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Criteria for a Sustainable Use of Bioenergy on a Global Scale

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16. Abstract
The German Biokraftstoffquotengesetz, the EU Biofuel Directive and other policy making initiatives lead to promote the production and use of bioenergy, liquid biofuel for transportation in particular. Such an increase requires a reliable verification on compliance with sustainability principles on a global scale. Domestic biofuels (e.g. RME) have to meet the same standards as palm oil or ethanol from sugarcane imported from tropical regions and vice verse. As a first step the German government has passed the Draft Biomass Sustainability Regulation in December 2007 hat die Bundesregierung. This research project supported UBA and BMU to prepare that regulation. The overall goal was to examine the applicability of exis The analysis of existing certification systems featured number of good practice examples, e.g. FSC, SAN, RSPO.ting certification systems in terms of sustainability approval for biomass and to propose a set of criteria. But in fact none of the existing systems addresses all sustainability issues raised by biomass production and use. Selection of the proposed set of criteria has taken into account the current international state of discussion. Just to name above others: Minimum target of GHG saving; avoidance of losses of HNV areas an losses of Biodiversity; minimizing the risk of water scarcity; involvement of stakeholders into decision making processes; respecting international labour standards. Within this research project the GHG methodology and the default values implemented in the Draft Biomass Sustainability Regulation have been elaborated.

17. Keywords
Bioenergy, biofuels for transport, certification and certification systems, sustainability, criteria, indicators, Biomasse Sustainability Regulation, greenhouse gas balance, directe and indirect land use change, biodiversity, HNV, water competition

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15. Zusätzliche Angaben

16. Kurzfassung

Mit dem deutschen Biokraftstoffquotengesetz, der Biokraftstoff-RL der EU, sowie weiterer politischer Initiativen wird eine verstärkte Erzeugung und Nutzung von Bioenergieträgern, insbesondere Biokraftstoffen erfolgen. Damit erhält die Sicherstellung von Nachhaltigkeitsprinzipien eine Bedeutung von globaler Tragweite. Dabei müssen für im Inland produzierte Biokraftstoffe (z.B. Rapsdiesel) wie für aus tropischen Regionen importiertes almöl oder Zuckerrohethanol die gleichen Maßstäbe gelten. Im Dezember 2007 hat die Bundesregierung hierzu als ersten Schritt die Biomasse-Nachhaltigkeitsverordnung im Entwurf verabschiedet. Dieses Forschungsvorhaben diente dabei das UBA und das BMU in dieser Phase fachlich zu beraten, existierende Zertifizierungssysteme auf Eignung für diese Fragestellung zu untersuchen und einen Vorschlag über einen atz an Nachhaltigkeitskriterien zu erarbeiten. Es wurde festgestellt, dass keines der existierenden Systeme im Stande ist, die Anforderungen an die Zertifizierung nachhaltiger Biomasse im vollen Umfang zu erfüllen. Mit FSC, SAN, RSPO liegt allerdings eine Reihe von Beispielen mit guter Ausgangsbasis vor. Unter Berücksichtigung des internationalen Diskussionsstands werden u.a. folgende Kriterien vorgeschlagen: Mindesteinsparziel für Treibhauseffekt, Ausschluss des Verlusts von Lebensräumen mit hohem Naturschutzwert und des Verlusts von Biodiversität, Minimierung der Gefahr von Wasserknappheit, betroffene Bevölkerungsgruppen (stakeholders) sind in alle Entscheidungsprozesse einbezogen, international anerkannte Standards für Arbeitsbedingungen werden eingehalten. Im Rahmen des Forschungsvorhabens wurde die in der Biomasse-Nachhaltigkeitsverordnung vorgegebene Methodik zur Treibhausgas-Bilanz sowie der Default-Werte erarbeitet.

17. Schlagwörter
Bioenergie, Biokraftstoffe, Zertifizierung und Zertifizierungssysteme, Nachhaltigkeit, Kriterien, Indikatoren, Biomasse-Nachhaltigkeitsverordnung, Treibhausgasbilanz, direkte und indirekte Landnutzungsänderung, Biodiversität, HNV, Wasserkonkurrenz, soziale Standards

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Executive Summary

1 Initial situation and objective of the project

When this research project was started in autumn 2006, the discussion on the sustainability of bioenergy – and particularly biofuels – was largely restricted to expert circles. The tenor of the discussion however had already developed in the direction of increasing skepticism. Biofuels have so far only become important in terms of volume in Brazil, in the USA (both bioethanol) and in Germany (biodiesel), although production and use is to be significantly expanded from now on for the fulfillment of climate policy objectives. In 2006, the EU, in its schedule KOM (2006) 848, raised the biofuel target quota specified in the Biofuel Directive [2003/30/EG] from 5.75% in the year 2010 to 10 % for the year 2020. Ecological and socially orientated non-governmental organizations (NGO) have increasingly criticized such plans, pointing out the substantial environmental risks and competition with other forms of land use.

In December 2006, the Biokraftstoffquotengesetz (BioKraftQuG) (Biofuel Quota Act) was passed in Germany, which prescribes the compulsory mixture of biodiesel and bioethanol. The possible conflicts were however already known to legislators, who therefore linked the biofuels counting towards the quota with binding confirmation of

- the sustainable management of agricultural areas
- the protection of natural biospheres in the production of the biomasses used
- and a specific CO_2 reduction potential.

During the course of the year 2007, the Biomass Sustainability Regulation (BioNachV) was drafted[1] in order to firm up these requirements further.

From the very beginning, the objective of this research project demonstrated significant overlapping with the context of the BioNachV. For this reason, the task of the project was directed mainly at supporting the development of the ordinance. One main focal area lay on the calculation methodology to be developed and the basic data on the greenhouse gas balance (Section 6). An integral part of the work was to take an active part in the ongoing international discussion, and to exchange ideas and experience with the initiatives particularly from the Netherlands, Great Britain and also the Joint Research Center of the EU Commission, in order to arrive at an internationally viable solution.

Over and above the subject of greenhouse gas, and in accordance with the original project objective, the basic subjects, principles and criteria of sustainability were also addressed. In this case too, the mutual exchange with other national, international and NGO initiatives was of great importance.

On completion of the work in January 2008, the final processing of the task had not been completed. Continuation of the work is therefore necessary, both from the content point of view as well as for reasons of intensive continued development of the political discussion and the political processes. This is explained in greater detail below in Section 7 “Outlook”.

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[1] The draft was approved by the Federal Cabinet on 5th December 2007.

2 Certification as a solution?

The legally prescribed and urgent environmental policy requirements on the sustainability of the biofuels produced necessitates a reliable confirmation procedure. Technically justified criteria are only suitable if their fulfillment can be confirmed beyond doubt. Currently, only the principle of certification appears suitable as an instrument for mass goods such as biomass or biofuels produced from them. This view has quickly prevailed both in the national and international discussion, and has in the meantime also been incorporated into the text of the act in the stipulations of the BioNachV. In the Netherlands [Cramer et al. 2007], Great Britain [Department of Transport 2008] and the draft of the *EU Directive on the Promotion of the Use of Energy from Renewable Sources* [EU 2008], the application of the principle of certification is also beyond question.

The fundamental question remains however as to whether all major problem areas can be solved adequately by means of certification. Individual aspects – such as an indirect change in land use (see further below), and also various socio-economic aspects – may not be able to be taken into account completely in a mandatory certification system. Further measures over and above the scope of certification, for example at the inter-state and political level, will therefore be both advisable and necessary, in order to delimit the ecological and eco-social risks of massive expansion of the use of biomass for energy purposes.

If one analyzes the practice of certification for agricultural and forestry products, one finds a number of good examples which offer sound basic approaches for the confirmation of sustainability of biomasses. However, none of the systems analyzed within the scope of this project fulfils the specified requirements in their entirety. Individual and sometimes essential criteria remain unaddressed. Amongst these, the consistent lack of a greenhouse gas balance is considered to be something which can be added comparatively easily.

3 Which possible approaches already exist?

During the course of the research project, a total of 20 certification systems from the field of agriculture and forestry for ecological and/or socially compatible production were thoroughly examined. These also included the systems, which are still under development, of the *Roundtable on Sustainable Palm Oil (RSPO)* and the *Roundtable on Responsible Soy (RTRS)*. These systems are therefore aimed at cultivated plants which belong explicitly to the group of important raw materials for biofuels. From the criteria selection, both approaches cover a very broad range of essential sustainability requirements. No assessment can yet be made however on the practical viability of these two approaches. RSPO has in the meantime entered into the trial phase.

Amongst the positive examples already proven in practice, the following should be mentioned:

- *Forest Stewardship Council, FSC:* Forestry or wood label; since 2003 also with plantation standard:

  Positive aspects include in particular the organization and decision-making structure (three-chamber principle), the independent monitoring (third-party auditing), the comprehensive standards (criteria) and the strict traceability system (chain of custody), in which the principle of mass balance (mixed resources) is also applied in addition to the "classical" track-and-trace. The FSC Label enjoys great credibility.

- *Sustainable Agriculture Network, SAN:* Agricultural label directed specially at tropical cultivation regions:

  This label is subject to a very extensive catalogue of ecological and socio-economic criteria. The confirmation system and the participation of vested interest groups are assessed very positively in comparison to the FSC. The label enjoys very high credibility, although it is only little known.

- *Euro-Retailer-Produce-Working Group - Good Agriculture Practice (EurepGAP):* This internal retail certification system for agricultural products is also subject to a very strict chain of custody, whose control effect is based on the strong self-interest of the retail trade. Here again, there is high credibility, although the label is little known in consumer circles.

Various other certification systems are also assessed positively. Overall however, the direct application of existing systems to biomass is assessed as inadequate. This can be explained by the fact alone that none of the existing systems has historically been confronted with the question of assessing the form of land use in the context of sustainability. No system has so far developed any parameters as to whether land use for foodstuffs, raw material or energy production is actually sustainable. Instruments for the consideration of this basic question are so far lacking, and are not founded in any system.

The standards for sustainable biomass urgently required from the environment policy point of view are therefore not fulfilled by any of the existing certification systems "as they stand". The complete production chain is not taken into account adequately by any of the above examples. The principal problem is that there is as yet no viable approach with regard to the question of indirect land use changes (competition with foodstuffs). Although other central criteria such as "protection of biodiversity" are addressed by these systems, this is done, on closer consideration, basically in a very unspecific way. What is lacking here are any "hard indicators".

Once the standards (criteria) are clearly defined on the political side, a number of the systems considered will attempt to incorporate these specifications into their certification and achieve recognition (accreditation) in the sense of §9 BioNachV. This principle is being discussed in Europe, and in particular the Netherlands and Great Britain, as the "meta-standard". This is intended to mean that no SINGLE certification system alone will have the function of sustainability confirmation of biomass, but instead various systems which demonstrate basic suitability (specialist knowledge, organization structure etc.) will be accredited for this purpose.

4 What are the existing obstacles?

The central challenge of the working certification systems lies in the continual assurance of confirmable certification results. Only in this way can long-term credibility be created. Ensuring that the certified goods actually fulfill the relevant requirements and criteria involves a great deal of effort. There is also a great danger of misuse of such systems due to ineffective control mechanisms. Experiences gained from existing certification systems show that confidence can only be created through strict controls, high transparency and continual intensive participation of the relevant stakeholders. For products and production systems which have a reputation of being fundamentally problematical from an ecological point of view (extensive monocultures, proximity to tropical forests), long-term acceptance is particularly hard to achieve. For the same control intensity and transparency, the communication requirement increases substantially. This is also demonstrated by the example of the FSC, which enjoys very high credibility overall, but whose plantation standard has been regularly and sometimes severely criticized from the NGO side. The reasons for this are, on the one hand, weak points in the implementation of the certification, and on the other the basic conflict potential of the certified products.

It is also difficult to apply the experiences gained from certification systems operating on a voluntary basis to a mandatory system – such as is necessary from the point of view of legislators in the EU and in Germany. For voluntary labels, confidence, controlled by the demands of the consumer group addressed, is of essential importance. The fulfillment of such high demands must in this case be ensured by elaborate control mechanisms. The consumer group – and thus the action radius of these systems – thereby remains restricted. It can be seen that stricter requirements can be reflected in smaller market shares, as shown by a comparison of the FSC with its high credibility (2 % of world of forestry areas) and the PEFC with its comparatively low credibility (4 %). A mandatory system for a mass product such as bioenergy on the other hand is forced to rely on legal enforcement of the confirmation. In this case, further aspects must be taken into account:

- The consumer has no possibility of choice (compulsory mixing) and therefore disappears as an influencing factor;
- In order to fulfill the political objectives (quota proportions of biofuel and other bioenergy sources), far greater volumes will have to be certified than the existing labels can currently handle in terms of volume.
- Because the certification is enforced by law, this places the focus on political credibility. Politically desired and legally recognized products which do not actually (or supposedly) originate from sustainable production due to lacking reliable confirmation (or test criteria), will lead to loss of confidence in the policy – inwardly by consumers and outwardly by the trade.

In order to counteract this problem, the criteria (standards) of a certification system aimed at large mass flows not subject to influence by consumers must

- be restricted in number to the aspects of decisive importance for the subject of sustainability (core criteria),

- be capable of clear agreement on the international political level; i.e. accord with comprehensive worldwide signed agreements such as the Kyoto Protocol, the Convention of Biological Diversity (CBD), conventions of the International labor Organization (ILO),
- credibly reflect the views of the non-governmental organizations (NGO) responsible for the subject,
- be unambiguous and reliably confirmable.

The authors are aware that the combination of all four above aspects harbors mutual conflicts. The last point in particular – the unambiguous confirmability of fulfillment of the criteria – is difficult to reconcile with other vitally important aspects (e.g. indirect effects of land use change) or various other criteria considered as particularly important by NGO's (e.g. social standards, ensuring that relevant local population groups in producer countries do not suffer any substantial disadvantages in terms of sustainable development, major price increases due to shortage of land and competition for land).

There also exists a major restricting factor to mandatory state certification in the impending conflict with international commercial law, as represented by the WTO. For this reason in particular, placing the focus on criteria which refer to internationally recognized agreements is of particular importance.

Further obstacles with regard to certification of such large mass volumes can be seen particularly in the area of ensuring the confirmation of origin and the chain of custody. Other than in the case of solid goods (e.g. wood), it can be difficult, in the case of liquid fuels or their preliminary products, to confirm that they have been kept completely separate from non-certified products of a similar type. A complete decoupling of the confirmation from the actual product by means of a type of certification trade ("Book and Claim") is advocated on the part of the industry as a practical approach requiring comparatively little effort. On the part of politically responsible bodies and NGO's however, this decoupling is regarded as detracting from credibility. The approach of the mass balance (already established in practice in the *FSC mixed resources label*) already specified in the BioNachV as well as the drafts of the *EU Directive on Energy from Renewable Sources* is also regarded by the authors as a sensible compromise between traceability and practicability.

5 Proposal for sustainability criteria

During the course of the project, a catalogue of ecological and socio-economic principles were worked out on the basis of the intensive examination of the criteria of existing systems or those in development, the proposals from the Netherlands [Cramer et al. 2007] and Great Britain [Department of Transport 2008] and substantial contributions from NGO's [Lübbeke, Fritsche et al. 2006].

The proposals are condensed and summarized in table 1 and 2 part of the project, indicators and measurement sizes were also specified for each approach, according to which the fulfillment of the criteria would be measured. The full proposals can be taken

from the long version of the report. The further firming up of the indicators is the task of the ongoing follow-up project (see Section 7).

Table 1 Summary of the recommended ecological principles and criteria.

Subject	Principle	Criterion
Greenhouse gas reduction *(s. Section 6)*	1. There must be a significant contribution to greenhouse gas reduction.	1.1 A minimum savings rate in greenhouse gas emissions will be achieved over the complete production chain until the replacement of fossil fuels.
Land use and land use change	2. Minimization of negative consequences of indirect land use changes and compensation of competing land use.	2.1 In the production land, there must be mandatory state objectives with regard to land use and preservation of nature quality. 2.2 The land use policy must give clear preference to the cultivation of degraded land, which is not in competition with other usages or protection objectives. 2.3 In case of lack of objectives and a national land use policy, the company producing the biomass must confirm that in its case, no land use competition occurs.
	3. Exclusion of the loss of biospheres with high natural value (HNV)	3.1 An investigation is available which assesses the nature protection value of land areas affected by cultivation. 3.2 Primary vegetation and areas of high natural value (HNV) will not be turned into agricultural land; no deforestation from 2005. 3.3 Wetland areas will not be drained. 3.4 There must be an adequate buffer zone between cultivated land and areas of high natural value (HNV).
	4. Exclusion of the loss of biodiversity	4.1 Measures for the protection or increase of agrarian biodiversity will be implemented. 4.2 A minimum proportion of land will be taken out of use. 4.3 The requirements of the *Convention on Biological Diversity (CBD)* will be implemented (provided that the country is a signatory) 4.4 Genetically modified organisms (GMO) will not be used.
	5. Negative effects on soil, water and air must be minimized	5.1 Soil erosion must be minimized, and long-term fertility maintained by means of suitable measures. 5.2 Water consumption must be strictly adapted to regional resources (availability), and the needs of other users taken into account. 5.3 Harmful contamination of surface and ground water must be minimized. 5.4 The use of fertilizers must be restricted to the minimum requirements; documented confirmation. 5.5 The use of pesticides must be restricted to the absolute minimum required, the necessity for such use and usage quantities must be documented. 5.6 The emission of air contaminants must be minimized.

Table 2 Summary of the recommended socio-economic principles and criteria.

Subject	Principle	Criterion
Effects on socio-economic aspects	6 The local population should not suffer any disadvantages, but should participate in the opportunities of biomass cultivation.	6.1 Affected population groups (stakeholders) must be included in all decision-making processes. 6.2 Projects should serve the purpose of combating poverty (where endemic poverty exists in the cultivation region). 6.3 Fair trading conditions must be in existence. 6.4 Land usage rights must be respected. 6.5 Complaints mechanisms must be instituted.
	7 internationally recognized standards for working conditions must be observed.	7.1 Workers must have the right of free organization, tariff autonomy. 7.2 Child labor must be prohibited. 7.3 Forced labor must be prohibited. 7.4 Wages and compensation of workers must be regulated. 7.5 Rules of health protection and safety at work must be observed. 7.6 There must be no form of discrimination. 7.7 Training and qualification measures must be implemented

6 Methodology for determining the greenhouse gas reduction potential and default values

Of the subjects, principles and criteria recommended in Section 0, the greenhouse gas subject – “A minimum savings rate in greenhouse gas emissions will be achieved over the complete production chain until the replacement of fossil fuels” – has already been largely firmed up for liquid biofuels by the BioNachV. This project provided a specialist input for the design of the methodology and also the development of the so-called “default values”. A range of basic findings were established at a specialist meeting held in May 2007 between representatives of the BMU, the BMELV, the UBA, the FNR, the FAL, the Ecological Institute and the IFEU. The main aspects are summarized below:

- The **complete life-cycle chain** must be taken into account; the chain is divided into the following sections (modules):
  - Land use change
  - Generation of biomass
  - Transport of biomass
  - Processing / conversion (stage 1)
  - Transport between conversion stages (if necessary)
  - Processing / conversion (stage 2, if necessary)
  - Transport of the biofuel (for storage)
- **Default values** must be defined in cases where concrete values for a biofuel are not confirmed. For this reason, the default values are necessarily conservative, and refer to unfavorable but basically realistic cases in order to incentivise the producers to perform more efficient and to verify this by specific values.

- The balance refers to the **energy content** of the biofuel:
  kg CO_2-equivalent per GJ.
- The **aggregation** of the greenhouse gases in CO_2-equivalent is carried out in accordance with the factors specified in the Kyoto Protocol [IPCC 1996].
- **By-products** are taken into account by means of allocation on the basis of the lower calorific values (H_u). These findings unanimously established at the above specialist meeting have been intensively and controversially discussed by various international groups with participation of the EU Commission, Dutch and British experts. The main arguments in favor of the selected approach[2] are as follows:
  - In view of the legislative effect, this must be considered a robust approach, which unambiguously specifies the allocation method according to physical dimensions.
  - Calorific values are empirical, confirmable and available (standard tabulation).
  - Energy is the definitive factor in the BioKraftQuG.

  Attention is drawn to the fact that an individual cases, the lower calorific value is subject to uncertainty, e.g. in case of severely fluctuating water contents. By-products with high water contents may be under-assessed despite the given usage value (e.g. as feed materials for direct feeding in the wet condition).
- By-products which remain on the cultivated land or are returned there (e.g. straw, spelt, husks), are not allocated.
  For **waste** as the basic material for biofuels, no preliminary chain is taken into account.
- The **reference values** used are 85 kg CO_2-eq./GJ for petrol and 86.2 kg CO_2-eq./GJ for diesel. These values are taken from the "Well-to-Wheels Study" of the JRC/Eucar/Concawe [2006].
- In the case of **land use changes,** the associated changes in carbon levels will be divided by a period of 20 years. IPCC [2004] applies as the most important data basis for the calculation of the carbon levels. The default values are based on unfavorable land use changes which are nevertheless still compatible with general sustainability criteria.[3]

The minimum savings objectives according to BioNachV are 30 % in comparison to the fossil reference system. From 2011, these objectives will be increased to 40 %. (The EU Commission has set the minimum requirements at 35 % in the corresponding Direc-

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2 This approach has since been specified in the drafts of the *EU Directive on the Promotion of the Use of Energy from Renewable Sources* [EU 2008] and the amendment of the *EU Fuel Quality Directive*.

3 The example of "Soya from Latin America" is not based on the presumption of rain forest clearance, although this cannot be excluded a priori, but on the conversion of savanna-type vegetation;
The example of "Palm oil" is not based on the presumption of moorland/wetland drainage and clearance, but on rainforest on mineral soils, although this conflicts with the general criteria of sustainability. This simply represents the "standard case" in large areas of South-east Asia.

tives [EU 2008]). Figure 1 summarizes the default values established during the course of the project, in combination with the minimum objectives of 30 % and 40 %.

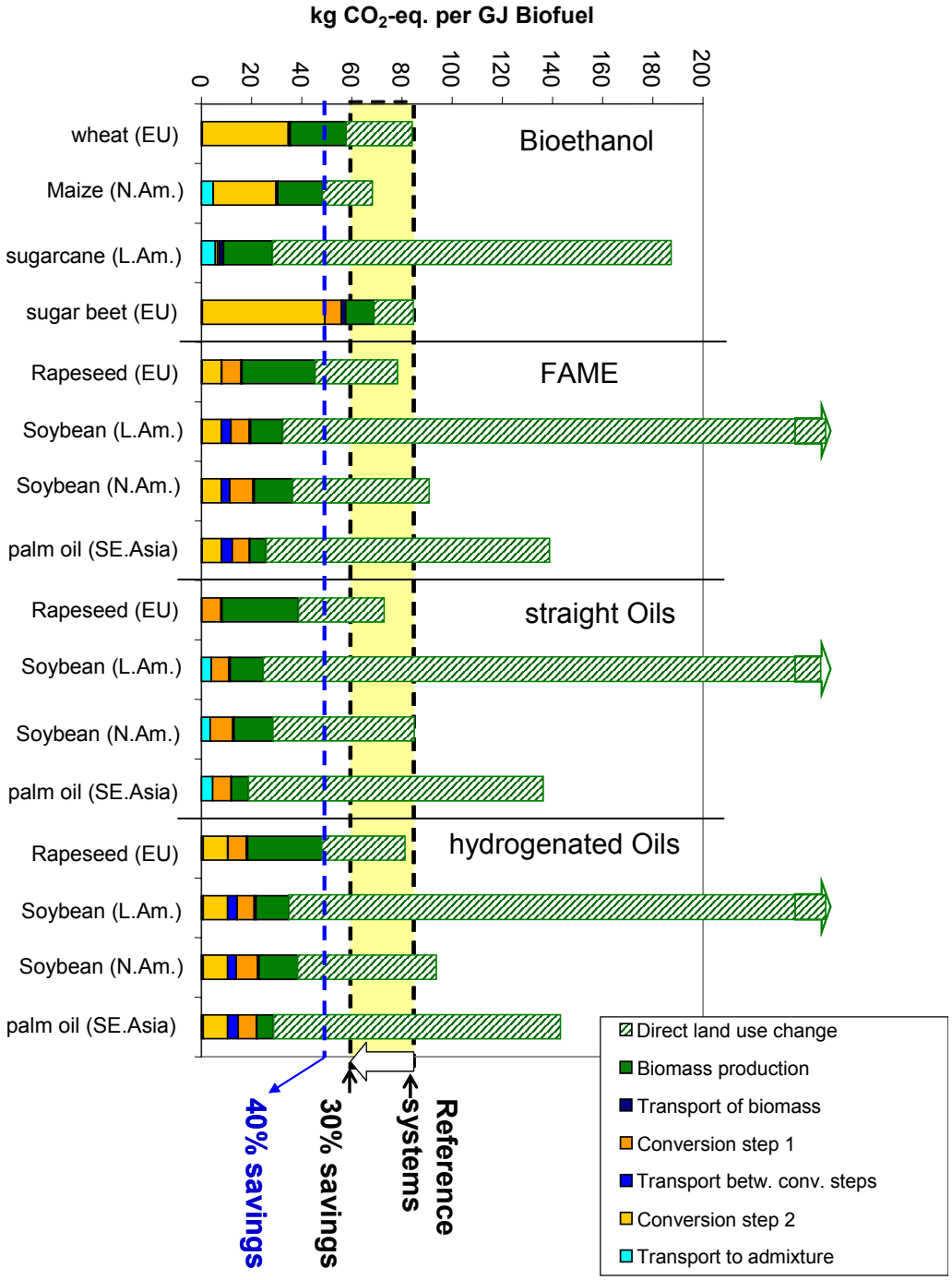


Figure 1 **Proposed strictly conservative default values for the selected examples of biofuels in comparison to the reference systems or the minimum saving of 30% or 40% of greenhouse gas emissions.**

7 Outlook

The legal framework for the assessment and certification of sustainable biomass has already been sketched out by the approval of the draft of the BioNachV by the Federal Cabinet on 5th December 2007. Comparable mechanisms at EU level are also currently being developed in the form of the Directives on renewable energy sources and fuel quality. This research projects was able to support the process on the German level with scientific foundations. These foundations were also made available for the process at EU level. Despite the intensive, specialist investigations at both national and international level, the draft regulations have not brought the specialist discussions to a close.

There exists a requirement for further firming up of some subjects or criteria assessed as essential (see below), in order to be able to ensure their practical applicability. Since the discussion is currently becoming more animated on the international level, this firming-up process must take place in continual exchange with the relevant major international fora. One of the most important of these is the G8 Initiative GBEP (Global Bioenergy Partnership). In addition to the EU and a number of individual states (including, increasingly, also the USA), the FAO is considered to be a further, centrally important institution. This finds itself subjectively direct at the interface of foodstuffs production in possible competition with biomass production, and has recently instituted a promising initiative by calling for the establishment of an international Bioenergy Charter.

An international discourse involving local/regional NGO's in important countries of origin of biomass to be imported in future was also addressed in the project, although this has not been implemented to the required degree. This will be continued in intensified form in the already mentioned and started follow-up project in co-operation with the Öko-Institut[4].

In this follow-up project, the following subjects in particular will have to be dealt with in greater detail:

- **Indirect land use change**; with the two main groups of questions:
  - How can this be taken into account in the greenhouse gas balance? Is the "Risk Adder" approach [Fritsche 2008] brought into the discussion by the Öko-Institut an appropriate and viable approach? What alternative approaches are available?
  - What further steps are necessary in order to make the criteria described in Principle 2 (see table 1) capable of implementation? Are there also new, alternative proposals available here?
- **Biodiversity and preservation of biospheres with high natural value:**
  - Biodiversity is regarded generally and almost without exception as an indispensable principle in the sustainability assessment of biomass. The application of this principle to certification has however so far been much too vague. The classifica-

[4] "Development strategies for the optimum use of biogenic industrial raw materials: Sustainability standards and indicators for certification of biomass for the international trade" (FKZ 3707 93 100).

tion of biospheres of high biodiversity itself has not been standardized so far, and remains largely indistinct. The methodical investigation of the area of agro-biodiversity is also only in its initial stages.

- There is currently no internationally accepted definition of the term “area of high natural value” used in the BioNachV. This applies equally to related terms of similar significance. The term must be more clearly defined. Only then can an exclusion procedure of such areas be carried out on a global level for the purposes of certification.

- **Water competition**:

  The first question to be asked in this respect is which regions of the world must be assessed as critical from this aspect. An assessment scheme adapted to regional circumstances must be developed, which can be used to assess contractual cultivation concepts, and their reciprocal effects on regionally affected users of available water resources, and on the ecological conditions (HNV wetland areas, regionally important water supply resources).
  This point must also take into account future developments in water requirements, as well as possible influences of changing climatic conditions.

- **Socio-economic standards**

  These have been dealt with very intensively and pointed out significantly in the course of the study. In the BioNachV on the other hand, no reference is considered to social criteria. This was justified by possible conflicts with international commercial law. Irrespective of this fact, social criteria will have to play a specific role in the general acceptance of biomass as a sustainable energy source. If legally-founded obligations prove to be impracticable, the possibilities of other mechanisms must be examined (e.g. bilateral agreements).

- **Further problems of the greenhouse gas balance**:

  From Section 6, it can be seen that the greenhouse gas methodology, as incorporated in Appendix 1 of the BioNachV, is already well advanced. Over and above the aspect of indirect land use change, further individual points still require clarification, such as:

  - Further development of the specific data available on carbon storage in natural types of vegetation and agricultural systems.
  - Questions on the assessment of the emission of nitrous oxide (N_2O).

  The greenhouse gas methodology of the BioNachV is restricted to liquid biofuels. The forms of biomasses used for energy however also extend to the solid, liquid and gaseous forms used for the purposes of electricity and/or heat generation. Since the Eneuerbare-Energie-Gesetz (EEG) (Renewable Energy Act) comes up for amendment this year (2008), and the Eneuerbare-Energie-Wärme-Gesetz (EEWärmeG) (Renewable Energy and Heat Act) is also due to come into force, this will require a similar extension of the methodology of the balancing and also the default values for the relevant energy sources.

Contents

Annexes:

A Evaluation scheme for system inventory

B Characterisation of the analysed systems

C Analysis of socio-economic issues

D Data background: Greenhouse gas calculation and default values

1 Introduction and Objectives

Increasing the use of renewable energy is a fundamental element in counteracting global warming and is possibly the most pressing challenge for global environmental policy making. Bioenergy, as a major component of renewable energy, is recognized as being a help in meeting environmental and energy policy goals, including national obligations to reduce greenhouse gases under the Kyoto Protocol.

But production of biomass is primarily bound to land use and land is limited. So an increasing use of bioenergy raises serious concerns regarding both sustainable development in general and the impact of its use on the environment. Effects on sustainable development are connected with all steps of the biofuel production cycle, from agricultural systems, processing of biofuels, transportation and distribution to final use. Since import from countries even outside of Europe is a major issue, this discussion must take place on a global scale.

Bioenergy comprises utilization as fuel for transport as well as for power and heat generation. However the biofuels for transport are massively attracting the political attention at present. One major cause is that the European Union has set a goal to increase the use of biofuels in the automotive sector in EU member countries from a current rate of 1 % to 5.75 % by the year 2010 (EU Directive 2003/30/EC, Biofuel Directive). In 2007 the EU even enhanced this objective to a quota of 10 %.

Adopting the indicative objectives given by the Biofuel Directive Germany has enacted the law of a mandatory biofuel quota (Biokraftstoffquotengesetz, BioKraftQuG) on the 01.January. 2007. This act requires that from 2007 on at least 4.4 percent of Diesel has to be of biomass origin. For gasoline a biofuel share of 1.2 % has been required since 2007. The regulation for gasoline foresees an increase of the admixture in 2008 of 2 %, in 2009 of 2.8 % and finally of 3.6 % by 2010 onwards. A quota of 8.0 % for biofuel for the total of all fuels sold in Germany has to be fulfilled by 2015 onwards.

In August 2007 the German government enhanced the national climate protection targets (“Meseberg process”) towards a 40 % reduction of GHG emission from 1990 to 2020. One element to meet that target is the raise of the biofuel admixture quota to 20 % (volumetric) in 2020.

Furthermore the BioKraftQuG empowers the government to dictate certain requirements concerning

- the sustainable cultivation of agricultural land
- the protection of natural habitats
- a minimal level of CO_2 savings for the biofuels

Details will be established in the Biomass Sustainability Regulation (Biomasse-Nachhaltigkeitsverordnung) under the BioKraftQuG. It will include the evidence of a proper execution of the requirements and its monitoring.

The Biomass Sustainability Regulation was drafted during the performance of this research project and passed by the Bundestag on 05.December.2007. However project results were incorporated into the Regulation particularly with regard to the greenhouse gas issue.

In 2006 Germany has achieved a share of 6.3 % of biofuel for transport, mainly Biodiesel and mainly from domestic or European production [BMELV 2007]. Agrarian intensification and conversion of former set-aside areas have sourced this biomass production.

In order to increase the shares to meet the required quotas imports of bioethanol from other countries, especially from Brazil, will have to continue to grow.

With this background, the German Federal Environmental Agency (UBA) has launched a project named “Criteria for a Sustainable Use of Biofuels on a Global Scale” which was given to the IFEU-Institute in cooperation with FSC German Working Group and Kerstin Lanje from Germanwatch.

Objectives of this research project are:

1. To receive an overview of the existing certification systems for biomass and biofuels produced in a sustainable manner as well as to find any loopholes and the need for action.

2. To be able to make recommendations at an international level for a certification system for sustainably produced biomass and biofuels based on our experience with the present systems. Essential points for making these recommendations are
   - Practicability, efficiency, plausibility, controllability, low costs and short-term feasibility (2-3 years);
   - Compatibility with existing statutory regulations of the exporting countries as well as with questions of international trade (WTO);
   - Consideration of geographic differences and the dependencies that result from them.

3. To establish guidelines for international projects (e.g. CDM, World Bank).

2 Scope and Working Steps

The project's main working steps are:

1. Summarise function, possibilities and shortcomings of certification (chapter 3)
2. Survey and documentation of existing international certification systems.
   Evaluation of these systems and the criteria contained in them.
   Identification of obstacles that impede certification as well as recommendations for counteraction (chapter 4).
3. Survey and documentation of similar activities from different countries or iniatives in terms of certification of biomass for energy use (chapter 5)
4. Working out the major issues concerning sustainability of biomass production essentially for energy use (chapter 6).
5. Special focus on the greenhouse gas (GHG) issue – scope, methodology and default values for a GHG balancing (chapter 7)
6. Brief assessment of potential infringements of international trade rules (chapter 8)
7. Recommendations of a set of criteria appropriate essentially for representing sustainability (chapter 9).

In order to provide a high level of political acceptance and transparency a continuous consultation of relevant stakeholders was started from the beginning and was performed during the project work. This happened in bilateral consultation as well as in a broadly organised international workshop (26.February. 2007) within the starting phase and the final workshop (see below).

Addressed are **NGOs** amongst others: WWF, BirdLife, Friends of the Earth, European Environmental Bureau (EEB), Corporate Europe Observatory (CEO), International Council on Clean Transport (ICCT), European Federation for Transport and Environment (T&E), Greenpeace, Watch Indonesia, and Borneo Orang-utan Survival Foundation (BOS).

Industry has been also included in this stakeholder process. Companies which had elaborated constructive contributions concerning the subject matter were given preference and invited. E.g. Daimler, Volkswagen, mineral oil (Concawe, the mineral oil companies' European association focussed on environmental issues) and plant oil industry.

Also **state-run institutions** from Germany, other European states (the Netherlands, United Kingdom), the European Commission and global organisations (i.e. UNEP, FAO, GBEP) were invited to participate. The advanced activities in the Netherlands and the UK have been of specific interest.

Further workshops were planned to perform in the course of this project. The International Council on Clean Transport (ICCT) granted a budget for co-financing two stakeholder workshops in significant overseas producer regions (especially South America, South East Asia). Also the GTZ (Gesellschaft für technische Zusammenarbeit) was

ready to support this process. These workshops were predominantly scheduled to invite and consult the local and regional NGO's with the intention to intensify the discussion of NGO positions on the spot.

However due to low interest from corresponding administrations the set-up of these events could not be completed in the timeline of this project.

Therefore promoting such events is also in the scope of the R+D project "*Development of strategies and sustainability standards for the certification of internationally traded biomass"* (No. 3707 93 100) performed by Öko-Institut and IFEU beginning in 2007.

A final workshop on European level concerning this project took place on 25.January. 2008 in Brussels. Again relevant policy makers and stakeholders have been invited and attended the workshop, which introduced the start of the follow-up project at the same time.

3 Why certification?

Certification is a tool to verify credible sources for goods from natural resources. These can be voluntary approaches by self-commitment, voluntary certification schemes or laws and related sanctioning mechanisms.

Having the German Forest Stewardship Council (FSC) Working Group as an official project partner we decided to study backgrounds of FSC certification in the forest sector to identify the basic points that need to be considered when developing criteria and schemes for the credible verification of biofuels on an international level.

Management of forests is linked to a high extent to social and environmental issues. Over 90 percent of the 1.2 billion people living in extreme poverty depend on forests for some part of their livelihoods (World Bank). Half of the world's forests have been cleared. A forest with area the size of Belgium is lost every year. Over 100 species disappear each day. Poor management of forests has also an enormous economic impact and results in billions of dollars in lost license fees, taxes, revenues and business opportunities in forestry, trade, processing, manufacturing and retailing. Distorted timber markets, depressed timber prices worldwide (7-16% lower prices, AF&PA) and additional costs for good businesses (esp. in marketing) are also consequences. In general poor management of forests creates a loss of customer confidence and leaves wood products with a bad reputation. Boycotts and campaigns have influenced perceptions of forest managers and impacted markets for all forest products over the last 20 years.

Certification of forests is a tool used to differentiate timber from poorly managed forests to create customer and consumer confidence and reduce substantial additional risk to any business especially in environmentally and socially conscious markets. This can be achieved as long as the verification scheme and the underlying criteria are recognised as credible. It is very likely that other types of land use (agricultural use, mining etc.) will lead to similar results and conclusions.

3.1 Drivers for credibility

The driving force behind creating credibility for the certification schemes are mainly society groups (stakeholders) that have addressed the major conflicts in the production process and have been verified and certified. A credible scheme is able to include these groups in standard setting processes as well as in governance and in the verification-process itself. Only if these elements are addressed in an adequate way will the system be able to create long-term-credibility. In both – development of standards and of verification processes – there is always a need to involve local/national affected stakeholders (representatives of local/national indigenous groups, local/national environmental groups, social groups, industry and trade). For the development of international standards and procedures there is a need to involve, beside local/national groups of interests, international environmental and social stakeholder groups.

The FSC met this demand by developing a 3-chamber approach with equal voting rights for environmental, social and economic needs and the direct participation of (local) stakeholders in certification-processes.

3.2 Risks for credibility

There are many positive drivers to gain credibility which are addressed in the FSC-system to a wide range. In development processes for criteria and verification-systems for biofuels these positive aspects should be considered very broadly to guarantee that new systems will gain comparable credibility or even more as FSC does for the forestry sector. Positive aspects are summarised in chapter 4.

Beside these aspects there is serious risk to lose credibility. The following risks involved in a credibility process are experiences of FSC as a result of stakeholder involvement during the development of the system over the last 15 years and a current review of the FSC certification of plantations. The results below can not directly be analysed by a formal screening of the FSC system. Therefore these points are not summarised as result of the evaluation of existing systems in chapter 4.4.2 (“Major Obstacles”) but are given as additional examples for potential risks involved in developing processes for criteria and procedures of sustainable bioenergy that should be taken into account:

1. There is a risk, that consultation processes of stakeholders are well formulated on paper. In practise it is sometimes very difficult to implement the requirements because it is difficult to identify relevant local stakeholders. Sometimes groups are very small and very difficult to involve, especially in less developed countries.
2. It seems that environmental issues are very often very well addressed in systems that are initiated in well developed countries, whereas social issues are underestimated and not recognized as a major source of conflicts for sustainable production.
3. It seems that certification based only on international standards only is sometimes problematic, because it gives too much room for interpretation in specific local circumstances.
4. Certification processes are very often paid by the land-owner who wants to sell and label certified products. Sometimes there is a direct economic link between a certification body and the land-owner which should be avoided and considered as a potential risk for credibility.
5. FSC certification of large-scale plantations indicated very clearly that conflicts increase the bigger the size of the management because the impact has influence not only on values on stand level but also on landscape or even on national level.[1]

[1] Example: A small scale concession (in terms of FSC plantation standard about 1,000 ha) would allow small holders that had been cultivating in that area before to shift into neighouring areas. A large scale concession would dispel small-holders long way off, which would worsen their situation significantly.

6. In international stakeholder processes it seems that the “big players” (which are usually large companies) influence existing systems easier than smaller ones (such as local NGOs) because of their economic capacities. Especially in long processes this can become a growing problem.
7. In addition to the point above it is a challenge for credible systems to guarantee equitable access for stakeholders from less developed countries compared to industrialised countries.

A general problem for the implementation of credible verification schemes is the financial issue. Either a system tends to be too expensive in the development of procedures, criteria, certification processes or systems are cost-effective but not really able to create broad societal credibility.

3.3 Some view-points addressing social-economic implications

Above a FSC-related perspective on certification was given. An additional list of statements based on experiences from international stakeholder processes touching social issues has been provided below:

- Certification or standards can at best be a solution to avoid extreme abuses.
- Certification cannot solve fundamental displacement problems or outweigh the lack of good governance but can create incentives for sustainable production.
- Certification is not a substitute for international rules that prohibit illegal land use practices (e.g., illegal logging etc.) to ensure traditional land rights, whereas the lack of such rules might enhance the dynamic of biofuel production.
- It is necessary to prove in how far the “right to food” (FAO) or the principal “prior and informed consent” can address these systemic effects.
- The implementation of a stakeholder dialogue, a complaint-mechanism, training-measures and regular controls are necessary to improve the situation.

3.4 Summing-up

Certification is an extremely ambitious project. While credibilty is hard to gain and even harder to sustain but easily challenged. However certification is a measure without a reasonable alternative whenever commodities and their production chain have to verify their specific claims in a most credible way.

Global practicability and high grade credibility turn out to be competing claims. Therefore a certification system for sustainable bioenergy has to take compromises into account. However compromises cannot be accepted with respect to a water-tight chain of custody and a sincere involvement of relevant stakeholders – most notably locally concerned NGOs – whenever compromises for criteria have to be decided.

4 Inventory and evaluation of existing certification systems

Scope of this chapter is an analysis and evaluation of established **certification systems**, as well as actual systems which focus on specific biofuels.

Similar assessments and evaluations have been performed by other institutions.[2] Those works have been examined along this project work to refine the pattern of analysing the systems and to crosscheck the results.

