concentrated in the Free State, North West Province, Gauteng and Mpumalanga. Relatively small areas are under irrigation, e.g. near Douglas and in the Groblersdal/Loskop area.
Yield	Approximately 4 tons/ha (12 tons/ha in the USA, 16-18 tons/ha in Europe); yields would be higher for irrigated maize.
GM maize	Estimates are that around 25% of the maize produced in South Africa is genetically modified, however data is unreliable. [African Centre for Biosafety] GM maize enters the food chain in South Africa without the need for any declaration on product labels. There is presently no requirement for imported maize to be traceable, nor for assurance that an imported consignment only contains varieties of GM maize that have been approved in South Africa.
Ethanol production potential	Ethanol Africa is planning to build 8 bioethanol production plants in 6 years. At full capacity, the 8 plants could supply 4 million litres of ethanol per day, which would satisfy a South African demand for a 10% blend by 2015.
By-products ethanol production	A by-product in ethanol production from maize is distillers dried grains with solubles (DDGS). DDGS is richer in protein than maize. DDGS can be used for feed (protein cake), whisky, gel and as an organic fertiliser. Another by-product of the dry-milling process is carbon dioxide.
Maize to ethanol conversion	1 ton of maize produces 402 litres of ethanol and 304 kilograms of DDGS.

### 5.2.2 Sustainability issues

Table 5.3 summarises the main sustainability issues linked to South African maize production, by reflecting the 'voices from the South'. The results deriving from the research conducted by Gwynne Foster have been inserted and compared with the Cramer Commission criteria to signal the overlaps and potential gaps.

**Table 5.3: Comparison of Cramer Commission criteria with South African maize sustainability issues**

<p><b>Cramer Commission Criteria as from 2007</b></p>	<p><b>Issues identified during field research by Gwynne Foster</b></p>
<p><b>Greenhouse gas balance</b> A net reduction in emissions of at least 30% (inclusive of application) compared with fossil reference.</p>	<p>There are conflicting reports from research institutes, NGOs and industry about the energy-efficiency of maize, which at 1:1.3 would be extremely low (by comparison: sugar cane would be 1:8.3). Using maize as a feedstock could thus be energy-negative, i.e. cost more energy than is being produced. Exporting maize ethanol would aggravate this situation, further reducing potential gains.</p> <p>Generally, the ethanol industry presumes better results than research institutes and NGOs. The South African petroleum industry is sceptical in respect of maize/ethanol, and has suggested that the energy efficiency be measured "seed to tank". Until now, the petroleum industry has refrained from investments in this field. Ethanol Africa believes it is a viable industry and steams ahead.</p>
<p><b>Competition with food, local energy supply, medicines and building</b> No shortage of food, local energy supply, medicines and building materials on the local level due to biomass production</p>	<p>White maize is mainly used for human consumption. Yellow maize has a higher protein content than white maize and is primarily used for feed. Ethanol Africa has stated that only yellow maize will be used for biofuels, and hence the food chain will not be affected. This is contested by NGOs, who feel that either colour maize will be used for either purpose with the appropriate motivation. There are, therefore, concerns that there will be a clash between food supplies and fuel contracts in times of short supply. For instance, were there a drought (which is likely to occur in years of low rainfall in South Africa), farmers would nevertheless be expected to honour their contracts with ethanol plants or face penalties. [Sasol; Ethanol Africa] Requirements in all government statements and speeches claim that <i>food supplies should not be at risk</i>.</p> <p>Global demand for ethanol is driving up prices, especially due to the large-scale conversion of maize into ethanol in the USA. Early 2006, the price for maize in South Africa was R600 per ton. The price has since risen to R1,400 per ton due to speculation and expected shortage. This mainly hurts the communities that rely on maize as a staple food. <i>Access to low cost, staple foods is vital</i>. [CURES-NGO network] However, improved income (also resulting from jobs in the ethanol industry) could allow farmers and communities to purchase higher priced foods. [SADC Biofuels Report]</p> <p>The role of South African maize production in meeting regional food needs also needs to be taken into account. South Africa does export to SADC (Southern African Development Community) countries, although the price of South African maize is often too high for neighbouring countries. However, South Africa's role in this respect may grow in importance, as the development of the ethanol industry in the USA might change the outlook on world supplies and prices.</p> <p>Concerning the provision of energy on the local level, the South African government has stated that biofuels should account for 40% of South Africa's renewable energy by 2014. Legislation is expected early in 2007, with mandatory requirements to blend (phased implementation). All ethanol produced in South Africa will probably be needed to service domestic demand.</p>

Cramer Commission Criteria as from 2007	Issues identified during field research by Gwynne Foster
<p><b>Biodiversity</b> No deterioration of protected areas or valuable ecosystems.</p>	<p>South Africa potentially has 4.5 million ha that are suitable for cultivation of maize. In 2006, only 1.5 million ha was planted, the remaining part lying fallow or established as pasture. Apart from the elimination of subsidy programmes, contributory reasons are a lack of market and low prices when there is an over-supply (in 2004 there was a 3 million tons over-supply, which caused prices to fall dramatically). The present focus for additional production area is on the 4.5 million ha that were once cultivated. There might be additional scope in the previous 'homeland areas' in the Eastern Cape and Limpopo provinces. Some parties believe 4.5 million ha to be unrealistic, as a lot of the land taken out of production is marginal and subject to soil erosion, and global warming is likely to result in more frequent droughts in maize-growing areas.</p> <p>Still, conversion of biodiversity-rich areas for the purpose of maize cultivation is not likely to occur, even in the longer term. Further increase in production would be more likely to come from maize varieties that produce higher yields, withstand dry conditions and have high levels of starch. [Universities]</p> <p>NGOs, however, do claim that biodiversity is impacted. Dryland maize is produced as a monoculture, with associated concerns given the extent of the cultivation. Ethanol Africa discounts concerns about maize being a monoculture, as that has been the case for a long time without problems.</p>
<p><b>Economic prosperity</b> Insight into possible negative effects on the regional and national economy.</p>	<p>Maize farms are typically 800-1000 ha in size. Many maize farmers own several farms in order to survive. High costs make it difficult for emerging farmers to enter the maize industry (consolidation and mechanization would be required to become profitable in the large-scale monoculture type of environment in which maize is currently cultivated). At present, maize farmers do not have alternate markets for their crops and many previously self-sufficient farmers are in debt due to the low prices of last years. The government expects the biofuels industry to offer opportunities for rural development, job creation and improving the quality of life of millions of inhabitants. Biofuels will attract new investments in agriculture by companies that would not normally invest in this sector. It will also bring improved infrastructure that would benefit conventional agriculture and rural communities. The farmers embrace the increased demand for their products following the establishment of a bioethanol plant. Ethanol Africa gives a profitability threshold for the ethanol plants of 40 US\$ per barrel crude oil. This is considered too low by other parties.</p> <p>Ethanol Africa plans to construct 8 plants within the next 6 years. The establishment of each plant will create 10,000 direct and indirect jobs. [Ethanol Africa] This is contested by other parties, who state that maize lends itself to mechanisation and large-scale commercial production. This will not create many new jobs and people may in fact lose jobs if there is consolidation of farms to establish viable commercial entities or to improve profitability. [NGOs, industry]</p> <p>Ethanol Africa furthermore will encourage and assist local women to work on horticultural projects around the plant.</p>

Cramer Commission Criteria as from 2007	Issues identified during field research by Gwynne Foster
<p><b>Well-being</b></p> <p>No negative effects on the social well-being of the workers and local population, taking into account:</p> <ul style="list-style-type: none"> <li>• working conditions of workers</li> <li>• human rights</li> <li>• property rights and rights of use</li> <li>• insight into the social circumstances of local population</li> <li>• integrity</li> </ul>	<p><i>With maize in South Africa (taking into consideration the harsh conditions for maize farmers over the last years), the people-aspect of sustainability is being overshadowed by commercial and survival concerns at commercial-farmer levels. [Ethanol Africa]</i></p> <p>Ethanol Africa states its ultimate aim is to achieve sustainability. It will not own maize production areas but source the maize required from farmers. Producers will be contracted to grow maize exclusively for Ethanol Africa, whereby the aim is that 30% of maize input will be procured from black people. These people will fall under Ethanol Africa's emerging-farmer programme and be taught and mentored. <i>'If it is not feasible for new farmers to start producing from scratch, the local communities might miss out a good opportunity to improve their quality of life.'</i> [NGOs, government, industry]</p>
<p><b>Environment</b></p> <p>No negative effects on the local environment. This relates to:</p> <ul style="list-style-type: none"> <li>• waste management</li> <li>• use of agrochemicals (including fertilizers)</li> <li>• insight into the prevention of erosion and soil exhaustion, and conservation of the soil fertility level</li> <li>• insight into the conservation of quality and quantity of surface and ground water</li> <li>• emissions to air</li> </ul>	<p>South Africa is a water-poor country. Most maize plantations these days depend on rainfall. Relatively small areas are under irrigation now, though, formerly, 1.8 million ha out of 4.5 million ha was irrigated.</p> <p>Ethanol Africa claims that water will be recycled several times, and that waste will be used to the benefit of horticultural projects close to the plants.</p> <p>Concerns are that a rapid increase of intensified production of crops to feed biofuel plants could aggravate existing environmental problems such as soil erosion, which is of particular concern in the maize-growing areas where there is often a clay under bed. South Africa's commitment to sustainable development would not allow for an unprecedented intensification of agricultural practices. [NGOs]</p>

### 5.2.3 Monitoring of sustainability level of imported biomass

The bioethanol industry in South Africa is only at the doorstep of a new era, and the stakeholders interviewed had little to suggest when asked: how the Netherlands could ensure a minimum sustainability level when importing biomass. Although 'general' environmental and social issues are known from sustainability researches of other supply chains, questions on e.g. greenhouse gas balances and competition with local needs are new considerations. The African Centre for Biosafety indicated that certification is likely to exclude small-scale farmers.

The study revealed that Southern African countries collectively (e.g. Angola, Mozambique, Zambia and Tanzania) offer opportunities for biomass production. The sector still largely needs to be developed in these countries, which offers an opportunity to set compliance with *sustainability* standards as a goal from the beginning.

Although stakeholders have not really considered monitoring yet, the general indication was that opinions on various issues are often so conflicting that multi-stakeholder consultation would be desirable. At least, parties buying from Ethanol Africa can potentially identify the relevant stakeholders. Ethanol Africa says it will computerize detailed records of volumes and varieties delivered per farm, allowing sources to be traced back.

### 5.3 Analysis: how *sustainable* is South African maize?

Sustainability is about attention for *people, planet* and *profit*. Taking this into account, how sustainable is South African maize? The field research pertaining to this topic by Gwynne Foster revealed significant input. Analyzing the results delivers the following observations:

- **Sustainability**

Sustainability can be regarded both on the level of the importing country as well as on the level of the producing country:

→ *Importing country*

Given the results of this study, importing maize-based ethanol from South Africa can hardly be considered sustainable in the short term due to the impact on local bioenergy supplies. A conclusion from this study, however, is that there is significant potential and value for biofuels industries in the sub-Saharan African countries that could be developed on the back of and in parallel with South African initiatives. The Netherlands can contribute – with investments, knowledge, capacity building – to such development and turn the new sector's focus on *sustainability*.

*'Biofuels policy framework due soon*

*Johannesburg - A policy framework on biofuels, due by the end of this month, is expected to open floodgates of investors and entrepreneurs into the industry.'*

*By Tiisetso Motsoeneng, 17 November 2006, Business Report*

→ *Producing country*

From a producing country point of view, many stakeholders indicate that exporting maize based ethanol is not expected to be viable, mainly because domestic demands are likely absorb all levels of biofuels that are produced. A delayed mandatory blending in South Africa may encourage producers to start selling ethanol on the international market. Given the current greenhouse gas emissions in South Africa and its expected own bioenergy targets, it seems – however – much more sustainable to comply with and increase local demand. The sustainability angle in this particular respect therefore is not the production level, but the application level.

Another aspect linked to the South African maize/ethanol discussion is the low energy efficiency of maize/ethanol conversion. Can the focus on maize be considered sustainable from this point of view?

- **Voices from the South**

Contradictory opinions were expressed during the research on many topics, including which feedstock holds best potential, whether the focus should be on bioethanol or biodiesel, whether the industries will be sustainable and what would happen were the price of crude oil to fall. Still, it was clear that debates on bioenergy are at an early stage in South Africa. There is yet little evidence of NGOs engaging government or industry on economic factors or of community-based / environmental NGOs being involved in biofuels debates.

Some NGOs feel that they are being sidelined, others are waiting for government to release a national biofuels strategy before taking a position and some admit to 'not yet having looked at in detail'. So far, the CURES-network and GM-fighting NGOs are most active. CURES Southern Africa took up the challenge and hosted a biofuels workshop for NGOs in August 2006. The main stakeholders involved with and actively supporting the development of the biofuels industry are the government – by drawing up a National Biofuels Strategy – and Ethanol Africa – by building the first out of 8 planned plants.

- **Cramer Commission criteria**

The results of the field research have been compared with the Cramer Commission criteria. It can be said that the Commission criteria mostly cover the main sustainability issues put forward by the stakeholders in South Africa, though some criteria might be considered in a broader perspective:

*Competition with food*

The two previous case studies already signalled that the popularity of a biomass resource can involve an increase in the price of the corresponding food product. This effect especially feeds the discussion on the *sustainability* of using food products for generating energy, when it concerns a staple food like maize in South Africa.

*Environment*

An important aspect is the compliance with (inter)national legislation. Many countries have proper environmental legislation (South Africa, for example, demands Environmental Impact Assessments to take place prior to cultivating natural areas), though the enforcement is often weak or absent. This issue is applicable to legislation in the social field as well. Compliance with legislation therefore requires attention from purchasing parties. The fact that certain legislation is in place does not automatically mean that this legislation is duly enforced and/or complied with.

## Conclusions and recommendations

*'By investing in biofuels, developing countries can produce their own domestic transportation fuels, cut their energy costs, improve public health, create new jobs in the rural economy and ultimately build export markets', Mr Turner said.*

*[Mr Turner, Chairman of the United Nations Foundation, speaking at a World Trade Organization forum, September 2006]*

### 6.1 Introduction

It is clear that there are factors that 'force' governments around the world to focus their attention on renewable forms of energy. Many consider global warming the most pressing one. Accepting that current developments urge countries to respond, raises the question: How? As state secretary Van Geel of the Dutch Ministry of Housing, Spatial Planning and the Environment recently said in a radio interview: "Some do not like the sight of wind mills, some do not want nuclear power generation and others have sustainability concerns with respect to biomass imports. So...?". A 2000 World Energy Assessment showed that mainly five renewables are expected to be in the picture to meet global energy demand (see table 6.1).

**Table 6.1: Global potentials for renewable energy sources**

Resource	Current use (EJ/year)	Technical potential (EJ/year)
Hydropower	9	50
Biomass energy	50	>276
Solar energy	0.1	>1,575
Wind energy	0.12	640
Geothermal energy	0.6	5,000
<b>Total</b>	<b>59.82</b>	<b>&gt;7,500</b>

Current world energy consumption is near 500 EJ.

Source: World Energy Assessment<sup>25</sup>

Although global potentials would suggest otherwise, highest expectations – at least for the short-term – are vested in the use of biomass for energy purposes. This report wishes to contribute to a growing awareness that this renewable is not by definition a *sustainable* response to the pressure factors faced. On the contrary, substantial risks attached to biomass imports have come to the surface that hopefully encourage purchasing parties to carefully consider potential imports.

<sup>25</sup> UNDP 2000, World Energy Assessment

Simultaneously, the contents of this report and the conclusions and recommendations given below wish to contribute to the valuable work undertaken by the Cramer Commission.

## 6.2\_\_\_ Conclusions

Based on the input from the South, the Dutch members of the project team have drawn the following conclusions in the field of:

- Comparisons of field research results with the Cramer Commission criteria
- A comparison of the Sustainability Assessment Framework (drawn up for the purpose of this study) with the Cramer Commission criteria
- The case studies carried out
- The use of biomass as a renewable energy source (risks and opportunities)

### 6.2.1\_\_\_ Comparisons of field research results with the Cramer Commission criteria

This project aims to deliver input for the final elaborated criteria of the Cramer Commission. To serve this purpose, the various case study results have been compared with the Cramer Commission criteria in chapters 3, 4 and 5. Table 6.2 lists the conclusions that can be drawn.

**Table 6.2: Conclusions on comparisons of field research against Cramer Commission criteria**

<b>Cramer Commission Criteria as from 2007</b>	<b>Conclusions on comparisons of the field research with the Cramer Commission criteria</b>
<p><b>Greenhouse gas balance</b> A net reduction in emissions of at least 30% (inclusive of application) compared with fossil reference.</p>	<p>This criterion regards the entire chain to determine the greenhouse gas balance, from production up to and including usage. Pursuant to this criterion, calculating the balance also involves that the potential side-effect in terms of changes in land use elsewhere needs to be taken into account, such as the fact that conversion of cattle grazing land to sugarcane may lead to new land clearings in the Chaco or the Amazon region for the benefit of cattle farmers. Field research reaffirms that this inclusion is significant. It should be noticed, however, that opinions on the occurrence of land shift differ and that commonly accepted calculation methods in this respect do not seem to exist yet.</p> <p>The case study results, especially regarding Indonesia, raise questions as to the potential of biomass from a greenhouse gas reduction point of view: large-scale land clearance and burning are rampant and could easily lead to a net increase in greenhouse gas emissions (NB: Forest fires in Indonesia in 1997 were estimated to have released an amount of CO<sub>2</sub> equivalent to emissions by all cars in the EU member states in that same year).</p>