The following questions must be posed regarding the systems:

- How are the systems constituted?
- How do they work?
- How do they gain acceptance?
- Which major problems and obstacles do they have to tackle? Where are major limitations or which kinds of drawbacks (in terms of sustainability) won't be avoided despite an effective-working system?
- What are the mechanisms of control?

4.1 Selection of systems

The selection given in Table 1 is defined by the following conditions:

1. Addressing aspects of sustainability,
2. Addressing different biomass production sectors (biofuel, forestry, agriculture and electricity),
3. Avoiding redundancy because of bounded project volume.

[2] • Öko-Institut [Lübbeke, Fritsche et al. 2006] on behalf of WWF Germany,
• Lewandowsky and Faaij [2006], giving input to the Cramer Commission in the Netherlands,
• a working group by UNEP, DaimlerChrysler, and the Federal ministry of Agriculture of Baden-Württemberg [UNEP, Daimler, MLR 2007],
• the IEA Task 40 working group [van Dam et al. 2006]
• meó Consulting Team [2007]

Table 1 Selected existing certification systems

Biomass for energy	**RSPO** [a)]	Roundtable on Sustainable Palm Oil	Focus on palm oil production (pilot phase)
	RTRS [a)]	Roundtable on Responsible Soy	Focus on soybean production (not yet implemented)
	GGL	Green Gold Label (Eugene)	
Forestry	**FSC**	Forest Stewardship Council	
	PEFC	Program for Endorsement of Forest Certification	
	CERTFOR	CERTFORCHILE Sistema Chileno de Certificación de Manejo Forestal Sustentable	Focus on Chile, linked to PEFC
	MTCC	Malaysian Timber Certification Council	Focus on Malaysia
Agriculture and agricultural production	**IFOAM**	International Federation of Organic Agriculture Movements	Focus on organic agriculture
	SAN	Sustainable Agriculture Network	
	EUREP-GAP	Euro-Retailer Produce Working Group - Good agricultural practice	
	SQF	Safe Quality Food	
	Bioland		Focus on organic agriculture
	BIO	Organic Farming – EC control system	Focus on organic agriculture
	CCCC	Common Code for the Coffee Community	Focus on coffee
Social standards	**ETI Base Code**	Ethical Trading Initiative Code of Conduct	
	FLO	Fair-trade Labelling Organisations International	
	FLP	Flower-Label Program	Focus on flower production
Labels for Electricity	**GSL**	Grüner Strom Label	
	OK Power		
	green-e		

a) RSPO and RTRS are not certification systems specifically meant for bioenergy but palm oil and soybean oil are predestined feed stocks for biofuel even if predominantly used in the food and animal food sector.

Beyond the selected systems there is a large number of further labels that are not considered in this analysis because of bounded project capacities. Here are some of them:

- Eco-label (General certification or criteria systems)
- Demeter (agriculture)
- Naturland (agriculture)
- IBD-Instituto Biodinâmico Certification Association (agriculture)
- SFI-Sustainable Forestry Initiative (forestry)
- CSA-Canadian Standards Association (forestry)
- LEI-Lembage Ekolabel Indonesia (forestry)
- Utz Kapeh (coffee)
- Agrocel (cotton)
- AgroFair (social)

During this project the “Better Sugarcane Initiative” (**BSI**) proposed a first draft of principles and criteria. Because this draft has not been published yet, BSI is not assessed within this project.

4.2 Selection of characteristics

Concerning the selected systems (Table 1), the inventoried characteristics are subdivided into three major categories: “framework”, “monitoring” and “criteria”. The first item gives a cursory description. The other two deliver a basis for evaluation.

Table 2 Characterization scheme for the selected certification systems – inventory of framework and monitoring

FRAMEWORK		MONITORING
Basics		**Verification**
Responsible body		Reviewer
Website		Evaluation Process
Foundation (year and participants)		Local stakeholder involvement
Scope of the system (product-wise)		Publication of results
Scope of the system (geographically)		Monitoring
Type of system (certification system, law, …)		Renewal
Objectives (vision, mission, goals)		**Qualification of verification bodies**
Governance		Accreditation bodies
Governance structure		Accreditation process
Basis for participation (e.g. voluntary)		Monitoring
Representation / members		Renewal
Standard setting		**Claims and Product Tracking**
Standard setting bodies and process		Claim
Stakeholder participation		Material tracking
Standard updating default		Validity of claims
Approval		Labelling

Table 3 Characterization scheme for the selected certification systems – inventory of criteria

CRITERIA
Land-use competition
Land use competition (energy vs. competing land usage)
Environmental land-usage issues
Conservation of biodiversity
Protection of species/ecosystems
Soil – erosion
Water resources – depletion/loss
Chemicals – nutrients/pesticides (how is it addressed, what is affected)
Genetically Modified Organisms (GMOs)
National land use regulations
High nature values addressed
Others
Life-cycle aspects
Social-issues in life-cycle addressed
Energy balance (the complete production chain)
Balance of removed resources addressed (nutrients, organic matter)
Water resources – contamination
Soil – contamination
Safeguard subject, climate addressed
GHG balance: (only CO_2 emission / more complex approach)
Air pollution (NOx, SO_2, POP, others...)
Waste management addressed
Others
Socio-economic issues
Social aspects by stakeholder consultation
Land rights (indigenous people, local communities, …)
Freedom of association, collective bargaining
Labour conditions, basic treatment
Temporarily employed (seasonal workers, contract and non-documented workers)
Child labour; forced labour
Wages and compensation
Health and safety
Discrimination (sex, age, handicap, religion, race, nationality)
Training – capacity building, development of skills
Change of way of life, economy and culture, (important stakeholders, indigenous people)
Struggle against poverty (equitable distribution of returns)
Fair trade conditions
Complaint mechanism
Others

The selected certification systems are evaluated according to the characteristics listed in Table 2 and Table 3 in the following section. In most cases this is done by applying a simplified and self-explanatory principle: “clearly addressed”, “addressed but clearly”, “not addressed”. In annex 1 the logic of assignments is given in detail. Some characteristics – such as “reviewer”, “claim”, ”material tracking” are explained below:

Reviewer:
The evaluation differentiates between following types of review (ordered by increasing score):

- “first party”: review is performed by the certification system itself (scored as if there is no review);
- “second party”: review is performed by the trade partner
- “third party”: review is performed by somebody independent

Material tracking
Three supply chain mechanisms are approved:

- Fully segregation:
  There is no mixing of certified and non-certified products. There is a verifiable physical link between plantation and final product.
- *Mass balance:*
  Certified products are mixed with non-certified ones. The actual inventory of certified products is balanced (input/output) after each stage of the supply chain.
- *Book and Claim:*
  Final trader buys certificates from a stock exchange (booking), which have been sold to the market by the producer of certified products. Buyer of certificate claims sustainability independent of the product he receives. In consequence there is no traceability.

For the first two of these mechanisms traceability from the plantation up to the certified end product is required. The third mechanism is a type of certificate trading system. These three mechanisms are scored equally within the evaluation in the section below.

4.3 Screening of existing certification system

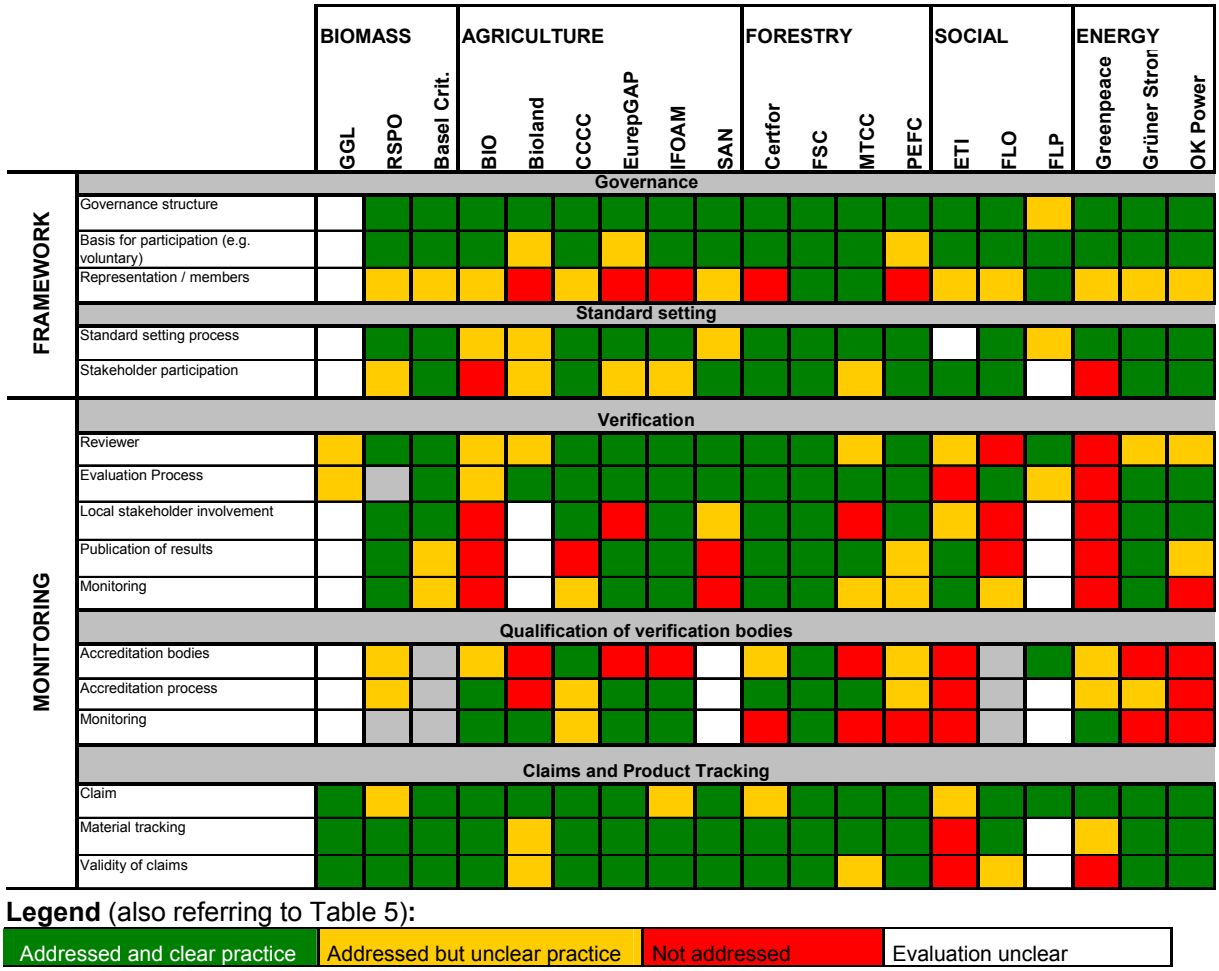
4.3.1 Synoptic overview on screened certification systems

Table 4 and Table 5 sum up the results of the general evaluation of the selected systems. A green flag indicates that the system clearly addresses the concerned aspect and gives an explicit order for practise. Yellow stands for a general reference, leaving practical application unclear. Red shows that the aspect is definitely not addressed by the corresponding system. In annex 1 the logic of assignments is given.

A rough overall evaluation shows a rather broad compliance of most of the selected systems in terms of “framework” and “monitoring”. FSC, IFOAM, Certfor and CCCC can be pointed out to grant the largest grade of conformance.

Table 5 shows a significantly higher total share of “red” labels. Especially an important criterion like “Land use competition” is hardly addressed by any of the systems except GGL (Green Gold Label, Eugene). CCCC, Certfor, ETI, FLO, FLP, FSC, MTCC, PEFC, RSPO, Basel Criteria (RTRS) and SAN comply with the majority of land-use and socio-economic issues. But altogether there is a weak reference to life-cycle issues.

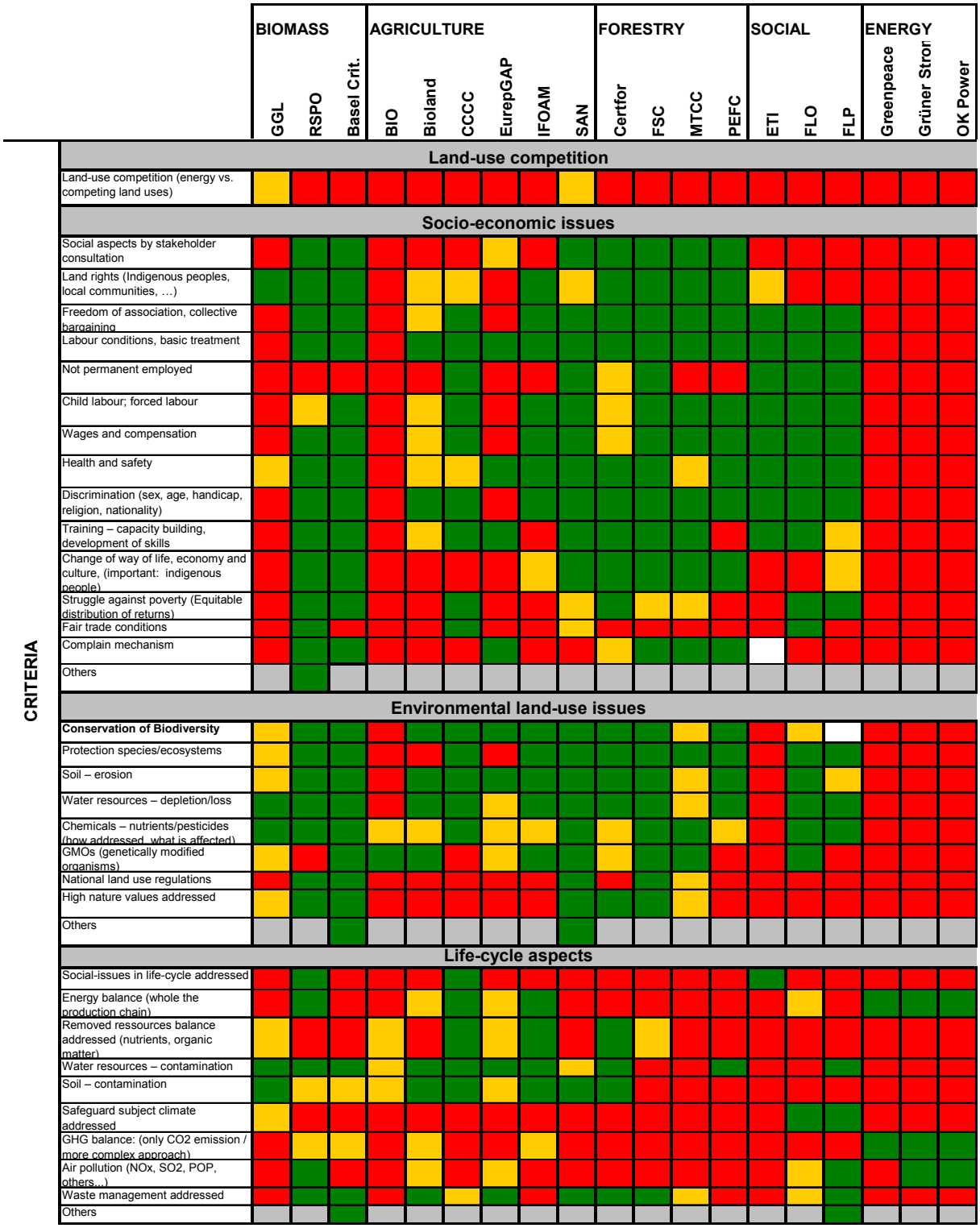
Table 4 Screening evaluation of the selected certification systems (1)



Legend (also referring to Table 5)**:**

Addressed and clear practice	Addressed but unclear practice	Not addressed	Evaluation unclear

Table 5 Screening evaluation of the selected certification systems (2)



The following sections (4.3.2 to 4.3.6) give a brief characterization for each certification system. Section 4.4 contains a detailed consolidation of positive aspects and major obstacles. Final conclusions are summed up in section 4.5.

4.3.2 Biomass for Energy certification or criteria Systems

Roundtable on Sustainable Palm Oil (RSPO):
Officially founded in 2003 this organization passed its principles and criteria in 2007 and started a trial implementation phase in the summer of 2007. Thus the system is not yet fully active.

According to the RSPO Certification document by the executive board three supply chain mechanisms are approved:

- Full segregation
- Mass balance
- Book and Claim

For the first two of these mechanisms traceability from the plantation up to the certified end product is required. The trial phase is supposed to show which mechanism will be most effective.

According to the framework papers [RSPO 2007] the procedures for verification assessment in the future must include consultation with external stakeholders. There are also public summary reports planned. As shown in Table 4 a large number of required aspects were fulfilled. The governance structure of the RSPO decision making remains unclear in the case of conflicts between the participating parties.

Table 5 shows that the majority of scrutinised ecological and social criteria are clearly addressed and defined. These have been elaborated by ProForest and reviewed by the roundtable meetings of members and stakeholders. However missing aspects are criteria in terms of land use competition (national development strategy, food-safety, land-use and usage of the products are not addressed), clearly defined regulations concerning GMO and some life-cycle-aspects (e.g. GHG balance).

RSPO is a broadly esteemed initiative and expected to offer an appropriate certification system for heavily debated oil palm plantation. However some NGO's presume that only a marginal share of palm oil production will be covered by it's label due to it's voluntary character and a discerning (European) outlet market. On the other hand the so-called "spill-over-effect" might drive a broad propagation of the label.

Roundtable on Responsible Soy (RTRS):
RTRS was initiated by WWF Switzerland and Coop Switzerland. It goal is to support the development of criteria for the production of sustainable produced soy. A first paper has been developed by ProForest [2004] known as the so-called “Basel Criteria for Responsible Soy”.

The Basel Criteria has not yet been adopted by the RTRS itself. In the meantime a paper of agreed RTRS principles has been passed by the executive board which covers in a very general manner the majority of the Basel Criteria. A crucial exception is the GMO issue which will definitively be excluded from RTRS criteria [RTRS 2007].

Taking the state of development and the uncertainty about the final paper into account, the Basel Criteria (except the GMO issue) are taken as the baseline for the RTRS system. The evaluation in Table 5 endorses an overall good result. There is a high coverage of the required issues. Comparably to RSPO some life-cycle aspects (GHG) are missing as well as the land use competition issue.

Currently it is unclear whether RTRS will manage to start up, due to discordance within the board. There is particularly substantial disagreement on the “use of gene technology” between industrial members and NGO members. Thus it is criticised that RTRS decision making is extremely unclear in the case of conflicts between the participating parties, whereas the NGO position demands a higher representation.

Green Gold Label:

The quality system of GGL certified products is focussed on a tracing system for biomass from (by-) products (and the energy produced) back to the sustainable source, where there is written proof that the pollution risk of the product with other products and (environmentally) harmful substances is excluded. Information about governance structure, standard setting process and verification is hardly available.

The most interesting criterion of the standard is the method of resolution in regard to the land-use competition. In this the management plan for storage and distribution problems, affecting food availability must be identified and dealt with. Participation in the initiation and maintenance of district and village agricultural land resource planning will be assisted by management and conservation groups. Information gathered by continuous monitoring of the utilisation of natural resources and living conditions will be used for the land resource planning (either individually or on a regional basis). Data about climate, water and soil, land use, vegetation cover and distribution, animal species, utilization of wild plants, production systems and yields, costs and prices and, social and cultural considerations affecting agriculture and adjacent land use will be collected on a regular basis.

Apart from this very ambitious criterion most other socio-economic, environmental and life-cycle issues are not or only poorly implemented.

4.3.3 Forestry Certification systems:

Forestry Stewardship Council (FSC):

An essential feature of FSC is the three-chamber-system comprising of a balanced participation of economic, social and environmental interests in decision-making at all levels including the development of standards. Furthermore a broad participation of stakeholders in certification processes is given in this international binding certification system based on international performance-based standards and procedures. The independent third party certification, the annual monitoring of the owner and the standard setting process is summarized in summary reports which are freely available.

The certified product is traceable from production to the consumer by a credible chain of a custody system (COC) and a trademark.

Concerning the consultation processes improvement is needed in order to grant an adequate performance.

In regard to the criteria the major environmental and social problems are addressed. Particularly positive is the requirement that land ownership and user rights should be clarified before certification is possible. However the implementation of this criterion remains unclear. Land-use competition is somehow addressed by restriction to not certify forest that has been converted before 1994. A negative aspect is the absence of a poverty-criterion, like equitable distribution of returns or fair trade conditions.

Program for Endorsement of Forest Certification (PEFC):
The PEFC is using national and local certification bodies for the certification of forests. This is very positive because the knowledge of the local and national environmental and social situation is still important for the certification. Another positive aspect in regard to national or local certification bodies is the possibility of regional approaches and therefore cost-efficient and easily accessible for small forest owners. Like FSC the PEFC features a credible chain of custody system and a trademark.

On the other hand the PEFC participation models differ from country to country. That rouses an impression of arbitrariness. In some countries the majority of the panel seats are exclusive for representatives of the economic-section (i.e. forest industry). There is no independence between certification/accreditation and the standard setting body.

Positively the PEFC standards find a renewal every five years. But publication of summary reports is not mandatory. Taking the country specific variability into account there is a considerable lack of transparency and consistency as a consequence.

The requirement of ILO standards for all certification schemes under PEFC is again a positive feature. Even if these standards are often system-based standards, with unclear defined regulations for example absence of clear thresholds.

CERTFORCHILE Sistema Chileno de Certificación de Manejo Forestal Sustentable (Certfor):
The exclusively Chilean Certfor certification is implemented through independent third party certification with field-works of national and/or local experts. Summary reports of the certification processes and standards are freely available and the owner of the certificate is subject to annual visits. A traceable chain of custody system and a trademark are given.

Balanced participation of stakeholders is not required – either in the standard setting or in any other organisational process. Decisions are forestry, and industry driven.

In regard to the criteria a requirement that land ownership and user rights should be clarified before certification is addressed but it is unclear how it can be implemented. Also unclear is the way the regulations for GMO, Pesticides, Land-use competition, and many life-cycle-aspects are defined.

Malaysian Timber Certification Council (MTCC)
The MTCC as a national Malaysian certification system demonstrates a legal framework in accordance with various laws, policies and regulations of the three Malaysian regions Sabah, Sarawak and Peninsular Malaysia. The certification is implemented with field-work by national and/or local experts. The resulting outcomes, procedures, standards and guidelines are freely available and clearly documented.

In Malaysia environmental NGOs and representatives of Indigenous Peoples accuse MTCC of a lack of fair and equal participation rights on all levels. Despite the constitution decisions are forest and industry driven without considering the NGO's positions.

The criteria are lacking quantifiable indicators in performance, especially the recognition of land rights of local and indigenous people and there is no requirement for full participation of such groups. On the other hand MTCC aims to reach compatibility with the FSC Principles, Criteria and Indicators.

4.3.4 Agriculture certification systems

Common Code for the Coffee Community (CCCC or 4C):
The internationally scoped CCCC is about to implement certification with field-work from local and or national experts.

It will involve a self-assessment scheme by the producers and which includes no clear regulations and formal procedures for stakeholders to influence neither the production nor the verification process.

An international chain of custody and a label for the independent third-party certified coffee is in place but it is not recognized as credible by conflicting parties and furthermore there is no publication of the verification reports in place.

The Logos and the "The 4C general statement" may not be printed on coffee-end-products, only "The 4C members' statement". The members may use the logo along the coffee chain or for publication.

The accreditation of the certifiers is progressed by 4C and regarding the accreditation, standard setting and certification there is no equal participation of major conflicting parties in place.

Concerning criteria clearly defined social aspects and stakeholder consultation, land rights (Indigenous peoples, local communities), regulation for GMOs, national land use regulations, areas of high nature values are missing.

International Federation of Organic Agriculture Movements (IFOAM):
The international accreditation system IFOAM features a well-structured governance and evaluation process which is a basic element of credibility. Furthermore the set of standards is renewed every three years and the standard setting is a clearly defined and structured process.

The water-tight chain of custody (COC) means it's possible to trace the finished product back to incoming ingredients or fields of production. Processing and handling and the monitoring of the verification are carried out by an independent 3rd party inspector.

Most of the ILO standards are considered within the criteria. But fair trade conditions, a complain mechanism or a criterion for temporarily employed workers are not required. Furthermore a criterion for removed resources is addressed, but life cycle aspects like the GHG-balance are missing.

Organic Farming – EC control system (Bio):
This European certification system is under the umbrella of the European Union. The certification is progressed by inspection authorities and/or by approved private bodies. In the certification process there is no stakeholder involvement or publication of results addressed, but there are annual unannounced random audits of the certification owner.

The product tracking and the claim are clearly defined and structured.

Concerning the criteria land use competition, national land use regulations and HNV are not addressed. Furthermore, there are no social criteria in the Bio-Standard and the GHG and most other environmental issues are not addressed. GMOs are generally prohibited.

Bioland:
The governance of the national certification system Bioland is well structured, but members are only agricultural companies. The standards are based on existing guidelines of ecological agriculture (IFOAM, EG-Bio-regulation etc.). Participation of non-agricultural stakeholders in this process is not addressed. The Bioland certification bodies are accredited by Bioland itself as well as are the continuous evaluations of the certification bodies. Bioland has no own track and trace system, but there is an implementation of track and trace systems driven by Bioland certified partners.

The criteria and guidelines for the handling of different organic products are formulated in great detail and the land use issues are strongly addressed. In other respects there is correspondence with the BIO label criteria.

Euro-Retailer Produce Working Group - Good agricultural practice (EurepGAP):
Similar to IFOAM the EurepGAP system offers a well-structured governance and evaluation process. Standard setting is a clearly defined and structured process.

EurepGAP is a „Business-to-Business“1st party certification. For the consumer the label is not directly visible.

The criteria are focussed on food quality and therefore deficient in terms of socio-economic issues, the land-use and the GHG criterion.

Sustainable Agriculture Network (SAN):
The scope of SAN is focussed on tropical areas under the umbrella of the Rainforest Alliance. This certification system features well structured governance and evaluation processes and an intensive stakeholder involvement, as basic instruments for credibility.

A chain of custody system is included to avoid the mixing of products from certified farms with products from non-certified farms.

The strong social criteria are clearly defined and the land use competition is partly addressed. Furthermore the national land use regulations and HNV are addressed and in regard to the rainforest conservation a clearly defined claim is related, GMO are strictly prohibited, but GHG and most other life-cycle issues, like energy and removed resources are not addressed.

4.3.5 Fair Trade certification or criteria Systems

Ethical Trading Initiative Code of Conduct (ETI Base Code):
The Governing Board is made up of equal representatives from the three main categories of members, companies, trade union organisations and NGOs.

The ETI Base Code is voluntary and dependant on the self-commitment of the members. It is not obvious how auditing and monitoring work. In the code of principles there is just a written commitment: "Member companies accept the principle that the implementation of codes will be assessed through monitoring and independent verification; and that performance with regard to monitoring practice and implementation of codes will be reported annually."

The ETI Base Code is a reflection of the most relevant international social standards with respect to labour practices.

Fairtrade Labelling Organisations International (FLO):
The FLO standard-setting process includes the participation of stakeholders in terms of drafting proposals for new or revised standards. Even though FLO certification acts as an independent body and contracts consultants to carry out the inspections, there is no direct involvement of stakeholders in the verification process. There is also a lack of transparency as inspection reports are not published and the verification body has not yet been accredited.

The socio-economic issues considered by FLO address the rights of small farmers and hired workers directly involved in the production of agricultural products. Broader issues concerning the local population such as land rights, land use conflicts and changes in the way of life are not taken into account. By dividing the prices paid into fair-trade premium, social premium and organic premium FLO channels the sustainable use of revenues. However, this complex concept remains abstract to many farmers, because of the social premium often being used to cover operational costs or distributed among farmers and prefinancing is often mixed with other credits and not identified as a fair-trade benefit [Murray et al. 2006].

The FLO environmental standards neither address national land use regulations nor high nature values. Life-cycle aspects are only roughly considered.

Flower Label Program (FLP):
FLP strives for stakeholder participation at the governance, standard-setting and verification levels, thus leading to high credibility. The verification process of FLP is quite transparent since human rights groups and trade unions being founding members of the program actively participate in the inspections. Regarding the product labelling, consumers are not always able to identify FLP flowers since the labels are often assigned to traders rather than to certain flowers [Jorge Rosero 2006].

Labour standards are widely covered, but broader issues such as land rights, change of way of life and the particularly relevant aspect of land-use competition are not taken

into account. The FLP environmental standards neither address national land use regulations nor high nature values. Life-cycle aspects are not considered.

4.3.6 Energy certification systems:

The considered energy certification systems or concepts do not address socio-economic or environmental criteria. The major criterion is the 100% renewable nature of the applied energy sources.
The three systems only differ in terms of framework and monitoring.

Greenpeace Energy, as a local service concept, provides power from Greenpeace e.V.-accepted sources, but a certification is not in place. Independent evaluators, like Stiftung Warentest or TÜV Nord approve Greenpeace Energy eG. Greenpeace Energy sources the power from renewable energy providers and delivers the green power unlabelled to the consumer.

Grüner Strom is a German certification system. The Zentrum für Sonnenenergie- und Wasserstoffforschung (ZSW) is providing the certification body. A broad stakeholder involvement and publication of certification and standard setting processes is given.

OK Power certification is in progress by non accredited but provider-independent certifiers. During the certification process and also during the standard setting process, a broad stakeholder participation and publication of results is given.

4.4 Conclusions from screened Certification Systems

The following positive essences and major obstacles are the result of a detailed evaluation of screened certification systems in chapter 4.3., including experiences of existing certification systems, information from third parties, direct consultation of experts, feedback on existing systems from observers via internet and articles and advisements during analysis and evaluation. The list below summarises all positive and negative aspects that should be considered by developing criteria or even systems for verification of the sustainable production of biofuels.

4.4.1 Positive Aspects

The listed positive aspects should be understood as essentially recommended elements for implementation for a biomass certification system.

4.4.1.1 On Framework:

International approach: Internationally binding certification system based on international standards and procedures concede a standardized system. A standardised international system guarantees unity on national levels, which means that every national certification system under the umbrella of the international system has the same governance structure, procedures and standards, with the effect of more transparency and a high potential to gain credibility.

Balanced Participation: Balanced participation in the governance and decision making seems to be a key factor to gain credibility for verification systems. Without this balanced participation with equal voting rights, the whole system, especially the decisions like the standard-setting, lose their emphasis.

Transparency: Transparency for stakeholders, regarding decision making processes and outcomes of monitoring procedures (in certification) seems to be another key factor to gain credibility. No transparency arouses suspiciousness among conflicting parties and thus risks credibility.

Stakeholder involvement: Is essentially needed in the verification processes (defining of criteria and the verification process itself) to provide an opportunity to address international, national and local needs in standard setting processes. Furthermore it seems that only with equitable access for stakeholders from low income and industrialized countries is it possible to gain credibility.

Track and Trace: International COC procedures and a label create a direct link between production and consumption. It is an essential element to maintain trust in labelling. Mass balances are a reasonable solution if strictly separate COC is not practical. The FSC mixed resources label is an example for transparency in the case of a mix of verified and non verified feed stocks.

Regional approaches: Regional approaches may make verification systems cost-efficient and easily accessible for small certification candidates. Nevertheless regional approaches would require credible sampling methods for the monitoring to be recognised as a positive aspect.

Democratic values: It could be seen as positive aspect if verification systems are democratic and open for competing viewpoints. Some systems gain credibility by opening their systems for voluntary membership structures which allow a wide range of stakeholders to directly influence decision making processes and governance structure with basic democratic tools.

4.4.1.2 On certification

Generic standards: The existence of generic standards allows verification in circumstances where there is no national movement or national acceptance for sustainable approaches. With generic standards it is an owner-decision to work with international standards independent from national constraints. Nevertheless there is a high risk to lose credibility by the use of generic standards by not involving national/local stakeholder needs to an appropriate extent.

National adoption on indicator level: Criteria for verification of products in international markets should be internationally binding and identical. For the development of indicators and verifiers national adoptions give the possible positive effect of reflecting national laws, national ecological and social conditions and specific national needs of stakeholders.

Requirement for certification: The requirement that land ownership and user rights should be clarified before certification in order to prevent obstacles after certification are key positive factors regardless of the scope of verification or the product.

Publication of results: Summary reports of certifications and standard setting processes should be freely available to get more transparency and gain credibility from interesting stakeholders.

Certifier: International accredited independent third party certification done by certification bodies with national/ field-work experience are positive aspects. An independent third party certification is more credible than a second-party or a first-party certification. National and/or local certification bodies have more knowledge in regards to local social and environmental occurrences.

Monitoring: Annual visits of all certificate owners and periodic inspections avoid deliberate infringements by the certificate owner.

Stakeholder involvement: Stakeholder viewpoints and their serious considerations in verification procedures can be a major obstacle in implementing a certification system

and so a certification system should provide a potential for a stakeholder to address international, national and local needs in certification processes.

4.4.1.3 On criteria:

Definition of criteria: Clearly defined criteria are the basis for transparency, a better implementation and a better controlling/monitoring system.

Performance-based standards: The screening of existing systems showed clearly that system-based standards are often weak and do not have the potential to gain credibility. Therefore specified criteria with clear regulations and thresholds where possible or appropriate are easier to understand and to control. At the same time performance-based standards have the potential to have a real impact on production methods on the ground.

This is particularly essential in regard to the important criteria for biomass (e.g. land use competition) that is not yet being sufficiently addressed by existing systems.

Social-economic aspects: ILO is a credible and approved convention and internationally accepted. Most certification systems enclose these standards, which should be minimum requirements.

Some examples reveal that addressing the rights of small farmers and hired workers is extremely helpful to avoid possible social obstacles or evocation of social conflicts.

4.4.2 Major obstacles

The listed negative aspects are in some cases just negations of the discussed positive aspects. In this section it is discussed from a point of view, what should be avoided to facilitate an accepted and reliable biomass certification system?

4.4.2.1 General obstacles

Acceptance and credibility of certification is strongly dependant from a balanced and well-structured framework and monitoring system. The following aspects are of specific relevance:

No balanced participation at all levels: A real balanced participation of major conflicting interests in decision-making at all levels including the development of standards is required for the credibility of the whole system. Without this balanced participation, including equal voting rights, the certification system instruments will lose credibility.

Participation is unclear and internationally very different: Concerning the above-named reason a participation in the system should not be unclear and should be internationally consistent and binding.

No certification system: Voluntary and self-assessment procedures have a very low potential to gain long-term credibility. Thus certification is an indispensable device.

No transparency: Furthermore for credibility the whole system should be transparent for all interested parties or persons. Required publication of certification or standard setting processes are important instruments to implement transparency.

System-based standards: For credibility and application of the criteria the standards should be performance-based and not system-based.

Variability of standards: For credibility and application of the criteria the standards should not be too different or variable on national and international levels.

No water-tight track and trace system: To trace the product from the end-consumer to the producer a water-tight track and trace system should be in place. Mixing with non conformable parts from non certified sources should at least be connected with a mass-balance-verification. The Book and Claim mechanism might be practical, but there are no experiences with this type of commodity.

No label or no direct visible label in place: Concerning the above-named reason a label, visible for every part in the Chain of Custody until the end-consumer, should be in place.

Second- or first-party accreditation or certification: For a credible certification system there should be an independent third-party certification and accreditation in place.

Use of international certification bodies: National and/or certification bodies have more experience and support in regard to the local environmental and social occurrences. Furthermore in many cases they are cheaper depending on the financing structure of the verification system.

No monitoring: To avoid unconscientious certification or accreditation monitoring by the third-party accreditation and certification bodies should be implemented by the certification system and the accreditation body respectively.

No clear defined criteria: The criteria should be clearly defined in order to create better controlling, monitoring and implementation.

4.4.2.2 Obstacles concerning standards and specific criteria

None of the evaluated certification systems considers the whole scope of the screened criteria checklist (see Table 5). Of course this is a natural consequence of the specific goals and claims of the systems. For a fair-trade system ecological aspects are secondary claims, for ecological agriculture vice verse. Taking life-cycle aspects into account is a very recent way of scoping. Land use competition is an issue that started to become notorious with the increase in biomass production for energy. So naturally these sorts of criteria where not (satisfactorily) addressed by any of certification systems.

Criteria for **land use competition** (→ fuel vs. food issue) and **indirect land use change** (→ displacement of e.g. smallholders to log primary forests driven by expanding biomass producing farms or plantations) turn out to be very complicated to define and even more complicated to verify. Experience of obstacles with these criteria is not available. The basic obstacle is the need to develop and implement such criteria.

The major obstacle for implementing criteria considering indirect effects is the difficulty in realizing the need for monitoring and verification of land use change mechanisms throughout the surface of an economy. This cannot be provided by a certification system covering only the specific production site for biomass and the process chain. It requires proof on a verifiable land use policy in the countries of origin.

There is also very little experience in terms of ecological criteria throughout the **life-cycle**. In most cases the reason is that the certification focuses on a specific stage of the production (e.g. cultivation) and obviously not the whole life-cycle. But a well constituted chain of custody should be a working foundation to verify respective criteria throughout the chain. Some of the existing systems discuss implementation of life-cycle aspects in Chain-of-custody systems such as environmental or social standards for the processing of goods. However criteria and there application still need development (especially GHG).

A larger number of criteria of basic importance concerning **ecological impacts of biomass production** are addressed by the evaluated systems (see Table 5). Conservation of biological diversity for instance is a frequently required criterion. But by considering the ways in which it is implemented and consolidated we see big differences between the systems. Forest certification mostly requires just the number of tree species, not the diversity of a forest as a complex ecosystem.

Social-economic criteria are key factors for credibility and acceptance of certification. A broad number of such criteria are addressed by many of evaluated systems. But verification involves complex issues. The invasion of land which is traditionally used but not officially owned by the local population is a common practice throughout many developing countries. Severe conflicts and human rights violations are often the consequence. Land tenure conflicts also lead to increased deforestation. When subsistence farmers are deprived of their land and the plantation project does not generate sufficient jobs for the local population, leakage effects can be generated. People deprived of their (agricultural) land may open up patches of forest, in order to generate income and food.

e.g. Indigenous communities which used to be well-off in terms of food security and available recreational time while having the control over production and management and enjoying stability in supply and income may after their integration into the oil palm business receive regular wages, but at the same time they experience new challenges such as the dependence on markets and trade, the loss of control at community level, environmental damage and conflict. Even ambitious certification systems have difficulties in taking such inter-relations into account. And often short-comings in this area offer reasons to blame certification.

Social-economic problems might also root in the change of cultivation modes. The production of bioenergy often involves the cultivation of perennial crops such as short rotation forests and miscanthus. These crops require immediate investments, but do not generate short-term revenues, since their first harvest may only be after some years. Thus, long-term bioenergy production has an increased financial risk, compared to annual crop production. Such risks are complications which have to be considered along with certification.

The structural situation that exists in many producer countries in the South challenges the goal of certification systems because of their need for:

- Fair labour conditions (There exists poor housing facilities, no sanitary facilities, poor food and water supply, lacking safety equipment, no social security, debt bondage due to charging for all kinds of expenses including working equipment, armed supervision).
- Struggle against discrimination (there are no payments for wives, or only daily employment)
- Wages and compensation (an unawareness of a minimum wage is due to the absence of independent unions; people exists on subsistence level barely covering children's school costs; there is the question of who determines the minimum wage and how? Formulas often are too static and bargaining between local actors is difficult to audit; an unskilled worker earns a little more than one euro a day).
- Child labour (in poor countries child labour is complicated to query because families depend on their income; a rigorous prohibition of child labour may push children into dangerous informal employment sectors; there is a necessity to offer alternatives, e.g. educational programmes)
- Freedom of association and collective bargaining (due to the absence of unions a criterion of free speech can not be monitored by the yearly inspections of a few workers)
- Training (the most important instruments to improve problematic situations in companies and one which is underestimated is that of awareness raising and training. Strategies for training do not exist).
- Fair-trade (it often remains an abstract concept to many farmers; social premium is often used to cover operational costs or is distributed among farmers; pre-financing is often mixed with other credits and not identified as fair trade benefit).

4.5 Summary of Conclusions on usability of existing certification systems

None of the evaluated certification systems covers the whole range of criteria and requirements needed for biomass certification. A major reason is the specific scope of each of the single systems which concentrate on a sector (wood, agriculture etc.) or specific claims (fair-trade, environmentally sound cultivation etc.). But overall they provide a broad coverage of a large number of criteria even if some specific ones are definitively absent. For instance life-cycle based aspects are rarely addressed and land use competition is actually not included. A number of addressed core criteria like *conservation of biodiversity* appear to be applied only in a rather unspecific way and lack "hard indicators". Monitoring and verifying of social criteria often collide with structural problems in poorer countries.

However the evaluated selection provides promising starting points. For example:

- *FSC* (with a good practice frame work and monitoring, an extended list of criteria and a tight chain of custody),
- *SAN* (covering the largest scale of core criteria with strong)
- The business-to-business system *EurepCAP* (no 3rd party verification, but strict COC and evaluation due to direct economic interest of the members).

Good practice features with regard to biomass can be summarized as follows:

- Broad stakeholder involvement
- Certification in absence of national standards is problematic (Generic standards of Certification bodies).
- Avoidance of unclear and internationally different participation models
- Avoidance of it being too easily accessible for everybody without implementation of standards on the ground (Systems to comply with the criteria)
- Publication of summary reports shall be addressed
- Variability of standards (international to national, national to national)
- Participation of indigenous groups
- Third-party accreditation of the certification bodies
- Water-tight COC and labelling until the end-consumer must be in place
- Clear balance of participation on all levels (governance, standard setting…)
- Such trends could be observed in the case of smallholder schemes. They consist of a nucleus company, which is in charge of developing smallholder estates usually adjacent to its own estates. The nucleus company arranges and guarantees the financing and provides agricultural inputs, while the smallholders agree to sell their

yield to this company. The credit system that such smallholder schemes are based on makes farmers highly dependent on the nucleus company.

There are significant obstacles to surmount if a certification system should satisfy the complete list of these features. The most challenging obstacle in general is the permanent need of granting reliability often working in socially and politically complicated areas of the world.

Some of the criteria not yet in application (GHG balance, Life-Cycle aspects) should be feasible to implement. But a good practice example for consideration of indirect land use change effects is missing. Only the *Green Gold Label* (EUGENE) requires, that "the agricultural management system has implemented sustainable plant nutrition to increase food production" [GGL 2005]. But practical application of this criterion has not been presented.

Obstacles might occur specifically concerning the COC verification of biomass for liquid fuels as final products. Good *track and trace* experiences exist with solid materials (wood, food). The alternative *mass flow balance* system (input-output) is only in application by the FSC mixed resources label. The *book and claim* approach is currently only in application in green electricity labels, where contracted delivery and real connections between producer and customer can be traced.

The legislative background in Germany (and also in the EU) requires a mandatory certification. This might rouse specific obstacles for all existing systems are voluntary and motivated by the demand of a section of consumers.

5 Survey and documentation of similar work

In this chapter a selection of the most advanced initiatives will be analysed and compared in regard to sustainability criteria.