<b>Cramer Commission Criteria as from 2007</b>	<b>Conclusions on comparisons of the field research with the Cramer Commission criteria</b>
<p><b>Competition with food, local energy supply, medicines and building</b> No shortage of food, local energy supply, medicines and building materials on the local level due to biomass production</p>	<p>Almost everything we eat can be converted into bioenergy, including wheat, maize, rice, soybeans, palm oil and sugar cane. The case study results do not show any indication that marginal land is primarily being used for the production of biomass to leave the other land for nature conservation and/or food production. Economic reasons are the main driver: as the price of oil climbs and the popularity of biomass for energy generation grows, it becomes increasingly profitable to convert farm commodities into bioenergy.</p> <p>The criterion should be adapted to take the ripple effect of an increasing demand for a food product for the purpose of energy generation into account, i.e. a rise in the price of this food product. Rising maize prices can quickly become life threatening for the poorest people in the world. An extended risk is the political instability that can be generated in low-income countries as a result of food crises.</p> <p>The criterion also does not take into account the fact that the expansion of biomass production often seems to be in the form of monocultures, leaving little or no room for other land uses and the cultivation of other food crops.</p>
<p><b>Biodiversity</b> No deterioration of protected areas or valuable ecosystems.</p>	<p>The criterion refers to an impact on biodiversity which may not have taken place after 1994 (for wood products), 2005 (palm oil) and 2006 (other biomass flows). This means that production locations having impacted biodiversity only recently can be labelled 'sustainable'. It can be argued that more attention should be paid to the history of the production location. Indicators could relate to e.g. the legitimacy/existence of permits allowing previous deforestation or the extent to which the principle of 'free, prior and informed consent' of stakeholders such as indigenous people (often having (un)official customary land rights; this aspect is also referred to under 'well-being' below), has been applied. With reference to the RSPO Principles and Criteria, it is crucial that unresolved conflicts be addressed, e.g. resulting from expropriation in the past.</p> <p>The criterion also refers to indirect land use – see 'Greenhouse gas balance' above for notes in this respect.</p> <p>The criterion would need to include a reference to the construction of (export-oriented) infrastructure for the purpose of transporting bioenergy. Infrastructure not only can seize valuable land (from a biodiversity point of view), but it may open up previously closed areas to other new activities as well.</p>
<p><b>Economic prosperity</b> Insight into possible negative effects on the regional and national economy.</p>	<p>The criterion refers to potential negative impacts on the regional and national economy. The difficulty with this indicator is that the <i>net</i> impact may be positive, though could involve an uneven distribution amongst the players. The case studies emphasize that biomass production is often in the hands of large estate owners and absentee landlords.</p> <p>Moreover, elements listed to evidence this criterion should refer to major issues at the local level (identified in the case studies), such as subsistence farming not being feasible anymore due to people being expelled from their (customary) lands and landless farmers forced to work as land labourers.</p>

<b>Cramer Commission Criteria as from 2007</b>	<b>Conclusions on comparisons of the field research with the Cramer Commission criteria</b>
<p><b>Well-being</b></p> <p>No negative effects on the social well-being of the workers and local population, taking into account:</p> <ul style="list-style-type: none"> <li>• working conditions of workers</li> <li>• human rights</li> <li>• property rights and rights of use</li> <li>• insight into the social circumstances of local population</li> <li>• integrity</li> </ul>	<p>This criterion entails various elements.</p> <p>With respect to working conditions, reference is made to the ILO (International Labour Organisation) standards. Many countries accepted these standards and have adopted the same in national legislation (Brazil, South Africa and Indonesia each are ILO member countries). However, enforcement of law and legislation is often weak or absent, as governments lack the institutional capacity to enforce regulations. A prime issue for this criterion should be the extent to which the production location performs in compliance with (inter)national legislation and human rights. This would not only apply to working standards, but to social, labour and environmental legislation as a whole.</p> <p>The aspect of 'land and customary rights' should have a broad perspective, in a sense that the history of a production location should also be taken into account. The case studies reflect large violations of land rights in the present and recent past. When such problems occurred in the past, it would be unjust to consider such production sites as 'sustainable' in case they <u>currently</u> comply with sustainability standards. It is not yet known whether the criterion demands involvement of local people as from 2006 or as from the start of the production location ('free, prior and informed consent').</p> <p>An important item lacking is 'gender'. Women are often specific targets of exclusion, sexual harassments, under payment, hazardous conditions, etc.</p> <p>A significant item to be taken into account when considering 'well-being' is the fact that large-scale biomass cultivation can trigger the (im)migration of labour. The Brazil case study for example put forward deteriorating working conditions for local labourers as a result of migrated labourers accepting bad working conditions.</p>
<p><b>Environment</b></p> <p>No negative effects on the local environment. This relates to:</p> <ul style="list-style-type: none"> <li>• waste management</li> <li>• use of agrochemicals (including fertilizers)</li> <li>• insight into the prevention of erosion and soil exhaustion, and conservation of the soil fertility level</li> <li>• insight into the conservation of quality and quantity of surface and ground water</li> <li>• emissions to air</li> </ul>	<p>See 'well-being' above –notes on compliance with legislation. To prevent degradation of the environment, it is essential that companies comply with existing legislation (lacking legislation, Best Practices known in the sector should be applied). An important requirement often enforced by law, for example, is the execution of an Environmental Impact Assessment prior to activities being carried out.</p>

Two overall conclusions can be drawn from comparing the field research results with the Cramer Commission criteria:

- The majority of issues put forward by the stakeholders in the South is dealt with in the criteria. These criteria will be further worked out in indicators and protocols by the Cramer Commission. Following the insights gained from the case studies, points deserving extra attention in this process should be:
  - potential ripple effects on the price of food products;
  - the development of monocultures to serve biomass demand;
  - the social and environmental history of a production location;
  - construction of infrastructure potentially impacting biodiversity;
  - distribution of benefits;
  - compliance with national and international legislation;
  - gender issues; and
  - social impacts of (im)migrant labour.
- Substantial efforts will be required to show compliance with the criteria set, taking opposing and conflicting opinions and statements of stakeholders into account. Knowing, for example, that stakeholder involvement (free, prior and informed consent) has taken place is not sufficient; imparting parties should vest efforts in learning which power has been allocated to stakeholders involved and how results of stakeholder consultations have been dealt with. *Due* compliance therefore demands investments in time, resources and capacity by the purchaser and also requires patience to give producing countries and individual companies and producers time to adjust production to comply with sustainability criteria.

### 6.2.2 Comparison of Sustainability Assessment Framework with the Cramer Commission criteria

The Sustainability Assessment Framework has been compiled to map sustainability issues linked to the production of and trade in biomass. Since this framework has been used during the execution of the case studies, several aspects referred to in this Framework, though not in the Cramer Commission criteria, have already been dealt with. However, as indicated in Chapter 1, the case studies have focussed on the main sustainability issues in the supply chains discussed. *Issues not put forward by the local stakeholders are by no means issues that do not matter!* This paragraph serves to picture remaining conclusions that can be drawn when comparing the Sustainability Assessment Framework with the Cramer Commission criteria.

Comparing both compilations has resulted in the identification of the following points of attention<sup>26</sup>:

- **(Im)migrant labour/seasonal workers**  
Field research already showed a potential impact arising from (im)migrant labour (see table 6.2, under 'well-being'). This concerned the fact that people (temporarily) (im)migrating for work may accept worse working conditions than local workers. Based on the Sustainability Assessment Framework, this issue could be extended to:

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<sup>26</sup> The Sustainability Assessment Framework is rather extensive and the points of attention address the *main* issues identified. Further study of the Framework is recommendable to those involved in the field of 'sustainable biomass' (be it a researcher, purchaser, NGO, etc.).

- a potential conflict between permanent and seasonal workers;
- a potential conflict over land between local people and (im)migrated labourers;
- a potential impact on biodiversity due to land and resource pressure from (im)migrated labourers.

- **Impact on biodiversity around the production site**

Potentially disturbing production activities (emissions, noise, light, etc.), human presence and environmental degradation may impact remaining biodiversity around the production site. Such impact could affect, for example, survival rates or migration routes of certain species. The biodiversity criterion in the Cramer Commission criteria refers to such impact, though only in the context of rare or threatened species and high value conservation areas. It could be considered to broaden this aspect, since the impact may be quite extensive and impacting a large variety of species and ecosystems. An indicator could be the selection of key indicator species whose presence reflect the remaining natural status of the area.

When considering the wider impact around the production site, potential negative effects as a result of transmission of hazardous elements through surface or ground water or through the wind should be taken into account.

Another aspect in the 'impact on biodiversity' field, which is not yet considered in the Cramer Commission criteria, is the potential impact over time. Some effects are not immediately measurable or visible, but need longer to come to the surface (e.g. disturbing the mating season of a specific species may impact next year's populations). Delayed effects can also occur as a result of accumulation, such as in the case of toxic elements entering a confined water body<sup>27</sup>. It is difficult to include all potential delayed effects in an indicator, though the protocol for the biodiversity criterion could raise awareness regarding the possible occurrence of such impact and ask parties to report on it.

- **Traceability**

In order to be able to ensure that the biomass is produced in accordance with specific social and environmental standards, the origin of the biomass and the flow must be traceable. The relevance of traceability is highlighted through the case studies' results, since the current tendency towards commodization complicates due tracing to the production location. The significance of this topic demands that it is incorporated as a separate criterion in the Cramer Commission criteria.

A last conclusion from this comparison deals with the interconnectivity of sustainability issues. An issue like 'land use' reverts under social, environmental as well as under economic issues in the Sustainability Assessment Framework in view of the fact that a change in land use – e.g. the development of monocultures – impacts social, environmental and economic circumstances. Similarly, an issue like 'biodiversity' in the Cramer Commission criteria has a strong linkage with well-being and economic prosperity. Deforestation on Sumatra, for example, not only impacts the survival rate of wildlife, but interferes with cultural traditions and jeopardizes subsistence farming. It is important to acknowledge this linkage in order to regard the criteria in the proper context.

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<sup>27</sup> The Biodiversity Assessment Framework, as referred to in Chapter 2, can be of valuable assistance when further designing and implementing the biodiversity criterion of the Cramer Commission criteria.

### 6.2.3 Case studies

The case studies have brought forward various dimensions relating to the main sustainability issues attributed to the production and export of biomass. The views differ for each of the product/country combination, taking into account:

- the different stages of product development (e.g. maize/ethanol in South Africa versus sugar cane/ethanol in Brazil);
- the different focus points from a sustainability point of view (e.g. clearance of tropical rainforests in Indonesia versus economic viability of the sector in South Africa);
- the different structures of the sector (e.g. private production land in Brazil versus state-owned land in Indonesia);
- etc.

Governments and industries in the three producing countries studied generally seem anxious to meet the growing demand from developed countries and focus on the opportunities given. Indeed, such demand offers several opportunities, though these will not self-evidently be exploited. A critical role is often to be played by local NGOs, trying to balance economic benefits with social and environmental costs. Overall concerns which can be picked up from the case studies are:

- the trend to turn biomass into a commodity mainly competing on price and quality, hardly addressing sustainability issues;
- the trend to cultivate biomass as a large-scale monoculture, leaving little land for local food production, subsistence farming and economic diversification;
- the lack of spatial planning in most developing countries, enabling the monoculture trend to occur.

The extent of NGO involvement in the three producing countries varied significantly, ranging from strong involvement in Brazil to weak involvement in South Africa. Taking a helicopter point of view, the NGOs still had one thing in common: they cannot keep up with the pace of the current developments resulting from the 'western' drive to import biomass. They are especially struggling to find an answer to the question 'how to ensure a minimum sustainability level for the production of biomass?', also given the fact that enforcement of (inter)national environmental and social legislation in the countries studied is often weak or absent. Their struggle became most visible when asking their opinions on monitoring the sustainability level of the supply chain. Ideas in this field are in an early development stage and pressure and input from western buyers to enforce environmental and social minimum standards is generally expected.

### 6.2.4 The use of biomass as a renewable energy source

*In response to a study on sustainable imports of biomass from large scale tree plantations in Brazil by Leen Kuiper, Probos:*

*'Let me raise a crucial question first: has the Dutch Government analyzed all the possibilities for reducing energy consumption, improving energy efficiency and developing alternative energy sources in the Netherlands itself, or is it simply trying to access cheap energy (externalizing costs to other countries) while portraying itself as environmentally friendly (using biomass instead of fossil fuels)?'*

*Ricardo Carrere, coordinator World Rainforest Movement, 18 August 2004  
[<http://www.biomassa-upstream.nl/pdf/reportBUS23.pdf>]*

The generally recognized potential benefits/opportunities of biomass as a renewable source of energy are:

1. Contributing to a reduction in greenhouse gas emissions
2. Providing opportunities for socio-economic development
3. Attributing value to and opportunity to restore degraded areas

#### **Sub 1. Contributing to a reduction in greenhouse gas emissions**

In principle, the use of biomass could reduce greenhouse gas emissions significantly compared to the current use of fossil energy sources: biomass releases carbon dioxide to the atmosphere when it is being burnt, but also absorbs it as it grows. Many stakeholders in biomass supply chains are not aware of the fact that biomass growing and farming practices potentially nullify the reductions gained. Clearance of natural vegetation and burning practices (Indonesia)<sup>28</sup> and low energy efficiency in the supply chain (South Africa) are decisive in the end when it comes to the *true* reduction in greenhouse gas emissions.

#### **Sub 2. Providing opportunities for socio-economic development**

Creating jobs and offering trade opportunities and scope for diversification of crops and sources of income, are valuable and potentially interesting developments that can thrive on the introduction or intensification of a biomass export sector. However, the case studies teach western players that the expected beneficial aspects of such a sector do not occur 'automatically' for those needing it the most. Skewed land ownership, landless farmers, severe working conditions and market power vested in a few dominant players point to an uneven distribution of benefits throughout the chain.

#### **Sub 3. Attributing value to and opportunity to restore degraded areas**

Numerous studies point to the global availability of degraded areas which, supposedly, could be used to cultivate biomass for energy generation. In practice though, as evidenced especially in Indonesia, it is more beneficial to convert forested land in view of the extra income derived from the sale of wood. Generally, degraded and deforested areas in practice seem to lack attractiveness to develop for the purpose of biomass production.

In conclusion, there *is* a potential value in using (imported) biomass as a source of energy that should be treasured and aimed for. Also many NGOs strongly support biofuels as one of many renewable technologies needed to reduce our dependency on fossil energy and to avert the worst of climate change. However, *attention should be duly paid to the risks associated with large-scale biomass production*. Shifting our problem to the South and to the next generations, creating social and environmental costs that are mostly born by the poorer people, should be considered unacceptable by all stakeholders involved.

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<sup>28</sup> Research by Wetlands International and Delft Hydraulics was brought to the attention of those present during a meeting of the Roundtable on Sustainable Palm Oil in November 2006 and presented at the UN-climate Conference in Nairobi, Kenya, on the 7th of November 2006. It showed that the CO<sub>2</sub> balance of palm oil from Indonesia is often very negative due to deforestation accompanying the development of plantations, especially taking into account the current peat fires to clear land. Information on the research can be downloaded at <http://www.wetlands.org/ckpp/news.aspx?id=c32e9c34-b5a7-4b2d-a38d-b96d50d447cc>.

**In this respect, specific attention should also be paid – from a sustainability point of view – to the local needs when considering to import a biomass resource from a specific country.** The South African case study shows that the ethanol to be produced in principle is needed to serve own demands. In Indonesia, for example, the subsidy on fossil fuels has been released resulting in a substantial increase in price. Not using biomass resources for own energy generation can keep producing countries trapped in (imported) fossil fuel dependency and hit local people hard with high fossil fuel prices. This in turn could slow down the economic growth of a country. Especially Brazil and Indonesia intend to produce considerably to serve international demand. It can be questioned whether the accompanying construction of export-oriented infrastructure to support this intention (e.g. construction of pipes in Brazil) is desirable.

Apart from local biomass needs, **local food security is another issue that deserves considerable attention.** It seems likely that biomass processors, such as the South African maize ethanol plants, will conclude contracts with farmers to secure their supply. Importing parties may conclude delivery contracts with producing partners as well. In times of disappointing harvests, this kind of contract is likely to be met first, at the expense of supplies to food chains or outlets that have not similarly been agreed upon in advance.

### **6.3 Recommendations concerning import of sustainable biomass**

It has been recognized several times throughout this report that biomass can be a sustainable source of energy. This paragraph lists recommendations drawn up by the Dutch members of the project team, which can help ensuring and enhancing the beneficial aspects of a biomass supply chain. There is time left to maximize potential additional sustainability benefits and minimize potential costs, now that the industry is still developing.

→ It is acknowledged that stakeholders in the Netherlands cannot be held *solely* responsible for the sequence of events following the international, increased interest in biomass. However, the current developments at least demand efforts from such stakeholders to address sustainability issues signalled and to work in this field in joint co-operation with governments, NGOs and local people – both in the importing as well as in the producing countries.

The recommendations are:

1. Optimizing Cramer Commission criteria
2. Ensuring a valid tracking & tracing system for biomass sources
3. Enhancing sustainability in the supply chain
4. Introducing sustainability verification systems
5. Capacity building in the South
6. Investing in new technologies
7. Encouraging energy savings
8. Entering into multi-stakeholder partnerships/joint endeavours
9. Conducting pilot projects

### **Sub 1. Optimizing Cramer Commission criteria**

In its final report, the Cramer Commission acknowledges that the input of stakeholders from producing countries is desirable for the further designing of indicators and protocols. Their input has not been asked when drafting the criteria. Although the final criteria delivered by the Cramer Commission offer a very good framework to ensure the sustainable production of biomass, the stakeholders interviewed for this project have indicated issues that could be used to optimize the wording of the criteria. It is recommended to process the issues brought forward by stakeholders from the South in the final composition of the criteria, being:

- potential ripple effects on the price of food products;
- the development of monocultures to serve biomass demand
- the social and environmental history of a production location;
- construction of infrastructure potentially impacting biodiversity;
- distribution of benefits;
- compliance with national and international legislation;
- gender issues; and
- social impacts of (im)migrated labour.

Simultaneously, it is recommended to learn from the issues brought forward by the Sustainability Assessment Framework, being:

- environmental impacts of (im)migrated labourers/seasonal workers;
- potential conflicts between permanent and seasonal workers;
- impact on biodiversity over time; and
- traceability.

### **Sub 2. Ensuring a valid tracking & tracing system for biomass sources**

A primary action to be undertaken is to ensure that products can be tracked and traced throughout the supply chain. This is not only a 'must' to be able to ensure that sustainability standards are adhered to. It should also be wished for to ensure that the biomass imported is not illegally produced, i.e. deriving from a plantation that trespasses legal requirements (such as labour or environmental laws) or that has illegally obtained its exploitation permit.

This tracking & tracing action can actually be quite difficult to undertake. Palm oil, for example, is a commodity which – currently – can hardly be traced back to the plantation. The Cramer Commission criteria vest the responsibility for tracking and tracing with the purchaser, who needs to provide evidence of the sustainability level of the biomass used. Purchasers can try to set up an integrated supply chain or join/start a sector initiative (such as the Roundtable on Sustainable Palm Oil<sup>29</sup>).

→ Specific attention needs to be paid to the position of emerging farmers and smallholders who might be excluded from supply chains due to tracking & tracing requirements. Stimulating the formation of co-operatives, or similar institutions, and exploring possibilities of 'group certification' form options to consider in this respect

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<sup>29</sup> <http://www.rspo.org>



### **Sub 3. Enhancing sustainability in the supply chain**

Stakeholders in the South signal (potential) sustainability issues in the supply chain. However, many feel that the parties accelerating the growth of the sector should take (part of) the responsibility in diminishing resulting social and environmental pressure. Purchasers importing biomass could take up this part, for example, by entering into a dialogue with a representative set of local stakeholders, transferring knowledge on farming methods (differentiated cultivation rather than monocultures, Good Agricultural Practices) or providing long term certainty for producers to encourage them to incorporate sustainability improvements.

*'Cars that run on sugar cane, fuel made from palm trees - it sounds like an oil-free future that could solve global warming. But, as a major report backs the biofuels revolution, the critics are gathering.'*

→ It should be recognized that criteria on sustainable production may be met by producing parties, though this does not prevent the existence of monocultures (limiting chances for other land use opportunities). Significant in this respect is land use planning (see sub 5. below).