At the beginning of this research work in autumn 2006 the most advanced activities with similar objectives were being promoted by the Dutch and the British government. Meanwhile the German government drafted the Biomass Sustainability Regulation and the EU Commission drafted the Directive on the promotion of the use of energy from renewable sources [EC Directive 2008/0016 (COD)]. Both legal works contain sustainability criteria and in both cases previously started actions in the Netherlands and the UK have been respected.

In the year 2006 the European Commission also initiated a research project to develop sustainability criteria for biofuels. A report is not yet available. The documents from the Dutch and British part are well-elaborate and will be addressed in more detail below.

France, Sweden, Belgium have also started to tackle this issue. In Switzerland the Roundtable on Sustainable Biofuels led and managed by the École Polytechnique Fédérale de Lausanne (EPFL) has started a multi-stakeholder initiative to develop standards for the sustainability of biofuels.

The Low Carbon Fuel Standard (LCFS) launched by the Californian Government is a notable initiative outside of Europe. However the sustainability issue focuses on the greenhouse gas balance.

Apart from governmental initiatives there are several non-governmental inputs to this global issue.

5.1 Selection of Initiatives

Similar work to this project is currently ongoing or in the state of further refinement by:

- The Netherlands: coordinated by the “Cramer Commission” on behalf of the Dutch Ministry of Environment. Involved organisations: Senternovem (lead-manager), CE, Ecofys, University of Utrecht [Cramer et al. 2007].
- The United Kingdom: coordinated by Low Carbon Vehicle Partnership (Low CVP). Involved organisations: E4Tech, Ecofys [Department for Transport 2008].
- The WWF Germany: performed by Öko-Institut [Lübbeke, Fritsche et al. 2006]
- The Roundtable on Sustainable Biofuels [RSB 2007]

In the **Netherlands** the discussion about a certification system for biofuels started when NGO ran campaigns against palm oil import from Indonesia with accusations of logging of tropical rain forest. This led the Dutch government to set up the project group “Sus-

tainable production of biomass" – briefly called the *Cramer Commission*[3]. A first document about criteria for sustainable biomass production was published in July 2006 [Cramer et al. 2006]. The final report [Cramer et al. 2007] consolidates these criteria within a testing framework.

The **UK** Renewable Transport Fuel Obligation (RTFO) aims to encourage the supply of biofuels from sustainable sources that will contribute effectively to the reduction of greenhouse gas emissions. To achieve the aim of carbon & sustainability reporting within the RTFO the work has been split into two separate projects:

- the Carbon Certification Project to develop a robust, practical and cost-effective methodology for the consistent quantification of GHG savings for biofuels from different pathways [E4Tech 2006]
- the Sustainability Reporting Project, [Ecofys 2006]

Very recently the Department for Transport [2008] published the Requirements and Guidance documents to enable companies to apply the reporting requirements effectively.

The **WWF study** [Lübbeke, Fritsche et al. 2006] is considered to be one of the most targeting contributions on the part of NGO considering sustainability standards for bioenergy. The study proposes a core list of standards which are categorized in a governance system in terms of (regional) scope, and recommends the time horizon for implementation. The study is understood to be a starting point for a long-term procedure of adjustment, refinement and making "operational". The authors define the time scale of a "fully" developed set of criteria about 10 to 20 years.

The **Roundtable on Sustainable Biofuels (RSB)** published draft principles for sustainable production of biofuels, for global stakeholder comment via the Bioenergy Wiki, in person, via email, or through teleconferences. It will be the baseline for a second round of stakeholder consultation.

The RSB has organized commitment into principles, criteria and indicators – elements which enable an evaluation as to whether a farm, producer, or company is meeting a particular criterion. The purpose of these principles is to indicate the ideal scenario towards which stakeholders should be progressing.

The RSB will develop mechanisms to encourage companies and supply chains to progress towards these goals. The RSB remains committed to incorporating and recognizing other sustainability standards work, to harmonize and reduce any eventual reporting burdens as much as possible [RSB 2007].

[3] Referring to the chairwoman Jacqueline Cramer (meanwhile Dutch minister of environment).

5.2 Evaluation of criteria proposed by the selected initiatives

In the following the initiatives from the Netherlands and the UK, the study by WWF [Lübbeke, Fritsche et al. 2006] and the latest proposal by the RSB will be analysed in terms of criteria and proposed standards. In general these works are based on criteria taken over from existing certification systems and/or including national legislations. Compared to existing systems (FSC, IFOAM, FLO) or to systems about to enter market (RSPO) these initiatives try to keep the number of criteria limited to selective "core criteria".

Table 6 and Table 7 give a very short survey on the three works – plus the latest proposal by the RSB. The criteria structure by the German BSR and the EU Renewable Energy Directive will serve as a pattern. Below some aspects are highlighted.

5.2.1 GHG-balance and conservation of carbon stocks

Within the German BSR and the EU Renewable Energy Directive GHG saving is somehow the central criterion concerning sustainability of bioenergy. Whereas in Germany biofuels will have to verify a saving rate of 30 % (40 % by the year 2011) the European Commission targets 35 % GHG emission saving from the use of biofuels and other bioliquids compared to the fossil reference system.

In addition to the required saving rate the Renewable Energy Directive will regulate that "biofuels and other bioliquids … will not be made from raw material obtained from land with high carbon stock." Such as: wetlands (including pristine peat land) and continuously forested areas (Art. 15 (4)).

Existing certification systems do not require a GHG balance. It was up to the Dutch and UK initiatives and the WWF to introduce this requirement.

The **Netherlands** and the WWF proposed limiting values already in 2006. Limiting values can be recommended due to their containment of clearance. The values themselves can be adapted in the future into practicable limit values. The Cramer Commission [Cramer et al. 2007] defines that the emission reduction of greenhouse gases amounts to at least 50-70% for electricity production and at least 30% for biofuels as the minimum requirement.

Further the Cramer Commission defines the principles that biomass production must not be at the expense of important carbon deposits in the vegetation and in the soil. The loss of above-ground carbon storage has to be recovered within a period of ten years of biomass production. Areas with a great risk of significant carbon losses from the soil, such as certain grasslands, peat areas, mangroves and wet areas are excluded. (→ compare with Article 15 (4) of the Renewable Energy Directive).

In the beginning GHG saving emission was the only criteria within the **UK** approach. Meanwhile the "*Carbon and Sustainability Reporting Within the RTFO*" [Department for

Transport, 2008] has developed into a multi-criteria system, which is comparable to the Dutch approach in many respects. As for GHG saving the UK system has chosen a specific type of approach: it sets a target to the overall level of GHG saving achieved by the biofuel supplied in each obligation period:

2008 – 2009: 40 %
2009 – 2010: 45 %
2010 – 2011: 50%

The level of GHG saving is an overall target for all fuels and feed stocks reported by a fuel supplier.

Concerning “carbon preservation” the UK has adopted a principle identical with the Dutch one described above.

The approach proposed by the **WWF** [Lübbeke, Fritsche et al. 2006] tends to differ between the bioenergy cultivation scope and the complete life-cycle. The first one will be limited to 30 kg CO_2-eq. /GJ bioenergy, the second one is to reduce the GHG to a maximum life-cycle GHG balance of 67% compared to crude-oil combustion. Both approaches are in relation to their existing limiting values essential criteria.

The **RSB** currently only requires that a biofuel will contribute to climate stabilization by reducing GHG emissions as compared to fossil fuels.

5.2.2 Land-use competition

Land-use competition is addressed by the **Dutch** initiative which requires that “the production of biomass for energy must not endanger the food supply and local biomass applications (energy supply, medicines, and building materials).” However the Cramer report does not deliver clearly defined indicators. The criterion concentrates on reporting on request of the Dutch government and to support the monitoring at macro-level. There is definitively a need for criterion. But it is difficult to describe how it can be implemented in nations where controlling of land-use change by the governance is not given.

Along with the conclusion by **WWF** [Lübbeke, Fritsche et al. 2006] it must be stated that this essential criterion needs to be expanded.

RSB also defines that Biofuel production shall not impair food security. GHG balancing will also include GHG emissions resulting from land use changes as land is converted to biofuel crop production, or as other production is displaced.

5.2.3 Biodiversity

Protection of biological diversity is a core criterion within the German **BSR** and the EU Renewable Energy Directive. The BSR dedicates the entire section 3 to the protection of natural habitats and regulates that sustainably produced raw material for biofuel may not be grown in high natural conservation value areas (areas that exhibit, in globally or regionally significant levels, accumulations of protectable resources of relevance to biodiversity). Reference date is January 2005.

According to Article 15 (3) of the **EU** Renewable Energy Directive "biofuels and other bioliquids … will not be made from raw material obtained from land with recognised high biodiversity value", like:

- forest undisturbed by significant human activity,
- areas designated for nature protection purposes,
- highly bio diverse grassland.

Reference date here is January 2008.

Within the **Dutch** and the **UK** approach the preservation of biodiversity is also a central principle. They define a large number of indicators as minimum requirements and also some just for reporting (Cramer report). The Dutch report announces January 2007 as a reference date concerning replaced HCV areas – with the exception of those biomass flows for which a reference date already applies from other certification systems (currently under development). The UK sets November 2005 as a reference date for no conversion of high biodiversity areas.

Also **WWF** recognizes the need of a standard to prevent additional negative biodiversity impacts due to biomass production. The report [Lübbeke, Fritsche et al. 2006] provides a detailed analysis of mechanisms of biodiversity loss and deforestation.

RSB postulates that Biofuel production shall not directly or indirectly endanger wildlife species or areas of high conservation value.

5.2.4 Soil conservation, water conservation and use, air quality

The German BSR refers in section 2 to the requirements of a "sustainable cultivation of agricultural land" necessary for the prevention of negative impacts on global protectable natural resources. The Regulation assumes general compatibility as far as the "biomass was produced in accordance with the principles of good practice pursuant to the laws and regulations governing agriculture, forestry and fisheries or in conformity with the rules of cross-compliance."

In case rules of cross-compliance or comparable rules are not given BSR requires:

1. no significant increase in emissions of acidic, eutrophic, ozone-depleting or toxic substances;

2. no significant deterioration of soil function or soil fertility (e.g. preservation of organic substance, protection against erosion);
3. no significant deterioration of water quality and water supply;
4. no significant deterioration of species and ecosystem diversity and environmentally safe use of fertilizers, pesticides and herbicides.

The **EU** Renewable Energy Directive does not announce specific criteria for the protection of soil, water and air but requires reporting by the member states according to the estimated impact of biofuel production on biodiversity, water resources, water quality and soil quality (Article 19 j).

The **Dutch** and the **UK** proposals again are setting far-ranging criteria which are in line with a number of existing certification systems. A basically new and estimated criteria concerning soil conservation is the use of agricultural by-products. The indicators are a balance of soil nutrient and organic matter. Also favourable is the requirement that the use of by-products shall not occur at the expense of important traditional uses. Furthermore the Dutch initiative excludes the use of non-renewable water resources. Within the Dutch and the UK initiative records are required of annual measurements of values like pH, loss of soil or use of water salt content.

Dutch and UK initiative address the prohibition of fire for land clearing or waste disposal, which is an important criteria regarding the air pollution. Relating this criterion to national legislation might not be sufficient because most of the non-industrial countries have no regulation in this area.

WWF also address these important environmental themes and expresses three standards:

- Minimisation of soil erosion and degradation,
- Minimisation of water use and water contamination,
- Avoiding human health impacts

RSB defines that biofuel production shall not directly or indirectly degrade or damage soils, shall not directly or indirectly contaminate or deplete water resources and shall not directly or indirectly lead to air pollution. More concrete indicators have not yet been developed.

5.2.5 Synopsis of the proposals

Table 6 summarizes the environmental issues shown above and gives a short survey on the principles and standards within the BSR, the EU Renewable Energy Directive, the Dutch and the UK approach, as well as the recommendations by WWF and RSB.

In addition Table 7 gives a survey on the socio-economic criteria required by the Dutch and the UK proposal and recommended by the WWF and the RSB.

Table 6 Ecological principles and criteria by the Dutch and UK initiatives and standards proposed by WWF/Öko-Institut

Principles and criteria	**BSR**	**EU Dir RES**	**NL**	**UK**	**WWF**	**RSB**
Carbon performance:						
GHG emission saving	**X**	**X**	**X**	**X**	X	X
Carbon conservation:						
Preservation of … above ground carbon stocks	(X)	X	X	X	(X)	(X)
… below ground carbon stocks	(X)	X	X	X	(X)	(X)
Food competition:						
No competition with food, local energy supply, medicines and building			X		X	X
Biodiversity conservation:						
Biomass production will not lead to the destruction or damaging of high biodiversity areas	X	X	**X**	**X**	X	X
Soil conservation:						
Biomass production does not lead to soil degradation	X		**X**	**X**	X	X
Sustainable water use:						
Biomass production does not lead to the contamination or depletion of water sources	X		**X**	**X**		X
Air quality:						
Biomass production does not lead to air pollution	X		**X**	**X**	X	X

Explanation:
X: addressed and consolidated by a detailed number of indicators or elaborate methodology
X: directly addressed but low level of specification
(X): indirectly addressed

Table 7 **Socio-economic principles, criteria or standards by the Dutch and UK initiatives, recommendation by WWF/Öko-Institut and RSB**

Principles and criteria (taken from NL/UK)	**NL**	**UK**	**WWF**	**RSB**
Prosperity: Biomass production contributes to local and national prosperity	**X**		X	X
Positive contribution of production activities to local economy and local industries				
Social Well-Being Production of biomass contributes to the well-being of workers and local population	**X**		X	X
No negative effects on working conditions of workers				
No violation of human rights				
No violation of prosperity rights and rights of use				
Positive contribution to social conditions of local population				
No violation of integrity				
Labour standards		**X**		
Compliance with law on national working condition				
Legal contracts with transparency about employees' rights				
Freedom of association and right to collective bargaining (ILO)				
Regulation of workings hours (ILO, SASA)				
Child labour restricted				
Health and safety			X	
Wages/compensation at least at the level of legal national minimum				
No discrimination (ILO, SASA)				
No forced labour				
Land use rights and participation		**X**	X	X
Land right issues and consultation of local stakeholders				

5.3 Further initiatives from NGO position

Apart from the work done by WWF/Öko-Institut [Lübbeke, Fritsche et al. 2006] there are some more NGO-driven activities in the filed of developing or requiring sustainability criteria for biomass. They are briefly featured below.

BirdLife International

Within the position paper “Bioenergy fuel for the future?” [BirdLife 2005] this environmental NGO laid down its requirements for Bioenergy use in the EU. They demand for the introduction of a system of certification and accreditation for bioenergy. This should measure carbon benefits and ensure a production that will not result in other negative biodiversity or environmental impacts. BirdLife recommend that such a system would best be brought in through a specific EU Directive to cover Bioenergy imports from countries outside the EU as well.

BirdLife does not present a detailed scheme of criteria but points out the major topics and requirements:

- Biofuels have to be connected to increased fuel efficiency and there must be real carbon savings
- Special safeguards are required for high value biodiversity areas, while Environmental Impact Assessment have to guarantee that no harm is done to protected species and habitats
- Conversion of grasslands and other valuable habitats will be banned,
- A crop rotation with at least three different crops and a precautionary moratorium on growing GM crops is demanded.
- Set aside land should not be used for energy crop production until an equivalent area is set aside for environmental management as it represents an important refuge for wildlife in agricultural landscapes.

Southern African NGO position (CURES)

The Citizens United for Renewable Energy and Sustainability (CURES [2006]) has formulated a Southern African NGO position on biofuels. Therein opportunities and drawbacks of increasing biofuel production are clearly worked out reflecting the perspective of poor countries in that region. These are the central claims:

- Conversion of current productive land must not be subverted for fuel crop, in order that self-sufficient supply of food is maintained.
- Water use for irrigation in favour of fuel crop production must be limited to water capacities.
- An energy balance has to prove efficiency and discriminate less efficient crop types.
- A full life cycle assessment (LCA) has to be done.

- GMO should not be used.
- Change to Biofuel driven land use has to improve the landownership situation and must not reinforce the partly post-colonial landowner patterns.
- Good conversation farming techniques and intercropping practices must be ensured. Compliant in that the crop type has to be selected (perennial and diverse species preferred).
- Governance and public engagement must support smallholders and capacity building (see also Sugrue [2006]).
- Environmental Impact Assessment is required to grant environmental quality and health for all media.
- Biodiversity has to be sustained.

CURES suggests to stick to a small target (5 % margin concerning domestic petrol and the diesel market) to ensure assessing of the impacts.

FBOMS

The Brazilian Forum of NGOs and Social Movements (FBOMS) have provided an elaborated paper on “Sustainability Criteria and Indicators for Bioenergy” [Moret et al. 2006]. 15 criteria are formulated and associated with desirable goals, undesirable impacts to be prevented, prerequisites and indicators.

Social criteria are strongly present like: social accountability, participation in decision making, type of management, job creation an income situation, social inclusion, gender equality, regulatory compliance, financing modes, organization of work (labour conditions).

Environmental and technical criteria aim on land use (focus on diversification), origin of biomass, environmental management, efficient use of energy and appropriate locally integrated technology.

Food security is a strong argument. Monocultural structures offend many criteria, whereas diversity of crops, agroforestry and permaculture are favoured.

Group of Dutch NGO

The NGO Milieudefensie, Oxfam-Novib, WWF Netherlands, Natuur & Milieu and IUCN Netherlands commissioned by AIDEnvironment introduce a number of sustainability principles in the bio-energy debate [Richert et al. 2006]. They propose three kinds of principles:
Do no harm principles: prevent essential negative sustainability effects like;
- violation of rights (human, land, culture, food security
- decrease of biodiversity on ecosystem level
- impacts on soil and water resources
- use of GM technology (precautionary principle)

Do more good principles: stimulate the realization of the opportunities, like:
- positive contribution to socio-economic development in the production region
- active stimulation of local processing of the energy crop
- re-investing revenues generated from energy crop production
- increases the ecological quality of the production area by re-reclaiming degraded areas.

Enabling governance context principles: provides a framework for effective sustainable biomass policy, like:
- guarantee that the production of energy crops remains within national legal boundaries and complies with relevant international treaties.
- decent and effectively implemented land use planning
- local population and indigenous people have sufficient control over their situation concerning changes resulting from energy crop production
- The production country has signed and ratified all relevant international conventions.

Solidaridad

In cooperation with Essent, Unilever the social oriented Dutch NGO proposes a fair trade-scheme for biomass [Douglas 2004]. The criteria cover mostly social issues like endangering of local food security or contribution to direct local income improvement.

Solidaridad is also supporting EurepGAP, is member of RSPO and supports building up of pilot projects for fair trade biomass together with Essent in South East Asia, Latin America and the cotton belt of Africa (Sahel).

5.4 Conclusions on usability of the current initiatives

The Dutch and the UK initiative and as well the WWF works – taking this as representative for the number of NGO contributions – have triggered essential impulses to promote the global discussion on sustainable biomass. On the first hand the legislative acts by the German Government and the EU Commission have profited by all these activities. This research work has used the opportunity to discuss the internationally discussed items at diverse international fora and to assimilate them to the working scope and advice the Federal Environment Agency and the German Ministry for Environment on process.

On the other hand the discussion is far from reaching an end. The issue of sustainable biomass and how to certify it will proceed. And the floor has to be more and more international.

Both, the Dutch and the UK proposal aim at a so-called Meta-Standard system. In fact so does the German BSR by the accreditation of certification systems checking on conformity. The Meta Standard approach therefore offers the opportunity to end with an internationally harmonized system of certifying sustainable biomass.

6 Identification and elaboration of a set of appropriate sustainability criteria

At this stage of the project a large number of existing certification systems and the ongoing activities in the Netherlands and the UK have been evaluated. Furthermore the first workshop starting a broad stakeholder consultation has already taken place. Based on these working steps a first rough proposal of most relevant criteria will be pointed out.

The criteria shall

1. reflect the (global) state of discussion on how sustainable biomass can/has to be assessed;
2. be applicable and verifiable in terms of application;
3. be evaluated in terms obstacles in the course of application;
4. be evaluated with regard to WTO compliance.

For the time being not all of these requests can be properly estimated, There will be further developments in the following working steps.

At the beginning the definition of used terminologies will be clarified. The concept of sustainable biomass production refers to a number of *themes* or *topics*. Climate change and impacts from land use are for instance such themes. Within each theme *principles* will be postulated. These describe certain areas of concern from a general point of view like: biodiversity shall be conserved. *Criteria* are needed for clarifying the fulfilment of the rather general principles. A criterion might be: “High value nature habitats have to be preserved!” At the next step the criterion needs an indicator providing a measurement. The final goal is a clear decision about the fulfilment of the criterion: yes/no or possibly to a certain grade. Figure 1 shows the hierarchic structure of items used in the field of standard definition.

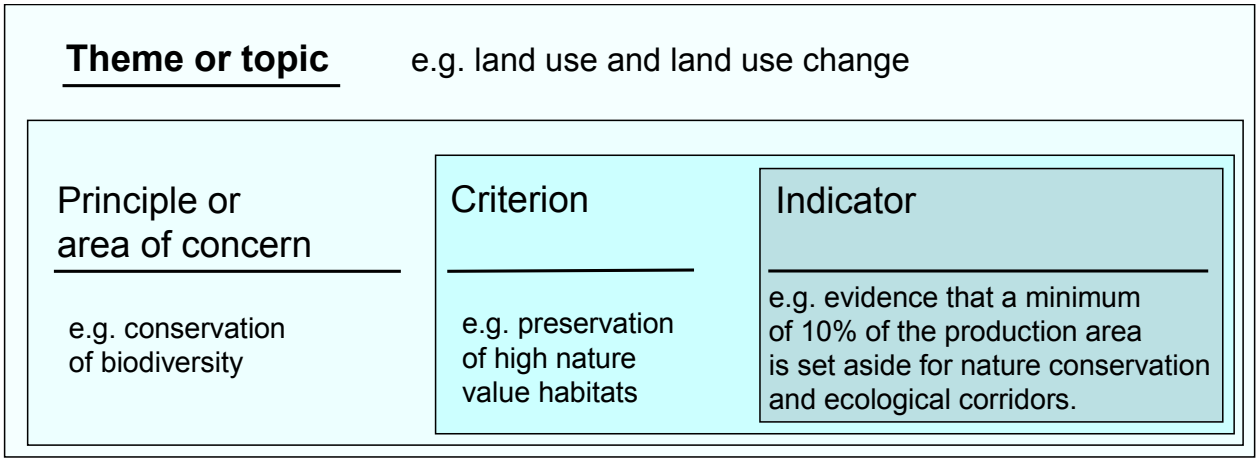


Figure 1 Hierarchy of categories for standard definition and standard setting

Considering the international discussion about sustainable biomass production and use, three areas of significance can be clearly found:

1. Biomass for energy use has to prove its substantial benefit in terms of **greenhouse gas emissions**.
2. **Land use practices** and **land use changes** driven by biomass production shall not lead to significant ecological impacts
3. Increased biomass production shall not lead to worse **social-economic terms**

In the next section these topics will be discussed and conclusions will be drawn considering the design of criteria. The conclusion drawn will become part of the final proposals in chapter 9 as far as this report is concerned. This will also become an input to the ongoing international discussion about this topic and the even the underway R+D project No. 3707 93 100 performed by Öko-Institut and IFEU.

In the followings the major themes shall be discussed pointing at potential criteria concentrating on theme 1 and 2 (see box above). The GHG theme (theme 1 from box) has been profoundly analysed during the project work and will be separately reported in chapter 7.

6.1 Minimizing negative impacts from land use and land use change

This theme is identified to be the most sensitive aspect of expansion of biomass production for energy. This is confirmed by a large number of expert studies and NGO statements, especially in tropical regions, where the severity of impact is claimed to be very high. Land use change in fact is horizontally linked to the other major topics. For instance deforestation affects the carbon cycle balance significantly and conversion of land use might have strong influence on social issues.

There is large number of impact categories concerned by the land use topic, e.g.:

- Loss of habitats, biodiversity and possibly high nature values by conversion of (natural) forests, grassland, less intensified arable land;
- Soil erosion due to adverse practice and crucial crops in combination with topographic and climate factors ;
- Water balance may be heavily affected in case of intensive irrigation
- Soil and/or waters may be polluted by agro-chemical (fertilizers, pesticides).

Even if biomass production for biofuel will start to prevent or mitigate all these negative impacts on site, the impacts may arise somewhere in the surrounding area due to leakage effects. Expanding biomass production naturally increases pressure on exploitation over a wider area.

Such indirect leakage effects have to be faced when acceptable criteria for sustainable biomass production are worked out. It is a very challenging complex issue and one probably without an overall satisfactory solution. But ignoring this issue will lead to definitive non-acceptance of certified sustainability by a predominant number of regional and international NGO.

6.1.1 Land – a limited resource

Above all land is a limited resource. As a matter of fact, currently roughly 12 % of the surface of the earth (Antarctica excluded) is used as arable land including permanent crops. Pasture and grassland covers 25 %, forest roughly 30 % whereas one third is primary forest (see Figure 2).

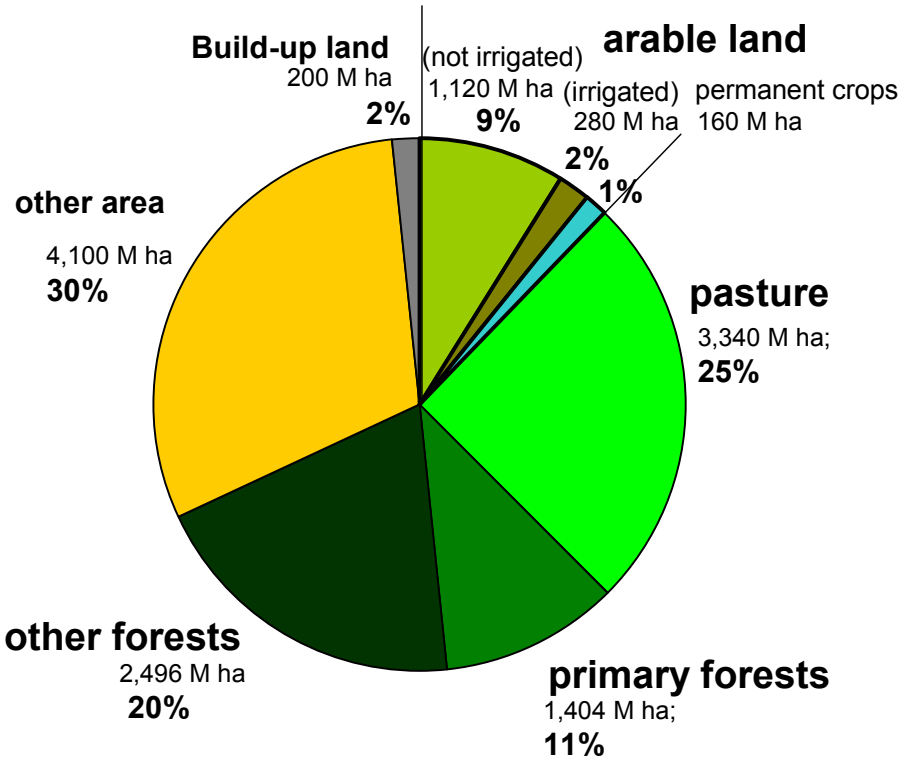


Figure 2 Current global land use structure (sources: FAOSTAT, IIASA)

According to IIASA [2006] only about 25 % of the global land area is suitable for arable land limited by coldness, aridity, steep relief). In figures this is another 13 % equal to the area of arable land in use. But this "potential" area is of very different disposition and quality. Any increase of agricultural biomass production will induce some mechanism that finally affects quality of area. It might:

- impact on existing area under cultivation caused by intensification;

- lead to conversion of grassland, forest, even primary forests;
- re-reclaim set-aside-land which had been taken out of use aimed for strengthening nature quality
- reclaim idle or degraded land, which possibly needs high input e.g. intensive irrigation of semi-arid regions.

6.1.2 Quality of area

There are diverse potential impacts on the quality of area. So first of all an assessment of impacts requires a clarification about quality of area – and even more essential – of political (national, international) objectives about quality of area in the sense of nature value.

It is a complex issue measuring nature value. Therefore there are scientifically approved approaches like the system of hemeroby[4] classes [Kunick 1974] [Sukopp 1976]. This approach has been identified to deliver an appropriate base for implementing land use as an impact category to Life Cycle Assessment (LCA) [Klöpffer, Renner 1995]. In the course of an LCA study on pulp and paper production performed for German UBA, a methodology based on criteria and indicators (C&I) were developed, applied and practically approved by Giegrich, Sturm [1996].

Table 8 shows a scheme for categorization "naturalness" by seven classes to describe hemerobial levels. This scheme is generally applicable for all types of area and all geographical regions.

Table 8 Categorization of classes of naturalness (hemeroby) [Giegrich, Sturm 1996]

class of nature proximity	name of the class	different types of land use; to be defined by measures
1	natural	undisturbed ecosystem, primary forest
2	close-to-nature	close-to-nature forest management
3	partially close to nature	intermedium forest management
4	semi-natural	half natural forest management and close to nature agricultural land use
5	partially distant to nature	monocultural forest and intermedium agricultural land use
6	distant-to-nature	distant-to-nature agricultural land use
7	non-natural artificial	long-term sealed or degraded area

[4] hemeroby is defined by the grade of anthropogenic influence on an ecosystem; or seen as the opposite: the grade of naturalness (nature proximity)

Another approach for classifying nature quality is given by the “High Conservation Value” concept (HCV). It is based on the FSC terminology where **High Conservation Value Forests** are defined to contain significant concentrations of biodiversity values or rare, threatened or endangered ecosystems or provide basic services of nature in critical situations or meet basic needs of local communities or traditional cultural identity [FSC 2002].

ProForest [2003] developed on behalf of WWF and IKEA a toolkit to identify High Conservation Value. It is a detailed framework on how to define each of the six types of HCV:

- Globally, regionally or nationally significant
  - concentrations of biodiversity **(HCVF 1)** ;
  - large landscape-level forests with viable populations of mostly naturally occurring species **(HCVF 2)**
- Rare or threatened forest ecosystems **(HCVF 3)**
- Forests providing basic services of nature in critical situations **(HCVF 4)**
- Forests fundamental to meet basic needs of local communities / critical to traditional cultural identity **(HCVF 5,6)**

The Dutch and UK proposal of criteria for sustainability of biomass is referring to HCV concept.

A promising starting point for an ecological valuation of farmland is provided by the concept of the **High Nature Value (HNV) farmland indicator**. In 2001 the European Council (KOM(2001) 144) required a strategy to implement environmental indicators into the framework of the Common Agriculture Policy (CAP). In total 35 agricultural environmental indicators have been defined. Based on this EEA, UNEP und JRC developed the HNV farmland indicator and defined HNV farmland as follows: *„those areas in Europe where agriculture is a major (usually the dominant) land use and where that agriculture supports or is associated with either a high species and habitat diversity or the presence of species of European conservation concern or both”* (EEA/UNEP 2005). Three types are characterized:

- Type 1: Farmland with a high proportion of semi-natural vegetation.
- Type 2: Farmland dominated by low intensity agriculture or a mosaic of semi-natural and cultivated land and small-scale features.
- Type 3: Farmland supporting rare species or a high proportion of European or World populations.

At first sight these three types comply with the classes of hemeroby (Table 8) referring to the classes 5, 6 and 7.

A running research project on behalf of the Bundesamt für Naturschutz (BFN) is evaluating the possibilities to implement the HNV farmland indicator for the total agricultural area in Germany [IFAB, PAN, ILN 2007].

6.1.3 Land use change and land use competition

As given above every kind of expansion of fuel crop production is connected with land use change. And since area is mostly dedicated to some purpose (i.e. production of food or other crops, settlement, set aside land, forest, natural protection area, set-aside-land) land use competition will be a logical consequence.

In nations with good governance land use is politically well-regulated. There land use rights are constitutional and practical assured and there is transparent insight in structure and allocation of area. Stakeholders have a voice in decision making. If such proceedings are missing there is general uncertainty about consequences of land use change. Even if a newly reclaimed cultivation of fuel crop would satisfy sustainability criteria on site, negative indirect impacts cannot be excluded at all.

A direct land use change is given whenever a new plantation is installed in an area where cultivation has not taken place before. The area might have been under forest or other natural and near-to-nature ecosystems. It might also have been idle land.

Indirect land use can be described as the shift of the land use prior to biofuel production to another area where a land use change occurs (leakage, displacement).

Figure 3 shows two exemplary mechanisms of displacement by increased use of bioenergy in Europe. The upper scheme refers to an increase of biomass imported from the South. In the producing country good practice and absence of direct land use change may be certified. But the required area now being used by the new crop is no longer available for the previous crop which is still needed. The previous cropping will be displaced to other areas. And finally areas that are not yet in use (natural forests) will be requested.

The lower scheme in Figure 3 shall demonstrate that an increased biomass production in Europe may induce forest logging indirectly. In fact it is not relevant at what location area biomass is required. Agrarian markets are global and global area is limited. Finally it is always the area with the cheapest and most facile development for agricultural use. And that will always be forest or similar natural areas.

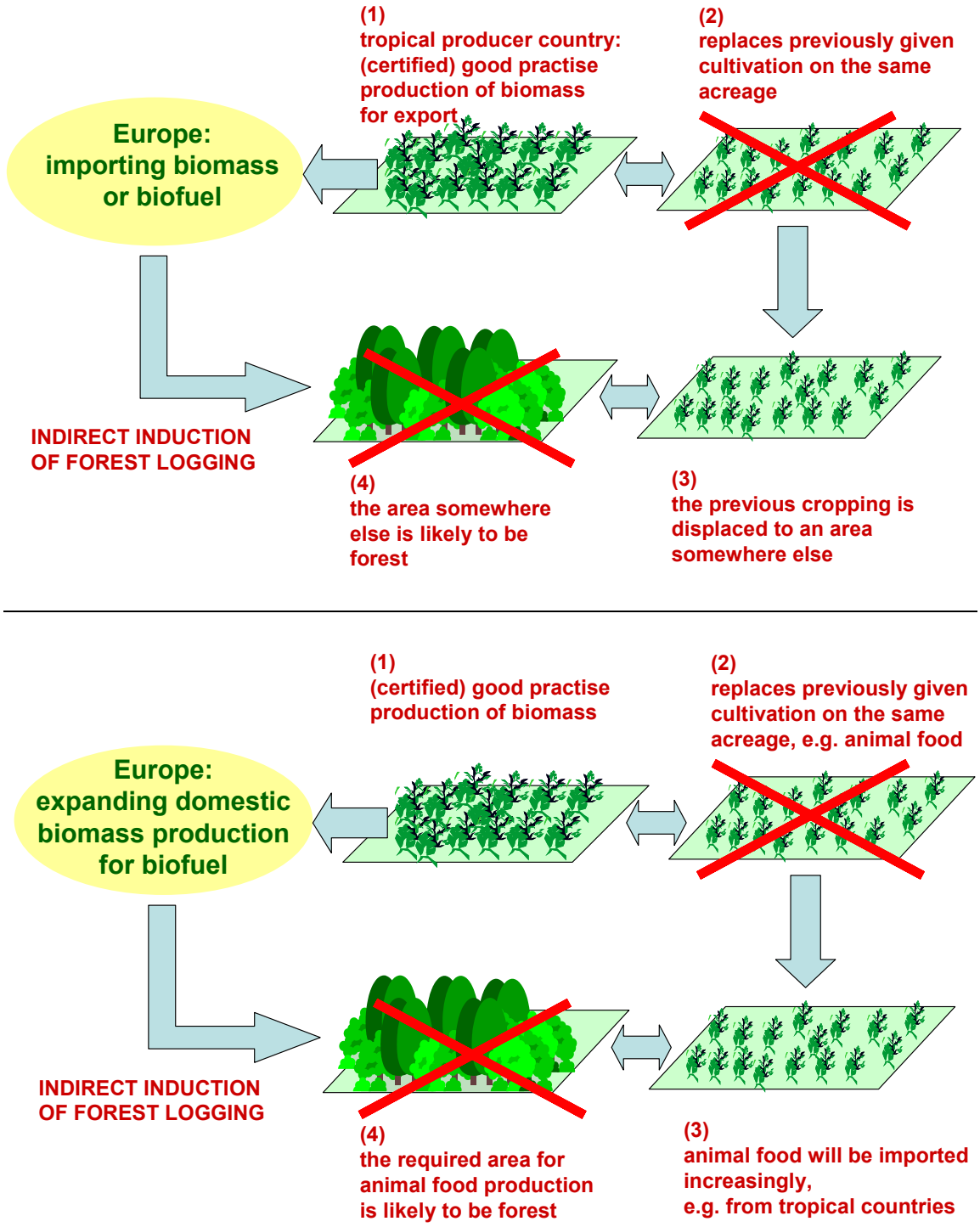


Figure 3 **Two exemplary mechanisms for indirect land use change**

Figure 4 shows this option of limiting the visual angle to the actual biomass production area, the direct impact as to say. In this case the surrounding is not considered. Figure 5 shows the mechanism induced by reclaiming land for biomass production – where land is already allocated to diverse utilizations. There might be pressure driven by expanding settlements and increasing or at least constant need of food crops and area to

produce them. This will put pressure on areas like forests, set-aside-land (if existing) and areas of still unspoiled nature (if existing).

Without any doubt it is up to the sovereignty of the corresponding nation to cope with these mechanisms and developments. A certification system for sustainable biomass production cannot presume to influence national responsibilities. On the other hand sustainability cannot be attested to a production system placed in a country where clear and enforced regulation of land rights is absent.

In consequence this leads to a fundamental criterion: Certification of sustainability required land use regulation. Binding **objectives** have to be codified. How much land is needed to what purpose and to what nature quality level? Figure 6 shows exemplarily how politically announced land use objectives can take shape as an (national) allocation plan. Following elements are necessary to put such a goal into practice:

1. setting up an area-wide status quo inventory of land use activities
2. précising the objectives in terms of percentages or absolute numbers
3. installing a monitoring system (e.g. utilizing satellite monitoring)
4. granting transparency and disclosure concerning the achievement of objectives

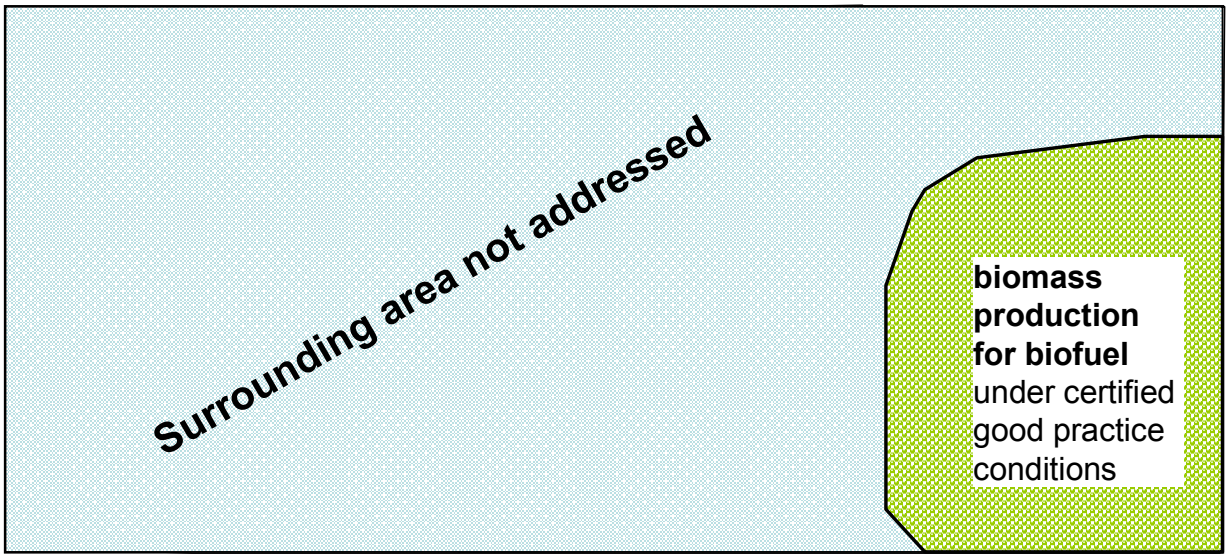


Figure 4 **Effectiveness of land allocation for biomass production; visual angle limited to the actual biomass production area**

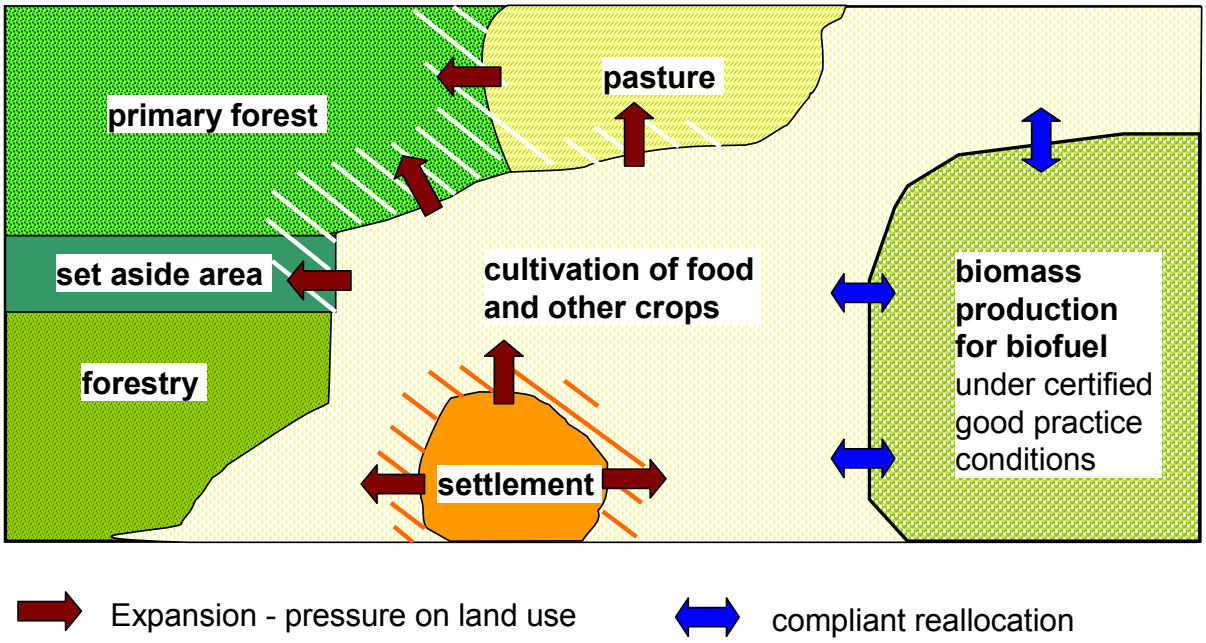


Figure 5 **Effectiveness of land allocation for biomass production; considering dynamic effects of land use expansion by several forces**

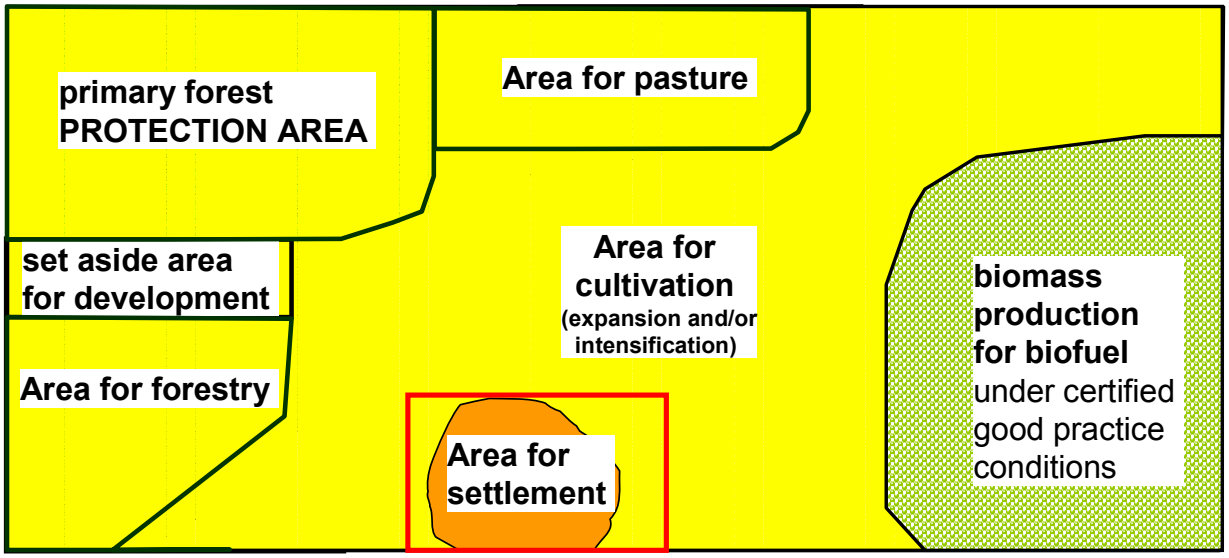


Figure 6 **Consolidation of defined land use areas and land use objectives within an (national) allocation plan.**

6.1.4 Ecological impacts of land use

Clear definition of land use objectives - as quoted above – is seen to be the basic requirement for starting a sustainability assessment for fuel crop production. It should be somehow the first level of fulfilment. The next level has to deal with impacts in particular.