### **Sub 4. Introducing sustainability verification systems**

Governments around the world are introducing bioenergy targets without incorporating any environmental and social safeguards. There is a campaign (as yet unsuccessful) to get the European Union to adopt a mandatory certification scheme for all biofuels as part of the European Biofuel Directive. The case study results show that the beneficial aspects of biomass are not *automatically* honoured and plead for the overall introduction of sustainability verification systems. Ideally, such a verification system would form part of an international agreement. Meanwhile, however, individual countries and purchasers should work towards the introduction of a sustainability verification system to create a sustainable renewable energy sector. Lessons can be learnt from the verification system in progress of the Roundtable on Sustainable Palm Oil.

*Robin McKie and Ned Temko, Sunday 17 September 2006, The Observer*

→ Specific attention needs to be paid to the position of emerging farmers and smallholders which could be excluded from supply chains due the costs of certification.

→ A dilemma in this respect is the question whether to link up with existing initiatives or to develop a new verification scheme. The first choice asks for a thorough assessment of existing initiatives and the drawing up of sustainability assessment guidelines: when does an initiative meet the standard? The second asks for a dedicated expert group having time to design a new scheme and to enter into multi-stakeholder dialogues.

### **Sub 5. Capacity building in the South**

NGOs have a significant role to play in balancing economic benefits against social and environmental costs, though, the pace of the current developments requires capacity building in the South. *How to enhance capacity to enable parties to properly react to our biomass drive?* Part of the responsibility of the importing countries should be to contribute to capacity building by making funds available and transferring knowledge; funds could be allocated for this purpose by the government and/or the private sector, while both the private sector and NGOs (in importing countries) could do an excellent job in capacity *building*.

→ Apart from NGOs, training of local governments and industry to raise awareness and to develop/implement land use planning instruments may be vital for tackling multiple sustainability issues related to the existence of monocultures.

### **Sub 6. Investing in new technologies**

Many researchers are optimistic about a 'second generation' of bioenergy in 5-10 years' time, including technologies such as the ligno-cellulosic technology that would greatly improve the picture for biofuels. In future, also switchgrass, forestry residues and fast-growing trees could be used to make biofuels for transport. However, it is the present technology that matters in view of the bioenergy targets currently implemented worldwide. Present technologies require substantial amounts of biomass that compete with food. Definitely, *there is no alternative to food for people*.

Investing in new technologies such as efficient cars and other renewable resources such as wind energy or resolving technical bottlenecks to accelerate the development of second generation bioenergy is therefore essential. The pitfall of bioenergy is the potential conviction that biomass offers a long-term solution to the unsustainable use of energy, which may slow down investments in innovative energy technology for the longer term. Government policies and private sector investments are key contributors to the process of new technologies.

### **Sub 7. Encouraging energy savings**

Stakeholders interviewed for this project pointed out that measures should be taken in western countries to reduce the energy consumption. They acknowledged that renewable sources are very good to reduce dependency on fossil fuels, though a transfer to new sources should go hand in hand with a reconsideration of own needs. A governmental policy on bioenergy is therefore recommended to be embedded in an energy policy giving the highest priority to energy efficiency and savings.

### **Sub 8. Entering into multi stakeholder partnerships/joint endeavours**

During the World Summit on Sustainable Development (Johannesburg, 2002), the concept of public-private partnerships was strongly supported. Dutch parties may consider exploring a partnership with the various stakeholders in one of the producing countries in order to help enhancing the sustainability level of biomass production for export. Turning the sector's focus on *sustainability* can for example be stimulated by investments, knowledge and/or capacity building and by joint fact-finding and shared analysis by the different stakeholders.

### **Sub 9. Conducting pilot projects**

The case studies have revealed new insights into the sustainability issues attached to the (increased) production of biomass for energy generation. It is therefore recommended to carry out more pilot projects, especially in co-operation with local counter parts. These pilot projects can be carried out in co-operation with the Cramer Commission by testing its draft criteria and suggested additions and in this way contributing to the set-up of an auditing framework.

An important requirement within the Cramer Commission is the entering into multi-stakeholder dialogues. Training of companies – as well as local/national civil society organisations in producing countries – to duly undertake such dialogues could form part of a pilot project.

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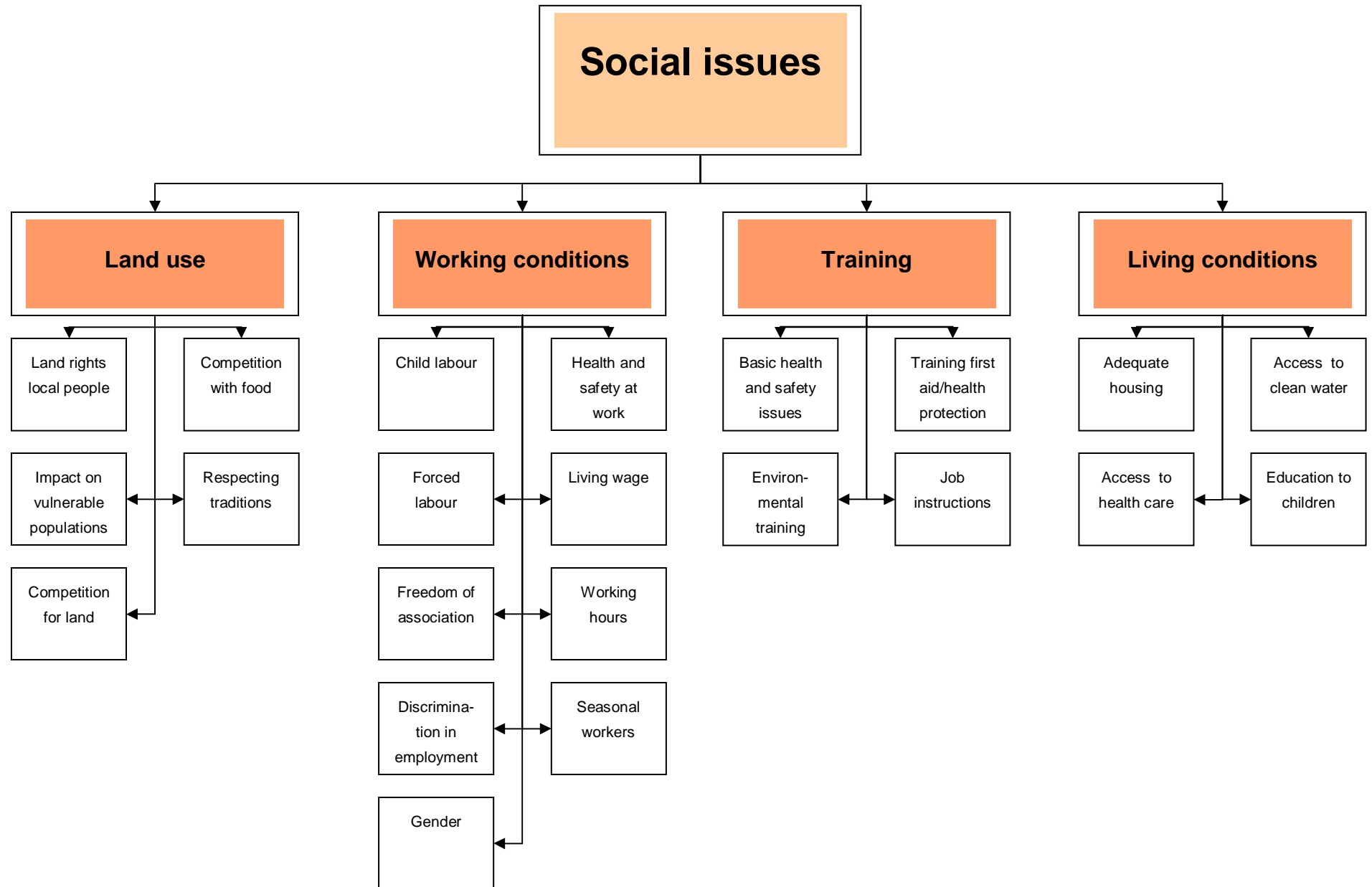
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# **Annex I**

## **Sustainability Assessment Framework**





People, Planet, Profit	Issue	Points of attention	Elucidation
<p style="text-align: center;"><b>Social issues</b></p>	<p style="text-align: center;">Land use</p>	<p style="text-align: center;">Land rights local people, with particular attention to vulnerable or marginalised groups, e.g. women, indigenous/tribal people</p>	<p>Often, local people have the common usage of pieces of land to serve daily requirements (e.g. living, food, tradable products), though do not have the <i>official</i> land rights. It so happens that companies obtain licenses from governmental departments to undertake activities on these areas. Companies licensed to do so appropriate land, following which local people are mostly denied entrance to the land and resources they used to live from.</p>
		<p style="text-align: center;">Competition with food production and demands, both at local and national level</p>	<p>The stretches of land required to meet the expected growth in bioenergy demand are huge. Moreover, the production of biomass to fulfil energy needs involves other elements such as the use of water. Competition with food production can occur as a result of a competition over land, water, etc. Another form of competition will occur as well. Certain food products are used for bioenergy production, such as palm oil, sugar and maize. In years of disappointing yields, the question is: which demand will first be met, the one coming from the energy plant or the demand for food?</p>



People, Planet, Profit	Issue	Points of attention	Elucidation
<b>Social issues</b>	Land use	Impact on vulnerable populations (socio-economic value of land for them)	Own land is valuable from a socio-economic point of view: it provides opportunities for e.g. subsistence farming to keep the family or trade. A huge bioenergy demand can lead to large-scale biomass production, for which land is required. Rural farmers may lose their land, either because they were not officially entitled to the land (no land rights) or they have been tempted to sell the land to big land owners. The potential impact is big, especially for women and non-educated people who may lose their opportunity for being self-supporting and may have difficulty in getting work under acceptable conditions.
		Respecting cultural/religious traditions	For many rural communities, important cultural / religious values can be attached to certain pieces of land. When land is being developed, it is important that these values are recognized and respected. Consultation with rural communities is indispensable prior to development taking place.
		Competition for land with local people resulting from (im)migrated labour	Large-scale development of land offers working opportunities and will attract those who are out of a job. They need a living area close to the plantation, which may cause competition for land with local people to occur.
	Working conditions	Child labour	There shall be no use of child labour. The age for admission to employment shall not be less than the age of completion of compulsory schooling and, in any case, not be less than 15 years (ILO Convention 138). Children in the age of 15-18 years shall not perform work which, by its nature or the circumstances in which it is carried out, is likely to harm their health, safety or morals (ILO Convention 182).