6.1.4.1 Loss of habitats of high nature value (HNV)

Natural ecosystems might be provided with the weakest bargaining power considering the land use competition issue above. History of human civilization proves on continuous conversion of natural systems in favor of an anthropogenic biosphere. In Europe nearly all primary ecosystems have disappeared.

There is relatively high presence of primary systems in the tropical and subtropical regions. But there is a tremendous regression dynamic as Figure 7 shows by the example of the isle of Borneo – one of the "hot spots" of species richness in the world. Here on of the globally most important oil plants – the palm oil – is the predominant crop in this region. Further expansion of this crop is the key driver for the on-going conversion of primary forests. Currently biofuel production from palm oil just has a marginal share in the total plant oil production in South East Asia. But there markets are emerging and are now starting-up further plantations (especially Indonesia but also the Philippines and continental countries).

Another "HNV hot spot" is Brazil. There biofuel production has a long-term history. Starting bioethanol production from sugar cane in the 70ies Brazil is today's biggest producer of biofuel. More than 16 Billion of litres have been produced in 2005 [WWI/gtz 2006]. The perspective of exporting bioethanol to Europe will probably induce further expansion. In fact soy production has expanded tremendously in Brazil. The predominantly affected zone is the Campo Cerrado region (savannah) [FBOMS 2004]. Similar to South East Asia biodiesel production is just beginning to increase.

Loss of habitats due to agricultural production, concerns not only tropical countries, as given in the two examples above. Already in 1992 the environmental expertise of SRU[5] had identified agriculture to be the most relevant cause of loss of habitats and species in Germany [SRU 1992]. Current studies maintain that statement [SRU 2004].

Self-evidently sustainability criteria have to be valid for all zones in the world where agriculture and production of energy crops is applied. Nevertheless a special focus has to be put on regions of exceeding natural value and species richness. The analysis by BirdLife [Lambertini 2006] shown in Figure 8 gives evidence that habitat loss in South East Asian and Latin American countries is the outstanding factor in the threats against different bird species.

5 Sachverständigenrat für Umweltfragen = German Environmental Advisory Council

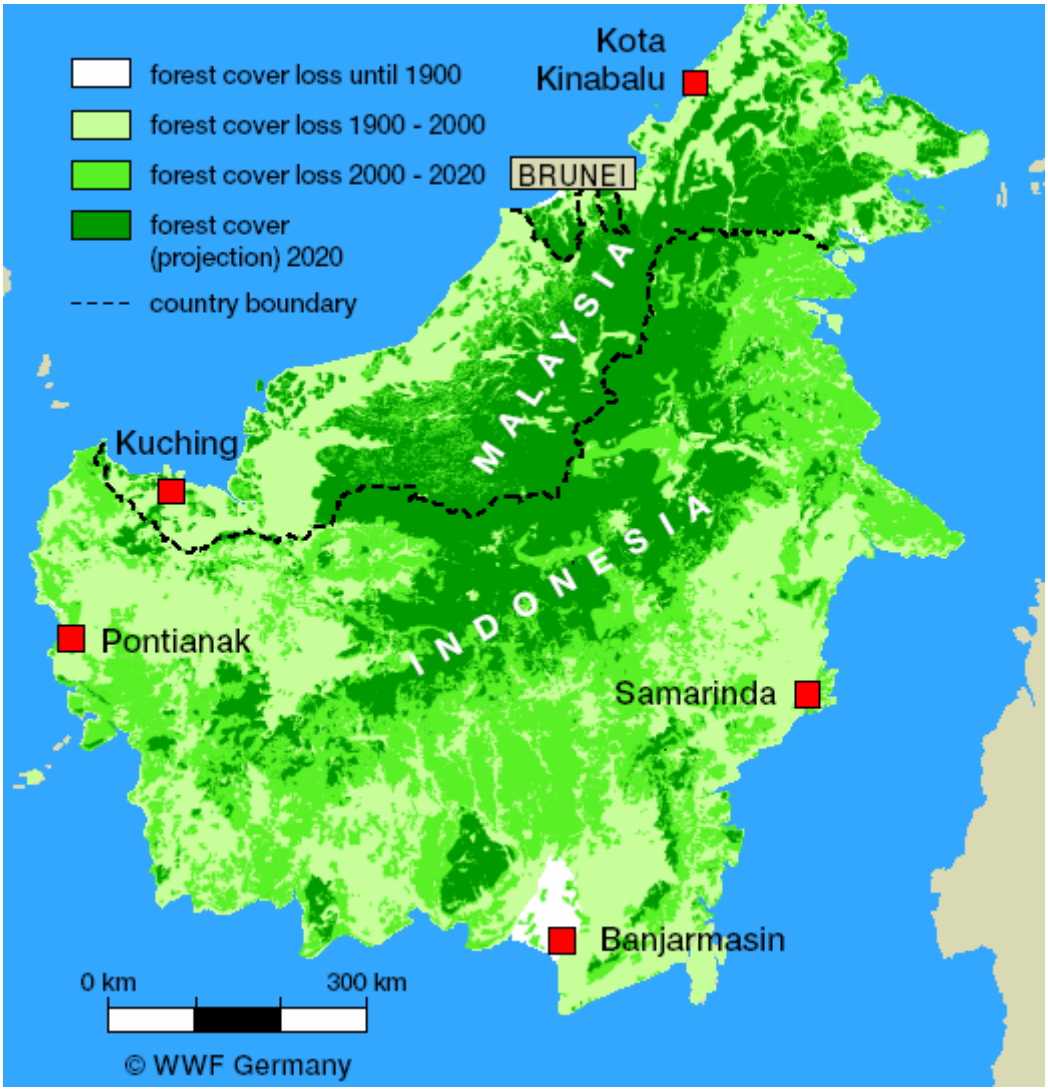


Figure 7 **Forest cover loss on Borneo from 1900 to 2020; source: WWF**

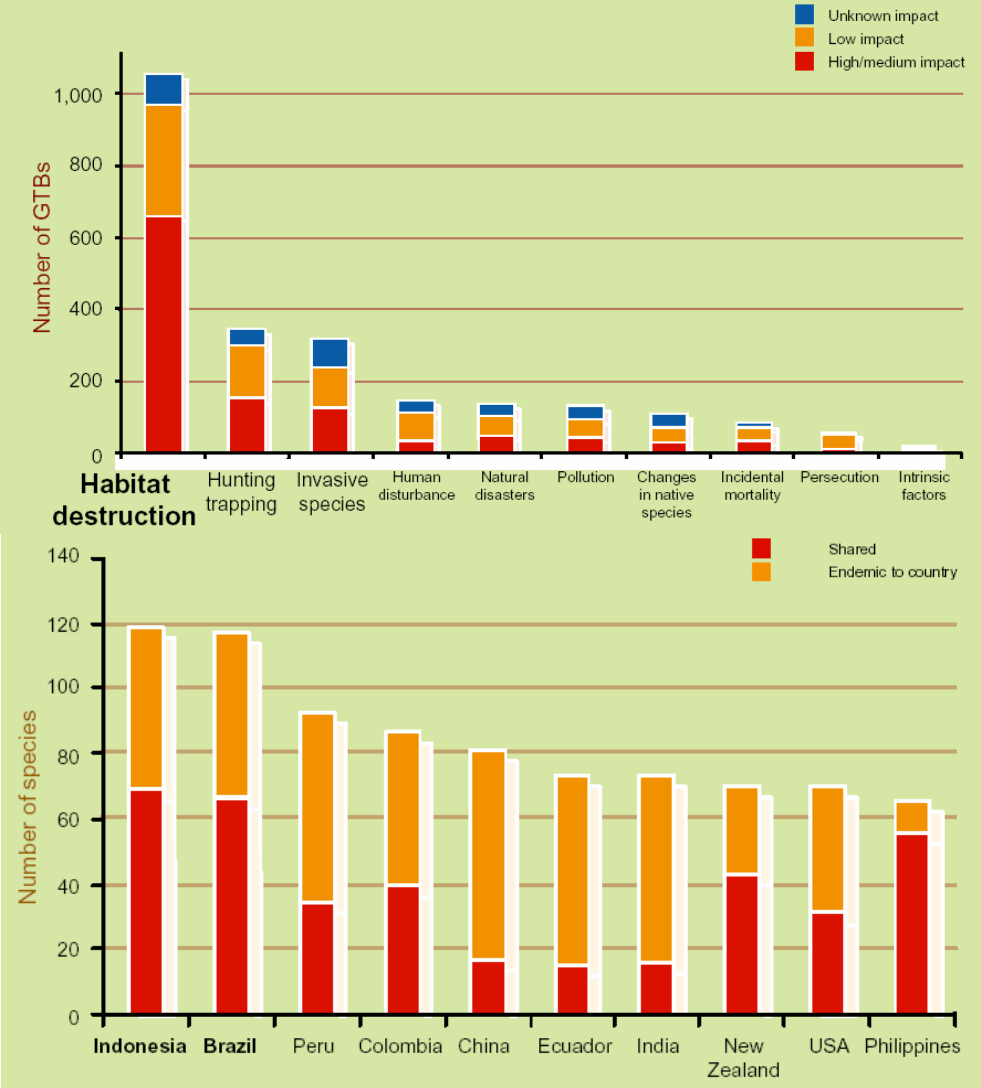


Figure 8 **Reasons for threats against bird species (above) are differentiated according to countries; GTB: globally threatened bird; source; Lambertini [2006], BirdLife**

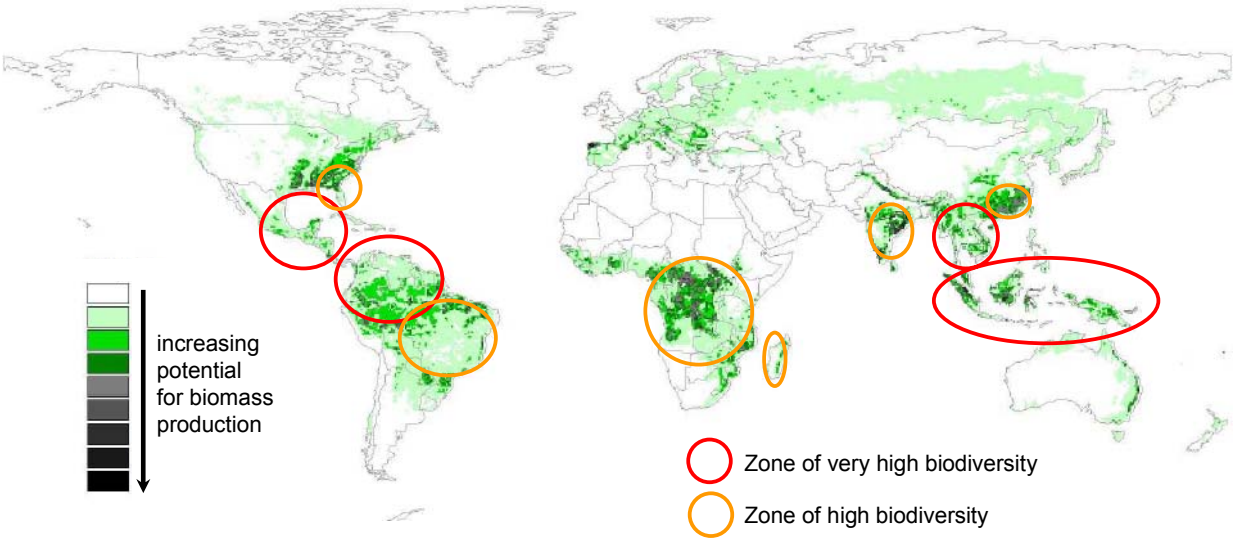
6.1.4.2 Loss of biodiversity

Loss of high value natural habitats leads naturally to loss of biodiversity (as seen within the bird example in Figure 8). But there are other mechanisms causing decreases. Biodiversity is a relative indicator. As defined by the Convention on Biological Diversity (CBD) it describes the “variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part.”

Every type of ecosystem – even an acre – is featured by a certain magnitude of diversity. According to anthropogenic influence this item might decrease or even increase. Conversion of forests – especially primary forests – might lead to substantial losses.

But also intensification (e.g. promoting intensive mono-cropping) deprives diversity on-site.

Thus decrease of biodiversity is an issue everywhere cultivation is advancing and/or intensifying. Of course the highest impacts will be apparent where the highest potential of biodiversity is located. As shown in Figure 9 these zones can be found in tropical belt. Considering the potential of biomass production leads to extensive congruence concerning the geographical location. Research by the IIASA [Kraxner 2007], Smeets et al. [2006] and others recognize the highest potentials in exactly those zones where very high or high biological diversity is resident. The largest capacities are estimated in the tropical and subtropical regions, to name Africa, Latin America, and South East Asia.



Source: IIASA, Kraxner 2007, Rokiyanskiy et al. 2006 Source: Data from UNEP IMAPS

Figure 9 **Conflict zones: high potentials for biomass production vs. high biodiversity**

6.1.4.3 Soil erosion

In general every method of moving the soil and cultivating one (or a few) plant species leads to soil erosion depending on soil type, climate and topography. In the tropic region losses of soil can reach tremendous dimension due to vast and episodic precipitation.

For agriculture soil erosion is a permanent challenge. Thus crop type and cultivation style have to be selected in compliance with these unchangeable circumstances. Especially cultivation of root crops (e.g. maize, sugar beet) is known to be crucial. They need deep ploughing and long periods of denudated surfaces free of weeds. In some regions of Central Europe sugar beet agriculture on loess soil delivers examples of noticeable erosion [Baden-Württemberg 2007][6].

Even more alarming are examples from soy bean cultivation in Brazil but also the USA. A study headed at Appalachian State University in Boone North Carolina combined erosion rates, estimated by soil type and climate, with data from hundreds of field studies for various crops and concluded that global average potential yield losses were 0.3%/ year [Wiebe 2003].

There are also structural means to foster erosion. Cultivation in contour line, intercropping, and agro forestry are proved to minimize losses of organic structure especially on vulnerable sites like tropical hillsides [Pretty, Hines 2001].

6.1.4.4 Inference of water balances

Whereas Central Europe is furnished which more or less abundant resources of water (apart from short-time scarcities in hot dry summer periods), a strong share of the agricultural zones of the world are bound with a limited water resources.

Figure 10 shows the distribution of areas of physical but also of economic water scarcity in the world (source: water research institute [2007])[7]. Physical scarcity is given when the development of water consumption is approaching or has exceeded sustainable limits. It is defined by the situation when more than 75 % of the river flows are withdrawn for agriculture, industry and domestic purposes. This implies that dry regions are not necessarily scarce of water. Physical water scarcity is approached by definition when 60 % of the river flows are withdrawn.

Economic water scarcity is given when human, institutional, and financial capital limit access to water even though water is available locally. Water resources are abundant relative to water use with less than 25% water withdrawn from rivers.

6 http://www.umweltplan.baden-wuerttemberg.de/text/umpl151.htm
7 http://earthtrends.wri.org/updates/node/264

Figure 10 shows that physical water scarcity is limited to larger regions in Central Asia, Southern India, Arabia and the North African coastal zone, some regions in Southern Africa, the Southern Rocky Mountains in the USA and North Mexico, and Southwest Australia. Economic water scarcity is predominant all over Sub-Saharan Africa, in Northern India and some countries in South East Asia and Central America.

From the social point of view economic water scarcity is the more severe situation. So Africa and India can be estimated to be the most crucial zones.

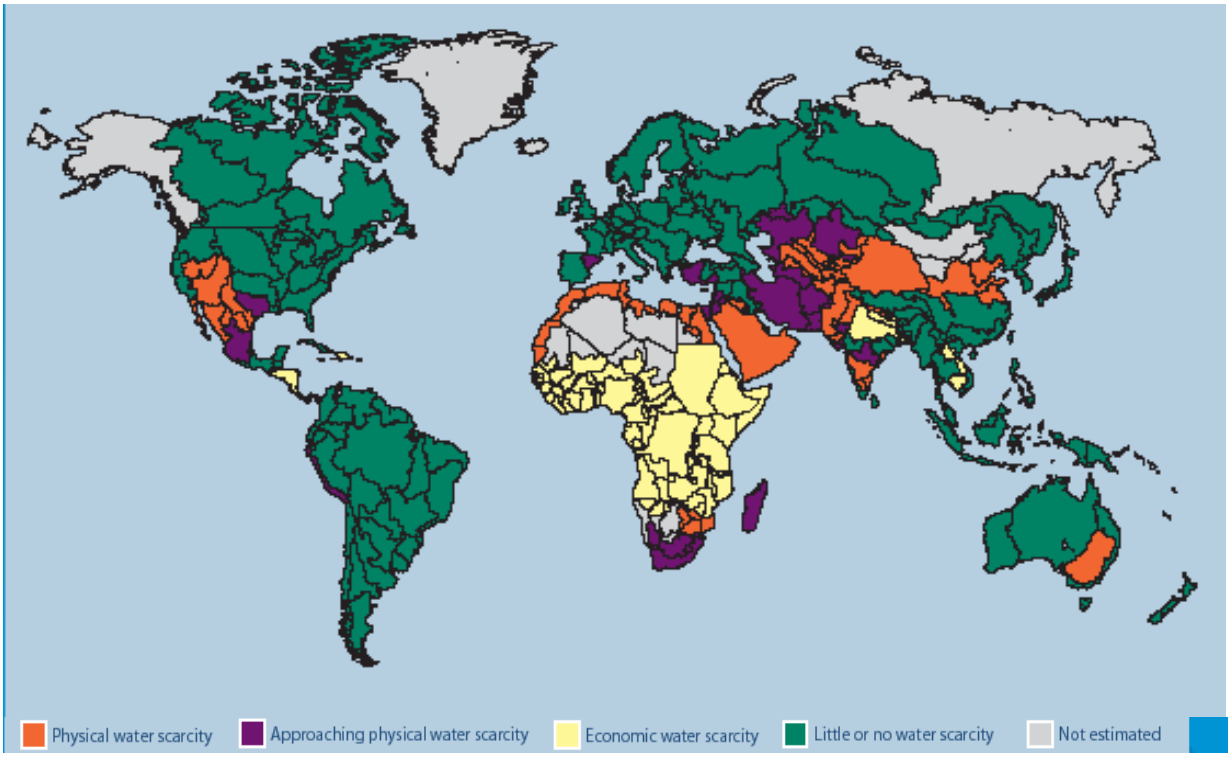
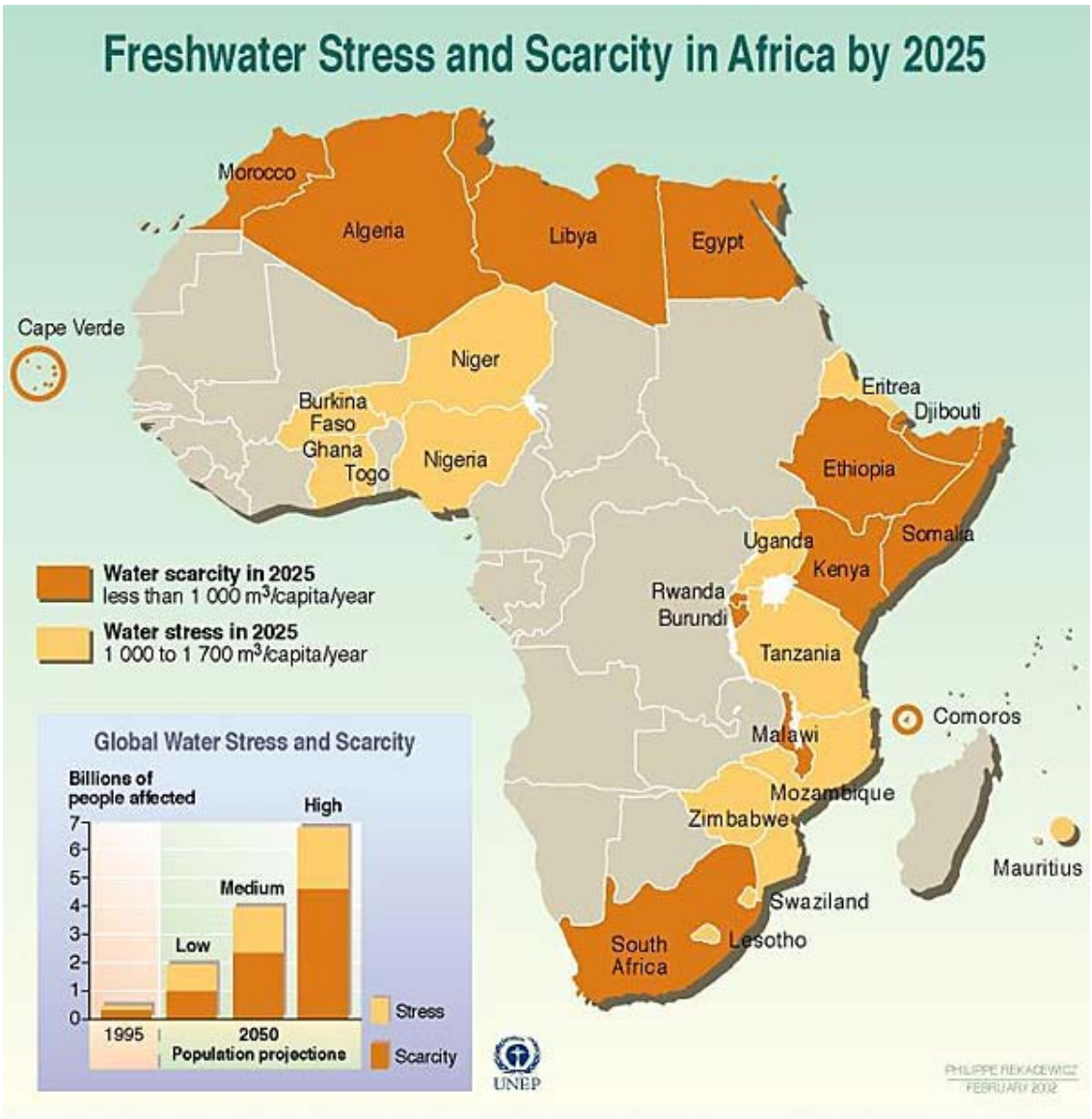


Figure 10 Areas of physical and economic water scarcity

According to UNEP 40 % of Africa's population lives in arid, semi-arid, and dry sub humid areas. Climate change model forecast an increase in arid zones that are susceptible to drought. The map in Figure 11 shows the locations where freshwater stress and scarcity are presumed in 2025 according to climate models. The most affected (scarcity definition here: less than 1,000 m^3 per capita per year available) countries are South Africa, Malawi, Rwanda, Burundi, Kenya, Somalia, Ethiopia and the Maghrebian countries.

Key regions for biomass production were predominantly located in the Congo basin and the South Eastern Part (Mozambique, South Africa, Zambia, and Zimbabwe) [Kraxner 2007]. High potentials concerning sugar cane yields are also figured out for Southern Chad and Ethiopia. The conclusion of climate change forecast and this potential seems to run into severe conflicts.

In such regions agricultural intensification by irrigation might lead to drastic impacts on local or regional hydrologic cycles. Ground water tables tend to lower. Increasing potentials for salinization and impacts on river and lake water bodies are likely. As EEA [2006] has analysed, water competition between agriculture, drink water supply and nature has been increasing in these regions.



Source: United Nations Economic Commission for Africa (UNECA), Addis Ababa; Global Environment Outlook 2000 (GEO), UNEP, Earthscan, London, 1999; Population Action International.

Figure 11 **Freshwater stress and scarcity in Africa by 2025;**
water stress: **annual water supplies drop below 1 700 m^3 per person.**
water scarcity: **annual water supplies drop below 1 000 m^3 per person.**

6.1.4.5 Inputs of agrochemicals

Intensive application of fertilizer and pesticides is a key argument in order to gain high yields with low production prices. Extensive or organic methods tend to lower yields per hectare. But the negative environmental impacts from high input are known. Health of field workers, long-term soil accumulation, and transfer to ground water and discharge to surface water are widely reported side-effects of non adapted practice.

On the other hand studies like Pretty and Hines [2001] have given proof that ecological oriented (low input) agriculture is capable of increasing yields by 50 to 150 % compared to traditional extensive farming systems.

6.1.4.6 Genetic modified organisms (GMO)

The debate on the application of GMO for biomass production is an extremely fundamental one. Proponents and opponents are divided into intransigent camps. The first one highlights the opportunities by transgenic sorts which produce higher yields and resistance against pests or immunity against herbicides. In some cases the application of certain pesticides might become obsolete.

Opponents emphasize that a wide-spread open land application of GMO bears risks of unknown dimension. Modified alleles are reported to disperse and proliferate. Furthermore an increasing concentration on GMO might lead to further genetic pauperization of sorts.

6.1.5 Recommendations for land use criteria

A baseline for the definition of principles and criteria can be grounded on the general discussions above in combination with the conclusions of the analysis of existing certification systems and proposal by other governmental and non-governmental institutions. Following aspects shall be covered:

- protection of high nature value areas (HNV) zones
- sustainment of biodiversity
- prevention of soil erosion and degradation
- protection of water balance
- minimization of agrochemical input
- avoiding GMO

"Measuring" **high nature value areas** (HNV) cannot be compared with some physic-technical methodology like calculating a GHG balance. Ecosystems are extremely complex and so are their values. In fact several codes exist to sort habitats into a classification system like it is shown in Table 8. Applied valuation systems for biotopes exist. In Europe the Natura 2000 has lead to the registration of all habitats worthy of protection. But also other countries have registers of ecosystems of relevant natural value. There are protection zones by national legislation or by international contracts and conventions. Databanks by UNEP and IUCN enable the clarification of natural quality issues on the concerned site. Another applicable approach is given by FSC methodology, which announces the HCVF concept. At last a generic approach including nature-oriented stakeholder consultation (relevant local and/or regional stakeholders) will be a mighty tool to ensure an appropriate assessment of nature quality.

Biodiversity normally is included within assessing HNV. But incremental aspects like structural diversity (set-side area, corridors) have to be included as indicators.

Soil erosion is a local impact which is strongly dependant on local circumstances (topography, precipitation, soil type) and of course on crop type. A scheme should be based on pointing out practice, local conditions and crop type, in particular and in combination to point out practices not in line with sustainability concerning soil erosion: intense tilling, long-term denudation of soil, certain maximum steepness, certain plants not for certain soils etc.

On EU level the Statutory Management Requirements (SMR) and the necessity Good Agricultural and Environmental Condition (GAEC) posed by the regulation on Cross Compliance enforces national legal requirements on erosion control measures.

To safeguard **water balances** water management plans are necessary. Everywhere an intensification of irrigation is projected a hydrologic impact assessment is requested to avoid far-reaching conflicts concerning water competition in non-humid regions.
The protection of wetlands and water bodies is connected to this aspect.

Organic agriculture standards provide distinct criteria for limiting **agrochemical input**. Also the Cross Compliance elements require National Codes of Good Farming Practice in terms of pesticide management. Considering a sustainable approach the application of agrochemicals has to be restricted to the needful demand and justified by documentary evidence.

The application of **GMO** for biomass production is ardently debated. Due to a precautionary position the authors recommend GMO as exclusion criterion until risks are excluded by evidence.

6.2 Social-economic issues

In understanding sustainable development, sustainable biomass production for energy use must not promote deterioration to the producers, their societies or specifically concerned population groups. Especially with regard to poorer countries, a biofuel-induced increase of poverty would not be acceptable.

6.2.1 Specific aspects concerning social-economic issues

The following section addresses the socio-economic problems, which can arise from an increasing production of bioenergy crops for export. The examples are based on experiences from the soy and palm oil production in Latin-America, Asia and Africa.

Land use competition

If energy crops are produced as cash crops, the production will most likely be dominated by large land owners and transnational companies, which could come into conflict with the requirements of diversified agriculture driven by family farms, cooperatives and rural communities aiming at supplying food and income for the local population [Lübbeke, Fritsche et al. 2006], [Fritsche et al. 2005]. One of the major issues in the context of land use competition is food security. If the production of biomass for export results more profitable than selling food products or biomass on local markets, there is a serious risk of food and energy supply shortages at local and regional levels.

The soy boom in **Brazil** is one example where small farmers were forced to sell their land to large scale enterprises because of high production costs. Soybean production requires high investments in technical equipment and is thus only profitable for production on 1,000 ha and more. Many soybean producers have migrated from the south to the central western and north eastern parts of Brazil. They buy up land and establish large soybean plantations, while the local farmers move to the cities or the Amazonian rainforest. Others, particularly landless people, were displaced and expelled in order to extend soy production to natural and indigenous habitats. Case studies have shown that especially women were affected who earn their living by extracting oil, selling coconuts and handicrafts [Bickel 2004]. Between 1993 and 2002 the land used for soybean production expanded by 80 percent. At the same time, the area cultivated with rice, beans, cassava and other products for national food supply declined [Bickel 2004].

Since there is no direct link between food security and bioenergy, linkages are extremely difficult to measure. Other ways of land use that are in competition with the production of bioenergy crops include the use of natural resources and the attendance of cultural sites. Since these issues also address the aspect of land rights, they will be discussed in the next subsection.

Land rights

Closely related to the aspect of land use competition is the issue of land rights.
The invasion of land which is traditionally used but not officially owned by the local population is a common practice throughout many developing countries. Severe conflicts and human rights violations are often the consequence.
Illegal practices which have been reported in the Indonesian oil palm sector include land clearing without required permits, expansion outside concession boundaries and illegal burning. These practices are promoted by poor land use planning and mapping of the Indonesian government, as well as weak law enforcement in the face of widespread corruption. Communities often lack the land titles to defend their formally recognized territories from being invaded by oil palm companies, while the latter sometimes change their name after clearing community land in order to avoid compensation payments and trials. The Kayak in West-Kalimantan have lost large parts of their customary rights land to palm oil companies, leading to violent conflicts between the local people on the one side and members of the police, army and government on the other, who are not seldom paid by company owners. Recent conflicts have been triggered by villagers who are trying to re-occupy their former land and resources. The lack of mechanisms to resolve long-standing tenure disputes underlies many of these troubles. [Colchester et al. 2006], [Friends of the Earth 2004].

Most of the land in Papua New Guinea is owned by communities. Conflicts arise when land is leased out to companies which themselves lease out plots to people from outside the community or when companies redefine borders with neighbouring communities. Under these circumstances land use decisions are often no longer based on customary decision making processes but subject to individual interests [Friends of the Earth 2004].

In **Cameroon**, the expansion of the largest oil palm plantation threatens neighboring forests traditionally used by local populations. This has led to important land conflicts involving the Bagyeli, Bulu and Fang populations whose land has been confiscated without compensation. As a consequence their traditional ways of life have become impossible [Gerber 2006].

A group of Chocó communities in **Columbia** received the deeds for their lands in November 2000 after years of reiterated violations of their human rights. This was also nine years after the National Constitution had recognized the territorial rights of afrodescendent and indigenous communities. The deeds were received at a time when the communities were displaced. On their return they found their territories occupied with oil palm plantations. A long drawn out legal process started with claims by the communities to recover their territories. This process was tainted with major irregularities to favour the oil palm companies (Roa Avendaño 2006).

In the Tumaco region of **Columbia**, communities that have gone through forced displacement and have been threatened, have been advised by companies or even the State itself to become “rural sector entrepreneurs” in order to be able to stay in their territory. In other words, they are being forced to involve themselves in partnerships or productive chains with palm oil companies. In this way, territories that used to be rain-

forests have now become monoculture palm plantations, depriving the Afro-descendent communities of their culture and their territory and destroying regions that are among the most diverse on the Planet [Roa Avendaño 2006].

Land tenure conflicts also lead to increased deforestation. When subsistence farmers are deprived of their land and the plantation project does not generate sufficient jobs for the local population, leakage effects could be generated. People deprived of their (agricultural) land may open up patches of forest, in order to generate income and food. This is the case in the Brazilian state of Paraíba, where large soy plantations were established leading to land tenure conflicts with squatters as well as further deforestation. [Verdonk 2006]

Change of way of life, economy and culture

Expanding the production of cash crops often carries with it serious changes in the ways of life, economy and culture of the local population.

In South East Asia, indigenous communities used to have large access to land and resources. They were well-off in terms of food security and available recreational time, while having the control over production and management and enjoying stability in supply and income. After their integration into the oil palm business they began receiving regular wages, but at the same time experienced new challenges such as the dependency on markets and trade, the loss of control at community level, environmental damages and conflict (Friends of the Earth 2004).

Such trends could be observed in the case of smallholder schemes in Indonesia. The structure consists of a nucleus company, which is in charge of developing smallholder estates usually adjacent to its own estates. The nucleus company arranges and guarantees the financing and provides agricultural inputs, while the smallholders agree to sell their yield to this company. The credit system that such smallholder schemes are based on makes farmers highly dependent on the nucleus company. Traditional agroforestry systems, in contrast, are relatively resistant to market shocks and do not require long term horizons or large initial investments. They have been adjusted to farmers' needs where food sovereignty and stable income often are more important than high cash income (Friends of the Earth 2004).

Environment and health

Energy crop cultivation involves practices such as the use of agrochemicals, irrigation and land burning, which adversely affect not only the environment but also the human health of both farm workers and local population.

In **Cameroon**, agrochemicals used by an oil palm company and the waste from its treatment factory massively pollute the neighbouring streams. There have been several cases of sicknesses within the village population [Gerber 2006].

Sharing of benefits

Essentially, the production of energy crops for export is hardly compatible with agriculture to cover national basic needs. Employment effects and the distribution of returns depend on the level of centralization in both production and consumption chains [Fritsche et al. 2005].

Sustainable energy crop production must secure and expand employment opportunities in rural areas, include the local population into the value chain and decision-making processes. The production of bioenergy often involves the cultivation of perennial crops such as short rotation forests and Miscanthus. These crops require immediate investments, but do not generate short-term revenues, since their first harvest may only be realised after some years. Thus, long-term bioenergy production has an increased financial risk, compared to annual crop production. Long-term commitments from producers and traders are needed e.g. through long-term contracts and/or financial investment support [Lewandowski and Faaij 2004].

Bioenergy trade may be an opportunity for a sustainable development of rural developing regions. Its production can generate employment and (fair) income, while improving access to basic needs, such as portable water, sanitary facilities, adequate housing, education and training, infrastructure and health services. However, this will only be the case if benefits are shared with the local population instead of being kept by only few as is often the case [Verdonk 2006].

In **Bolivia**, the soybean production generated few jobs, while 80% of the soybean farms where owned by foreigners [Kaimowitz and Thiele in Lewandowski and Faaij [2004]).

In the case of palm oil production in **Cameroon**, the local population has not been able to benefit from an insertion into the market economy, because workers are hired from other regions of Cameroon and then accommodated in camps located at the plantation. The neighbouring villagers, on the other hand, only rarely get jobs [Gerber 2006].

Revenues from producing bioenergy must compensate at least for the production costs and some added value, in order to support farmers' households covering nutrition, housing, education and health expenditures. Market prices may not always resemble such "fair" remuneration. If producers are to benefit from bioenergy trade, they may need to be protected by some minimum prices or income support [Verdonk 2006].

Labour conditions

The following examples illustrate some of the prevailing problems regarding the labor conditions of rural workers in developing countries.

In **Brazil**, many rural workers suffer from slavery conditions, especially those assigned to burning the primary vegetation. Their everyday life consists of inhuman working hours, poor housing facilities, no sanitary facilities, poor food and water supply, lacking safety equipment, no social security, debt bondage due to charging for all kinds of expenses including working equipment, armed supervision [Bickel 2004].

In **Indonesia**, the number of daily workers has increased compared to permanent workers. Wives often work as unpaid labourers without contract, helping their husbands to achieve their production targets. Female workers are more often employed on a daily basis, because companies do not want to pay for maternity leave. The wages are at subsistence level barely covering children's school costs. The unawareness of a minimum wage is due to the absence of independent unions. Vocal workers and union members are often transferred or dismissed. Workers are not provided with working tools, safety equipment or safety training. Medical facilities are available for permanent workers only, resulting in higher risks for female workers [Friends of the Earth 2004].

In **Malaysia**, children between six and ten years of age work to help their parents reach the production target, 60 percent of the oil palm plantations do not provide schools. Significant shares of legal and illegal foreign workers are from Indonesia, Bangladesh and Philippines. The accident rate is very high due to sharp thorns, branches and fruits, long-handled implements, and exposure to pesticides. Housing facilities are of low quality and often without an adequately treated water supply [Friends of the Earth 2004].

In **Cameroon**, jobs are often temporary. Workers receive neither labour contracts nor health and accident insurance. The wages are extremely low. An unskilled worker earns a little more than one euro a day. A usual workday starts at 6 am and sometimes lasts until 6 pm [Gerber 2006].

Child labour

Especially developing countries producing bioenergy may be susceptible to child labour. Since bioenergy production and trade can be an opportunity for rural regions of developing countries, it might be attractive for some to employ children in the production process, because children are a cheap workforce and a welcome income supplement for low-income households. In general, child labour is not desirable, since it conflicts with ethics and laws on the development of children [Verdonk 2006]. However, a rigorous prohibition of child labour may push children into dangerous informal employment sectors. Therefore it is important to offer alternatives, e.g. educational programmes [Scherrer/Greven 2001].

The SASA[8] initiative emphasizes the importance to differentiate between three forms of child labour: contracted child labour, young workers, and child labour on farms. While the first form is not acceptable because there is too little protection of the children's safety, young workers of ages 14 - 17 as well as children working on their families' farms may be allowed to work as long as this does not present a hazard to health and safety and does not jeopardize a child's educational, moral social and physical development [Lorenzen et al. 2004].

[8] Social Accountability in Sustainable Agriculture

6.2.2 Recommendations for socio-economic criteria

The standards recommended here can only be generic standards. Based on these, a detailed set of criteria needs to be designed for the geographical or political context and with the participation of the relevant stakeholders. The most appealing requirements are:

Participation

Establish means for local communities to participate in decision-making for policies and programs which concern them (→prior informed consent).

This shall open the way to establish appropriate mechanisms for fair compensation whenever legal or customary rights, property or resources of livelihoods of local peoples are affected.

Improving the **local economic situation** for the population as a whole.

This implies:

- supporting, as far as is practical, any project that improves local infrastructure or facilities.
- Maintain or enhance the long-term social and economic well-being of forest workers and local communities.

Ownership

Recognize rights of ownership and possession.

- Safeguard the right of the people to use land not exclusively owned by them, but traditionally accessed.
- Documentation of land rights, legal acquisition, fair compensation and conflict resolution mechanisms.
- Respect cultural and spiritual relationship with lands and territories.

Child labour:

- The minimum age specified in pursuance of paragraph 1 of this Article shall not be less than the age of completion of compulsory schooling and, in any case, shall not be less than 15 years.
- Companies must take immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour as a matter of urgency.

Forced labour:

- Companies must suppress the use of forced or compulsory labour in all its forms within the shortest possible period.
- Companies do not make use of any form of forced or compulsory labour.

Building up capacities:

The companies shall gradually extend, adapt and harmonise its vocational training systems to meet the needs for vocational training throughout in all sectors of the economy and branches of economic activity and at all levels of skill and responsibility.

7 Greenhouse gas balances to verify a minimum reduction rate

The GHG savings are the reason for promoting biofuel production. The benefit for reducing the greenhouse effect must be included as a criterion for a sustainable use of bio based material of any purpose.

7.1 Need for a stringent method

Many studies performed GHG balancing in the past. They indicated which types of biofuels under which circumstances are the most positive regarding GHG reductions. In most cases it was sufficient to present ranges for final results as they were clear enough for the objectives of the studies.

Also methodological differences tended not to be important because with the help of sensitive analysis it was possible to prove the robustness of results. The following figure gives an example for applying different methods of GHG accounting for co-product counting in RME production.

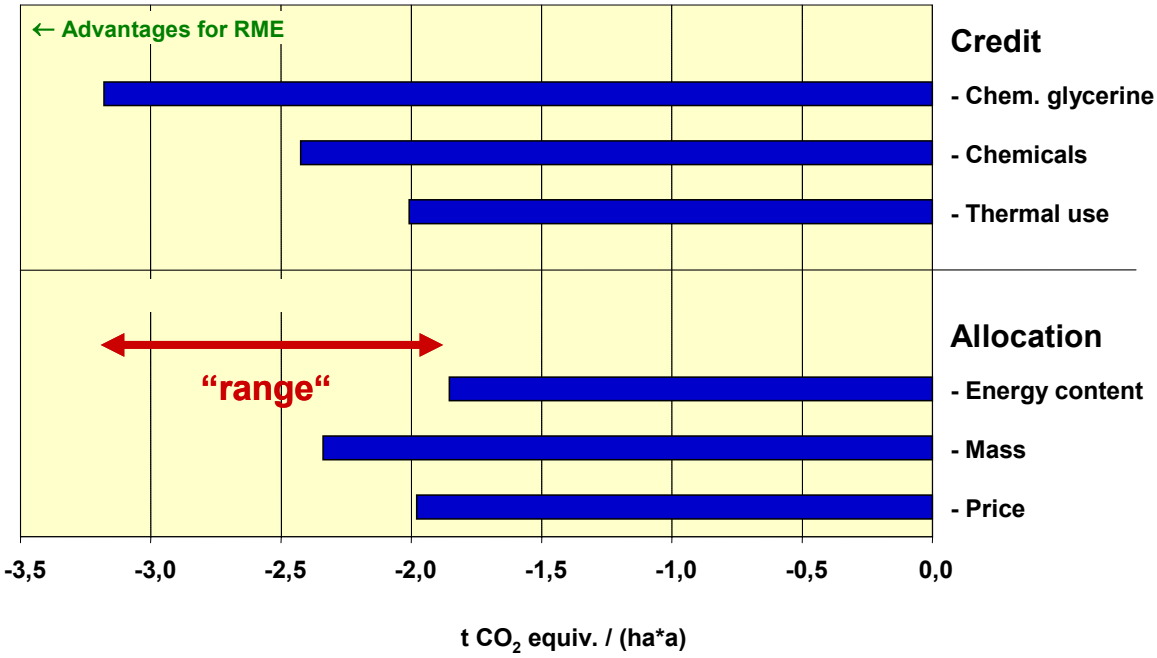


Figure 12 **Range of GHG balance results for RME due to different methodical approaches concerning the co-product glycerine; source: IFEU [2006].**

Nevertheless if one or more quantitative criteria are needed for a labelling purpose a clear and well defined method is necessary to handle the criteria. If a specific CO_2 reduction criterion is demanded for fulfilling specific requirements the methodological approach must be defined to calculate the quantitative value.

The setting of a GHG reduction value itself is a normative step. It should be oriented at the most efficient use of biomass for GHG reduction. But it also can allow certain developments by being more explicit in setting specific goals for bioenergy for electricity production, heating, transportation or material use. It also can be adjusted to developments in time as more ambitious criteria could be achieved in different time scales.

The normative step of criteria setting can be done on a national level but should be discussed and coordinated at least at the level of the European Union. A prerequisite of European criteria on GHG balancing is the harmonization of methodologies and important default values. There are a considerable number of approaches to standardize GHG emission for energy (and also bioenergy) systems like:

- IPCC: “Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories“.
- GREET – “Greenhouse gas, regulated emissions, and energy use in Transportation” – GHG Tool developed by Argonne (Wang et al.) Chicago, USA.
- JRC/ EUCAR/ CONCAWE: “*well-to-wheels study”* (Edwards, Larivé, Mahieu, Rouveirolles) May 2006, updated March 2007 (version 2c).
- IEA Task 38: “Greenhouse Gas Balances of Biomass and Bioenergy Systems”.
- UK: “Methodology for Carbon Reporting under the Renewable Transport Fuel Obligation (RTFO)” – worked out by E4tech (Bauen, Watson, Howes), commissioned by LowCVP, draft from Dec 2006.
- The Netherlands: “The greenhouse gas calculation methodology for biomass – based electricity, heat and fuels” – worked out by CE and University of Utrecht (Bergsma, Vroonhof, Dornburg) commissioned by Senternovem, draft from Jan. 2007.

The exercise to harmonize different approaches was started in autumn 2006 by the national representatives of the Netherlands and the United Kingdom. In two workshops other experts and representatives of other countries and of the EU were invited. Further bilateral communication between the two countries gave rise to the first conventions being formulated.

In mid October 2007 the European Commission (DG TREN) hosted a workshop meeting specifically on the issue “how to deal with co-products”. Senternovem organised and coordinated the meeting. The EU member states busy in this topic presented there approaches. The goal was to find a roadmap for harmonization along a profound technical discussion. Although there was strong will to converge the meeting revealed that this process will take more time.

Thus the formulation of a German approach had to be promoted due to the time schedule of German legislative objectives (Climate protection package was passed on 05.December.2007, to complete the “Meseberg Decisions”). Nevertheless the discussion within EU, with other member states as well as GBEP, and other international institutions will continue to facilitate a harmonization in future.

The GHG methodology described here is designed specifically for the purpose of the regulation under the Biofuel Quota Law and the Biomass Sustainability Regulation respectively. The methodical development considered similar applications like the reporting systems in the Netherlands and the UK as well as the issued verification schemes by European Commission. Explicitly different objectives (e.g. LCA for policy making and evaluations of future technologies and potentials) may require other approaches.

7.2 Basic framework issues

The legal Background in Germany is primarily defined by the Biofuel Quota Law. It enables the Government to establish two types of requirements especially concerning GHG balance:

- a minimum value of GHG savings for biofuels
- a calculation of the GHG savings for the different types of biofuels to derive the specific quota applied for the contribution to the total quota (correction factor)

Both applications need a fixed and comprehensible value for greenhouse gas savings. Ranges cannot be applied.

Greenhouse gas savings are calculated on the basis of greenhouse gas balances (GHG balances) figuring out the emission of all greenhouse gases to produce and use a biofuel and the emission of all greenhouse gases to produce and use the equivalent energy amount of the respective fossil fuel.

The emission of greenhouse gases shall be calculated in the unit:

kg CO_2 equivalent / GJ of fuel.

Biofuel systems and fossil reference systems will be treated in the same way concerning methodological provisions.

In case of doubt the specifications of the Kyoto Protocol are valid. For any greenhouse gas balance regarding the Biofuel Quota Law only the greenhouse gases as mentioned in the Kyoto protocol are relevant. The CO_2 equivalents will be derived using the conversion factors laid down in the Kyoto Protocol. They are listed in Table 9.

Table 9 **Greenhouse gases and conversion factors according to the Kyoto Protocol considered within this method.**

Greenhouse gas	Conversion factor
Carbon dioxide (CO_2)	1
Methane (CH_4) fossil [a)]	21
non fossil [b)]	18.25
Nitrous oxide (N_2O)	310

a) includes the impact of CO_2 after CH_4 has been oxidized in the atmosphere

b) does not include the impact of CO_2 after CH_4 has been oxidized

7.2.1 Recommendations for a GHG criterion

The benefit for reducing the greenhouse effect has been reflected by a criterion (threshold saving quota) for a sustainable use of bio based material of any purpose. Taking uncertainties of GHG balancing into account any bioenergy system is expected to provide a “significant” reduction of GHG emissions against the fossil reference system.

It has to be noted that a threshold cannot be figured out solely based on science. This is a predominantly political procedure and decision making, referring to the ambitions of policy goals and taking feasibility into account.

By legal decision of the German government a value of **30 % saving** compared to the substituted fossil based reference system is defined to be the minimum requirement for a “significant reduction” from 2008 on. The value shall be 40 % saving from 2011 on [BioNachV 2007].

The Biofuel quota act authorises the government to introduce a multiplication factor for different biofuels based on their GHG savings. This factor should correspond to the GHG saving rate of a biofuel. Contributions to the quota and tax concession are only granted commensurately to the multiplication factor (see Figure 13). The application mode of the multiplication factor is defined in the Biomass Sustainability Regulation [BioNachV 2007] in § 4 (2).

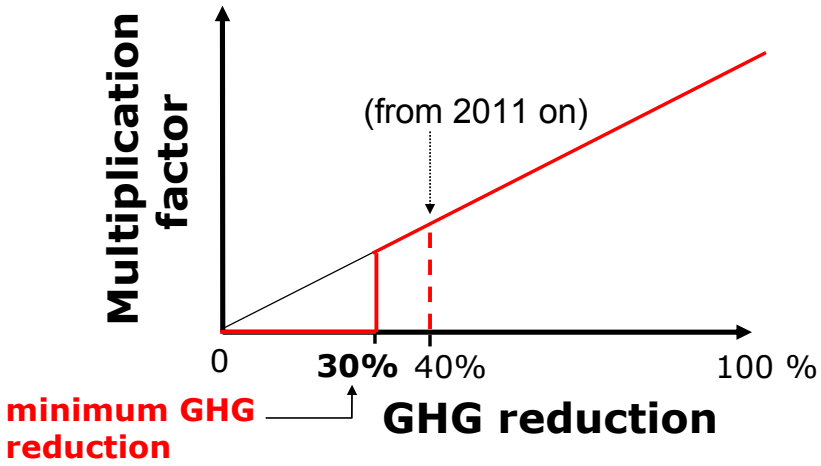


Figure 13 **Scheme showing the relation between GHG reduction and multiplication factor**

7.2.2 Implementation strategy and default values

A differentiation has to be made for using default values and using singular case values. For the fossil reference system only default values will be used. Default values will be given in this document. They have to be applied if no certified singular case values are available.

The default values for the biomass systems are based on **conservative** but **realistic** cases for Germany. They reflect the situation closest in time to their implementation based on the availability of information.

The default values should be updated on a regular basis (e.g. every 2 years). The update can be positive or negative according to the actual development. Default values will be available for different steps of the biofuel production system including a sufficiently comprehensive set of types of biofuels (given in section 7.4.3, see Table 12 and Table 13).

As long as no procedures for the certification of singular cases are in place only the default values shall be applied. The procedure for deriving values for singular cases must include at least the following items: way of application, quality control, third party review, monitoring, etc..

A singular case can encompass the entire production chain from biomass production to admixture. Then the GHG accounting for all steps is necessary. A singular case can be established for a specific production step of the biofuel production chain. Then the default value can be substituted by the certified specific value while keeping the default values for the rest of the chain.

In the sense of the Biofuel Quota Law a provider will not be allowed to be counted for the quota if there is evidence that a provider of biofuels performs worse than the default values.

7.2.3 The Biofuel system

The biofuel system encompasses the production of the biomass, all conversion processes, waste treatment, any transportation of goods and the use of the biofuels (see Figure 14). Production of ancillary material is included. Also all downstream processes like effluent and waste treatment is included. The production of capital goods and infrastructure is excluded.

A cut-off criteria to include the production of ancillary material in the system will be limited to 1 % of the total mass input of the system step (as detailed above). If there is knowledge about GHG intensive production of such cut-off material it will be included in a consistent way.

The point of balancing is the point of admixture which has to be reported to the authorities. The reference is the energy equivalent of the biofuel to the fossil fuel at the admixture storage tank.

For reasons of simplification the handling of the fuel from the point of admixture to the final use is treated equally. Differences caused by different ratios of energy content to mass (relevant for transport processes) and similar effects are neglected. Additives are disregarded.

The use phase is included with the assumption that all carbon is released as carbon dioxide. In the case of biofuel the CO_2 emissions are accounted for with the value “zero” if the biofuel is 100% from biomass. If this is not the case a corresponding calculation has to be applied.

7.2.4 Reference systems

A fossil or “conventional” system has to be defined which serves as a reference for calculating the reduction of GHG emissions. The reference system has to be defined in a consistent way whenever it is used. There should be one reference system and not a choice of many arbitrary systems in the same calculation procedure.

For the reference system the same methodological rules have to be applied as for the bioenergy system.

The fossil fuel reference system encompasses the extraction of crude oil, the transportation to the refinery, all refinery processes to produce gasoline and diesel and the use of the fuels. The production of ancillary material is included. Also all downstream processes like effluent and waste treatment is included. The production of capital goods and

infrastructure is excluded as well. A cut-off criterion is considered analogously to the biofuel system.

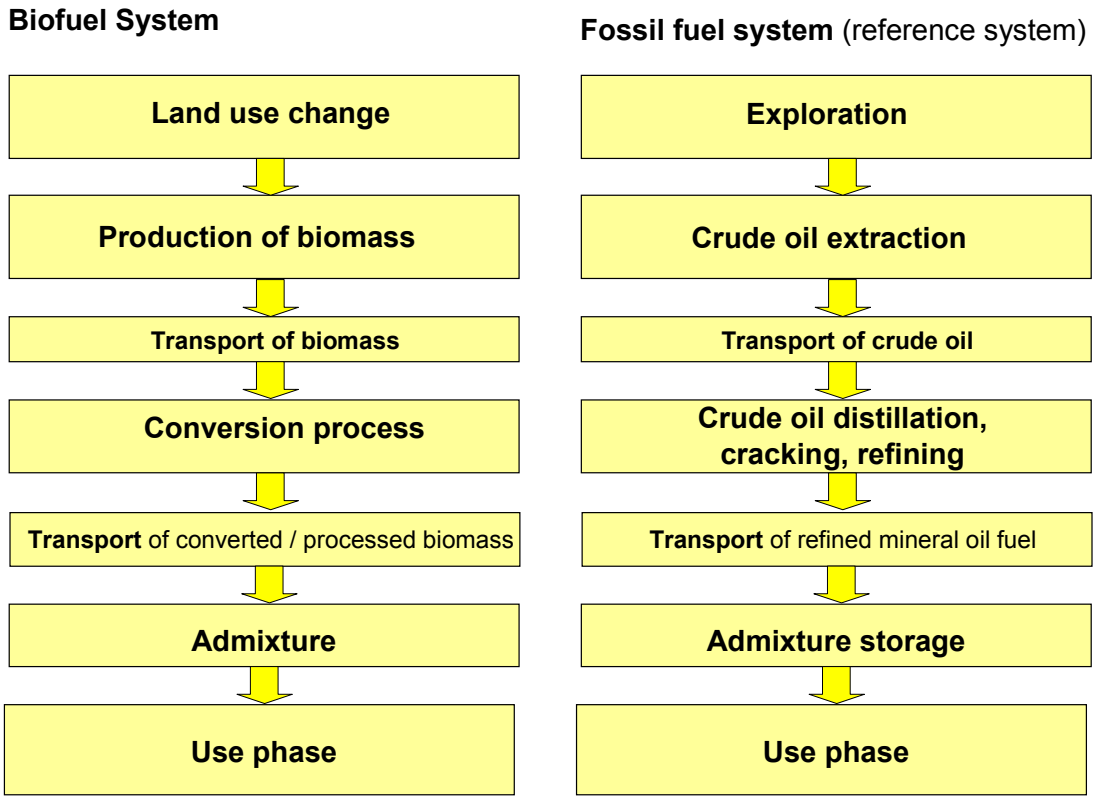


Figure 14 Scheme of process stages of the biofuel and the fossil

The point of balancing is the point of admixture which has to be reported to the authorities. The reference is the energy equivalent of the fossil fuel at the admixture storage tank. For reasons of simplification the handling of the fuel from the point of admixture to the final use is treated equally. Differences caused by different ratios of energy content to mass (relevant for transport processes) and similar effects are neglected. Additives are disregarded.

The use phase is included with the assumption that all carbon is released as carbon dioxide.

Future developments like exploitation of more effort consuming mineral oil resources (e.g. tar sands) or an increasing use of natural gas as fossil fuel has to be observed and potentially included. A preferred approach is to use marginal changes from today to a ten year development as a reference.

As consolidated in chapter 7.4.1 data from JRC/Eucar/Concawe [2006] are preliminarily laid down to facilitate accordance in terms of data on a European scope. There is further need to check if the values given there are actually in line with the approach devel-

opment here for biofuel. It is not within the scope of this study to examine this. Specific GHG calculations for fossil systems are not performed at this stage.

The Dutch methodology refers to a report “To shift or not to shift” [CE, 2003] and the “Well to wheel” study [JRC/EUCAR/concawe 2006]. The UK study refers also to the “Well to wheel” study as a major reference. The Well to Wheel Study favours the “incremental approach”. The authors stated that they calculate two realistic future scenarios. Obviously the formulations are “average” future scenarios.

7.2.5 How to deal with co-products

Many processes in the biofuel systems have one or more co-products. There are diverse options to operate on this issue. A legislative and incentive system as given by the German legal situation requires a robust and pragmatic but also scientifically accurate approach. Weighting pros and cons of the three most promising options (see Table 10) is:

All inputs and outputs shall be **allocated** to the co-products by their share of the **lower heating value** (= net calorific value).

Table 10 Comparison of co-product consideration

	Feature	PRO	CON
Substitution (system expansion)	Widening the scope, taking interrelated spheres into consideration	• Possibility to consider mechanisms that are actually happening • specific developments (progress) can be considered	• System expansion tends to raise complexity untraceable for “non-experts”. • the multiple pathways open a range of +/- unbound choices • needs evidence of what is really substituted.
Allocation	Remaining within the system	• by-products of the biofuel chain are seen as by-products of the biofuel chain	• no consideration of any correlations with other production sectors.
by energy content (lower heat value)		• robust and widely unambiguous approach • Coefficients are empirical, provable and available • Energy is the major issue concerning biofuel	• energy content is not always the most appropriate indicator • In some cases the LHV is unclear (varying water content)
by market value		• market coefficients are representing the real driving forces for producing a (co-) product. • Coefficients are in most cases available and published	• market values are very variable and fluctuant. There “validity” has to be determined by convention over a certain time span. • market values are not scientifically based.

The lower heating value is recommended to minimize the arbitrariness for the objective of the Biofuel Quota Law because it provides a clear and measurable figure to be used as a rule for allocation.

The lower heating value as an energy figure is appropriate for allocation in this context because the Biofuel Quota Law is about the substitution of fossil energy. Therefore all energy uses of co-products and also the material use of co-products (e.g. animal feed, etc.) can be analysed according to their energy content. A consistent table of lower heating values will be used (see Table 11).

Biomass which stays on the land or is returned to it (directly or indirectly) is not treated as co-product but modelled in a closed loop. Cross compliance demands for the carbon content of the soil has to be taken into account. Biomass with no use or no defined use is treated as if it stayed on the agricultural land.

Co-product allocation according to the energy content is probably preferred by the *European Commission*. First drafts of annex 7 of the Fuel Quality Directive favour this approach.

In the *Netherlands* there is a tendency to give priority to allocation according to economic values.

In the *United Kingdom* it is recommended that the approach to address co-products should be flexible and, that the most appropriate approach (i.e. that which most accurately estimates the net GHG impact) should be decided for each individual co-product. In practice this means that: Substitution will be the first choice approach, and allocation will be preferred when co-products are used for heat or electricity generation or are converted into another biofuel".

7.2.6 Biofuels from waste material

Bio based waste material is a source for biofuels which is included in the application of the Biofuel Quota Act. Such materials enter the GHG balancing system without up-chain emissions and input. Only the point of handing over the waste from its original system to the biofuel system – the system boundaries – must be clearly defined.

Bio based waste material must be declared explicitly as waste. This is the case if the waste material is defined as waste according to national and international legislation like having a waste code (European waste catalogue) and being reported under waste reporting requirements, etc. If bio based material does not fulfil these requirements the biomass has to be considered as co-product of another system and will be charged with GHG emissions from the other system according to given allocation rules.

The production of a biofuel from the waste material might compete with other recycling or recovery options. These options will be analyzed so that any possible misguided developments in the waste management regime will be avoided. Such an assessment can be based on a LCA in waste management.

Table 11 Lower heating values of the material investigated.

		Lower heating value Hu		Water content
		MJ/kg DS	MJ/kg OS	%
Agricultural products				
Wheat	Complete plant	17.1	13.5	18.4%
	Grains	17.0	13.7	16.9%
	Straw	17.2	13.3	19.8%
Maize	Complete plant	16.5	14.3	11.6%
	Grains	21.4	17.4	16.7%
	Straw	17.7	13.7	19.8%
Sugarcane	Complete plant	17.0	11.0	30.8%
	Crop harvest	17.0	11.0	30.8%
Sugar beet	Complete plant beet Crop harvest	17.0	2.1	76.4%
Rapeseed	Complete plant	21.8	17.0	19.6%
	Grains	26.5	21.8	16.2%
	Residue	17.0	14.7	11.8%
Soybeans	Complete plant	18.0	14.5	17.1%
	Beans/seed	20.0	17.0	13.3%
	Residue	17.0	13.0	20.5%
Palm oil	Seed head	24.6	22.3	8.5%
	Fruits	31.7	31.5	0.6%
	empty seed heads	17.5	14.0	17.5%
Semi-manufactured products				
Distiller's dried grains (DDGS)		21.8	16.0	23.9%
Molasses (45% sucrose)		19.0	7.2	55%
Bagasse (50% DS)		16.6	7.1	50%
Extracted beet slices		16.3	2.1	75.5%
Melasse, vinasse		17.0	7.2	50%
Rapeseed oil		37.2	-	0%
Soybean oil		36.6	-	0%
Palm oil		36.5	-	0%
Rapeseed extraction cakes		19.0	15.0	18.6%
Soy extraction cakes		19.0	15.0	18.6%
Oil fibres		17.5	14.0	17.5%
Palm nuts		28.0	28.0	0%
Glycerine (un-processed)		17.0	13.4	18.5%
Final product				
Ethanol		26.7	-	0%
RME		37.2	-	0%
SYME		37.0	-	0%
PME		36.6	-	0%
Hydrogenated vegetable oil		44.0	-	0%

DS: dry substance
OS: original substance with consideration to the given (default) water content

7.3 Specific requirements concerning the process stages

7.3.1 GHG accounting for direct land use and land use change

Biofuel systems interact directly with the land they are cultivated on. This interaction has two implications:

- On the one hand the type of land use is connected with storage of carbon in the soil and above ground. (carbon storage aspect)
- On the other hand the type of land use change may also result in constant emissions of greenhouse gases like methane and nitrous oxides (N_2O) which is not covered by the C-balance. (permanent emission aspect)

The direct land use and respective land use change (direct LULUC) has to be taken into account for the biofuel GHG balance.

For the carbon storage aspect a carbon account of all carbon above and below ground has to be taken into consideration. The difference of the system before and after the change to the biofuel system has to be calculated. The difference whether it is positive or negative has to be attributed to the biomass and as a consequence to the biofuel.

Land use changes may influence dramatically the GHG balances depending on the nature of the changes and the period of time over which their impact occurs. The following picture explains the complexities connected with this issue.

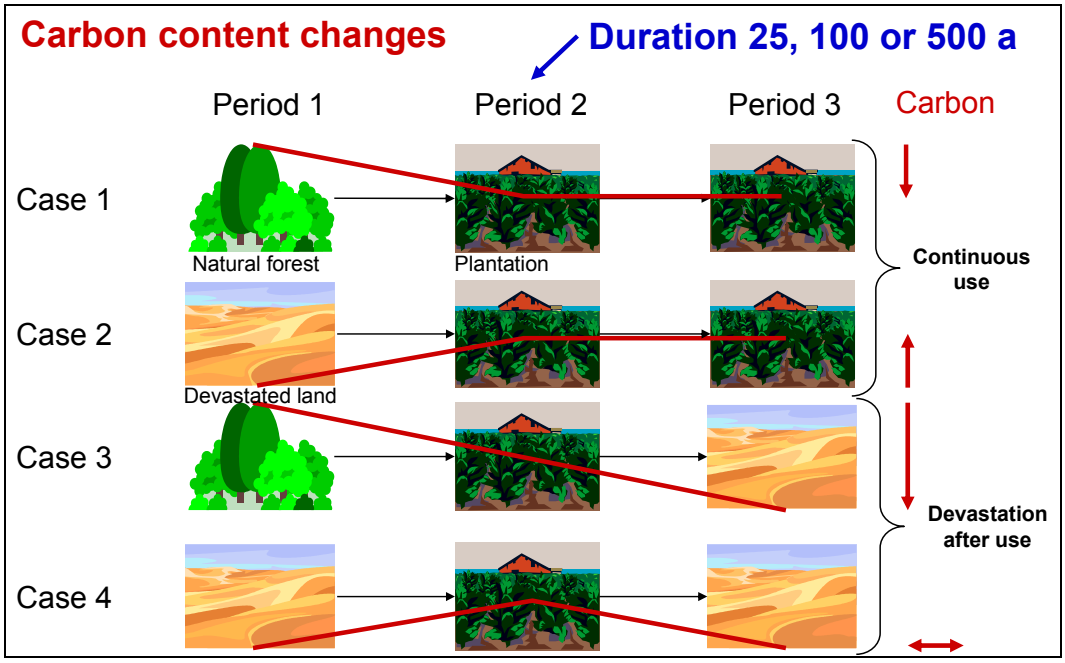


Figure 15 **Different case succession, duration of cultivation and the influence on carbon content changes (Reinhardt 2006)**

The default values shown below are predominantly based on the 2006 Guidelines for National Greenhouse Gas Inventories, Volume 4 taking into account changes in the carbon stocks of biomass, dead organic matter and soils. It covers the changes between forestland, cropland, grassland, wetland, settlements and other lands. Additionally the factors are based on climatic zones.

The effect shall be distributed over a time span of **20 years**.

It is complex to obtain reliable information on carbon storage above and below ground. Therefore values IPCC 2006 GHG Reporting Guidelines (vol. 4) values are preferred as long as no specific information is available. Permanent emissions of methane and nitrous oxides have to be taken into account.

Taking the date of enforcement of the Biofuel Quota Act into account a direct land use change will be recognized as such if the change did not happen after the 01.January. 2005.

7.3.2 Options for GHG accounting for indirect land use change

Indirect land use can be described as the shift of the land use prior to biofuel production to another area where a land use change occurs (leakage, displacement). These effects (indirect LULUC) have to be taken into account for the biofuel GHG balance.

However there is no approach in application to foster this issue. A pertinent approach is proposed by Fritsche [2007], who suggests a “risk adder”. It is defined by the global average share of area in use for producing agrarian products for export purpose and the land use change is given in the corresponding regions.

The estimation of the potential of indirectly caused GHG emissions takes into account that not only rain forest is affected but all countries trading agrarian products on a global level. These countries are potentially urged to increase biomass production for the global market of biofuels and thus in these countries displacements effects are likely to occur. The share of area utilized for producing biomass for export reflects the origin and country specific yields. The data can be acquired from FAO data banks.

The average share factor has to be adapted because not every increase of biomass production will lead automatically to indirect land use change. Until 2005 biomass for biofuel had been predominantly produced on former set-aside-areas or the increase of production had been provided by intensification of formerly marginal areas. In both cases a displacement is not given (risk adder = 0).

Hence a doubling of biofuel use in Germany is expected by the year 2020. Half of this production can be estimated to be covered by areas currently in use. Concerning the other half Fritsche anticipates about 50 % to be produced on areas inducing displace-

ment and the other 50 % by production of 2nd generation biofuels from lignocelluloses (from 2015) which again won't cause displacement.

Based on these assumptions displacement effects have to be taken into account for 25 % of biofuel from a German point of view up to 2020.

7.3.3 Modelling of agricultural systems

Modelling agricultural systems for GHG accounting is not always straightforward because of widely varying parameters and complex system interactions. Therefore some conventions are needed.

Agricultural systems are often composed of various cultivations and shifts of cultivations. For simplicity reasons the cultivation of biofuels will be cut out of the total period of the agricultural system with varying cultivations. But interactions with the shifting cultivations (e.g. fertilizer interactions) will be taken into account.

Biomass left on the agricultural land or brought back to the land has to be taken into account for balancing the fertilizer demand or carbon storage calculations (direct biomass loop).

Secondary biomass (e.g. straw, leaves, etc.) being used for non-energy purposes and brought back to the agricultural land has to be taken into account for balancing the fertilizer demand or carbon storage calculations. This shall be done even if it is not form the original land (indirect biomass loop).

N-fixation for subsequent cultivations (e.g. legumes like soy plants) and N-release from previous cultivations have to be taken into account. Therefore an N-balance has to be calculated which serves as the basis for the mineral fertilizer demand. This interaction with cultivation shifts will be considered.

Manure is not considered as a co-product of another system (e.g. meat production, milk production). It is modelled from the moment of its generation until its end use on the land.

All agricultural activities will be modelled as they occur in reality. This includes machine work, pesticide application, fertilizer application, biomass burning, etc.

7.3.4 Modelling of conversion and transport systems

GHG calculation for conversion steps within the biofuel chain is state of the art. Direct emissions, as well as emissions due to energy use (e.g. electricity, process heat, steam) and auxiliary material (e.g. methanol, process agents etc.) have to be accounted including pre-chains.

The specific process in calculation demand is defined with reference to realistic examples in practice. According to the conservative approach moderate to low efficient levels of energy use and yield will be chosen. The fuel type with the unfavourable GHG balance is chosen, as long as the usage of this fuel type is typically found in practice for a certain biofuel conversion system (e.g. lignite is in use in several German ethanol plants; so this is chosen to be the conservative default case).
Modelling transport needs is first defined as means of transport and distances. With regard to default values both data types are defined taking conservativeness into account. For instance truck transport is generally assumed for overland transport even if rail would be possible and practiced in special cases. Distances are estimated on a realistic base but also preferring longer (not the potentially longest) routes in case of doubt.

7.4 Default values

7.4.1 Reference system

As noted at the end of section 7.2.4 the GHG emissions for the fossil reference system are adopted from JRC/EUCAR/Concawe (2006). The values have been calculated as:

- 86.2 kg CO_2-eg. per GJ of diesel
  (adding together: crude oil extraction: 3.3; transport 0.8; refinery: 8.6; use: 73.5)

- 85 kg CO_2-eq. per GJ of gasoline
  (adding together: crude oil extraction: 3.3; transport 0.8; refinery: 6.5; use: 74.4)

7.4.2 Conservative character of the default values

The default values are used as references for greenhouse gases within the framework of the Sustainability Directive for the Biofuel Quota Act, in as far as the manufacturer of a biofuel does not present any greenhouse gas balance for his product. For this reason, the default values are derived on a **conservative** basis and represent a comparatively unfavourable case for each system. The intention is to give the biofuel manufacturer an incentive to achieve a better practice.

Conservatism is not an absolute quantifiable measure. It can be used on various levels in quite varying manners. In the definition used here, it does not necessarily describe the worst possible case. If numerous input data is available, the determination is made according to the principle illustrated in Figure 16. If only little input data is available, then generally the most unfavourable value was chosen. It must be noted that only single values were available for many processes and thus this value was taken.

It cannot be ruled out that in reality individual cases may occur that could correspond to a more unfavourable situation than the default value for the corresponding scenario.

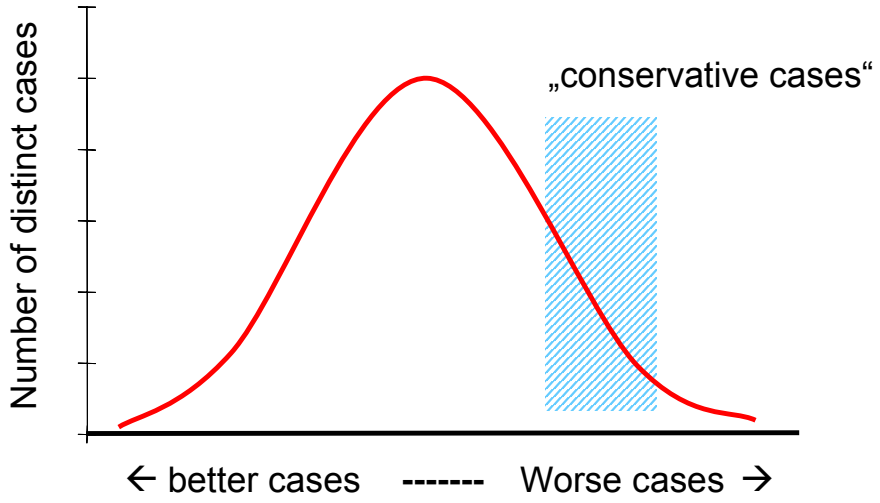


Figure 16 Definition range for “conservative cases” with extensive data basis

7.4.3 Default values for a selection of biofuel systems

The articles selected correspond to the global standards, i.e. the systems most relevant for the German biofuel market. These are listed below:

Ethanol:

1. from wheat through fermentation and distillation, origin of biomass and production in Europe
2. from maize through fermentation and distillation, origin of biomass and production in North America
3. from sugarcane through sugar extraction, production in Latin America
4. from sugar beet through sugar extraction, production in Europe

fatty acid methyl ester (FAME):

1. from rapeseed through pressing, extraction and transesterification, origin of biomass and production in Europe
2. from soybeans through pressing, extraction and transesterification, origin of biomass and production of oil in Latin America, transesterification in Germany
3. from soybeans like above but origin of biomass and production of oil in North America, transesterification again in Germany
4. from palm oil through pressing, extraction and transesterification, origin of biomass and oil production in SE Asia, transesterification in Germany

straight vegetable oils (rape seed oil, soybean oil and palm oil[9]):

hydrogenated vegetable oils (rape seed oil, soybean oil and palm oil)

[9] Straight palm oil (respectively crude palm oil, CPO) is not appropriate for biofuel (Biodiesel) use. Its consideration within this selection is exemplary intented for informational purposes .

Table 12 Set of proposed default values for examples of bioethanol and FAME; all figures given in kg CO_2-equivalents per Gigajoule.

Biofuel / **Biomass origin** / **step of production chain**	**Ethanol**				**Biodiesel (FAME)**			
	Wheat Europe	**Maize** (corn) North America	**Sugarcane** Latin America	**Sugar beet** Europe	**Rapeseed** Europe	**Soybean** Latin America	**Soybean** North America	**Palm oil** Southeast Asia
direct land use change	*26.2* [a)]	*19.8* [a)]	*158.8* [a)]	*15.6* [a)]	*32.8* [a)]	*289.6* [a)]	*54.5* [a)]	*112.8* [a)]
production of biomass	22.3	17.8	19.5	11.3	29.1	12.9	15.2	6.6
transport of biomass	0.7	0.7	1.5	1.7	0.4	0.5	0.5	0.1
conversion step I	-	-	0.8	6.6	7.6	7.3	9.2	6.90
transport between conversion steps	-	-	-	-	0.2	3.8	3.4	4.3
conversion step II	34.3	25.0	1.0	48.9	7.6	7.7	7.7	7.7
transport to fuel storage for admixture	0.4	4.8	5.5	0.4	0.3	0.3	0.3	0.3
Total without LUC	**57.7**	**48.2**	**28.3**	**68.8**	**45.3**	**32.4**	**36.3**	**25.9**
Total with direct LUC	*83.9* [a)]	*68.0* [a)]	*187.1* [a)]	*84.4* [a)]	*78.1* [a)]	*322* [a)]	*90.7* [a)]	*138.7* [a)]

a) worst case situation, contradicts general criteria for sustainability (conversion of areas with high carbon storage) only to apply as long direct land use cannot be verifiably excluded; when excluded, indirect land use change has to be considered.

Table 13 **Set of proposed default values for examples of straight and hydrogenated vegetable oils; all figures given in kg CO_2-equivalents per Gigajoule.**

Biofuel / **Biomass** origin / **step of production chain**	**straight vegetable oil**				**Hydrogenated vegetable oil**			
	rapeseed oil	**soybean oil**		**palm oil**	**rapeseed oil**	**soybean oil**		**palm oil**
	Europe	Latin America	North America	Southeast Asia	Europe	Latin America	North America	Southeast Asia
direct land use change	*34.2* [a)]	*298.8* [a)]	*56.2* [a]	*117.4* [a)]	*33.2* [a]	*293.4* [a]	*55.2* [a]	*114.3* [a]
production of biomass	30.4	13.1	15.5	6.9	29.5	13.0	15.4	6.7
transport of biomass	0.5	0.6	0.6	0.1	0.4	0.8	0.5	0.1
conversion step I	7.6	6.9	9.0	7.4	7.3	6.8	8.6	7.2
transport between conversion steps	-	-	-	-	0.2	3.8	3.5	4.3
conversion step II	-	-	-	-	9.7	9.7	9.7	9.7
transport to fuel storage for admixture	0.2	3.9	3.5	4.4	0.7	0.7	0.7	0.7
Total without LUC	**38.6**	**24.5**	**28.5**	**18.8**	**47.9**	**34.8**	**38.3**	**28.7**
Total with direct LUC	***72.8*** [a)]	***323.3*** [a)]	***84.7*** [a]	***136.2*** [a)]	***81.1*** [a)]	***328.2*** [a)]	***93.5*** [a]	***143.1*** [a)]

a) worst case situation, contradicts general criteria for sustainability (conversion of areas with high carbon storage) only to apply as long direct land use cannot be verifiably excluded; when excluded, indirect land use change has to be considered.

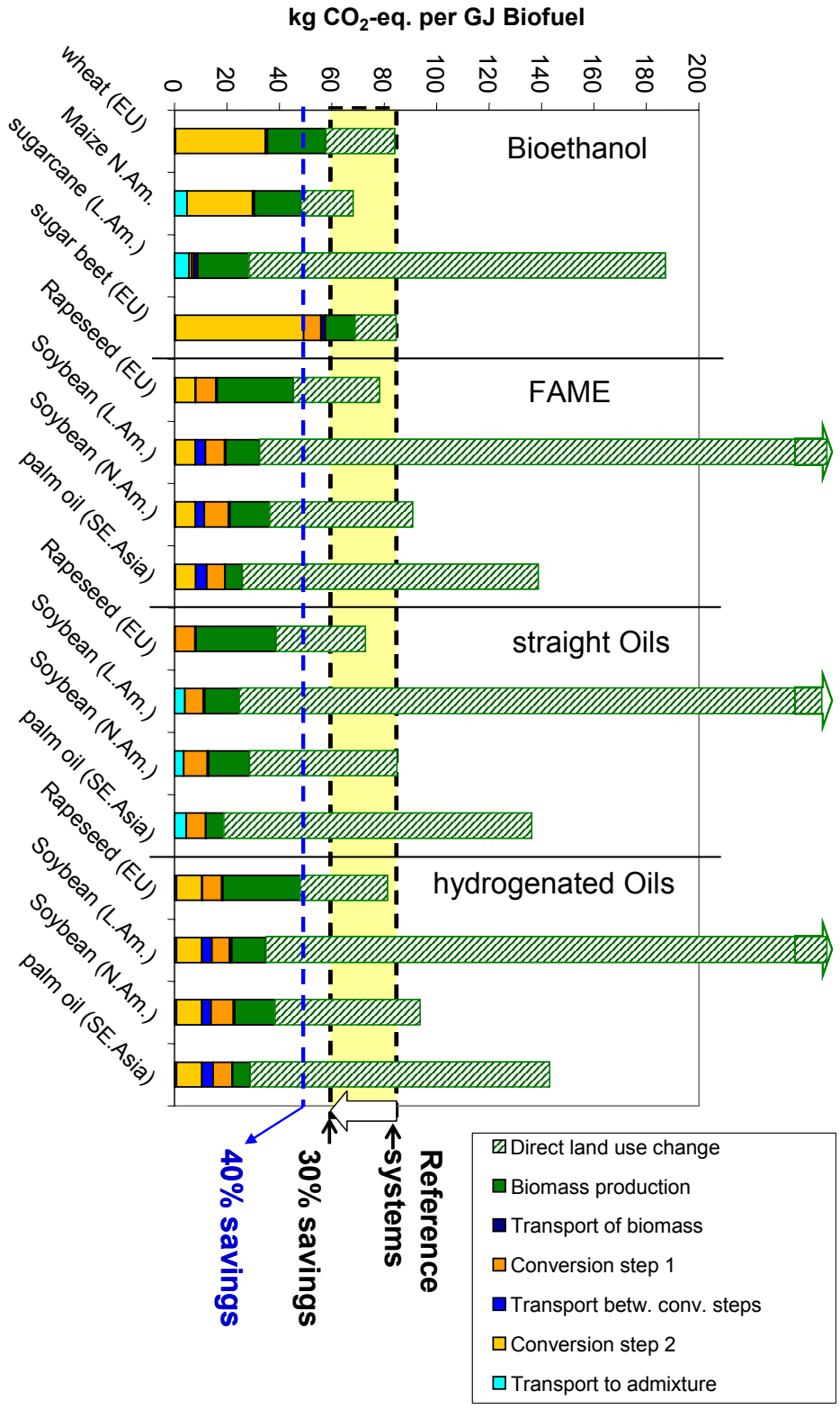


Figure 17 **Proposed strictly conservative default values for the selected examples of biofuels in comparison to the reference systems or the minimum saving of 30% or 40% of greenhouse gas emissions.**

8 Assessment of Compatibility with International Trade Rules (WTO)

The scope of this chapter is to give a rough overview about the disciplines of international trade rules concerning the introduction of a certification scheme for the differentiation of support for biofuels considering sustainability criteria.

8.1 Legal framework

The implementation of environmental or sustainability-related standards for biofuels aims implicitly to create a distinction within this type of commodity. This distinction will take specific conditions of production and use into account. In fact such standards will introduce mechanisms that fall into the category of 'non-trade' concerns in relation to the WTO Agreement on Agriculture (AoA, also known as Uruguay Round Agreement). This AoA is considered a first step towards fairer competition and a less distorted agricultural sector.

The Like Product issue

According to article 2, paragraph 1 of this agreement the signatories shall e*nsure that in respect of technical regulations, products imported from the territory of any Member shall be accorded treatment no less favourable than that accorded to like products of national origin and to* ***like products*** *originating in any other country*. Similarly article I of the GATT (General Agreement on Tariffs and Trade) compels this treatment of "like products".

Consequently, GATT rules in article I.1 *that internal taxes … or … internal quantitative regulations requiring the mixture, processing or use of products … should not be applied to imported or domestic products so as to afford protection to domestic production*.

This is enhanced by the condition of *General Elimination of Quantitative Restrictions* given in article XI, which forbids in paragraph 2(c) *import restrictions on any agricultural … product, imported in any form … to restrict the quantities of the* ***like domestic product*** *permitted to be marketed or produced, or, if there is no substantial domestic production of the like product, of a domestic product for which the imported product can be directly substituted….*

The terminus "like product" is decisive. For most purposes, however, meaningful comparison of "like product" definitions requires specifying the criteria by which likeness is to be measured. Strictly physical criteria might lead to other classifications than commercial criteria claiming that competing goods are "like products". Hudec (2000) found that interpretations vary from one GATT provision to another. "Like product" have to be defined on a "case by case" basis. A general agreed and systematic definition is not yet available.

With respect to biofuels a considerable number of "likeness" issues can be raised. Some simple examples include:

- Identical raw material (e.g. palm oil) for different uses (e.g. margarine, detergent, fuel)
- Different raw material (e.g. palm oil, rape seed oil, soy bean oil) for same use (e.g. fuel)
- Identical raw material (e.g. palm oil) for same use (e.g. fuel) produced under different conditions (on deforested area or existing plantations)

Howse at al. (2006) states the implications given by different options for classifying biofuels: Are biofuels agricultural, industrial or environmental commodities? This lack of clarity makes examining biofuels and trade regulations a rather complex issue. Agricultural goods, unlike industrial goods, are assigned to the Agreement on Agriculture (AoA). Bellmann (2006) points out the distinction made between bioethanol to be considered as an agricultural product and biodiesel classified as an industrial product. He pronounces that in the Doha negotiations tariff reduction objectives are much more ambitious for industrial goods than for agricultural goods.

Furthermore, confusion can be caused by the possibility to classify biofuels as “environmental goods”. The formally suspended Doha Ministerial Declaration calls for “the reduction or, as appropriate, elimination of tariffs and non-tariff barriers to environmental goods and services (EGS)” in paragraph 31(iii) (Singh (2006)).