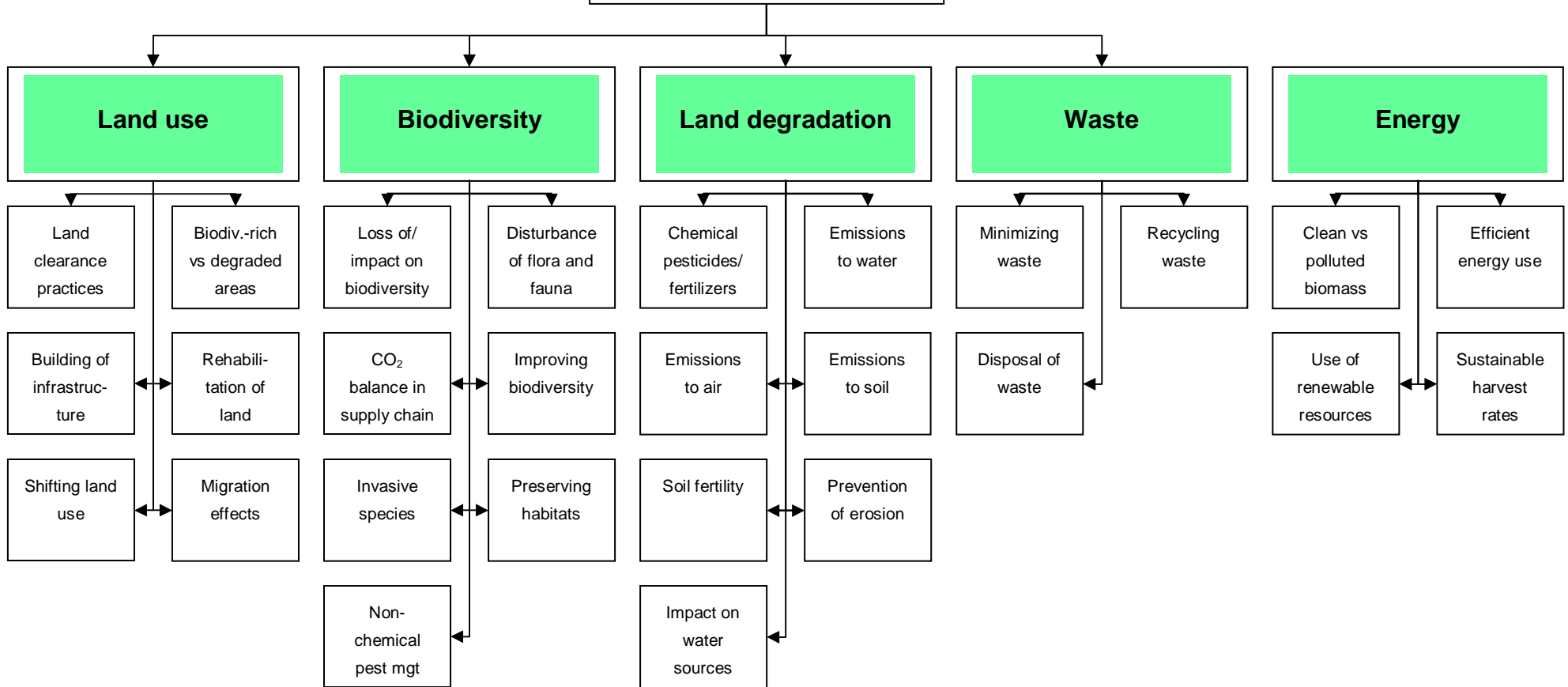
People, Planet, Profit	Issue	Points of attention	Elucidation
<b>Social issues</b>	Working conditions	Occupational health and safety	A safe and hygienic working environment shall be provided, and best occupational health and safety practices shall be promoted, bearing in mind the prevailing knowledge of the industry and of any specific hazards. Effective regulations shall be implemented to prevent accidents and minimize health risks as much as possible (following ILO Convention 155), including the provision of proper working clothes and equipment.
		Forced labour	Employment is freely chosen. There shall be no use of forced, including bonded or prison, labour (ILO Conventions 29 and 105).
		Living wage	Wages and benefits paid for a standard working week shall meet at least legal or industry minimum standards and always be sufficient to meet basic needs of employees and their families to provide some discretionary income (ILO Conventions 26 and 131).
		Freedom of association and the right to collective bargaining	The right of all employees to form and join trade unions and bargain collectively shall be recognized (ILO Conventions 87 and 98). When the right to freedom of association and collective bargaining are restricted under law, parallel means of independent and free association and bargaining for all employees shall be facilitated (ILO Convention 135, Recommendation 143).

People, Planet, Profit	Issue	Points of attention	Elucidation
<p style="text-align: center;"><b>Social issues</b></p>	<p style="text-align: center;">Working conditions</p>	<p>Working hours</p>	<p>Hours of work shall comply with applicable laws and industry standards. In any event, employees shall not on a regular basis be required to work in excess of 48 hours per week and shall be provided with at least one day off for every seven-day period. Overtime shall be voluntary and shall not exceed 12 hours per week, shall not be demanded on a regular basis and shall always be compensated at a premium rate (ILO Convention 1).</p>
		<p>Discrimination in employment (gender, race, colour, religion, etc.)</p>	<p>Recruitment, wage policy, admittance to training programs, employee promotion policy, policies of employment termination, retirement and any other aspect of the employment relationship shall be based on the principle of equal opportunities, regardless of race, colour, sex, religion, political affiliation, union membership, nationality, social origin, deficiencies or handicaps (ILO Conventions 100 and 111).</p>

People, Planet, Profit	Issue	Points of attention	Elucidation
<p style="text-align: center;"><b>Social issues</b></p>	<p style="text-align: center;">Working conditions</p>	<p>Seasonal workers</p>	<p>This issue is mainly applicable for bioenergy derived from agricultural crops. Due to the seasonal nature of most agricultural products, many employees in this branch of industry are only employed during a specific period of time. The following issues should be considered:</p> <ul style="list-style-type: none"> <li>• seasonal employees have often received little education and – due to their temporary employment – are mostly not trained other than with regard to the specific tasks for which they have been employed;</li> <li>• seasonal employees are often uninsured and most of them do not have recourse to unemployment benefits once employment ends;</li> <li>• working conditions for seasonal employees are often less than for fixed personnel;</li> <li>• living and working areas are not always in the same region for seasonal employees; this increases the need for infrastructure and temporary housing facilities.</li> </ul>
		<p>Gender</p>	<p>The bioenergy market will locally result in a shift in economic activities, whereby local production will be more export-oriented. Mostly, this results in the creation of 'male' jobs (example: from a woman selling food products at the local market, to a man dealing with the export company on the price of his products), deteriorating the position of women.</p>

People, Planet, Profit	Issue	Points of attention	Elucidation
<b>Social issues</b>	Training	Basic requirements of occupational health and safety	It is significant that occupational health and safety requirements are met by the employer, such as protective clothes and shoes. However, meeting such requirements is only effective if employees are trained to work in accordance therewith and are convinced of the importance thereof.
		Training on relevant health protection and first aid	Training on relevant health protection and first aid is important for employees: they become aware of potential hazards, learn how they can protect themselves and will be able to render first aid when accidents happen at work.
		Environmental training of employees	Environmental impacts, e.g. resulting from production processes, may be decreased when employees receive proper training. An example is the use of agrochemicals and the desired amount to be sprayed. Furthermore, environmental training can also touch upon the environmental issues employees come across privately.
		Job instructions/on the job training	Clear instructions and training opportunities are necessary for employees to adequately do their job and extend their skills in order to develop themselves.
	Living conditions	Adequate housing provided	For all employees that live on the production or processing sites, the employer should provide living quarters.
		Access to clean water and sanitary facilities	During work and in living quarters provided, there should be access to drinking water and sanitary facilities.
		Access to health care and medication	The employer should provide access to emergency health care and regular primary health care to all employees and their families in case of accidents or serious illnesses.
		Providing education to children	The employer should provide primary education to all children from its employees.

# Environmental issues



People, Planet, Profit	Issue	Points of attention	
<b>Environmental issues</b>	Land use	Land clearance practices (slash and burn, deforestation)	Land clearance practices such as slash and burn and deforestation can have a huge negative impact on biodiversity and the provision of ecosystem services. It should be regarded which land clearance practices are used and which of them have a minimum impact on the environment.
		Biodiversity-rich versus degraded areas	The origin of the land required to serve the bioenergy demand can be diverse. To the extremes, it can concern areas with a high biodiversity value or be degraded areas (biodiversity waste land). From an environmental point of view, degraded areas are preferred → biodiversity-wise, these can even benefit from production processes taking place.
		Construction of infrastructure	New production activities often entail the construction of infrastructure due to the required transport of production equipment, people (im(migrated) employees), products cultivated, etc. Infrastructure may be constructed at the cost of the environment and may open up previously closed areas to other new activities.
		Rehabilitation of land	Land no longer being productive or for other reasons no longer being useful for the producer can be rehabilitated. Preferably, this involves that the natural characteristics present prior to production, are brought back (i.e. flora and fauna). Sometimes, producers have made appointments with respect to rehabilitation with the government. Conservation companies can also carry out this rehabilitation.