The Box system

The basic purpose of the GATT/WTO regime is to compel member nations to make transparent and reduce non-tariff barriers to trade. In the WTO terminology, measures (primarily subsidies) are identified by the following “boxes”:

- green box (permitted),
- amber box (slow down — i.e. be reduced),
- red box (forbidden).

The Agreement on Agriculture (AoA) is more complex: there is no red box, although domestic support exceeding the reduction commitment levels in the amber box is prohibited. There is a blue box for subsidies that are tied to programmes that limit production. There are also exemptions for developing countries (sometimes called “S&D box”). Table 14 gives an overview of the Boxes according to AoA.

The Exemptions – GATT, Article XX

The WTO setup does not foster strong ambitions in the area of environmental concerns. Issues of trade and environment are limited to trade policies and to the trade-related aspects of environmental policies which have a significant effect on trade. If a measure that addresses environment or sustainability considerations is not clearly allocated to the green box, it runs the risk of being interpreted against the international trade law.

Table 14 The WTO Box system for the Agreement on Agriculture

Amber Box:	Comprises all domestic support measures considered to distort production and trade (with some exceptions). These include measures to support prices, or subsidies directly related to production quantities. These supports are calculated according to the so called Aggregate Measurement of Support (AMS) and subject to limits: 5% of agricultural production for developed countries; and 10% for developing countries.
Blue Box	Comprises "amber box measures" if the support also requires farmers to limit production ("amber box with conditions"). At present there are no limits on spending for blue box subsidies, but this issue is strongly negotiated. Examples are direct agricultural income aids for production restriction within the EU.
Green Box	These measures must not distort trade, or at most cause minimal distortion. They have to be government-funded (not by charging consumers higher prices) and must not involve price support. They tend to be **programmes** that are **not targeted at particular products**, and include direct income supports for farmers that are "**decoupled**" from current production levels or prices. They also include environmental protection and regional development programmes. "Green box" subsidies are therefore allowed without limits, provided they comply with the policy-specific criteria set out in Annex 2 of the AoA.

However, GATT, Article XX defines "general exceptions". Namely, the agreement shall not be an obstacle to prevent measures

(b) necessary to protect human, animal or plant life or health or
(g) relating to the conservation of exhaustible natural resources.

A positive example for a successful "environmental" use of an Article XX (b) exception is the *EC-Asbestos* case (WTO appellate body 2000). The protection of human life or health is a strong argument.

Another very famous case – the *US Tuna Dolphin* case – has failed to give animal life or biodiversity priority over international trade rules (WTO Panel 1994). In this case the US authorities had banned yellow fin tuna import from Mexico because the Mexican fishing fleet did not comply with the US protection standards for the domestic American fishing fleet considering dolphins. Mexico complained successfully in 1991 under the GATT dispute settlement procedure. It was concluded, that the US could not embargo imports of tuna products from Mexico simply because Mexican regulations on **the way** tuna was **produced** did not satisfy US regulations. This has become known as a "product" (quality) versus "process" (way of producing) issue. GATT rules did not allow one country to take trade action for the purpose of attempting to enforce its own domestic laws in another country ("extra-territoriality"), even to protect animal health or exhaustible natural resources. [14]

[14] http://www.wto.org/English/tratop_e/envir_e/edis04_e.htm

The reasoning behind this ruling is that any country could ban imports of a product from another country merely because the exporting country has different environmental, health and social policies. This would create an open-ended route for any country to apply trade restrictions unilaterally, not only to enforce its own laws domestically, but to impose its own standards on other countries.

Another important case is the *US Sea Turtle Shrimp* case (WTO appellate body 1998). In 1997, India, Malaysia, Pakistan and Thailand brought a joint complaint against a ban imposed by the US on the importation of certain shrimp and shrimp products. The US required that US shrimp trawlers use “turtle excluder devices” in their nets when fishing in areas where there is a significant likelihood of encountering sea turtles (Pacific Ocean). Such devices were not in use by the shrimp fishing fleets of the banned countries. The WTO Panel considered that the ban imposed by the US could not be justified under GATT Article XX but was inconsistent with GATT Article XI (limiting the use of import prohibitions or restrictions). The US lost the case, not because it sought to protect the environment but because it discriminated between WTO members. It provided countries in the western hemisphere (mainly in the Caribbean) technical and financial assistance and longer transition periods for their fishermen to start using turtle-excluder devices. [15]

Though the cited cases are not encouraging reference to the GATT Article XX(b,g), this article is the central premise and starting point for justifying sustainability standards for products like biofuels. Of prime importance is a clear and profoundly qualified reference to the protection of human, animals, plants and conservation of exhaustible natural resources.

The preamble of Article XX has to be respected which rules out measures “*…which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade*". The Appellate Body considered in the *US-Shrimp* case that the “rigidity and inflexibility” in the application of a measure constitutes "arbitrary discrimination" within the meaning of the preamble.

Howse et al. (2006) state that the *US Sea Turtle Shrimp* case proves that environmental measures based on (different) “*processing and production methods”* are not ruled out under Article XX. Indeed, in this case the Appellate Body went so far as to hold that, in principle, Article XX allows WTO Members to condition imports on the actual policies of other WTO Members.

Within the Agreement on Technical Barriers to Trade (TBT) the certification of biofuel is defined as a “technical regulation”. Article XX provides a legitimate objective for such regulations directed to the protection of health and safety of humans, animal or plant life and the conservation of exhaustible natural resources. From its inception the GATT/WTO regime has in fact recognized the need to accommodate domestic policy concerns of its

[15] http://www.wto.org/english/tratop_e/envir_e/edis08_e.htm

member states, including concerns regarding environmental protection and natural resource preservation (Dana 2004).

8.2 Criteria for environmental certification schemes

This chapter addresses the following general question:

- What are the requirements of environmental certification schemes to reach best compliance with and lowest chances for challenge under WTO regulations?

Arbitrary or unjustifiable discrimination will be the central argument against a certification system defining sustainability criteria. The following procedures are recommended for the set-up of a successful environmental certification scheme.

No discrimination between imported and domestic biomass/biofuel

Article XX of GATT requires that domestic products of same kind have to be treated the same way as imported products. Therefore, certification systems based on sustainability criteria have to be completely unbiased with regards to the origin of the biofuel.
A WTO compliant certification scheme has to ensure that domestic RME or bioethanol from wheat fulfils the same criteria and certification scheme as imported biodiesel from palm oil and bioethanol from sugar cane.

Science-based, manageable and transparent methodology

The challenge of arbitrariness can be countered by an excellent workmanship in the design of the compliance scheme. The methodology has to be based on a broad consensus, and best practice in standard setting and evaluation should be ensured.

A clear, comprehensive and transparent structure of the certification system will help to secure compliance with trade rules. This requires an intensive co-operation of on-going activities in EU member states (Netherlands, United Kingdom, Germany) and by NGOs (WWF, Bird Life, T&E etc.), aiming at a coherent approach. The higher the scientific standard of the approach, the less likely its appropriateness will be challenged.

If competing methodologies lead to different results, the entirety of schemes will be in question. The schemes may be considered arbitrary from WTO perspective, because results depend on the choice of scheme. Annex A to the TBT (“Code of Good Practice for the Preparation, Adoption and Application of Standards”) should be respected.

System and criteria flexibility with respect to specific framework conditions

Although generality and accuracy is required, a scheme that is too rigid may not comply with WTO regulations. A flexible system is a strong argument in favour of compliance, especially when the consideration of new (scientific and regulatory) knowledge is an integral part of the scheme.

Inflexible methodologies which don't into account specific conditions of the trade partner countries are unlikely to be acceptable. The willingness to consider the partner's specific framework conditions will be in line with the WTO principle of removing trade barriers. This is of special importance when trade partners are from developing countries.

This aspect has to be handled with great care because (a) bilateral negotiations will not lead to discrimination of other potential trade partners and (b) the science-based principles and criteria of sustainable biofuel production should not lead to low standards by unjustified pragmatism.

International consultations

The principles discussed above mean that intensive consultation at all stages of the process is essential for trade law compliance. This involves:

1. Mutual consultation:

   Negotiations between trade partners that take into consideration the special situation of the producer will underline the will to avoid the creation of trade barriers.

2. Multilateral consultation:

   The development of a certification system as well as its application should be continuously reviewed by international and multilateral institutions. The recently constituted Global Bioenergy Partnership (GBEP, secretariat hosted by FAO) provides a good opportunity to achieve a multilateral agreement on certification practices.

   Biofuel-oriented goals and strategies of various UN organizations (UNEP, FAO, UNCED, UNFCCC, UNCSD etc.) should be coordinated, and inputs from single nations should be incorporated (see pos. 3). If a certification scheme is in line with GBEP, it will hardly be challengeable.

3. Stakeholder consultation:

   Whenever relevant local stakeholders are consulted during the set-up of a system and its application, the concerns of the population in the producer countries are addressed. This will strengthen the WTO compliance of a certification scheme.

Synopsis of possibilities

Voluntary certification systems are unlikely to be challenged under WTO. A large number of voluntary systems exist in the field of sustainable, environmentally friendly biomass (wood, food crops, biomass for "green energy"), such as FSC (Forest Stewardship Council), PEFC (Programme for the Endorsement of Forest Certification Schemes), IFOAM (International Federation of Organic Agriculture Movements), and GGL (Green Gold Label).

Mandatory measures run a higher potential risk to infringe on trade laws. The central argument against mandatory schemes is that of **arbitrary or unjustifiable discrimination**. As shown above, there are various approaches to address this issue, summarized in the Figure 18. WTO compliance of a certification scheme will be more likely when all of them are considered.

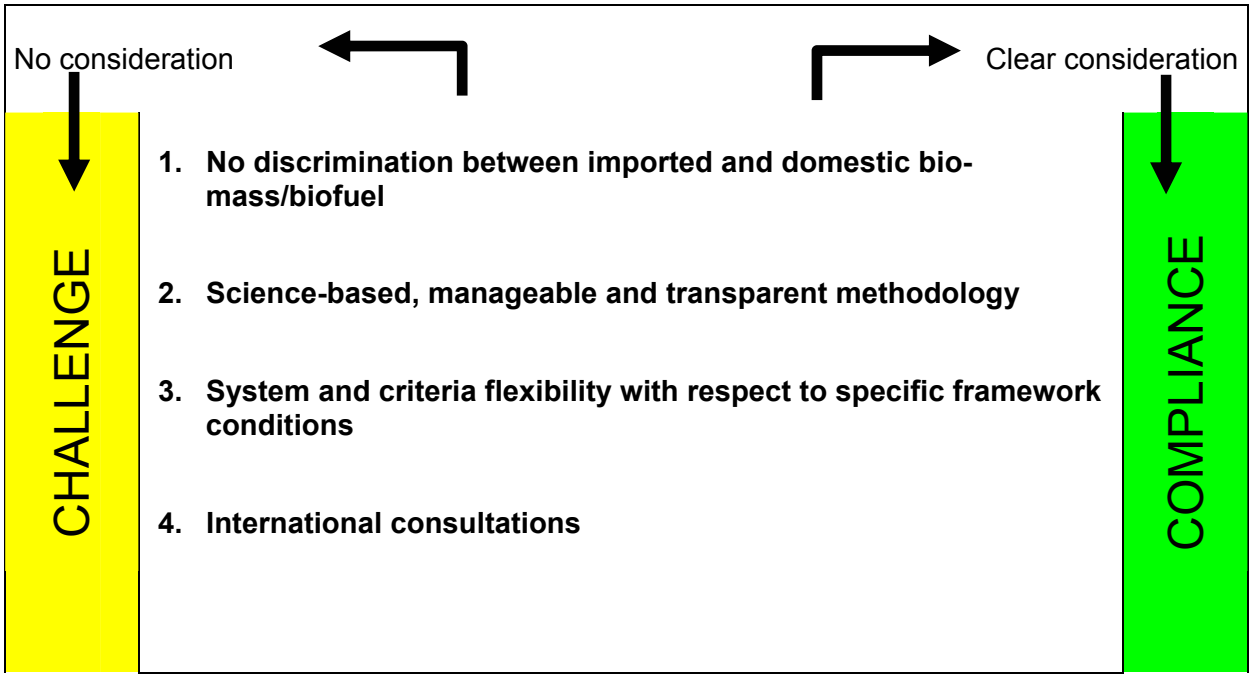


Figure 18 **Requirements for certification schemes for compliance with international trade rules**

9 Proposal of a set of criteria

This R+D project does not intend to create another number of basically new criteria. A large number of existing certification systems (chapter 4) and similar works with comparable objectives (chapter 5) have been evaluated in detail. In fact there are some more activities in process in terms of development of criteria (e.g. Roundtable on Responsible Soy, Better Sugarcane Initiatives).

At this state of the project it is appropriate to give a summary on principles and criteria that are estimated and review the state of the discussion. The proposal is meant for further intensive discussion with national and international policy-makers and involved stakeholders.

The criteria are kept in order of the major themes, as applied in the sections before.

9.1 Theme: Contribution to greenhouse gas mitigation.

It is common consent that this theme is an inevitable issue in terms of sustainability of bioenergy. In fact during this research project the German government passed a GHG methodology and criterion by the BioNachV. Just to be complete the picture this principle/criterion/indicator is featured here once again:

Principle 1: There has to be a significant contribution to greenhouse gas mitigation

Criterion 1.1: a minimum saving rate for GHG emissions is met taking into account the total process chain up to the point where it replaces fossil fuels is met.

The indicator is: a minimum target of 30 % (40 % from 2011 on) is met.
See all further details in chapter 7.

9.2 Theme: Land use practices and land use changes.

Land use practices and land use changes driven by biomass production will not lead to significant ecological impacts. The relevant principles are:

- Minimizing indirect land use change and keeping balance in terms of land use competition
- Loss of habitats of high nature value (HNV) shall be prevented
- Loss of biodiversity shall be prevented
- Negative impacts on soil, water and air shall be minimized

9.2.1 Principle 2: Minimizing indirect land use change and keeping balance in terms of land use competition

In section 6.1.3 the significance of indirect land use change effects has been profoundly analysed. Even if a biomass plantation for fuel purpose is installed on existing arable land, use change can be induced in an indirect way because the previous cropping might be displaced. A therefore competitive situation between food and fuel might indirectly transform into a competitive situation between fuel and forest (or other natural systems).

These mechanisms are not addressed by any existing certification system. Estimated to be one of the decisive issues is when biomass production should excel as sustainable. A reasonable approach to address this issue is indispensable to meet the original goal of certification and to gain acceptance. Retracing the actual inductions of one plantation or acreage is considered to be infeasible. As a consequence a producer cannot be charged with indirect effects. In fact it is widely determined by the corresponding political structure and land use policy given.

A feasible approach is considered to be based on reflections on actual land use change incidence in the producing countries. An indirectly induced clearing of natural forest can only be excluded when conservation objectives are formulated and implemented by a transparent and participative land use planning at national level.

The authors recognize the complexity of the problem of holding the national administration responsible to fulfil sustainability criteria for biomass production in place of the actual producer. The exclusion of a country in general may be considered as a breach of international trade rules (WTO).

The “risk adder” approach (see sector 7.3.2) takes indirect land use change into account within the scope of GHG balancing. It proposes a global area-related factor without regional differentiation.

9.2.1.1 Criteria referring to indirect land use change and land use competition

Criterion 2.1: There are nationally defined and observed **objectives** concerning land tenure and nature quality.

Objectives are the inevitable fundament of any land use planning. An objective can be e.g.: “X percent of the area of natural forest will be under conservation, the agricultural area will be expanded by X km^2 within the next X years, etc.”

Such objectives can be formulated on national, on regional or municipal level. If such objectives are absent, there is no justification for restraining any leakage.

But objectives are not sufficient. Sustainability can only be acknowledged when basic principles of good governance are given to attain the objectives.

Indicators are:

- Objectives are transparently documented and available to everybody;
- Clearly regulated and enforced land use rights;
- Stakeholder participation in decision making;
- A fully functional monitoring system is implemented and monitoring reports are public.

Examples for the use of this criterion:
This criterion is not implemented in any existing certification system. But the Dutch approach is “insight to the land use change in the region of the biomass production” as well as “insight in the price of food and land” within Dutch principle 3 [Cramer 2007].

Criterion 2.2: Land use policy clearly favours the **re-utilization of degraded land** which is not in competition to other interests of utilization and preservation objectives.

In an economy with expanding agriculture (e.g. when cropping systems for biomass are launched) land use competition is a logical consequence. Other cropping systems, grassland, potentially expanding settlement area, and forest (potentially primary forest or other high nature value areas) are competed.

In a number of countries degraded areas – idle land of low land use interest and mostly of modest ecological value – are available for biomass production. Utilization of such areas is unlikely to cause land use competition.

Indicators are:

- Implementation of suitable support programs to re-utilize degraded land or naturally idle land of modest ecological value.
- nation-wide monitoring of degraded areas and assessment of nature value to exclude high value succession biotopes.

Examples for the use of this criterion:
Avoiding land use competition by this criterion is also promoted by

- RSPO (principle 1),
- the Basel Criteria (criterion 4.4),
- the WWF proposal [Fritsche, Lübbeke et al. 2006] (standards 1 - 3),
- the Dutch approach [Cramer et al. 2007] (principle 3).

Principle 2 is of course a long-term requirement. Actually enforced land use objectives only exist in the majority of countries that are potentially significant biomass producers for the German biofuel market. In all these cases fulfilment of the criteria 2.1 and 2.2 would not be possible on a countrywide scale. On the other hand a project should be established to verify that land use competition is not created. For such cases an "escape criterion" is proposed.

"Escape criterion" 2.3: In case of missing national land use policy and objectives a biomass producing project has to prove that no land use competition has been created. Concretely speaking: Production has to be strictly limited to areas of degraded land or idle land which is not in use and do not shelter high nature value.[16]

Indicators are:

- Evidence on the state of degradation of the concerned area
- Evidence that degradation (deforestation) has not happened since 2005 (see crit. 3.2)

Examples for the use of this criterion:
This proposal is not covered by existing systems or any that are in development. Similar recommendations are provided by Fritsche, Lübbeke et al. [2006] (p. 22).
In general: There is no practical experience in certification concerning principle 2.

9.2.1.2 Practical experiences in certification concerning this principle

It is recognized that principle 2 is likely to be the most crucial issue, in terms of the certification discussion and within the scope of the recommendations of this study. Environmental and socially oriented NGO's have signalized not to accept any certification scheme which ignores indirect land use change and land use competition. On the other hand good practice examples are missing concerning this item. The authors are conscious about the complexity of global trade rules which might be infringed by suggesting criteria 2.1 and 2.2.

This issue needs to be further consolidated and deepened within the successive research project.

[16] With reference to 6.1.2 (Quality of area) there are criteria and measures needed to assess nature value.

9.2.2 Principle 3: Loss of habitats of high nature value (HNV) shall be prevented

Some high nature value areas or portions thereof are so rare, threatened, or ecologically vulnerable, and are of such global biological or cultural importance that any logging or commercial use could irreparably damage their conservation value.

In this context at first a clear scheme for the definition and identification of HNV is needed. Useful is the **HCVF concept**[17] which has been implemented by FSC and SAN. Furthermore the **protected areas** classification according to the IUCN[18] is a promising base. It is internationally recognized and connected to workable data bases like the WDPA (World Database on Protected Areas) or the UN List of Protected Areas.

9.2.2.1 Criteria referring to conservation of high nature values

Criterion 3.1: There is a documented assessment on the **status of nature value** concerning the reclaimed area.

The Identification of a threatened habitat provides necessary knowledge about the existence and locations of HNV areas. Therefore all existing natural ecosystems, both aquatic and terrestrial, must be identified. There must be knowledge about how they can be protected and there must be conservation programs to protect them. Such programs should include the restoration of natural ecosystems or the reforestation of areas within the farm that are unsuitable for agriculture.

Indicators are:

- The farm carries out activities to protect, conserve and restore natural ecosystems. These policies and activities are understood by the administration and farm workers.
- Species of plants threatened with or in danger of extinction have been identified, and activities are being carried out to protect and support their populations.
- Given conservation status on site and habitats is identified in the neighbouring surroundings (legal status, IUCN status, HCV concept, etc.)
- An impact assessment on the affected natural area is done and documented.
- Consulting relevant NGOs for assessing nature value and developing a management plan for mitigation of potential threatened habitats.
- The natural ecosystems and the current and potential areas for restoration or reforestation are indicated on maps. These areas are identified in the field and known by workers

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17 "High Conservation Value Forests" (see section 6.1.4.1)

18 IUCN = International Union for the Conservation of Nature and Natural Resources; since 1990 the name World Conservation Union is in use.

- A monitoring system is implemented and is surveying the status and development of habitats and the existence of specific endangered species, if any.
- There is a timeline and a person responsible for reforestation activities. Reforestation or restoration of ecosystems or areas unsuitable for agriculture is being carried out as indicated in the program

Examples for the use of this criterion:
Documentation of HNV presence and programs for protection using a criterion like this are also promoted by

- RSPO (criterion 5.2),
- the Basel Criteria (criterion 3.1.1),
- the WWF proposal [Fritsche, Lübbeke et al. 2006] (standard 2),
- the Dutch approach [Cramer et al. 2007] (criteria 4.1 and 4.2 – included by biodiversity criteria).
- the UK approach [Department for Transport 2008] (criterion 2.2)
- FSC (criteria 6.10, 9 and some further)
- SAN (criterion 2.1)

Criterion 3.2: **Primary vegetation** and **High Nature Value Areas** should **not be converted** to agricultural land; previous deforestations have not occured since 2005.

The reference data is 01.January.2005. An earlier date might be wishful and crucial when tracing biomass production for energy use. But the beginning of 2005 has been selected in line with the German Biomass Sustainability Regulation and justified as the year when biofuel use reached a significant quota (>1%).

Indicators are:

- retrieval documentation of land use practice by satellite mapping.
- Local interpretation should refer to existing national definitions of HNV or equivalent or consider how growers and the audit team can identify HNV areas.

Examples for the use of this criterion:
Avoiding conversion of HNV by a criterion like this is also promoted by

- RSPO (criterion 5.2),
- the Basel Criteria (criterion 3.1.1),
- the WWF proposal [Fritsche, Lübbeke et al. 2006] (standard 2),
- the Dutch approach [Cramer et al. 2007] (criteria 4.1 to 4.3 – included by biodiversity criteria).
- the UK approach [Department for Transport 2008] (criterion 2.3)
- FSC (criteria 6.10, 9 and some further)
- The proposal for the EU Renewable Energy Directive in article 15 (3).

Criterion 3.3: There is no drainage of **wetlands**.

Wetlands often have a high conservation value. A high value characteristic is the tremendous carbon storage within the soil (peat land) but also because destroying such ecosystems is explicitly irreversible. The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources[19].

Indicators are:

- Retrieval documentation of land use practice by satellite mapping.
- There is no evidence of filling or draining of wetlands.

Examples for the use of this criterion:
A specific wetland criterion is also promoted by

- RSPO (indirectly: criterion 4.4),
- the Basel Criteria (indirectly: criterion 2.1.4),
- the Dutch approach [Cramer et al. 2007] (criterion 4.3).
- the UK approach [Department for Transport 2008] (criteria 1.2 (carbon stock) and 2.2)
- The proposal for the EU Renewable Energy Directive in article 15 (4a).

Criterion 3.4: There must be **sufficient distance** between a farm and an HNV area.

Depending on the type and the absolute expansion High Nature Value ecosystems may be considerably vulnerable against impacts by directly neighbouring cultivation activities. Changing or even degrading impacts can be buffered by belt zones between HNV and a cultivation area. A general minimum distance will be allowed. If a specifically high vulnerability is given (e.g. due to sensitive species), or the concerned area represents an area of outstanding ecological value, or the area is comparably small, larger protection belts are required.

Indicators are:

- There should be a minimum distance of one kilometre between protected HNV area and farmland.
- If the distance between the farm and the concerned HNV area is less than one kilometre, the farm must show that it periodically communicates with protected area staff in order to avoid possible negative impacts due to the farm's activities.
- Local stakeholders are involved in the determination of the appropriate largeness of the buffer belt.

Examples for the use of this criterion:

[19] http://www.ramsar.org/

Keeping distance between HNV and cultivation areas using a criterion like this is also promoted by

- the WWF proposal [Fritsche, Lübbeke et al. 2006] (discussed on page 16),
- the Dutch approach [Cramer et al. 2007] (criteria 4.3: **requires 5 km as minimum**).
- FSC (criterion 6.2)
- SAN (criteria 2.3, 2.5)

9.2.2.2 Practical experiences in certification concerning this principle

Experiences from FSC certification could provide some useful reflections since that organisation introduced principle 9 (“Maintenance of high conservation value forests”) in 1998. The implementation of this principle turned out to be a successful step towards clarification of generalized categories like virgin forests, and made it clear that the areas that should have special attention should be those with certain defined values and characteristics.

This principle and definition recognize implicitly that all forests have many conservation values. Good management aims to maintain all these values, and certification provides a credible guarantee that they are being maintained. Nevertheless mistakes happen. Some conservation values are exceptionally important, and merit exceptional measures and a higher level of guarantee, to protect them from damage. When an exceptional value is identified, extra measures must be applied, including annual verification by the certifier. By this time FSC recognized the need for guidance and instruction to ensure that the new Principle was implemented coherently and consistently, and to monitor and evaluate the results.

Guidance was urgently needed for forest managers, and for certifiers trying to assess compliance, and for standard-writing groups trying to develop indicators and verifiers. The new Principle focused attention on the phrase High Conservation Value Forests, so it was still possible for many stakeholders to argue that all tropical forests or all natural forests are obviously High Conservation Value Forests. This offered room for ambiguities and conflicting interpretations.

As a consequence FSC announced an Advisory Panel for the Implementation of “High Conservation Value Forests”. The panel was made up of four (initially five) forest scientists, from Brazil, Canada, USA, and Sweden. The panel report provided excellent guidance on how to identify the existence and importance of high conservation values, including indicators and verifiers of such values. However it did not provide sufficient guidance or indicators for confidently verifying compliance with the four FSC criteria, in the form needed by managers, certifiers and standard-writers. A further step was needed: the development of the “High Conservation Value Forest Identification Toolkit”. It provides a clear and practical guidance on How to identify HCVFs and what to do with HCVFs, with practical field indicators, in the format and language needed by certification and standards.

However the Toolkit is focused on forests. Forests may be the most crucial HNV areas potentially affected by biomass production, but the scope has to be larger. Also non-forest HNV has to be included. Concerning this area still only little experience is available.

9.2.3 Principle 4: Loss of biodiversity shall be prevented

Biodiversity is densely connected with habitats – especially those of high nature value. Most of the certification systems and proposals by other countries combine HVN and biodiversity in one principle. In this proposal the authors kept the two separate because the relevance for biodiversity goes beyond HNV areas. Agricultural land itself is concerned as well.

9.2.3.1 Criteria referring to conservation of biodiversity

Criterion 4.1: Preservation and/or improvement of **biodiversity on-farms**

In general farmland biodiversity tends to be lower (in some cases extremely) than the original vegetation. But the way of cultivation is strongly affects the level of biodiversity on-farms.

Indicators are:
- There is a monitoring of agro-biodiversity – application of the HNV farmland indicator system is strongly recommended, as soon as that system is workable.
- Intensive mono-cropping should preferably be avoided;
  at least depletion of species shall be counteracted by
  - a maximum for a contiguous area planted with one crop
  - nature-orientated skirting buffer zones
  - network corridors for propagation
  - intercropping as far as possible
  - agro forestry in case of tree crops or plantations

Examples for the use of this criterion:
A criterion for on-farm biodiversity is also promoted by
- the Basel Criteria (criteria 3.1.2 and 3.3.2),
- the Dutch approach [Cramer et al. 2007] (criterion 4.4).

Criterion 4.1 a: Preservation and/or improvement of **biodiversity on short rotation plantations**

SRF systems differ significantly from agricultural systems in terms of biological diversity potential. Thus a separate criterion is introduced to address wood production from plantations.

Indicators are:

- There is a management plan to prevent, mitigate and if needed, remedy / restore for any environmental effects of its management on ecosystem integrity.
- Management practise is carried out adhering to the following requirements:
    - Provision of environmental benefits in production stands and set aside areas;
    - Local / regional conservation needs;
    - Local community needs in terms of natural resources;
    - Time frame for restoration / compliance.
- Various levels of retention of native tree species and structure in areas where the natural vegetation is forest
- Various conservation area designs
- Retaining structures and property characteristic of natural ecosystem dynamics;
- Adapting the size and spatial distribution of managed stands within the plantation management unit

Examples for the use of this criterion:
A biodiversity criterion for SRF is also promoted by

- FSC (principle 10)

Criterion 4.2: A fixed portion of **set aside area** shall be allocated.

The authors are aware that such a recommendation goes in the opposite direction to the current European agricultural policy. Existing (or recently existing) set aside area is the most preferred area for growing bioenergy crops. Meanwhile such areas are nearly completely under cultivation again.

On the other hand a significant contribution of set aside land will promote biodiversity only if long-term suspension of any use is provided. Thus in agricultural systems this criterion may not be practical with regard to actual agriculture policy.

Anyway on plantations, especially of considerable size, this aspect can be a decisive factor for sustaining a certain level of biodiversity. At least it should be applied for plantations of some km^2 in size.

Indicators are:

- A minimum-size and a maximum size of the set-aside area is defined for appreciable smaller or rather bigger cultivated areas; Between this amplitudes shall be a percentage quotation of 5% of the cultivated area
- Management plan for selection and maintenance of the concerned area
- Monitoring system for granting continued existence

Examples for the use of this criterion:
A set aside criterion is also promoted by
- FSC (criterion 10.5)

Criterion 4.3: The requirements of the **Convention on Biological Diversity (CBD)** has to be adopted and put into action (if the country has signed)

Currently CBD is signed by 168 nations. Only few are left (including the USA). Signature and ratification should be a primary pre-condition for meeting this criterion of course. If signature is missing, the key elements of CBD should at least be part of national policy. If not even that is given, there are severe concerns indicating a lack of compliance in realizing biodiversity targets .

Indicators are:
- Evidence on conscientiousness of farmers concerning the goals and requests of CBD
- Measures of in-situ and ex-situ conservation are implemented
- Appropriate adoption of economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity are implemented

Examples for the use of this criterion:
A criterion referring to the requirements of CBD are also promoted by
- RSPO (criterion 2.1),
- the Basel Criteria (criterion 1.1.1),
- the WWF proposal (standard 4)
- the Dutch approach [Cramer et al. 2007] (criterion 4.1).
- the UK approach [Department for Transport 2008] (criterion 2.1)
- FSC (indirectly in several criteria within principles 6, 9, 10)

Criterion 4.4: Genetic modified organisms (**GMO**) have to be avoided

This principle is vigorously disputed. Proponents and opponents are divided into intransigent camps. The authors recommend GMO as exclusion criterion until risks are excluded by evidence.

Examples for the use of this criterion:
A criterion restricting the application of GMO is also promoted by
- the Basel Criteria (criterion 2.3.1),
- the WWF *(recommendation off the standard list)*.
- the FSC (criterion 6.8)
- and some more like IFOAM, EUREPCAP, FLO etc.

9.2.3.2 Practical experiences in certification concerning this principle

Biological diversity is one of the most frequently addressed subjects about protection in terms of certification systems and standard definition. Nevertheless there is only a little experience in the application of practical indicators. Biological diversity as it is defined by CBD[20] is a complex parameter and thus complex to measure. Even though there are actually indices existing for calculation and measurement (e.g. the Shannon-Weaver-index), it remains impracticable to cover the vast scope of this issue within a global certification system.

The analysis of the whole number of screened certification systems displays this complexity: the working systems (FSC, SAN, organic agricultural labels) refer to biodiversity but the applied indicators generally address only a narrow section of this item. The currently proposed systems (RSPO, Basel criteria, but also the Dutch and the UK scheme) emphasize strongly this principle. But also here the application in practical cases needs clarification.

In fact in most systems biodiversity is addressed by conserving HNV on the one hand and on the other granting an ecologically sound way of cultivation. At first hand this might be a pragmatic solution. But with focus on the magnitude of the area required and the relevance of major regions for future biomass production biological diversity needs to be addressed in a full-scale way.

Similar to the indirect land use change principle biological diversity as a principle needs more substantiation in further research work (see ÖKO / IFEU [2009]).

9.2.4 Principle 5: Negative impacts on soil, water and air shall be minimized

Negative impact on the environmental media soil, water and air are typical and often unavoidable co-effects of biomass production. Especially agricultural practices tend to lead to soil erosion (because of temporary denudation), pollution of ground or surface water (because of excess use of fertilizer or dispersion of agrochemicals), water scarcity (in cases of irrigation), air pollution (due to fire for land-clearing or particle emission from aerial erosion or excessive fertilization) etc.

The number of negative environmental effectors by agricultural practises is known to be large. But it is also known that good practice can help minimizing these impacts to an

[20] see also section 6.1.4.2: “variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part”.

acceptable level. Especially experience from organic farming certification can give valuable support to define criteria for biomass production.

9.2.4.1 Criteria referring to minimization of negative impacts on soil, water and air

Criterion 5.1: **Soil erosion** has to be minimized and long-term fertility should be maintained through appropriate practice

Indicators are:

- Proof on performing good agricultural practice to avoid losses of soil and organic matter.
- monitoring of soil organic matter content
- ensuring adequate ground cover
- avoiding slopes (with regard to crop, soil type and climate)
- implementing and monitoring of structural erosion control measures on slopes;

It is recommended to develop a specific matrix of cultures in combination with grade of incline, soil type and measures for positive and negative list to consolidate these indicators and to make them operational.

Examples for the use of this criterion:
A criterion on minimizing soil erosion is also promoted by

- the RSPO (criteria 4.2, 4.3),
- the WWF (standard 6).
- the Dutch approach [Cramer et al. 2007] (principle 5).
- the UK approach [Department for Transport 2008] (principle 3)
- the FSC (criterion 6.5, 10.6)
- and some more like IFOAM, EUREPCAP, FLO etc.

Criterion 5.2: **Water use** has to comply strictly with limits given by the regional capacity of sources and to consider other users dependant on these sources.

Indicators are:

- existence of regional water management plan (furnished with stakeholder consultation)
- Implementing a farm-related (or process-related) water management plan and a monitoring system.
- water management plan (or specific assessment) gives evidence that riparian buffer zones are respected, and that drainage of wetlands does not happen (see criterion 3.3).

- water management plan (or specific assessment) gives evidence that non-renewable water sources are used.
- in case irrigation is implemented a hydrologic impact assessment is performed to give evidence on compliance with the actual water resources according to the water management plan.

Similar to soil erosion it is recommended to develop a matrix of regions according to the water capacities and to already report water scarcity. This shall support an ex ante identification of crucial regions.

Examples for the use of this criterion:
- the RSPO (criteria 4.4),
- the Basel Criteria (criterion 2.1.4/5)
- the WWF (standard 7).
- the Dutch approach [Cramer et al. 2007] (principle 6).
- the UK approach [Department for Transport 2008] (principle 4)
- the FSC (in preparation, partly criterion 10.6)

Criterion 5.3: **Contamination** of surface and ground water has to be avoided.

Indicators are:
- Effluents have to be treated according to national regulations and monitored;
- the water quality standards by WHO have to be observed in case national regulations are missing or contain weaker targets.
- No untreated effluents for irrigation

Examples for the use of this criterion:
- the RSPO (criteria 4.4),
- the Basel Criteria (criterion 2.1.4/5)
- the WWF (standard 7).
- the Dutch approach [Cramer et al. 2007] (principle 6).
- the UK approach [Department for Transport 2008] (principle 4)
- the FSC (in preparation, partly criterion 10.6)

Criterion 5.4: Input of **fertilizer** has to be restricted to the needful demand and justified by documentary evidence

Indicators are:
- Good agricultural practice of fertilizing: input has to be in line with demand. This has to be proved by farm gate measures of fertilizer input and export).
- organic fertilizers, if available, would be preferred.

Examples for the use of this criterion:
- the RSPO (criteria 4.2),
- the Basel Criteria (criterion 2.1.2)
- the Dutch approach [Cramer et al. 2007] (criteria 5.1, 5.2).
- the UK approach [Department for Transport 2008] (criteria 3.1, 3.2)
- the FSC (criterion 10.7)

Criterion 5.5: Input of **pesticides** has to be restricted to the needful demand and justified by documentary evidence

Indicators are:
- weed and pest management has to comply with appropriate management (preferably standard of organic agriculture; Integrated Pest Management (IPM) as a minimum requirement)
- no prophylactic use of agrochemicals
- documentary evidence on justification of application
- documentation of all applied chemicals
- evidence on exclusion of substances that are not permitted by the national law (at least the one's that are listed in Stockholm and Rotterdam Convention)

Examples for the use of this criterion:
- the RSPO (criteria 4.3, 4.4., 4.5),
- the Basel Criteria (criterion 2.2)
- the Dutch approach [Cramer et al. 2007] (criterion 5.1).
- the UK approach [Department for Transport 2008] (criteria 3.1, 3.2)
- the FSC (criteria 6.6, 10.7)

Criterion 5.6: **Air pollution** has to be minimized

Indicators are:
- No use of fire for land clearing (accepted only under the circumstances that it is permitted by regulations or if indicated by specific typology of the concerned ecosystem.
- No open burning to reduce residues or waste
- proof that the producer is familiar with relevant national and local legislation in terms of pollution control and complies with this legislation

Examples for the use of this criterion:
- the RSPO (criteria 5.5, 5.6),
- the Basel Criteria (criterion 3.2.3, 3.4.1)
- the Dutch approach [Cramer et al. 2007] (principle 7).
- the UK approach [Department for Transport 2008] (principle 5)

9.2.4.2 Practical experiences in certification concerning this principle

The mitigation of negative impact on the environmental media soil and water is strongly addressed by most of the existing organic farming labels. These certification systems can provide a large scale experience specifically in the field of soil erosion control, maintenance of fertility without excess use of fertilizer application and pesticides. However it has to be taken into account that evidence on righteously practiced organic farming can be traced potentially by controlling the quality of the products. It seems to be unlikely to install such a control mechanism for biomass where direct consumer interests are absent.

Certified producers in organic farming are also obliged to use techniques that conserve water. But mechanisms and workable indicators are not clearly available when conformity has to be verified in the case of large areas.

9.3 Theme: Impact on social-economic aspects.

The main objective of this issue is how the bioenergy-production affects people. Therefore the socio-economic consequences of biomass production, which should not lead to worse social-economic situations, must be addressed as analysed and described in this report. Socio-economic impacts on the local population must be considered such as the impacts on the employees of the bioenergy-companies. Some of the criteria suggested below are already legal or effective obligations, in countries which have ratified the ILO-conventions, or are members of the International Labour Organization, ILO. Countries without ratification or membership but with a general commitment to ILOs approach are expected to comply with all these conventions.

9.3.1 Principle 6: Local population shall <u>not suffer drawbacks</u> but <u>participate in opportunities</u>.

<u>Criterion 6.1:</u> **Stakeholders** with socio-economic interests are **integrated** in all procedures.

Mechanisms for Stakeholder consultation shall be implemented in the management plan

Indicators are:

- An assessment of social impacts shall be carried out and the results taken into account in management planning and operational procedures
- There shall be an effective method of communication and consultation with local communities and other affected or interested parties)
- Appropriate mechanisms shall be employed for resolving grievances and for providing fair compensation in case of loss or damage affecting the legal or customary

rights, property, resources and the livelihoods of local peoples. Measures shall be taken to avoid such loss or damage.

- ratification of ILO C169 (Indigenous and Tribal Peoples Convention)

Examples for the use of this criterion:
- the RSPO (criteria 6.1 – 6.4),
- the Basel Criteria (criteria 4.1.1, 4.1.2)
- the UK approach [Department for Transport 2008] (criterion 7.2)
- the WWF (standard 9, “share of proceeds”).
- FSC (principle 4)

Criterion 6.2: Struggle against poverty

Regulations and methods for maintenance or enhancement of the local socio-economic well-being are implemented.

Potential Indicators:
- Growers operations shall maintain or enhance the long-term social and economic local well-being (by maximising local employment, using local goods and services wherever possible, paying for goods and services promptly) (Basel Criteria, 4.3.4)

Examples for the use of this criterion:
- the Basel Criteria (criterion 4.3.4)
- the Dutch approach [Cramer et al. 2007] (criterion 8.1)
- the WWF (standard 9, “share of proceeds”).
- the FSC (criterion 10.8)
- the WWF (standard 9, “share of proceeds”).
- also FLO and FLP

Criterion 6.3 **Fair-Trade** conditions are given

Regulations and methods for a fair distribution of returns for the workers and the local communities are implemented

Potential Indicators:
- Transparency and monitoring of the cash flow shall be warranted
- Traders, who purchase directly from the producers shall pay a price which cover at least the costs of a sustainable production

Examples for the use of this criterion:
- the RSPO (criterion 6.1),
- the Basel Criteria (criteria 4.2.2)

- the UK approach [Department for Transport 2008] (criteria 6.2, 6.4, 6.9)
- FSC (criterion 4.5)

Criterion 6.4 **Land rights** are respected

Land right regulations, e.g. for the indigenous people are considered and implemented.

Potential Indicators:
- ratification of ILO C169 (Indigenous and Tribal Peoples Convention)
- Documentation of land rights, legal acquisition, fair compensation and conflict resolution mechanisms
- Evidence that the people's right to use lands not exclusively owned by them, but traditionally accessed is respected.
- Respect cultural and spiritual relationship with lands and territories, especially concerning indigenous and tribal peoples.

Examples for the use of this criterion:
- the RSPO (criterion 6.4)
- the Basel Criteria (criterion 4.4)
- the Dutch approach [Cramer et al. 2007] (criterion 9.3)
- the UK approach [Department for Transport 2008] (criterion 7.1)
- the WWF (standard 4).
- the FSC (principle 2, 3)
- the FLO (2)

Criterion 6.5 **Complaints mechanism** are given

Means are established for local communities to participate in decision-making for policies and programs concerning those communities.

Potential Indicators:
- There is a mutually agreed and documented system for dealing with complaints and grievances, which is implemented and accepted by all parties
- establish appropriate mechanisms for fair compensation whenever legal or customary rights, property or resources of livelihoods of local people are affected.

Examples for the use of this criterion:
- the RSPO (criterion 6.3)

9.3.2 Principle 7: Labour conditions

Since 1919, the International Labour Organization (ILO) has maintained and developed a system of international labour standards aimed at promoting opportunities for women and men to obtain decent and productive work, in conditions of freedom, equity, security and dignity.[21] The standards (conventions, protocols) are ratified by the majority of nations. It is justified to expect the ratifications to be observed. Above all two major criteria are selected from the list of ILO conventions.

Criterion 7.1: The employees have the right to organize, freedom of **association** and **collective bargaining**.