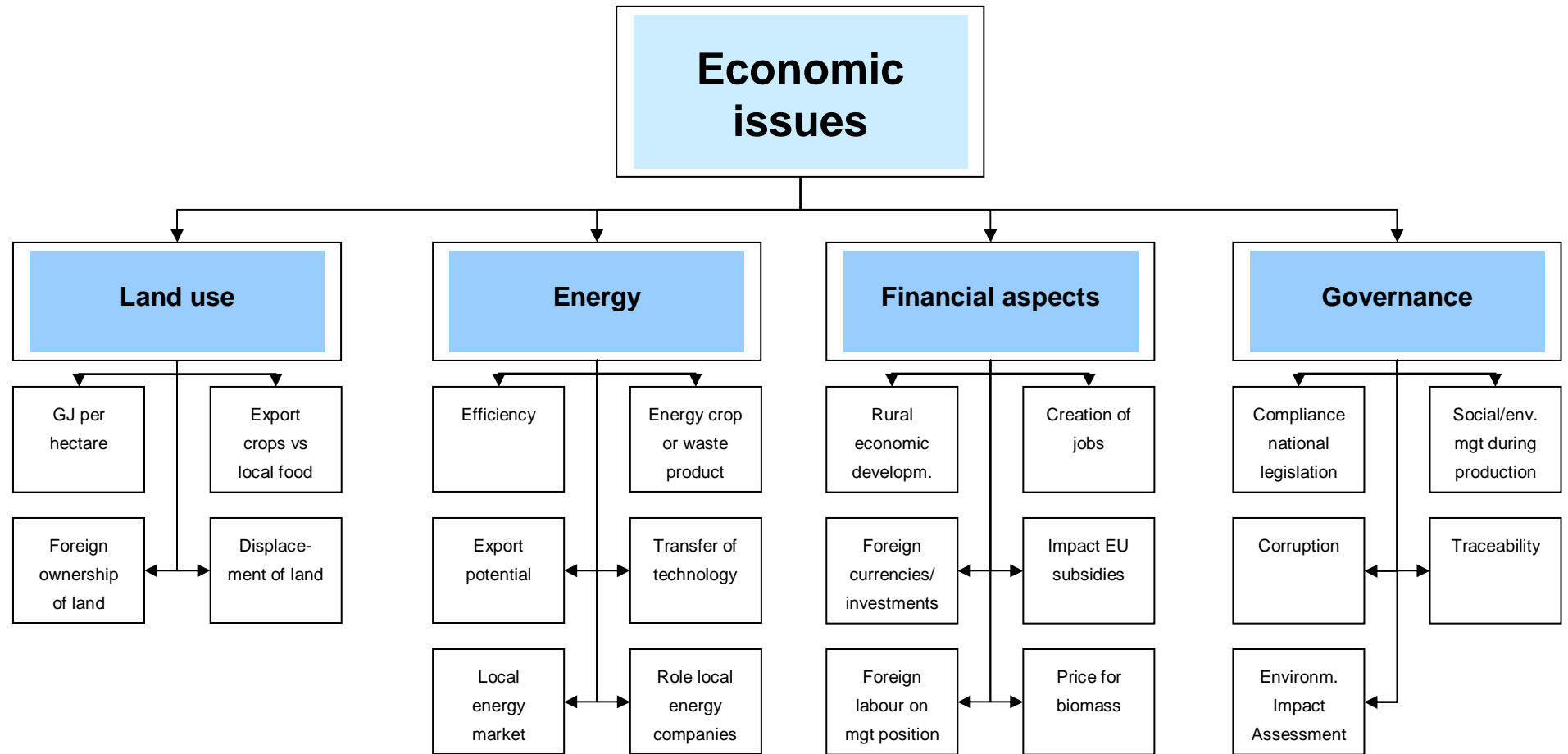
People, Planet, Profit	Issue	Points of attention	
Environmental issues	Land use	Effect of shifting land use patterns on areas of environmental importance, e.g. Amazon & agricultural frontier	The huge demand for bioenergy requires land. Preferably, production takes place on degraded areas or areas already used for human activities. The risk may be that areas already used for agricultural purposes will be used to comply with bioenergy demand (competition over land). The previous production will then need to be cultivated on new land, which could concern an area of environmental significance.
		(Im)migration effects	People (im)migrating to fulfil employment demand created by the extended bioenergy industry, will need a place as well as natural resources to live from, which involves new pressure on the environment.
	Biodiversity	Loss of/(beneficial/adverse) impact on biodiversity	Wild flora and fauna may be impacted as a result of land conversion and land degradation, both directly upon the new activities taking place and over time when impacts come stronger to the surface or accumulate. These will affect the quality and quantity of their habitats (and thus, the survival of the population) and limit their possibilities to migrate.
		Disturbance of flora, fauna and ecosystem services (production methods, human presence)	Disturbing activities (emissions, noise, light, etc.) can negatively affect flora and fauna species present close to the production sites. Since biodiversity is vital for ecosystem services, such services (e.g. fresh water provision) may be hindered as well – either directly upon the new activities taking place or over time when delayed and/or accumulated effects occur.



People, Planet, Profit	Issue	Points of attention	
<b>Environmental issues</b>	Biodiversity	CO <sub>2</sub> balance in supply chain (effect on climate change)	Bioenergy is thought to help fighting climate change by reducing the amount of CO <sub>2</sub> emissions to the air. A judgement in this respect requires taking into account all aspects linked to the production of bioenergy up to and including the usage by the customer, e.g. the land clearance practices (removing forests for production involves that much CO <sub>2</sub> is being emitted to air), transport of the biomass and the actual production of bioenergy.
		Improving local and regional biodiversity by upgrading areas	Production of bioenergy has the possibility of upgrading an area from a biodiversity point of view, depending on the production methods, characteristics of the area, etc.
		Invasive species	Production of bioenergy can involve the introduction of invasive species, for example when new species are being cultivated in an area or when using certain insects to fight plant diseases. Genetically modified species are considered invasive as well.
		Preservation of habitats in production areas	A way to reduce the potential negative impact on biodiversity is to preserve habitats in production areas for species to survive. An example is preserving habitats throughout the production site which are connected (a corridor) to enable species to migrate.
		Use of biodiversity-friendly non-chemical methods of pest management	Pests in production species are often fought with chemicals which are hazardous when getting in contact with natural resources. An option could be to apply biodiversity-friendly non-chemical methods, e.g. to introduce the natural predator of the pest species.
	Land degradation	Use of chemical pesticides and fertilizers	Chemical pesticides and fertilizers on production species used to fight or prevent diseases might affect natural resources by direct interaction (e.g. through spilling of pesticides), transmission through water surfaces (e.g. ground water), etc.

People, Planet, Profit	Issue	Points of attention	
<b>Environmental issues</b>	Land degradation	Emissions to water	Effluents of production processes might affect natural resources by emissions to water (e.g. waste water). The area of influence may be quite extensive as a result of transmission of hazardous elements through surface or ground water.
		Emissions to air	Effluents of production processes might affect natural resources by emissions to air (e.g. chemical residues). The area of influence may be quite extensive as a result of transmission of hazardous elements through the wind.
		Emissions to soil	Effluents of production processes might affect natural resources by emissions to soil (e.g. chemical residues).
		Soil fertility	The composition of the soil and the organisms living in/from it may be affected as a result of production processes taking place. These could affect the soil fertility.
		Prevention of erosion	Production processes are the main driver for erosion. Many best practice manuals exist to amend production processes to prevent erosion to occur (depending on the product cultivated, e.g. avoid production on slopes, no tillage, establishing natural wind breaks, the growing of grass between production crops to keep soil together).
		Impact on water sources (water use)	Production processes involve the use of water, e.g. for irrigation or cleaning purposes. Water-sensitive areas may be impacted due to this water use. The area impacted can be quite large, e.g. a production area close to a river side withdrawing water from it, may affect all downstream areas.

People, Planet, Profit	Issue	Points of attention	
<b>Environmental issues</b>	Waste	Minimizing waste	It takes land, efforts, energy, etc. to process waste. Moreover, the processing of waste can impact the environment by e.g. emissions to air or water. It should therefore be attempted to minimize waste.
		Recycling waste	An option to minimize waste is to reuse waste (e.g. waste water) or to dispose of it in a way that allows other organisations to recycle the same.
		Disposal of waste	The disposal of waste should be done in such a way that it minimizes the potential impact on the environment, e.g. by separation of waste and arrange for it to be processed by professional organisations.
	Energy	Clean versus polluted biomass flows	Clean biomass flows refer to flows which are specifically cultivated for the purpose of bioenergy (e.g. sugar cane/ethanol) or 'pure' waste flows (e.g. palm kernel). Polluted biomass flows refer to waste flows which are not specifically created to serve as a source for bioenergy, e.g. municipal waste, industrial waste or scrap wood (which is likely to carry along some traces of paint or nails).
		Efficient use of energy during production	The production of bioenergy costs energy. In order to benefit at most from biomass flows destined for bioenergy, an efficient use of energy during production is essential.
		Use of renewable resources during production	An option to minimize CO <sub>2</sub> emissions in the supply chain (thus impact on the environment) is to use renewable sources of energy such as wind or sun during the production.
		Sustainable harvest rates	Aspects to take into account include: annual versus perennial crops, harvest times per year, harvest efficiency.