Potential Indicators:
- consider ILO C87 (Freedom of Association and Protection of the Right to Organize)

Examples for the use of this criterion:
- the RSPO (criterion 6.6)
- the Basel Criteria (criterion 4.4.2)
- the UK approach [Department for Transport 2008] (criterion 6.5)
- also SAN

Criterion 7.2 **Child labour** must be prevented.
(ILO convention No. 138, 182, 184)[22]
Indicators are:
- The minimum age shall not be less than the age of completion of compulsory schooling and, in any case, shall not be less than 15 years.
- Companies must take immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour as a matter of urgency.

Examples for the use of this criterion:
- the RSPO (criterion 6.7)
- the Basel Criteria (criterion 4.3.1)
- the Dutch approach [Cramer et al. 2007] (criterion 9.1, 9.2)
- the UK approach [Department for Transport 2008] (criterion 6.6)

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[21] http://www.ilo.org/global/What_we_do/InternationalLabourStandards/Introduction/lang--en/index.htm

[22] C 138 The minimum age shall not be less than the age of completion of compulsory schooling and, in any case, shall not be less than 15 years.
C 184 The minimum age for assignment to work in agriculture which by its nature or the circumstances in which it is carried out is likely to harm the safety and health of young persons shall not be less than 18 years.
C 182 Ratifiers shall take immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour as a matter of urgency, e.g. practices similar to slavery.

- the WWF (standard 8, “worker rights”).
- the FLO (4.1)
- the ETI Code (4.1, 4.3, 4.4)

Criterion 7.3 **Forced labour** must be prevented.
(ILO convention No. 29, 105)[23]

Indicators are:
- Companies must suppress the use of forced or compulsory labour in all its forms within the shortest possible period.
- Companies do not make use of any form of forced or compulsory labour

Furthermore the following conventions are preferred to be taken into account for sustainability certification:
- Convention 87: Freedom of Association and Protection of the Right to Organize.
- Convention 98: Right to Organize and Collective Bargaining.
- Convention 100: Equal Remuneration Convention.
- Convention 111: Discrimination (Employment and Occupation) Convention.

Examples for the use of this criterion:
- the Basel Criteria (criterion 4.3.1)
- the Dutch approach [Cramer et al. 2007] (criterion 9.1, 9.2)
- the UK approach [Department for Transport 2008] (criterion 6.11)
- the WWF (standard 8, “worker rights”).
- the FLO (4.3.2)
- the ETI Code (1.1)

Criterion 7.4 **Wages** and **compensation** of the workers are regulated

Potential Indicators:
- ILO C131 (Minimum Wage Fixing Convention)
- ILO C95 (Protection of Wages Convention)
- Wages shall not be under the legal minimum wage
- Maternity protection, overtime and wage policy shall be regulated
- The rights for temporarily employed workers are regulated. Temporarily employed workers are not disadvantaged

[23] C 29 Ratifiers undertake to suppress the use of forced or compulsory labour in all its forms within the shortest possible period.
C 105 Ratifiers undertakes to take effective measures to secure the immediate and complete abolition of forced or compulsory labour.

Examples for the use of this criterion:
- the Basel Criteria (criterion 4.2.1)
- the Dutch approach [Cramer et al. 2007] (criterion 9.1)
- the UK approach [Department for Transport 2008] (criterion 6.9)
- the WWF (standard 8, “worker rights”).
- the FLO (4.1)
- the ETI Code (4.1, 4.3, 4.4)

Criterion 7.5 Regulations about **health** and **safety** of the workers are given

Potential Indicators:
- ILO C155 (Occupational Health and Safety Convention)
- ILO C184 (Safety and Health in Agriculture Convention)
- ILO Code of Practice on Safety and Health in Forestry Work provisions enterprise and worksite level (Not legally binding)
- Primary health care and continuous information about potential working-risks shall be warranted

Examples for the use of this criterion:
- the RSPO (criteria 1.2, 4.7)
- the Basel Criteria (criterion 4.3.2)
- the Dutch approach [Cramer et al. 2007] (criterion 9.1, 9.2)
- the UK approach [Department for Transport 2008] (criterion 6.8)
- the WWF (standard 8, “worker rights”).
- also the FLP and the ETI Code

Criterion 7.6 There is no type of **discrimination**

Potential Indicators:
- ILO C111 (Discrimination (Occupation and Employment) Convention)
- ILO C100 (Equal Remuneration Convention)
- ILO C169 (Indigenous and Tribal Peoples Convention)

Examples for the use of this criterion:
- the RSPO (criteria 6.8)
- the Dutch approach [Cramer et al. 2007] (criterion 9.2)
- the UK approach [Department for Transport 2008] (criterion 6.10)
- the WWF (standard 8, “worker rights”).
- also the FLP, FLO and the ETI Code

Criterion 7.7 **Training** and **capacity building** is given

Training and capacity building (e.g. safety programs and skill enhancement) of the workers is given. There must be a qualified workforce.

Potential Indicators:
- gradually extend, adapt and harmonise its vocational training systems to meet the needs for vocational training throughout all sectors of the economy and branches of economic activity and at all levels of skill and responsibility
- ILO C142 (Human resources Development Convention)
- ILO C169 (Indigenous and Tribal Peoples Convention)

Examples for the use of this criterion:
- the RSPO (criteria 4.8)
- the Basel Criteria (criterion 4.3.3)
- also the FLP, FLO and the ETI Code

9.3.3 Practical experiences in certification concerning this theme

Fair trade labels like FLO and ETI but also FSC are concentrating on socio-economic issues and criteria. These are recognized to be a key factor for credibility and acceptance of certification. However verification and control are known to be complicated to carry out in a completely convincing way. Experiences of FSC over the last 10 years clearly shows that social issues have not received enough attention in the past, even in those systems that have addressed social standards from the very beginning. This may be partly because social issues are scattered among several of the FSC Principles and Criteria (P&C), and there is not such a coordinated framework for handling them as it is in place for ecological forest related issues.

A recent process of reviewing FSC certification of plantation made clear that most stakeholders see a need for an upgrade of social elements in the system in order to bring the focus on social issues to an equivalent level to that of the other elements of FSC certification. In the FSC Plantation Review Process in 2005 stakeholders revealed their concerns about implementing regulations for plantations in the FSC Standard. As discussed in section 3 stakeholders are the key-drivers for the necessary credibility.

Land use policy is clearly favouring the **re-utilization of degraded land** which is not in competition to other interests of utilization and preservation objectives.

9.4 Summary of recommended principles and criteria

Table 15 summarizes the principles and criteria derived above.

Table 15 Summary of recommended principles and criteria

Theme	Principle	Criterion
Mitigation of greenhouse gas emission	1. There has to be a significant contribution to greenhouse gas mitigation	1.1 a minimum saving rate for GHG emissions is met taking into account the total process chain up to the point where it replaces fossil fuels is met.
Land use practices and land use changes	2. Minimizing indirect land use change and keeping balance in terms of land use competition	2.1 There are nationally defined and observed objectives concerning land tenure and nature quality. 2.2 Land use policy is favouring the re-utilization of degraded land which is not in competition to other utilization/preservation objectives. 2.3 In case of missing national land use policy and objectives a biomass producing project has to prove that land use competition is excluded.
	3. Loss of habitats of high nature value (HNV) shall be prevented	3.1 There is a documented assessment on the status of nature value concerning the reclaimed area. 3.2 Primary vegetation and High Nature Value Areas should not be converted to agricultural land; previous deforestations have not happened since 2005. 3.3 There is no drainage of wetlands. 3.4 There must be sufficient distance between farm and HNV area.
	4. Loss of biodiversity shall be prevented	4.1 Preservation and/or improvement of biodiversity on-farm 4.1a Preservation and/or improvement of biodiversity on short rotation plantations 4.2 A fixed portion of set aside area shall be allocated. 4.3 The requirements of the Convention on Biological Diversity (CBD) has to be adopted and put into action (if the country has signed) 4.4 Genetically modified organisms (GMO) have to be avoided

Table 15 Summary of recommended principles and criteria (continued)

Theme	Principle	Criterion
	5. Negative impacts on soil, water and air shall be minimized	5.1 Soil erosion has to be minimized and long-term fertility should be maintained through appropriate practice 5.2 Water use has to comply strictly with limits given by the regional capacity of sources and to consider other users dependant on these sources. 5.3 Contamination of surface and ground water has to be avoided. 5.4 Input of fertilizer has to be restricted to the needful demand and justified by documentary evidence 5.5 Input of pesticides has to be restricted to the needful demand and justified by documentary evidence 5.6 Air pollution has to be minimized
Impact on social-economic aspects	6 Local population shall not suffer drawbacks but participate in opportunities.	6.1 Stakeholders with socio-economic interests are integrated in all procedures 6.2 Struggle against poverty 6.3 Fair Trade conditions are given 6.4 Land rights are respected 6.5 Complaints mechanism are given
	7 Labour conditions	7.1 The employees have the right to organize, freedom of association and collective bargaining. 7.2 Child labour must be prevented. 7.3 Forced labour must be prevented. 7.4 Wages and compensation of the workers are regulated 7.5 Regulations about health and safety of the workers are given 7.6 There is no type of discrimination 7.7 Training and capacity building is given

10 Conclusions and Outlook

Recent policy and pressure to act

The urgency of the topic of this research project has increased since it was first started in autumn 2006. Bioenergy – particularly biofuel for transport – is currently receiving a great deal of public attention, however mostly in a negative context. The public's perception of biofuel has evolved more and more from a renewable "green" resource to a highly crucial commodity, which from case to case might be more in conflict than in line with the objectives of sustainable development.

There is unanimous assent about the need for criteria which define the accordance of bioenergy with sustainability. This has been agreed upon at both a national and international level, by policy makers and NGOs alike (whether environmentally or socially oriented) as well as by the concerned industries (biofuel, automotive and energy). Other countries like the Netherlands and the United Kingdom have already taken the initiative in addressing this issue in this issue. The Cramer Commission had already provided a system of criteria one year ago [Cramer et al. 2007]. The British department for transport [2008] published the RTFO requirements[24] this January. Both initiatives are essential paradigms for this research work. But unlike the EU and German legal necessities, the Dutch and British systems are embedded in a reporting system without consequences, in terms of their admission to quotas or subsidies.

The European Commission, which has called for an increase in biofuel production by means of the Biofuel Directive [EU 2003] and its quota settings, has accelerated the legislation process for a determination of the criteria for sustainable production of biofuels within the last months. The Commission agreed on the draft Renewable Energy Directive [EU 2008] on January 23, 2008.

On December 5, 2007, the German government passed the draft of a decisive regulation on the Biomass Sustainability Regulation (BSR). The work of this research provided some input into that regulation, particularly the greenhouse gas methodology and the so called default values (see chapter 7). The national and international debate on criteria like biodiversity, high nature values or socio-economic issues was also deliberated during the processing of the Regulation. Due to the pressing time schedule of the national climate protection targets ("Meseberg process") the regulation was finalized and passed before this research work had been completed. Therefore the latest results could not be considered in the passed version of the draft regulation.

However the BSR provides a framework which contains a number of decisive subjects and traces the verification procedure, known as the certification.

[24] RTFO: Renewable Transport Fuel Obligation

Certification – the solution?

Certification is a measure for which there is no reasonable alternative whenever commodities and their production chains have to verify their specific claims as credibly as possible. But, as mentioned in chapter 3, certification is not the solution to all problems that might occur in complex systems like biofuel production. Certification can at best be a solution to avoid extreme misuses. It is not an overall sufficient instrument for influencing systemic effects on food security, on chronic displacement problems or to outweigh a lack of good governance.

The analysis of existing certification systems (chapter 4) addresses a number of good practice examples. But in fact none of the existing systems addresses all sustainability issues raised by biomass production and use. Most of them provide a broad coverage of a large number of criteria. However life-cycle based aspects are rarely addressed and land use competition is actually not included. A number of the addressed core criteria like *conservation of biodiversity* appear to be applied in a rather unspecific way and lack "hard indicators". Monitoring and verifying of social criteria often collide with structural problems in poorer countries. The following examples are promising, although it must be stated that there are clear short-comings:

- *FSC* (providing a good practice framework and monitoring, an extended list of criteria and a tight chain of custody);
- *SAN* (covers the largest scale of core criteria with stringent claims);
- The business-to-business system *EurepCAP* (no 3rd party verification, but strict chain of custody and evaluation due to direct economic interest of the members);
- *RSPO* (specified for the "high-potential biomass plant" palm oil, but not yet in practice).

Obstacles might present themselves, specifically concerning the chain of custody verification of biomass for liquid fuels as final products. Good *track and trace* experiences exist with solid materials (wood, food). The alternative *mass flow balance* system (input-output) is only in application by the FSC mixed resources label. The *book and claim* approach is currently only in application in green electricity labels, where contracted delivery and real connections between producer and customer can be traced. Statements from industry show some preference for the *book and claim* approach due to enhanced practicability of the certification process. As a consequence the information about the production chain would be completely disregarded. The *mass flow balance system* can be considered as a compromise. It is adopted by the draft Biomass Sustainability Regulation.

The legislative framework in Germany (and presumably also in the EU) requires a mandatory certification. This might create specific obstacles for all existing systems as they are voluntary and motivated by the demand of a section of consumers.

Global practicability and high grade credibility turn out to be competing claims. Therefore a certification system for sustainable bioenergy has to take compromises into account. However compromises cannot be accepted with respect to:

- a water-tight chain of custody, and
- a sincere involvement of relevant stakeholders – most notably locally concerned NGOs – whenever compromises for criteria have to be decided.

Recommended set of principles and criteria

This R+D project has benefited from similar activities like the work of the Dutch Cramer Commission [Cramer et al. 2007] and the British LowCVP [Department for Transport 2008] as well as initiatives from several NGOs, particularly the WWF [Fritsche, Lübbeke et al. 2006]. Thus it was not necessary to create a set of principles and criteria from the very beginning. In fact each selection mirrors specific viewpoints and positions, as does the outcome of this study. The objective once again was to reflect the results of other positions (national, international, governmental and non-governmental positions), balancing and weighting arguments and opening further perspectives.

Taking into account the proposals by the Netherlands, the UK and also that of the basic directions given by the late draft Renewable Energy Directive, this proposal shall be compatible with an internationally favoured meta-standard system. Table 16 subsumes the proposed principles (more details and criteria see Table 15).

Table 16 Sustainability themes and recommended principles

Theme	Principle
Mitigation of greenhouse gas emission	1. There has to be a significant contribution to greenhouse gas mitigation.
Land use practices and land use changes	2. Minimizing indirect land use change and keeping balance in terms of land use competition.
	3. The loss of habitats of high nature value (HNV) shall be prevented.
	4. The loss of biodiversity shall be prevented.
	5. Negative impacts on soil, water and air shall be minimized.
Impact on social-economic aspects	6 Local population shall not suffer drawbacks but participate in opportunities.
	7 international agreed labour conditions has to be respected

Outlook and need for further action

Even though the draft Biomass Sustainability Regulation passed on December 5, 2007, defines the framework of criteria and certification at large, there are quite a number of

issues up for further intensive discussion. This discussion should be intensified particularly at an international level involving the EU and other key players like the USA (especially the state of California), but also relevant producer countries as well as the international fora of the GBEP and the FAO, amongst others.

We have to pronounce, that the objective of performing two workshops in relevant producer countries involving local/regional NGOs in particular, could not be realized within this project. Such a process takes long-term preparation in order to gain accordance and readiness by the administration to get involved. The recently started research project by ÖKO/IFEU (FKZ 3707 93 100) will resume this task.

In fact most of the proposed criteria and indicators need more substantiation, particularly in terms of precision and measurability of the indicators. The most important issues for further discussion and deepening within that follow-up project are:

- **indirect** land use change, within at least two matters:
  - How to consider this within the greenhouse gas balances? Is the “Risk Adder” approach an appropriate and tolerable method? Are there alternative approaches, e.g., [Ecofys 2007, Farrell 2008, Searchinger 2008]?
  - What is necessary to make principle 2 (land use practises and land use changes, see Table 16) manageable?

- **Biodiversity and high nature value (HNV) aspects**:
  - Biodiversity is a frequently addressed issue but existing certification schemes lack concrete measures. But such processes are apparently needed.
  - An internationally accepted definition of the term HNV is absent; specification is needed on a regional level by ecological defined units.
  - Uniformly agreed definitions and measurable criteria for “degraded land, “idle land” etc., are needed.

- **Water competition**:
  - This issue first requires a detailed analysis of crucial regions; based on this a regionally adaptable scheme has to be developed for the identification of compatible cultivation concepts in the interplay of diverse consumers (downstream users, drinking water) and ecological situations (HNV wetlands, regional water supply).

- **Socio-economic standards**

  These have been strongly addressed within this study. In fact the BSR eventually did not adopt any socio-economic criterion – excused by WTO considerations. Nevertheless the discussion about social requirements in terms of sustainable biomass will be a measure of credibility and acceptance and therefore will continue. If legislative

commitments should not be viable, other mechanisms to implement social criteria (e.g., in bilateral agreements) should be analysed and promoted.

- **Further issues in the field of GHG balancing**:

  The GHG methodology according to annex 1 of the BSR has been largely developed, however there are further issues that are not yet sufficiently prepared for implementation and require further attention. These are:

  - Open issues of carbon stocks in natural vegetation and agricultural systems.
  - Open issues of emissions of nitrous oxide (N_2O)

  Both items highly influence the absolute results of GHG balances for biomass production. And both items need agreed understandings and practicable adjustments on an international level. Default values provided by different institutions (which the authors on this study have included) turn out to be rather divergent).

  The BSR GHG methodology is limited to liquid biofuels for transportation. However in general the scope of this research work contains bioenergy. Solid biomass and biogas for heat and/or power generation should also be considered. In regards to the German Renewable Energy Act, which must be amended within the course of this year, there is a need for scientific contribution with regard to methodical adaption and generation of default values for the relevant bioenergy carriers.

The implementation of a system for the certification of sustainable production of biomass and biofuels will still be a challenge on an intergovernmental and inter-institutional level. In order to foster, international cooperation must be strongly intensified. However this won't exculpate national governments from promoting the process in a proactive way. One essential input should be the initialisation of good-practice pilot projects.

The promotion of bioenergy is warranted based on the assumption of good environmental performance particularly in terms of climate protection ("green fuel"). In return high level standards are justified as well as sizeable endeavour to realize these standards. Non-sustainable bioenergy would be a contradiction in terms – and therefore would not be acceptable at all. Since food production takes higher priority, lower standards might apply at first sight. But sooner or later non-sustainable food production (or animal feed, fibre, etc.,) won't be acceptable anymore. Sustainable land use is a global responsibility. The certification of bioenergy should be the very start for a certification of all traded agricultural products in the middle-term.

11 Literature

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ANNEX A

Evaluation scheme for system inventory

Framework	**Basics**			
	Name	*not evaluated*	*not evaluated*	*not evaluated*
	Responsible body			
	Website	*not evaluated*	*not evaluated*	*not evaluated*
	Foundation	*not evaluated*	*not evaluated*	*not evaluated*
	Scope of the system	*not evaluated*	*not evaluated*	*not evaluated*
	Scope of the system (geogr.)	international	national	regional
	Type of system (certification system, law, …)	Certification system	Law	self-assessment
	Objectives (vision, mission,…)	*not evaluated*	*not evaluated*	*not evaluated*
	Governance			
	Governance structure	clear structured	difficult to see through	unclear structured
	Basis for participation	voluntary	contingent participation	no participation possible
	Representation / members	equal participation of social, economic and environmental stakeholders	unclear assignment of the participation of social, economic and environmental stakeholders	no equal participation of social, economic and environmental stakeholders
	Standard setting			
	Standard setting bodies	not evaluated	not evaluated	not evaluated
	Standard setting process	clear structured	difficult to see through	unclear structured
	Stakeholder participation	complete transparency, broad stakeholder participation, subject to public review	limited transparency, limited stakeholder participation, limited public review	no transparency, no stakeholder participation, no public review
	Approval	not evaluated	not evaluated	not evaluated
Monitoring	**Verification**			
	Reviewer	third-party verifier	second-party verifier	first-party verifier/no verifier
	Evaluation Process	clear structured	difficult to see through	unclear structured
	Local stakeholder involvement	complete transparency, broad stakeholder participation, consideration of sentences of the stakeholders	limited transparency, limited stakeholder participation, limited consideration of sentences of the stakeholders	no transparency, no stakeholder participation, no consideration of sentences of the stakeholders
	Publication of results	complete publication	limited publication, summaries of results	no publication
	Monitoring	continuous monitoring	random monitoring	no monitoring
	Renewal	not evaluated	not evaluated	not evaluated
	Qualification of verification bodies			
	Accreditation bodies	independent international approved accreditation body	independent approved accreditation body, but accreditation only on national level	first-party accreditation
	Accreditation process	clear structured	difficult to see through	unclear structured
	Monitoring	continuous monitoring	random monitoring	no monitoring
	Renewal	not evaluated	not evaluated	not evaluated
	Claims and Product Tracking			
	Claim	clear claim addressed	unclear claim addressed	no claim addressed
	Material tracking	watertight track and trace system	no watertight track and trace system	no track and trace system
	validity of claims	validity of claims	limited validity of claims	no validity of claims
	Labelling	label existing	label in progress	no label in place

Criteria (1)	**Land-use competition**			
	Land-use competition (energy vs. competing land uses)	clear defined land-use competition in the management plan arranged. Local accommodation with feed must not be endangered by energy-land-use	not clear defined or lower level than green	not addressed
	Environmental land-use issues			
	Conservation of Biodiversity	conservation of biological diversity and its associated values	not clear defined or lower level than green	not addressed
	Protection species/ecosystems	safeguards shall exist which protect rare, threatened and endangered species and their habitats. Conservation zones and protection areas shall be established	not clear defined or lower level than green	not addressed
	Soil – erosion	methods to conserve and grow soil. Operators should minimize loss of topsoil through management practices that conserve soil and take measures to prevent all forms of soil degratation	not clear defined or lower level than green	not addressed
	Water resources – depletion/loss	efficiently and responsibly water-use. No depletion of water resources, Recycling of rainwater and monitoring of water extraction	not clear defined or lower level than green	not addressed
	Chemicals – nutrients/pesticides (how addressed, what is affected)	ICP addressed, management systems with environmentally friendly non-chemical methods; generally prohibition of highly dangerous chemicals	not clear defined or lower level than green	not addressed
	safeguard subject climate addressed	not clear defined or lower level than green	not addressed	
	GMOs (genetically modified organisms)	generally prohibited	not clear defined or lower level than green	not addressed
	National land use regulations	abidance of law to the full extent required	not clear defined or lower level than green	not addressed
	High nature values addressed	areas of native vegetation have been classified according their importance for biodiversity conservation. Areas with high conservation value native vegetation are managed so as to maintain the biodiversity they provide	not clear defined or lower level than green	not addressed
	others			

Criteria (2)				
	Life-cycle aspects			
	social-issues in life-cycle addressed	social issues are communicated throughout the company and to its suppliers and sub-contractors (including closely associated self-employed staff).	not clear defined or lower level than green	not addressed
	energy balance (whole the production chain)	efficiency of energy use and use of renewable energy is maximised	not clear defined or lower level than green	not addressed
	removed ressources balance addressed (nutrients, organic matter)	production, processing and handling systems shall return nutrients, organic matter and other resources removed from the soil through harvesting by the recycling, regeneration and addition of organic materials and nutrients	not clear defined or lower level than green	not addressed
	Water resources – contamination	voiding contamination of surface and ground water through run-off of soil, nutrients or chemicals, or as a result of inadequate disposal of waste	not clear defined or lower level than green	not addressed
	Soil – contamination	Nutrients and fertility products are applied in a way that protects soil. Operators take reasonable measures to identify and avoid potential contamination.	not clear defined or lower level than green	not addressed
	GHG balance: (only CO2 emission / more complex approach)	plans to reduce pollution and emissions, including greenhouse gases, are developed, implemented and monitored. Use of fire for preparing land for replanting is avoided	not clear defined or lower level than green	not addressed
	Air pollution (NOx, SO2, POP, others...)	plans to reduce pollution and emissions are developed, implemented and monitored, use of fire for waste disposal is avoided	not clear defined or lower level than green	not addressed
	Waste management addressed	waste management is addressed. Waste is reduced, recycled, re-used and disposed of in an environmentally and socially responsible manner	not clear defined or lower level than green	not addressed
	others			

Criteria (3)				
	Socio-economic issues			
	social aspects by stake-holder consultation	consultation with stakeholders about changes and potential social impacts	not clear defined or lower level than green	not addressed
	Land rights (Indigenous peoples, local communities, …)	respect of the rights of indigenous peoples, and should not use or exploit land whose inhabitants or farmers have been or are being impoverished, dispossessed, colonized, expelled, exiled or killed, or which is currently in dispute regarding legal or customary local rights to its use or ownership	not clear defined or lower level than green	not addressed
	Freedom of association, collective bargaining	no prohibition or limitation for the workers to forming or joining unions, collective bargaining or organizing for differnet reasons. Comply with ILO Conventions	not clear defined or lower level than green	not addressed
	Labour conditions, basic treatment	workers and their families that live on these farms, benefit from the rights and conditions established in the United Nations' Universal Declaration of Human Rights and Children's Rights Convention, and in the International Labour Organization's (ILO) conventions and recommendations	not clear defined or lower level than green	not addressed
	Not permanent employed (Seasonal Workers, contract and non-documented workers)	contracts with permanent and temporary workers. Temporary and part-time workers have the same rights and benefits as permanent workers. They have been informed of and are familiar with their rights, responsibilities, salaries or pay, work schedule and other subjects normally forming part of a legal work contract.	not clear defined or lower level than green	not addressed
	Child labour; forced labour	Contracting children under the age of 15 is prohibited. Any type of forced labor is prohibited, including working under the regimen of involuntary imprisonment, in agreement with ILO Conventions 29 and 105 and national laws	not clear defined or lower level than green	not addressed
	Wages and compensation	pay of wages, salaries and benefits equal or more than the legal minimum. Payment policies, maternity protection, ragulation of working hours addressed	not clear defined or lower level than green	not addressed
	Health and safety	access to medical services, occupational health and safety program, access to potable water	not clear defined or lower level than green	not addressed
	Discrimination (sex, age, handicap, religion, nationality)	no discrimination in its labor and hiring policies and procedures along the lines of race, color, gender, age, religion, social class, political tendencies, nationality, syndicate membership, sexual orientation, marital status or any other motive as indicated by applicable laws and ILO Conventions 100 and 111. Equal pay, training and promotion opportunities and benefits to all workers for the same type of work. No influence of the political, religious, social or cultural convictions of workers	not clear defined or lower level than green	not addressed
	Training – capacity building, development of skills	implementation of an educational program directed towards administrative and operative personnel and their families that encompasses three topics: the general objectives and requirements of this certification; environmental and conservation topics related to the standard; and fundamental health and hygiene concepts. The program must be designed for the culture, language and educational level of those involved.	not clear defined or lower level than green	not addressed

	Change of way of life, economy and culture, (important stakeholders indigenous people)	offering employment opportunities and education to people in neighboring communities. The farm must respect areas and activities that are important to the community socially, culturally, biologically, environmentally and religiously; these must not be affected by activities of the operator	not clear defined or lower level than green	not addressed
	Struggle against poverty (Equitable distribution of returns)	the operator contribute to local sustainable development wherever appropriate	not clear defined or lower level than green	not addressed
	Fair trade conditions	traders pay a price to producers that at least covers the costs of sustainable production: the Fairtrade Minimum Price; Pay a premium that producers can invest in development: the Fairtrade Premium; Partially pay in advance, when producers ask for it; Sign contracts that allow for long-term planning and sustainable production practices	not clear defined or lower level than green	not addressed
	complain mechanism	a system for dealing with complaints and grievances which is implemented and effective	not clear defined or lower level than green	not addressed
	others			

ANNEX B

Characterisation of the analysed systems

RSPO

FRAMEWORK

Basics		
Name	Roundtable on Sustainable Palmoil (RSPO)	
Responsible body		
Website	http://www.rspo.org	
Foundation (year and participants)	informal cooperation between a number of business partners and WWF, 2004	
Scope of the system (product-wise)	Palm Oil	
Scope of the system (geographically)	International	
Type of system (certification system, law, …)	Certification system	
Objectives (vision, mission, goals)	Vision: RSPO assures palm oil contributes to a better world. Mission: To advance the production, procurement and use of sustainable oil palm products through the development, implementation and verification of credible global standards and the engagement of stakeholders along the supply chain	
Governance		
Governance structure	General assembly consists of ordinary members affiliate members. General assembly designate an executive board which consists of 16 members. The Executive Board elects a President, a vice-President(s) and a Treasurer. The general management of RSPO shall be the responsibility of RSPO Executive Board in collaboration with RSPO Secretary-General, who it appoints. The Executive Board can appoint specific Working Groups for carrying out specific activities. The executive board and the Secretary General establish guidelines for the programs of the Technical Committee and the Working Groups	
Basis for participation (e.g. voluntary)	Voluntary	
Representation / members	ordinary members affiliate members from Oil palm growers, Palm oil processors and/or traders, Consumer goods manufacturers, Retailers, Banks/investors, Environmental/nature conservation NGOs and Social/development NGOs	
Standard setting		
Standard setting bodies	Group of technical experts cooperating with ProForest	
Standard setting process	Technical Committee developed a framework for the development of criterias on sustainable palmoil. Proforest is contracted to RSPO as facilitator for the verification protocol development. The next step was to nominate a criteria-workgroup consisting of 25 experts from different stakeholders to develop the criteria for the law, technical, ecological and social aspects for sustainable palmoil on international and national level. Drafting of national interpretations by the national working groups.	
Stakeholder participation	Public consultation phase	
Approval	Executive Board	

MONITORING

Verification		
Reviewer	Third party verifier	
Evaluation Process	Certifying sustainable palm oil have´nt begun yet. Currently, the Verification Working Group (VWG) is working on RSPO's eventual certification mechanism as well as other verification issues. The group is due to complete its work in May 2007	
Local stakeholder involvement	Procedures for verification assessment must include consultation with external stakeholders	
Publication of results	Verification body must make following documents public: Summary report of results of verification assessment, procedures for complaints and grievances, register of certfified organizations	

Monitoring	Certifying sustainable palm oil have´nt begun yet	
Renewal	5 years, surveillance assessments must take place at least annually	
Qualification of verification bodies		
Accreditation bodies	Certification or verification bodies have been accredited by national or international accreditation authorities, such that their organisation, systems and procedures conform to ISO/IEC Guide 65	
Accreditation process	The verification body must demonstrate to RSPO that their accredited systems include all of the supplemented set of specific RSPO verification process requirements. Certifying sustainable palm oil have´nt begun yet. Currently, the Verification Working Group (VWG) is working on RSPO's eventual certification mechanism as well as other verification issues. The group is due to complete its work in May 2007	
Monitoring	Certifying sustainable palm oil have´nt begun yet.	
Renewal	Certifying sustainable palm oil have´nt begun yet.	
Claims and Product Tracking		
Claim	Promoting of use of sustainable palmoil	
Material tracking	Chain of custody, verification of compliance with the RSPO supply chain requirements will be required from the grower to the final certified product. The RSPO supply chain requiremens for each organisation in the supply chain which owns or processes the material will be detailed in due course	
Validity of claims	Verification procedures must include measures to ensure compliance with RSPO requirements for the control of trademarks and claims by certified organisations	
Labelling	No label in place	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Oil palm growers and millers provide adequate information to other stakeholders on environmental, social and legal issues relevant to RSPO Criteria, in appropriate languages & forms to allow for effective participation in decision making.	
Land rights (Indigenous peoples, local communities, …)	Use of the land for oil palm does not diminish the legal rights, or customary rights, of other users, without their free, prior and informed consent. The right to use the land can be demonstrated, and is not legitimately contested by local communities with demonstrable rights	
Freedom of association, collective bargaining	The employer respects the right of all personnel to form and join trade unions of their choice and to bargain collectively. Where the right to freedom of association and collective bargaining are restricted under law, the employer facilitates parallel means of independent and free association and bargaining for all such personnel.	
Labour conditions, basic treatment	Labour laws, union agreements or direct contracts of employment detailing payments and conditions of employment (e.g., working hours, deductions, overtime, sickness, holiday entitlement, maternity leave, reasons for dismissal, period of notice, etc) are available in the languages understood by the workers or explained carefully to them by a senior company official.	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Child labour is not used. Children are not exposed to hazardous working conditions. Work by children is acceptable on family farms, under adult supervision, and when not interfering with education programmes.	
Wages and compensation	Pay and conditions for employees and for employees of contractors always meet at least legal or industry minimum standards and are sufficient to meet basic needs of personnel and to provide some discretionary income	
Health and safety	An occupational health and safety plan is documented, effectively communicated and implemented	
Discrimination (sex, age, handicap, religion, nationality)	The employer shall not engage in or support discrimination based on race, caste, national origin, religion, disability, gender, sexual orientation, union membership, political affiliation, or age	

Training – capacity building, development of skills	All staff, workers, smallholders and contractors are appropriately trained	
Change of way of life, economy and culture, (important stakeholders indigenous people)	No new plantings are established on local peoples' land without their free, prior and informed consent, dealt with through a documented system that enables indigenous peoples, local communities and other stakeholders to express their views through their own representative institutions	
Struggle against poverty (Equitable distribution of returns)	Growers and millers contribute to local sustainable development wherever appropriate	
Fair trade conditions	Growers and millers deal fairly and transparently with smallholders and other local businesses	
Complain mechanism	There is a mutually agreed and documented system for dealing with complaints and grievances, which is implemented and accepted by all parties	
Others	Compliance with all applicable local, national and ratified international laws and regulations addressed. There is an implemented management plan that aims to achieve long-term economic and financial viability.	
Environmental land-use issues		
Conservation of Biodiversity	Environmental impacts may be identified on biodiversity and ecosystems. A plan to maintain and increase biodiversity should be developed and implemented	
Protection species/ecosystems	The status of rare, threatened or endangered species and high conservation value habitats, if any, that exist in the plantation or that could be affected by plantation or mill management, shall be identified and their conservation taken into account in management plans and operations	
Soil – erosion	Practices minimise and control erosion and degradation of soils. Extensive planting on marginal and fragile soils is avoided	
Water resources – depletion/loss	Practices maintain the quality and availability of surface and ground water	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Agrochemicals are used in a way that does not endanger health or the environment. There is no prophylactic use, and where agrochemicals are used that are categorised as World Health Organisation Type 1A or 1B, or are listed by the Stockholm or Rotterdam Conventions, growers are actively seeking to identify alternatives, and this is documented.	
GMOs (genetically modified organisms)	GMOs are not mentioned	
National land use regulations	There is compliance with all applicable local, national and ratified international laws and regulations	
High nature values addressed	New plantings have not replaced primary forest or any area containing one or more High Conservation Value	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Aspects of plantation and mill management that have social impacts are identified in a participatory way, and plans to mitigate the negative impacts and promote the positive ones are made, implemented and monitored, to demonstrate continuous improvement	
Energy balance (whole the production chain)	Efficiency of energy use and use of renewable energy is maximised	
Removed ressources balance addressed (nutrients, organic matter)	Not addressed	
Water resources – contamination	Avoiding contamination of surface and ground water through run-off of soil, nutrients or chemicals, or as a result of inadequate disposal of waste	
Soil – contamination	Ensuring adequate ground cover and avoiding over-spraying of herbicides	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO_2 emission / more complex approach)	Plans to reduce pollution and emissions, including greenhouse gases, are developed, implemented and monitored	
Air pollution (NOx, SO2, POP, others...)	Use of fire for waste disposal and for preparing land for replanting is avoided except in specific situations, as identified in the ASEAN guidelines or other regional best practice	
Waste management	Waste management is addressed. Waste is reduced, recycled, re-used and disposed of in an environmentally and socially responsible manner.	
Others		

RTRS

FRAMEWORK

Basics		
Name	Roundtable on Responsible Soy (RTRS)	
Responsible body	Pro Forest, Coop Schweiz und WWF Schweiz	
Website	http://www.responsiblesoy.org	
Foundation (year and participants)	2006; WWF, Coop Schweiz, Cordaid (Netherland, development aid organization), Fetraf-Sul/CUT (Brasil, National Farmer´s Union), Grupo André Maggi (Brasil, soy-producer) and Unilever	
Scope of the system (product-wise)	Soy production	
Scope of the system (geographi-cally)	Production in South America, international Export	
Type of system (certification sys-tem, law, …)	Certification system	
Objectives (vision, mission, goals)	The goal of the Global Roundtable on Responsible Soy (RTRS) is to set up a multistakeholder and participatory process that promotes economically viable, socially equitable and environmentally sustainable production, processing and trading of soy	
Governance		
Governance structure	A core group of organizations committed to the responsible production of soy has agreed to set up an Organizing Committee (OC) and lead the RTRS Initiative through the first stages until a formal institutional framework is in place	
Basis for participation (e.g. volun-tary)	Voluntary	
Representation / members	Retailers, NGOs, banks	
Standard setting		
Standard setting bodies	Pro Forest, Coop Schweiz und WWF Schweiz	
Standard setting process	Existing approaches like ILO, SA 8000, EurepGAP and Criteria for Corporate Re-sponsibility of Soy Buyers Enterprises are considered and included in the standard setting process. Basler Kriterien were verified by the aid of a checklist from Genetic ID (Europe), in regard to their feasibility and additional costs for the farms and in the COC.	
Stakeholder participation	The RTRS is an open multistakeholder process. Anyone who is interested in the issue is welcome to participate.	
Approval	Not addressed	

MONITORING

Verification		
Reviewer	Independent third party certifier	
Evaluation Process	The certifier appoint a team with an agricluture-audit-experienced team-leader. The team should consists of local specialists with analytic expertise in technical, ecological and social sector. Date of visit, positioning of an audit-plan, review of documents, field inspection, meetings with the management, the workers and stakeholders. Exposition and discussion of the resultst with the management. In the case of failure of one criteria, development of advance actions is addressed. Composing of the final report by the team leader which will be presented to the producer and the consumer	
Local stakeholder involvement	Part of the certifier is a team responsible for all social questions of the workers and local communities. Comments of stakeholders can be bring in and will be considered.	
Publication of results	Publication of a short view of the final report for stakeholders.	
Monitoring	Annual monitoring	
Renewal	Annual	
Qualification of verification bodies		
Accreditation bodies	In progress	

Accreditation process	In progress	
Monitoring	In progress	
Renewal	In progress	
Claims and Product Tracking		
Claim	Soy and soyproducts descend from farms complying with the Basler Kriterien	
Material tracking	All of the product about which statements of compliance with these criteria are made should be traceable to the farm where it has been grown. This can be provided by: 1. Any certified chain of custody or 'Hard Identity Preserved' scheme that confirms that the product can be traced from the farm through all stages of processing and transport, e.g., EUREPGAP, organic; or 2. Systems being in place which ensure that products can be traced from the farm through all stages of processing and transportation through documentation, identification and segregation of soy and soy products produced in compliance with the Basel Criteria.	
Validity of claims	Separate storage and transportation, identification and documentation of soy complying with the Basler Kriterien. Special certification-team which is responsible for the material tracking	
Labelling	No label in place	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	There should be an effective method for communication and consultation with local communities and other affected or interested parties.	
Land rights (Indigenous peoples, local communities, …)	The right to use the land can be demonstrated and does not diminish the legal or customary rights of other users	
Freedom of association, collective bargaining	The right of employees and contractors to form associations and bargain collectively with their employer should be respected, in accordance with Conventions 87 and 98 of the International Labour Organisation	
Labour conditions, basic treatment	Workers should have freedom of association and bargaining. Labour laws, union agreements or direct contracts of employment detailing payments and conditions of employment (e.g., working hours, deductions, overtime, sickness, holiday entitlement, maternity leave, reasons for dismissal, period of notice, etc) should be available in the languages understood by the workers or explained carefully to them by a senior company official	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Forced labour, including slave labour, debt bondage and exploitation of prison inmates must be prohibited. Workers must not be obliged to lodge a 'guarantee payment' or the originals of their identity papers with their employer	
Wages and compensation	Employees and contractors should have pay and conditions in accordance with national laws and regulations or sector or trade union standards. Pay meets or exceeds the national minimum wage or a regional average if no minimum wage exists and must enable an adequate standard of living. A minimum wage should be established and adjusted from time to time in consultation with relevant parties	
Health and safety	There should be a health and safety policy which applies to all workers, both employees and contractors, and is adequate, implemented and monitored	
Discrimination (sex, age, handicap, religion, nationality)	The grower must ensure equality of opportunity and treatment for all employees and contractors, regardless of race, colour, sex, religion, political opinion, nationality, social origin or other distinguishing characteristics	
Training – capacity building, development of skills	Workers and contractors should be adequately trained and competent	
Change of way of life, economy and culture, (important stakeholders indigenous people)	An assessment of social impacts should be carried out and the results taken into account in management planning and operational procedures.	

Struggle against poverty (Equitable distribution of returns)	Growers should deal fairly with local businesses and make efforts to contribute to the local economy wherever possible. Growers should invest in local development by: Maximising local employment, Using local goods and services wherever possible, Paying for goods and services promptly, Supporting, as far as is practical, any projects that improve local infrastructure or facilities;	
Fair trade conditions	Not addressed	
Complain mechanism	There should be a system for dealing with complaints and grievances which is implemented and effective.	
Others		
Environmental land-use issues		
Conservation of Biodiversity	A plan to maintain and increase biodiversity in and around the farm should be developed and implemented	
Protection species/ecosystems	Ensure action to avoid damage to and deterioration of habitats, including protection of riparian areas, steep slopes, fragments of natural vegetation, conservation set-aside/reserve areas and areas of high conservation value	
Soil – erosion	Soil erosion should be minimised and soil structure maintained.	
Water resources – depletion/loss	The quantity of natural water sources should be maintained. Water use for irrigation, where used, should be efficient and sustainable	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Integrated Crop Protection (ICP) methods should be used wherever possible and chemical use minimised. All chemical use should be properly managed and records of pesticide use maintained.	
GMOs (genetically modified organisms)	Genetically modified material must not be used. Planting material should be of a high quality and from a known source	
National land use regulations	The grower should be aware of all applicable laws and conventions, and have a mechanism for ensuring that they are implemented	
High nature values addressed	Primary vegetation and High Conservation Value Areas2 should not be converted to agricultural land.	
Others	Soil suitability for soy cultivation should be established to ensure the long-term suitability of land for soy cultivation and the results should be used to plan field operations.	
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	Not addressed	
Removed ressources balance addressed (nutrients, organic matter)	Not addressed	
Water resources – contamination	The quality of natural water sources should be maintained. Water courses, wetlands and swamps should be protected, including maintaining appropriate riparian buffer zones along all bodies of water. Contamination of surface and ground water through run-off of soil, nutrients or chemicals, or as a result of inadequate disposal of waste, should be avoided	
Soil – contamination	Long-term soil fertility should be maintained through appropriate cultural practices. Integrated Crop Protection (ICP) methods should be used wherever possible and chemical use minimised.	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emission / more complex approach)	The use of fire for land clearance should be avoided wherever possible	
Air pollution (NOx, SO2, POP, others...)	Not addressed	
Waste management	Waste and pollution should be minimized and properly managed. Storage, sources and reduce of waste are part of the waste strategy	
Others	An assessment of environmental impacts should be undertaken and the results of the assessment should be incorporated into operating procedures.	