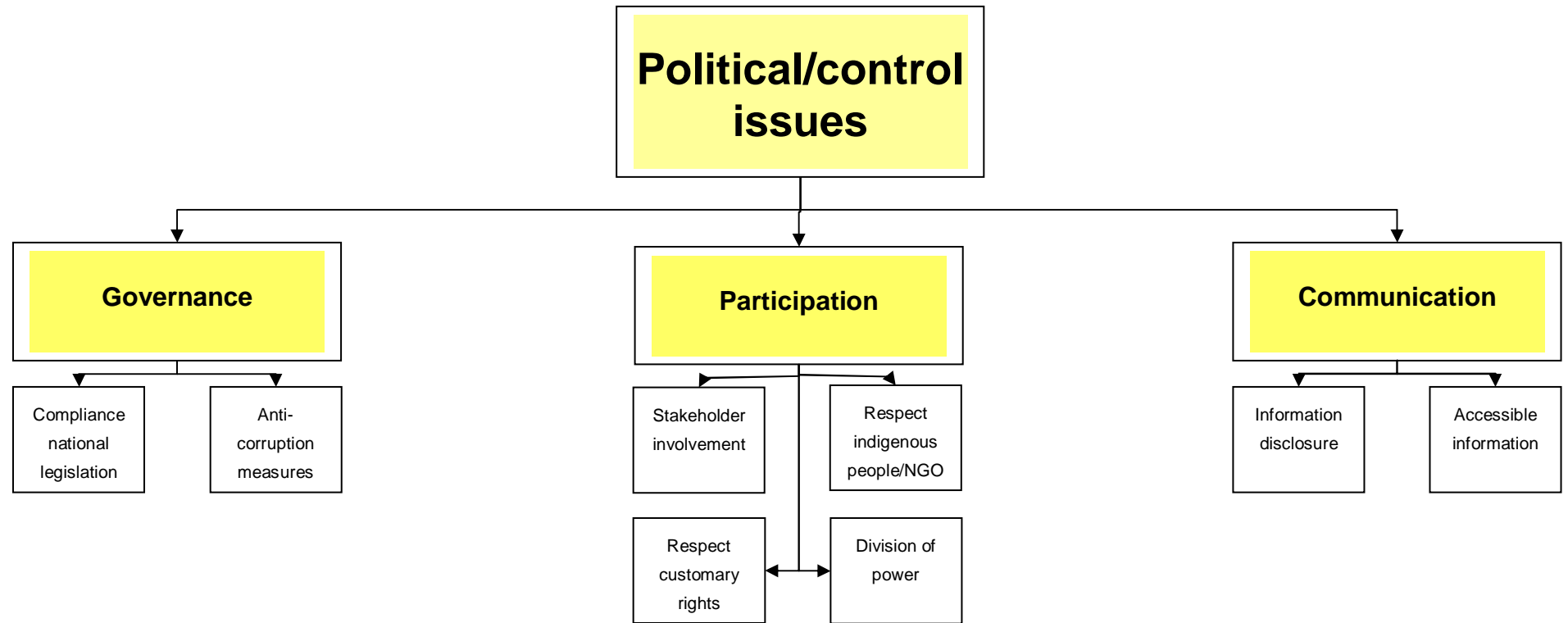
People, Planet, Profit	Issue	Points of attention	
<b>Economic issues</b>	Land use	Caloric value and yield of potential flow: GJ per hectare	In order to compare the different kinds of biomass flows suitable for bioenergy production, the GJ per hectare is important. The less GJ per hectare, the more land is needed to provide for the required amount of energy.
		Benefits from land used to produce energy crops for export versus value attached to land used for local food production	The production of energy crops for export will bring along local income. However, since not producing food on this land, food needs to be bought. This concerns the balance between getting an income and buying your food versus using land for local food production. Which option serves the local people better on the longer term?
		Foreign ownership of land	The international market is eager to invest in bioenergy. A consequence could be that foreign investors buy available land and local land increasingly will be in the hands of foreigners.
		Displacement of land use as a result of biomass production	The current attractive market for bioenergy may encourage organisations and people to convert the current land use to biomass production.
	Energy	Efficiency: net energy gained (energy produced minus energy involved with production, processing and transport)	The production of bioenergy costs energy. When assessing the different biomass flows used for bioenergy production, it should be considered how much net energy is gained throughout the supply chain.
		Energy crop or waste product serving as biomass (giving value as by-product)?	Bioenergy can have multiple origins, e.g. wood (disposal), agricultural products or waste, oil-bearing plants and municipal waste. Products can be specifically cultivated to create biomass, such as sugar cane for ethanol, or be derived from waste (e.g. forestry processing residues).

People, Planet, Profit	Issue	Points of attention	
<b>Economic issues</b>	Energy	Export potential	The existence of a new bioenergy market gives (specifically) many developing countries a change to increase its export potential.
		Transfer of technology/capacity building	Most developing countries have the biomass resources needed to meet the bioenergy demand, while western countries have greater access to technologies. Western countries could transfer their knowledge to enhance local capacity and support the development of the industry.
		Local energy market (to reduce dependency on fossil energy)	Export creates foreign currencies income, though it should not be forgotten that the exporting countries have a dependency on fossil energy as well. There will therefore also be a local market for bioenergy. Will this market also be served to reduce oil dependency?
		The nature and role of local energy companies	Local energy companies will be interested and involved to jump into the new market. Their role should be regarded compared to those of foreign companies wishing to be involved.
	Financial aspects	Rural economic development	The bioenergy market gives an opportunity for rural economic development: giving new value to land, people and resources.
		Capacity building: creation of jobs in producing countries	The bioenergy market contributes to the creation of jobs in producing countries at production and processing sites, export agencies, etc. It should be taken into account that the new jobs partly replace existing ways of living/working, such as subsistence farming.

People, Planet, Profit	Issue	Points of attention	
<b>Economic issues</b>	Financial aspects	Foreign currencies/investments in producing countries	Given the high expectations of the bioenergy market, foreign investors are expected to be significantly involved with the financing of production and processing sites.
		Actual or anticipated impact of subsidies within the European market	Different European countries, amongst which the Netherlands, subsidy the use of bioenergy to reduce dependency on fossil fuels, meet concerns on nuclear energy and contribute to the fight against global warming. The subsidies stimulate the production of bioenergy and can be used to enforce sustainability criteria.
		Foreign labour running the production	Bioenergy could bring new jobs for local people, although it is not excluded that foreign investors will bring own labour – especially for management positions.
		Remuneration for biomass flow	The demand for biomass flows will be high for the coming years, but production is expected to increase significantly as well. In a drive to enter new markets, exporters may be tempted to decrease prices. On the one hand, a price spiral driven by competitive exporters/countries may result in the biomass flow producers not receiving a fair remuneration. On the other hand, a rising popularity of certain flows may accelerate an increase in prices. Should the biomass flow in question also be a <i>food</i> product, this can have negative spin off on food prices (and especially hit the poorer people).

People, Planet, Profit	Issue	Points of attention	
<b>Economic issues</b>	Governance	Compliance with national legislation	It should be ensured, when buying biomass flows/bioenergy, that it has been produced in compliance with national legislation. Especially in developing countries, enforcement of national legislation can be weak or absent.
		Proper social and environmental management at production/processing sites	The level of social and environmental management in producing countries may be different than in the buying countries. It should be agreed upon which level is expected and required to do business.
		Corruption	The parties involved shall refrain from seeking or accepting exemptions not contemplated in the statutory or regulatory framework related to environmental, health, safety, labour, taxation, financial incentives, or other issues. In addition, the parties involved shall abstain from any improper involvement in local political activities and not offer – nor give in to demands – to pay public officials or the employees of business partners any portion of a contract payment (OECD).
		Traceability	In order to be able to ensure that the biomass is produced in accordance with specific social and environmental standards, the origin of the flow must be traceable.
		Environmental Impact Assessment prior to activities	Preferably, environmental impact assessments take place prior to activities being undertaken. In many countries, this is required when wishing to exploit a natural area.





Context	Issue	Points of attention	
<b>Political / control issues</b>	Governance	Policies addressing compliance with national legislation	Biomass flows should be produced in compliance with national legislation. When buying biomass, it should be regarded which policies or measures have been implemented to ensure compliance. Is compliance being enforced by the government, for example?
		Anti-corruption measures	It should be regarded which anti-corruption measures have been taken throughout the supply chain in order to ensure that corruption is prevented to take place, e.g. corporate governance principles and management control systems.
	Participation	Stakeholder involvement when deciding on the use of land	The bioenergy demand is likely to involve a significant extension of land cultivated for the purpose of creating biomass. Preferably, stakeholders are involved when deciding on the use of new land for production purposes (free, prior and informed consent). The question is to which extent this is the case in practice.
		Respect for indigenous people, NGOs	When undertaking activities, it is important to respect the rights and values of indigenous people and NGOs. To ensure this, their participation should be laid down in policy.
		Respect for customary rights	When undertaking activities, it is important to become acquainted with customary rights and respect the same.
		Division of power	The 'power' in the supply chain may not be equally divided between the different participants. It is important to assess how the power in the chain is divided and in which way it impacts social, environmental and/or economic sustainability.

Context	Issue	Points of attention	
Political / control issues	Communication	Information disclosure: which information/decisions are made public?	Open communication enables stakeholders to respond to activities carried out in the supply chain.
		Is the information accessible to indigenous/local people (language, illiteracy)?	This issue is especially important in respect of communication between employer and employee. It is important that communication, e.g. in respect of job training or first aid, is done in a way that the message is clearly understood.