GGL

FRAMEWORK

Basics		
Name	Green Gold Label Program	
Responsible body	Owned by the Green Gold Label Foundation	
Website	www.eugenestandard.org	
Foundation (year and participants)	Developed by Essent	
Scope of the system (product-wise)	Sustainable biomass, especially forestry and agriculture	
Scope of the system (geographically)	European	
Type of system (certification system, law, …)	Certification system	
Objectives (vision, mission, goals)	**Vision:** Buying green energy is a simple way to stimulate environmental improvements. **Mission:** To provide a trusted tool for ensuring that the green energy market delivers real benefits to the environment and communities.	
Governance		
Governance structure	It's an autonomous organisation (Independent from Eugene)	
Basis for participation (e.g. voluntary)	Sustainable biomass, especially forestry and agriculture	
Representation / members		
Standard setting		
Standard setting bodies	Essent basically set up the standards in the GGL Foundation	
Standard setting process	(GGL hat eigene Standards für eine Zertifizierung von Landwirtschaft (GGLS2) und Forst entwickelt (GGLS5). Diese tritt in Kraft, wenn die Rohstoffe nicht aus einem der anerkannten Zertifizierungssysteme (approved agricultural and forestry certification systems) kommen.) Die landwirtschaftliche Seite lehnt sich an Agenda 21 an und die Forstwirtschaft an verschiedene Forstmanagement-Standards an.	
Stakeholder participation		
Approval		

MONITORING

Verification		
Reviewer	The program is executed in cooperation with Skal International and Peterson Bulk Logistics, accredited certifying and inspection companies	
Evaluation Process	It's an accredited certification programme of the RvA (the Dutch council for accreditation). The procedures are followed in conformity with this standard	
Local stakeholder involvement		
Publication of results		
Monitoring		
Renewal	Forest every 4 years	
Qualification of verification bodies		
Accreditation bodies	RvA (the Dutch council for accreditation) accredited for ISO 65 / EN45011	
Accreditation process		
Monitoring		
Renewal		
Claims and Product Tracking		
Claim	Reducing the fossil CO2 emission and saving the environment	
Material tracking	track and trace system from (by-) products from the power plant (and its green power it produces) back to the sustainable source	
Validity of claims	mixing or contamination with non-intrinsic or environmentally harmful materials is prohibited. In every link of the chain written proof must be available that the GGL quality system is supported, sustained and maintained	
Labelling	Green Gold Label	

CRITERIA

Land-use competition

Land-use competition (energy vs. competing land uses)	Storage and distribution problems, affecting food availability are identified and dealt with the management plan. Participation in the initiation and maintenance of district and village agricultural land resource planning assisted by management and conservation groups. Collection and continuous monitoring of utilization of natural resources and living conditions are used for the land resource planning (either individually or on a regional basis). Data about; climate, water and soil, land use, vegetation cover and distribution, animal species, utilization of wild plants, production systems and yields, costs and prices and, social and cultural considerations affecting agriculture and adjacent land use are collected on a regular basis	
Socio-economic issues		
Social aspects by stakeholder consultation	Not addressed	
Land rights (Indigenous peoples, local communities, …)	A policy is implemented to influence tenure and property rights of local small holders positively, with the respect of minimum size of land-holding. Owner /forest manager demonstrates clear evidence of legal land use by having legal land title, customer right or lease agreement	
Freedom of association, collective bargaining	Not addressed	
Labour conditions, basic treatment	Not addressed	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Not addressed	
Wages and compensation	Not addressed	
Health and safety	Personal protection equipment must be made available for personnel by the employer. A safety plan has to be documented and the described safety measures shall be implemented	
Discrimination (sex, age, handicap, religion, nationality)	Not addressed	
Training – capacity building, development of skills	Not addressed	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Not addressed	
Struggle against poverty (Equitable distribution of returns)	Not addressed	
Fair trade conditions	Not addressed	
Complain mechanism	Not addressed	
Others		
Environmental land-use issues		
Conservation of Biodiversity	In agricultural principles addressed but not defined. In forest principles addressed and defined (The forest management is aimed at conservation of biological diversity)	
Protection species/ecosystems	In agricultural principles addressed but not defined. In forest principles addressed and defined (Plans for the identification and protection of rare, threatened and/or endangered species are addressed)	
Soil – erosion	Agriculture and forest management is aimed at land conservation and rehabilitation. Preservation of soil fertility are defined and executed.	
Water ressources – depletion/loss	Agriculture management is aimed at the insurance of freshwater supply and quality for sustainable food production and sustainable rural development. Waste water re-use has to be part of the agriculture management system	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Agricultural and forest management system has implemented integrated pest management and control. Use of banned pesticides is prohibited.	
GMOs (genetically modified organisms)	Natural renewal addressed	
National land use regulations	Not addressed	
High nature values addressed	Land and conservation areas at risk are identified and the policy and management measures are formulated	

Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	Not addressed	
Removed ressources balance addressed (nutrients, organic matter)	The management system has implemented sustainable plant nutrition.	
Water ressources – contamination	Agriculture management is aimed at the insurance of freshwater supply and quality for sustainable food production and sustainable rural development. Water quality has to be monitored on biological, physical and chemical quality. Pollution control addressed (Chemicals, fuels, machine use)	
Soil – contamination	Agriculture management is aimed at land conservation an rehabilitation. Preservation of soil fertility are defined and executed. Pollution control addressed (Chemicals, fuels, machine use)	
safeguard subject climate addressed	In agricultural principles addressed but not defined	
GHG balance: (only CO2 emission / more complex approach)	Not addressed	
Air pollution (NOx, SO2, POP, others...)	Not addressed	
Waste management	Not addressed	
Others		

FSC

FRAMEWORK

Basics		
Name	Forest Stewardship Council (FSC)	
Responsible body	FSC A.C., operated by FSC IC	
Website	www.fsc.org	
Foundation (year and participants)	October 1993 FSC Founding Assembly in Toronto, Canada with 130 participants from 26 countries	
Scope of the system (product-wise)	Forestry products (Wood products, paper, non-timber forest products)	
Scope of the system (geographically)	International	
Type of system (certification system, law, …)	Certification system, Trademark	
Objectives (vision, mission, goals)	Vision: The world's forests meet the social, ecological, and economic needs of present and future generations. Mission: The Forest Stewardship Council A.C. (FSC) shall promote environmentally appropriate, socially beneficial, and economically viable management of the world's forests.	
Governance		
Governance structure	FSC International Centre, Regional offices, national Initiatives. Membership/General assembly. Board of Directors. Balanced representation of 3 chambers (economic, social, environment) at all levels. With equal voting power and consensus orientation	
Basis for participation (e.g. voluntary)	Voluntary	
Representation / members	Academic, government, industry and consulting sectors; supported by all segments of civil society, international, regional and national social and environmental NGOs	
Standard setting		
Standard setting bodies	FSC International; national FSC working groups	

Standard setting process	Based on worldwide set of 10 principles and 56 criteria; adapted to national or regional conditions by national working groups with stakeholder participation. The FSC International Center sets the framework for the development and maintenance of international, national and sub-national FSC standards	
Stakeholder participation	Subject to public review; complete transparency; broad stakeholder participation, public certification reports	
Approval	International General Assembly and national General Assembly; Accreditation Service	

MONITORING

Verification		
Reviewer	FSC-accredited third party auditor (Certification body)	
Evaluation Process	Certification of Forest Management Units (FMU); evaluation of FMU before award of the certificate; auditor reviews documentation, conducts field assessments and consults relevant stakeholders	
Local stakeholder involvement	Any member can file a dispute if there is a disagreement with the decision or ongoing compliance to the standard	
Publication of results	Public summaries of audit reports	
Monitoring	annual audits	
Renewal	general verification every 5 years	
Qualification of verification bodies		
Accreditation bodies	ASI (Accreditation Service International)	
Accreditation process	ASI audits the applying certification body´s documents and office	
Monitoring	Annual inspections of certification body´s office and field work by ASI	
Renewal	Every 5 years	
Claims and Product Tracking		
Claim	FSC-labelled products are social, ecological, and economic responsible products	
Material tracking	Chain of Custody tracks products from forest through each stage of manufacturing and distribution. Either physical separation for pure products or mixture with strict control of all non-FSC-sources	
Validity of claims	Avoidance of wood from forest areas which have been illegally harvested, where traditional or civil rights are violated, been cleared for plantation or other use, from forests with threatened High Conservation Values and of GMO trees	
Labelling	Three product labels (pure, mixed and recycled label), various claims describing real content	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Stakeholder participation at all levels addressed	
Land rights (Indigenous peoples, local communities, …)	Clear evidence of long-term forest use rights to the land (e.g. land title, customary rights, or lease agreements)	
Freedom of association, collective bargaining	Workers have the rigths to organize and voluntarily negotiate with their employers shall be guaranteed as outlined in conventions of the ILO	
Labour conditions, basic treatment	The forest management operations are maintaining or shall enhance the long-term social and economic well-being of forest workers and local communities	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	The communities within, or adjacent to, the forest management area should be given opportunities for employment	
Child labour; forced labour	Not allowed (ILO)	
Wages and compensation	ILO (differences in national implementation)	
Health and safety	Forest management should meet or exceed all applicable laws and/or regulations covering health and safety of employees and their families	
Discrimination (sex, age, handicap, religion, nationality)	compliance with ILO	
Training – capacity building, development of skills	Trainings of the employees are given	

Change of way of life, economy and culture, (important stake-holders indigenous people)	Appropriate mechanisms shall be employed for resolving grievances and for providing fair compensation in the case of loss or damage affecting the legal or customary rights, property, resources, or livelihoods of local peoples. Measures shall be taken to avoid such loss or damage	
Struggle against poverty (Equi-table distribution of returns)	Indigenous people are favoured, fair compensations of the employees	
Fair trade conditions	Not addressed	
Complain mechanism	Dispute resolution procedures in place on all levels (certification, standard setting, ac-creditation, governance etc.)	
Others		
Environmental land-use issues		
Conservation of Biodiversity	Conservation of biological diversity and its associated values	
Protection species/ecosystems	Safeguards shall exist which protect rare, threatened and endangered species and their habitats. Conservation zones and protection areas shall be established, appropriate to the scale an intensity of forest management an the uniqueness of the affected resources.	
Soil – erosion	Written guidelines shall be prepared and implemented to control erosion	
Water ressources – depleti-on/loss	Written guidelines shall be prepared and implemented to protect water resources	
Chemicals – nutri-ents/pesticides (how ad-dressed, what is affected)	Management Systems with environmentally friendly non-chemical methods; generally prohibition of highly dangerous chemicals	
GMOs (genetically modified organisms)	Generally prohibited	
National land use regulations	Abidance of law to the full extent required	
High nature values addressed	Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps	
Others		
Life-cycle aspects		
Social-issues in life-cycle ad-dressed	Not addressed	
Energy balance (whole the production chain)	Not addressed	
Removed ressources balance addressed (nutrients, organic matter)	Ecological functions and values shall be maintained intact, enhanced or restored natural cycles that affect the productivity of the forest ecosystem	
Water ressources – contamina-tion	Not addressed	
Soil – contamination	Not addressed	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emis-sion / more complex approach)	Not addressed	
Air pollution (NOx, SO2, POP, others...)	Not addressed	
Waste management	Forest management should minimize waste associated with harvesting and on-site processing operations	
Others		

PEFC

FRAMEWORK

Basics		
Name	(PEFC) Programme for the Endorsement of Forest Certification Schemes	
Responsible body	PEFC Council	
Website	www.pefc.org	

Foundation (year and participants)	1999, by representatives of eleven officially constituted national PEFC governing bodies with the support of associations representing some 15 million woodland owners in Europe and of many international forest industry and trade organizations	
Scope of the system (product-wise)	All forest types throughout the world	
Scope of the system (geographically)	International	
Type of system (certification system, law, …)	Certification system	
Objectives (vision, mission, goals)	PEFC aims at strengthening and improving the positive image of forestry and wood as a renewable raw material	
Governance		
Governance structure	National Governing Bodies, each appointing voting delegates to the PEFC Council. General assembly board of DirectorsMajority voting on all decisions	
Basis for participation (e.g. voluntary)	Partly voluntary, majority of the seats in the governance are exclusive for representatives of the economic-section	
Representation / members	Academic, government, industry and consulting sectors; strong support of forest industry and forest owner, weak or no support of social and environmental NGOs. Forest industry holds majority	
Standard setting		
Standard setting bodies	National Governing Bodies co-ordinate the development of optional national and regional standards for a country	
Standard setting process	Initiated by national forest owners' organisations or national forestry sector organisations. A Forum (e.g., committee, council, working group) shall be created to which interested parties. The invited parties should represent the different aspects of sustainable forest management and include, e.g. forest owners, forest industry, environmental and social non-governmental organisations, trade unions, retailers and other relevant organisations at national or sub-national level. The Forum shall define its own written procedures based on the consensus principle which govern the methods used for standards development	
Stakeholder participation	The start of the standard setting process shall be communicated to the public. Information on the development process shall be distributed and discussed and final draft standards shall be available to all interested parties. The final draft standards are sent out for formal national consultation process. Consultation shall ensure that the views of interested parties are discussed	
Approval	PEFC Council	

MONITORING

Verification		
Reviewer	Accredited third party auditor (Certification body)	
Evaluation Process	Certification processes shall fulfil or be compatible with the requirements defined in any of the following documents: a) ISO Guide 62 (EN 45 012) if the certification is carried out as quality management system certification, b) ISO Guide 66 if the certification is carried out as environmental management system certification, c) ISO Guide 65 (EN 45 011) if the certification is carried out as product certification (the term "product" is used in its widest sense and includes also processes and services)	
Local stakeholder involvement	Any member of the public can file a dispute if there is a disagreement with the decision or ongoing compliance to the standard.	
Publication of results	Results not regularly and/or not published in their entirety	
Monitoring	Random inspection after award of certificate;	
Renewal	5 years	
Qualification of verification bodies		
Accreditation bodies	Independent national accreditation bodies shall be a part of the International Accreditation Forum (IAF)	
Accreditation process	Variable; depends on national accreditation body	
Monitoring	No inspections by PEFC	
Renewal	No regulation	

Claims and Product Tracking		
Claim	PEFC contributes to the environmentally appropriate, socially beneficial and economically viable mangement of forests for present and future generations	
Material tracking	Chain of Custody tracks products from forest through each stage of manufacturing and distribution Either physical separation, batch definition or volume calculation	
Validity of claims	Avoidance of illegal or unauthorized harvested wood	
Labelling	One label with two optional claims depending on content (100% or less then 100% PEFC)	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Forest management practices should make the best use of local forest related experience and knowledge, such as of local communities, forest owners, NGOs and local people.	
Land rights (Indigenous peoples, local communities, …)	Property rights and land tenure arrangements should be clearly defined, documented and established for the relevant forest area. Likewise, legal, customary and traditional rights related to the forest land should be clarified, recognized and respected.	
Freedom of association, collective bargaining	Compliance with ILO norms	
Labour conditions, basic treatment	Compliance with ILO norms	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Compliance with ILO norms	
Wages and compensation	Compliance with ILO norms	
Health and safety	Working conditions should be safe, and guidance and training in safe working practice should be provided.	
Discrimination (sex, age, handicap, religion, nationality)	Compliance with ILO norms	
Training – capacity building, development of skills	Not addressed	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Forest management planning should aim to respect the multiple functions of forests to society and the respect of the ownership rights and the right of others. Sites with recognized specific historical, cultural or spiritual significance should be protected or well-managed. Forest management practices should make the best use of local forest related experience and knowledge, such as of local communities, forest owners, NGOs and local people.	
Struggle against poverty (Equitable distribution of returns)	Not addressed	
Fair trade conditions	Not addressed	
Complain mechanism	Written procedures for standard setting contains an appeal mechanism for impartial handling of any substantive and procedural complaints	
Others		
Environmental land-use issues		
Conservation of Biodiversity	Natural regeneration should be preferred, provided that the conditions are adequate to ensure the quantity and quality of the forests resources. Introduction of non evaluated species is avoided or minimized. Forest management practices should, where appropriate, promote a diversity of both horizontal and vertical structures and the diversity of species. Where appropriate, the practices should also aim to maintain and restore landscape diversity	
Protection species/ecosystems	Maintenance of forest ecosystem health and vitality. Introduction of non evaluated species is avoided or minimized	

Soil – erosion	Forest management planning should protect soil against erosion and from adverse impacts of water such as floods or avalanches. Protection of silvicultural operations on sensitive soils and erosion prone areas as well as on areas where operations might lead to excessive erosion of soil into watercourses. Inappropriate techniques such as deep soil tillage and use of unsuitable machinery should be avoided on such areas. Construction of roads, bridges and other infrastructure should be carried out in a manner that minimizes bare soil exposure.	
Water resources – depletion/loss	Protection of water resources. Practices on forest areas with water protection function to avoid adverse effects on the quantity of water resources should be carried out carefully. Construction of roads, bridges and other infrastructure should be carried out in a manner that avoids the introduction of soil into water sources and that preserve the natural level and function of water courses and river beds. Proper road drainage facilities should be installed and maintained.	
Chemicals – nutrients/pesticides (how addressed, what is affected)	The use of pesticides and herbicides should be minimized, taking into account appropriate silvicultural alternatives and other biological measures.	
GMOs (genetically modified organisms)	Not addressed	
National land use regulations	Not addressed	
High nature values addressed	Not addressed	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	Not addressed	
Removed ressources balance addressed (nutrients, organic matter)	Not addressed	
Water resources – contamination	Practices on forest areas with water protection function to avoid adverse effects on the quality of water resources should be carried ot carefully. Inappropriate use of chemicals or other harmful substances or inappropriate silvicultural practices influencing water quality in a harmful way should be avoided.	
Soil – contamination	Not addressed	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emission / more complex approach)	Not addressed	
Air pollution (NOx, SO2, POP, others...)	Not addressed	
Waste management	Not addressed	
Others		

CERTFOR

FRAMEWORK

Basics		
Name	CERTFOR (Certificacion Forestal en Chile)	
Responsible body	Fundacion Chile is in charge as CertforChile's National Secretary, and administers the Corporation	
Website	www.certfor.org	
Foundation (year and participants)	2000, Fundación Chile and the Chilean Forest Institute INFOR	
Scope of the system (product-wise)	Forest products	

Scope of the system (geographically)	National (Chile)	
Type of system (certification system, law, …)	Certification system	
Objectives (vision, mission, goals)	Developin an internationally recognised National Forest Certification Standard for Chilean plantations, lenga forest and second growth beech forests	
Governance		
Governance structure	CertforChile elects a Superior Council composed of recognized personalities at the national level, among them two National Prizes. This one constitutes the body in charge of taking strategic decisions for the development and future of the CERTFOR Certification System	
Basis for participation (e.g. voluntary)	Voluntary	
Representation / members	Fundación Chile, CIPMA, the Chilean Wood Corporation CORMA, the Department of Agriculture, CONAMA, and the Association of Registered Professional Foresters	
Standard setting		
Standard setting bodies	Different members of Certfor	
Standard setting process	Definition of Principles and Criteria and produce a first draft after a round of meetings with relevant actors. A three member working group in collaboration with a Technical Committee preparing draft documents which will discussed and approved by the Superior Council (CertforChile elects a Superior Council composed of recognized personalities at the national level)	
Stakeholder participation	The draft standard is discussed at a workshop with interested stakeholders. Documents are freely available	
Approval	Certfor Chile Board of Directors, Superior Council	

MONITORING

Verification		
Reviewer	INN credited independent third party	
Evaluation Process	Field-work and dispose of a certification audit. Results of the audit are evaluated by a group of independent experts. Evaluation is then communicated to the certifier who decides the certification	
Local stakeholder involvement	A list of relevant stakeholders is prepared by the applicant which will be checked by the certifier to ensure all the relevant organisations are represented. A questionnaire is then sent to the stakeholders 30 days before the final evaluation. The summary of the questionnaires will be send to the group in charge of the audit for consideration	
Publication of results	Summaries of certification processes are available. FMUs should make information about their management practices available to third parties	
Monitoring	Annual visits	
Renewal	Every 5 years	
Qualification of verification bodies		
Accreditation bodies	Instituto Nacional de Normalizacion (INN), a Chilean State National Accreditation System, which is internationally recognized by IAF	
Accreditation process	Fundacion Chile and INN covers the development of accreditation programme for Certfor Chile certification scheme. The accreditation process is independent and separate from CertforChile attributions. Additionally to specific CERTFOR requirements, the INN demands from auditors and certification bodies that they comply in particular with the given norms (ISO). Before participating to any auditing activity, all auditors have to formally demonstrate their no presenting any conflict of interest	
Monitoring	Not addressed	
Renewal	5 years	
Claims and Product Tracking		
Claim	CERTFOR-labelled products are products from well managed forests	
Material tracking	Chain of Custody tracks products from forest through each stage of manufacturing and distribution. Either physical separation for pure products or mixture with strict control of all non-CERTFOR-sources	
Validity of claims	Certfified timber in the Chain of Custody must be separated from uncertified timber, if not it must be signed	
Labelling	Label for 100%-CERTFOR products, for non-100% products special labels which are equal to the percentage of certified timber	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Local communities have access to a representative identified by forest managers in order to discuss their worries and problems	
Land rights (Indigenous peoples, local communities, …)	Forest managers protect local communities against risks associated with forestry operations. Forest managers are aware of the presence of indigenous people in the area of their management activities and they know the rights of these peoples and respect them	
Freedom of association, collective bargaining	Forest managers respect the rights of workers and recognize the benefits of organising themselves and of collective bargaining	
Labour conditions, basic treatment	Forest managers provide field workers adequate transport, accommodation, rest and food. Rights of workers are respected	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	All workers have valid contracts	
Child labour; forced labour	No juveniles workers under the age of 18 except under training	
Wages and compensation	Workers receive an adequate and equitable compensation for their work	
Health and safety	Forest managers safeguard the health and safety of workers	
Discrimination (sex, age, handicap, religion, nationality)	There is no discrimination in employment, promotion or remuneration of workers with the same responsibilities and productivity on the basis of sex, age, religion or racial origin	
Training – capacity building, development of skills	Forest managers ensure that forest workers are trained (f.e. in pest and disease-control, biodiversity-protection, fire-preventing and fire fighting) so that they can carry out their work in a productive manner and they also have opportunities for development.	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Pre-afforestation planning takes into account social values. Forest managers have knowledge of the impact of their activities on local communities. Local communities have access to a representative identified by forest managers in order to discuss their worries and problems. Forest managers keep good neighbour relations with local communities	
Struggle against poverty (Equitable distribution of returns)	Forest managers make contributions towards improving the quality of life of neighbourhood communities	
Fair trade conditions	Not addressed	
Complain mechanism	Complain mechanism addressed, The governing board has the power to listen to complaints from either the certification body, or the client if they are not able to settle their differences and reach consensus among themselves.	
Others		
Environmental land-use issues		
Conservation of Biodiversity	Plantations should not be established on lands covered by native forests or other types of high environmental value vegetation. Pre-afforestation planning takes into account biodiversity. There is a skilled person responsible for biodiversity protection and other conservation values.	
Protection species/ecosystems	Areas in which rare and endangered species are found have been identified. Hunting of rare and endangered species is prohibited in the FMU. All personell working for the FMU know about the importance of biodiversity protection (trainings)	
Soil – erosion	Map of soil types that indicates their degree of erosion and fragility. Productive capacity of soils is maintained or if necessary restored. Methods to avoid soil erosion are addressed. Staff involved in planning and forest operations must have an adequate knowledge about the fragility of soils and the most appropriate management practices for them	
Water ressources – depletion/loss	Forest management planning is done considering hydrological availability of significant water flows and waterbodies that supply downstream communities. Staff involved in planning and forest operations must have an adequate knowledge about methods of protection of watercourses	
Chemicals – nutrients/pesticides (how addressed, what is affected)	In forest operations the use of environmentally friendly chemicals will be preferred. Chemicals, fuels, lubricants, other contaminants and their containers are stored, recycled or disposed of in a safe and environmentally friendly way. Pesticides banned by international agreements (f.e. WHO Type 1A and 1B, persistent pesticides) shall not be used: Management plans for all used chemicals are addressed	

GMOs (genetically modified organisms)	No GMOs shall be used	
National land use regulations	Not addressed	
High nature values addressed	Areas of native vegetation have been classified according their importance for biodiversity conservation. Areas with high conservation value native vegetation are managed so as to maintain the biodiversity they provide	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	Not addressed	
Removed ressources balance addressed (nutrients, organic matter)	Prior to reforestation soils showing serious nutrient deficienies are restored using appropriate methods. The FMU has a system for measuring and informing about the contribution to carbon cycling of ist forests	
Water ressources – contamination	Chemicals, fuels and lubricants are used in such a way as to prevent pollution of waters. Forest management planning is done considering hydrological availability of significant water flows and waterbodies that supply downstream communities	
Soil – contamination	Map of soil types that indicates their degree of erosion and fragility. Productive capacity of soils is maintained or if necessary restored. Chemicals, fuels and lubricants are used in such a way as to prevent pollution of soils	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emission / more complex approach)	Not addressed	
Air pollution (NOx, SO2, POP, others...)	Not addressed	
Waste management	There are procedures, manuals or plans for the disposal of all kind of waste	
Others		

MTCC

FRAMEWORK

Basics		
Name	MTCC (Malaysian Timber Certification Council)	
Responsible body	MTCC (Malaysian Timber Certification Council)	
Website	www.mtcc.com.my	
Foundation (year and participants)	Established in October 1998	
Scope of the system (product-wise)	Timber-Products	
Scope of the system (geographically)	National system (Malaysia)	
Type of system (certification system, law, …)	Certification System	
Objectives (vision, mission, goals)	**Vision:** To be recognised as the leading timber certification organisation for tropical forests. **Mission:** To establish and operate a credible and internationally recognised national timber certification scheme towards promoting sustainable forest management in Malaysia	
Governance		
Governance structure	The Board of Trustees, comprising the Chairman and eight other members	
Basis for participation (e.g. voluntary)	Voluntary	

Representation / members	In addition to the Chairman, the members comprise two representatives each from academic and research institutions, the timber industry, non-governmental organisations (NGOs) and government agencies	
Standard setting		
Standard setting bodies	Departement of Standards Malaysia (National accreditation body), MTCC	
Standard setting process	The first consultation in 1999 used the Criteria and Indicators of the International Tropical Timber Organization (ITTO) as the framework for the forest management standard and attended by a total of 111 participants from 58 organisations representing the various stakeholder groups, while the second consultation in 2002 used the Principles and Criteria (P&C) of the Forest Stewardship Council (FSC) as the framework	
Stakeholder participation	Stakeholder participation is addressed. They are invited to regional and national level consultations. The second consultation process took place under the multi-stakeholder National Steering Committee (NSC)	
Approval	The assessment reports for forest management certification and chain-of-custody certification will be prepared by MTCC-registered independent assessors.	

MONITORING

Verification		
Reviewer	The assessment report for forest management certification will be subject to a peer review process by qualified individuals who are registered with MTCC for this purpose	
Evaluation Process	Evaluation of Forest Management Units (FMU) and timber product manufacturers/exporters (COC). The Certification Committee is responsible for considering assessment reports submitted by the independent assessors on applicant FMUs and timber product manufacturers/exporters. Based on the recommendations of the assessors, the Certification Committee will make the decision whether the applicant merits the award of the MTCC certificate	
Local stakeholder involvement	In assessments for forest management certification, local stakeholders in the FMU involved will be interviewed by the assessor.	
Publication of results	Public summaries of audit reports	
Monitoring	Unsteady visits by assessors during the period of validity	
Renewal	Certificates are valid for a period of five years	
Qualification of verification bodies		
Accreditation bodies	MTCC	
Accreditation process	MTCC registers certifiers/independent assessors based on the Terms an Conditions for Registration of Assessors. The applicant must have an adequate number of qualified and experienced staff to carry out the assessments effectively (3 for FMU and 2 for COC)	
Monitoring	Not addressed	
Renewal	Annually	
Claims and Product Tracking		
Claim	MTCC-Label on products provides an assurance that the material in it originates from MTCC-certified forests	
Material tracking	Chain of Custody tracks products from forest to endconsumer	
Validity of claims	COC-System based on a minimum percentage system (70% for solid wood products and 30% for wood fibre based products) or on physical separation system	
Labelling	One product label (MTCC-Label)	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Management planning and operations shall incorporate the results of social impact. Consultations shall be maintained with people and groups directly affected by management operations	
Land rights (Indigenous peoples, local communities, …)	Clear evidence of long-term forest use rights to the land (e.g. land title, customary rights, or lease agreements), Local communities with legal or customary tenure or use rights shall maintain control.	
Freedom of association, collective bargaining	Workers have the rigths to organize and voluntarily negotiate with their employers shall be guaranteed as outlined in conventions of the ILO	
Labour conditions, basic treatment	The provision of ILO Conventions shall be respected	

Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Not allowed (The provision of ILO Conventions shall be respected)	
Wages and compensation	The provision of ILO Conventions shall be respected	
Health and safety	Forest management should meet or exceed all applicable laws and/or regulations covering health and safety of employees and their families	
Discrimination (sex, age, handicap, religion, nationality)	In signatory countries, the provisions of all binding international agreements like CITES, ILO , ITTA shall be respected	
Training – capacity building, development of skills	The communities within, or adjacent to, the forest management area should be given opportunities for training and other services	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Sites of special cultural, ecological, economic or religious significance to indigenous peoples shall be clearly identified in cooperation with such peoples, and recognized and protected by forest managers	
Struggle against poverty (Equitable distribution of returns)	The communities within, or adjacent to, the forest management area should be given opportunities for employement	
Fair trade conditions	Not addressed	
Complain mechanism	Availability of appropriate procedures to address grievances raised by workers and/or their organizations and for conflict resolution.	
Others		
Environmental land-use issues		
Conservation of Biodiversity	Forest management areas should be protected from illegal harvesting, settlement and other unauthorised activities	
Protection species/ecosystems	Safeguards to protect rare, treatened and endangered species and their habitats shall exist (f.e. use of exotic species shall be controlles and monitored)	
Soil – erosion	Written guidelines shall be prepared and implemented to control erosion	
Water ressources – depletion/loss	Written guidelines shall be prepared and implemented to protect water resources	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Management Systems with environmentally friendly non-chemical methods; generally prohibition of highly dangerous chemicals	
GMOs (genetically modified organisms)	Generally prohibited	
National land use regulations	Forest Managers should conduct an assessment of HCVFs in accordance with relevant national and regional legal and regulatory frameworks	
High nature values addressed	Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	Not addressed	
Removed ressources balance addressed (nutrients, organic matter)	Not addressed	
Water ressources – contamination	Written guidelines shall be prepared and implemented to: ...control erosion and protect water resources	
Soil – contamination	Not addressed	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emission / more complex approach)	Not addressed	
Air pollution (NOx, SO2, POP, others...)	Not addressed	
Waste management	Chemicals, containers, liquid and solid non-organic wastes including fuel and oil shall be disposed in an environmentally appropriate manner at off-site location	
Others		

IFOAM

FRAMEWORK

Basics		
Name	International Federation of Organic Agriculture Movements (IFOAM)	
Responsible body	International Federation of Organic Agriculture Movements (IFOAM)	
Website	www.ifoam.org	
Foundation (year and participants)	1972, President of the French farmers' organization, Nature et Progrès and five organizations from europe, south-africa and the USA	
Scope of the system (product-wise)	Agriculture products	
Scope of the system (geographically)	International	
Type of system (certification system, law, …)	System of Accreditation	
Objectives (vision, mission, goals)	Mission: leading, uniting and assisting the organic movement in its full diversity	
Governance		
Governance structure	Democratic structure. On the general assembly the members votes the World Board (chairman) and discuss the next targets of the work of IFOAM. The members organizes themselves to regional working groups. Consumer, Workers and Applicants are funding different Committees, Work- and Actiongroups.	
Basis for participation (e.g. voluntary)	voluntary	
Representation / members	Organizations and companies of the ecological agriculture and the ecological food industry (fabricators, advisors, research establishments, etc.)	
Standard setting		
Standard setting bodies	IFOAM Standards Committee and the Criteria Committee	
Standard setting process	The IFOAM Basic Standards and the IFOAM Accreditation Criteria are developed by the Standards Committee and the Criteria Committee. The standards are approved via a membership vote. The accreditation program bases on the "IFOAM-Framework Directive" for the ecological agriculture and the ecological food industry as soon as the "IFOAM-criterias for Certifiers". The guidelines will be adopted every 3 years	
Stakeholder participation	The members can organize itself to regional groups or stakeholders. A draft document for stakeholder participation is available.	
Approval	a combined workgroup consisting of IFOAM, the FAO and UNCTAD	

MONITORING

Verification		
Reviewer	IOAS accredited third party certification bodies that use certification standards that meet the IFOAM Basic Standards	
Evaluation Process	First application, initial consultation by an IFOAM-accredited certifier, discussion with the candidate, second application, first evaluation, if necessary second evaluation, award of the certificate	
Local stakeholder involvement	Is addressed, stakeholders can allude certifier to any mistakes and problems. Certifier will check this with an unnanounced inspection	
Publication of results	All certification decisions including the scope shall be objective and transparent and shall be recorded	
Monitoring	Annuall unannounced inspections from independent third party	
Renewal	Annuall	
Qualification of verification bodies		
Accreditation bodies	Certification bodies accreditet by IFOAM. The IFOAM Organic Guarantee System enables organic certifiers to become "IFOAM Accredited" and for their certified operators to label products with the IFOAM Seal next to the logo of their IFOAM accredited certifier. IFOAM accreditation is carried out under contract by the International Organic Accreditation Service Inc. (IOAS), a US based organization. IOAS accepts and reviews accreditation applications, conducts site evaluations, and grants IFOAM accreditation to compliant applicants	

Accreditation process	IOAS accepts and reviews accreditation applications, conducts site evaluations, and grants IFOAM accreditation to compliant applicants. The IFOAM Accreditation Criteria together with the IFOAM Basic Standards establish the requirements for certification bodies seeking IFOAM Accreditation. The standards used by the certification body in their IFOAM accredited certification program shall at least meet the IFOAM Basic Standards. The IFOAM Accreditation Criteria are based on the International ISO norms for the operation of certifying bodies	
Monitoring	Annuall inspections	
Renewal	4 years	
Claims and Product Tracking		
Claim	An organic label applies to the production process, ensuring that the product has been produced and processed in an ecologically sound manner	
Material tracking	COC. The routine inspection procedure shall be documented and shall at least include an input/output reconciliation and trace back audit which attempts to trace finished product back to incoming ingredients or fields of production in processing and handling	
Validity of claims	Product labels should identify all ingredients, processing methods, and all additives and processing aids	
Labelling	"certified organic": Minimum of 95% of the ingredients are of certified organic origin. "organic" 70% to 95%. Less than 70% may not be called organic	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Not addressed	
Land rights (Indigenous peoples, local communities, …)	Operators should respect the rights of indigenous peoples, and should not use or exploit land whose inhabitants or farmers have been or are being impoverished, dispossessed, colonized, expelled, exiled or killed, or which is currently in dispute regarding legal or customary local rights to its use or ownership	
Freedom of association, collective bargaining	Employees and contractors of organic operations have the freedom to associate, the right to organize and the right to bargain collectively	
Labour conditions, basic treatment	All employees and their families should have access to potable water, food, housing, education, transportation and health services. Workers should have adequate protection from noise, dust, light and exposure to chemicals that should be within acceptable limits in all production and processing operations.	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Operators should comply with all ILO conventions relating to labor welfare and the UN Charter of Rights for Children. Operators not use forced or involuntary labor	
Wages and compensation	Operators should provide for the basic social security needs of the employees, including benefits, such as maternity, sickness and retirement benefits.	
Health and safety	All employees and their families should have access to health services. Organic techniques promote human health and food safety. All dossiers shall document the impacts of the substance on human health.	
Discrimination (sex, age, handicap, religion, nationality)	All employees should have equal opportunity and adequate wages when performing the same level of work regardless of color, creed and gender	
Training – capacity building, development of skills	Not addressed	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Organic production is socially just and economically sustainable, and organic methods respect cultural diversity	
Struggle against poverty (Equitable distribution of returns)	Not addressed	
Fair trade conditions	Not addressed	
Complain mechanism	Not addressed	
Others		
Environmental land-use issues		

Conservation of Biodiversity	Operators shall take measures to maintain and enhance biodiversity quality.	
Protection species/ecosystems	Organic farming benefits the quality of ecosystems. Clearing of primary ecosystems is prohibited	
Soil – erosion	Organic farming methods conserve and grow soil. Operators should minimize loss of topsoil through management practices that conserve soil and take measures to prevent all forms of soil degratation	
Water ressources – depletion/loss	Organic farming methods use water efficiently and responsibly. Operators shall not deplete nor excessively exploit water resources and shall where possible recycle rainwater and monitor water extraction	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Pests, diseases and weeds should be managed by the knowledgeable application of measures which prefer	
GMOs (genetically modified organisms)	GMOs and their derivates should be excluded from organic production processing and handling to the fullest extent possible. The use of genetically engineered organisms or their derivates is prohibited	
National land use regulations	Not addressed	
High nature values addressed	Not addressed	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	Organic production and processing systems are based on the use of renewable and regenerative resources	
Removed ressources balance addressed (nutrients, organic matter)	Crop production, processing and handling systems shall return nutrients, organic matter and other resources removed from the soil through harvesting by the recycling, regeneration and addition of organic materials and nutrients	
Water ressources – contamination	Organic farming methods maintain water quality, Operators should use techniques that conserve water. Organic management plans should address and mitigate impacts on water ressources. Nutrients and fertility products shall be applied in a way that protecs water. Operators should take reasonable measures to identify and avoid potential contamination.	
Soil – contamination	Organic farming methods conserve and grow soil. Measures to prevent salination should be taken by operators. Nutrients and fertility products shall be applied in a way that protects soil. Operators should take reasonable measures to identify and avoid potential contamination.	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO_2 emission / more complex approach)	Land preparation by burning vegetation shall be restricted to the minimum	
Air pollution (NOx, SO2, POP, others...)	Not addressed	
Waste management	Not addressed	
Others		

SAN

FRAMEWORK

Basics		
Name	Sustainable Agriculture Network (SAN)	
Responsible body	Rainforest Alliance	
Website	http://rainforest-alliance.org	
Foundation (year and participants)		
Scope of the system (product-wise)	The SAN awards the Rainforest Alliance Certified eco-label to farms, not to companies or products	
Scope of the system (geographically)	Tropics	

Type of system (certification system, law, …)	Certification system	
Objectives (vision, mission, goals)	The vision is based on the concept of sustainability, recognizing that the well-being of societies and ecosystems is intertwined and dependent on development that is environmentally sound, socially equitable and economically viable. The Mission is to improve environmental and social conditions in tropical agriculture through conservation certification	
Governance		
Governance structure	Confidential information. The Rainforest Alliance is the international secretariat of the Sustainable Agriculture Network (SAN) and administers the certification system, a coalition of leading conservation groups that links responsible farmers with conscientious consumers by means of the Rainforest Alliance Certified seal of approval	
Basis for participation (e.g. voluntary)	Voluntary	
Representation / members	Rainforest Alliance and a network of Latin American partner organizations. The partners are local conservation groups committed to community-based conservation initiatives and research	
Standard setting		
Standard setting bodies	The SAN is the entity that develops the standards.	
Standard setting process	The Stakeholders are defining the content of the standard during the public consultation process of draft version of reviewed or new standards. These processes comply with the ISEAL Alliance Code of Good Practice for Setting Social and Environmental Standards.	
Stakeholder participation	All standards and criteria were developed with active stakeholder involvement through a public consultation process	
Approval	The Internatonal Standard Committee, with an equal representation of all the involved sectors interested in the standards approves the standards and the standard setting process	

MONITORING

Verification		
Reviewer	A independent third party auditor	
Evaluation Process	A multi-disciplinary team of Rainforest Alliance experts may conduct a scoping. This pre-assessment is designed to identify the strengths and weaknesses of the operation and to outline the steps needed to bring its management practices into compliance the standards, which are detailed, comprehensive, objective and verifiable. When a manager feels that an operation is up to par, he or she may request an inspection or "assessment," where a team of Rainforest Alliance-trained specialists measures compliance with the standards. The team writes a report, which is evaluated by an independent, voluntary committee of outside experts (i.e. peer reviewed), and -- based on the team's recommendations and peer review comments -- the Rainforest Alliance decides whether or not to award the operation its seal of approval. Operations that fail the test may continue making improvements and apply again when ready. Once the standards are met, the operation is permitted to display the Rainforest Alliance certification seal	
Local stakeholder involvement	Certification by local certfication bodies, who are integrated in local culture, governance and environment	
Publication of results	Not addressed	
Monitoring	Annual unannounced visits	
Renewal	Demonstration of continuous advances	
Qualification of verification bodies		
Accreditation bodies		
Accreditation process		
Monitoring		
Renewal		

Claims and Product Tracking		
Claim	The certification seal acts as a guarantee, assuring consumers that the products they are buying have been produced and/or manufactured according to a specific set of criteria balancing ecological, economic, and social considerations	
Material tracking	A chain of custody system is necessary to avoid the mixing of products from certified farms with products from non-certified farms	
Validity of claims	Farmers may apply for certification for all land in production and companies may request that all of their source farms be certified. In addition, companies may register with the Rainforest Alliance in order to begin purchasing and selling product as certified	
Labelling	Rainforest Alliance Certified eco-label	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Certified frams consult with interested parties about changes on farms that could have potential impacts on the social and environmental well-being of surrounding communities	
Land rights (Indigenous peoples, local communities, …)	The farm must contribute to the protection and conservation of community natural resources, collaborate with the development of the local community.	
Freedom of association, collective bargaining	Workers must have the right to freely organize and voluntarily negotiate their working conditions in a collective manner as established in ILO Conventions 87 and 98. No impediment of workers from forming or joining unions, collective bargaining or organizing. Opportunities for workers to make decisions regarding their rights and alternatives to form any type of organization for negotiating their working conditions must be given.	
Labour conditions, basic treatment	Benefit from the rights and conditions established in the United Nations' Universal Declaration of Human Rights and Children's Rights Convention, and in the International Labour Organization's (ILO) conventions and recommendations. Workweek and working hours must not exceed the legal maximums or those established by the ILO	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Contracts with permanent and temporary workers. Temporary and part-time workers have the same rights and benefits as permanent workers.	
Child labour; forced labour	Contracting children under the age of 15 is prohibited. Any type of forced labor is prohibited, including working under the regimen of involuntary imprisonment, in agreement with ILO Conventions 29 and 105 and national laws	
Wages and compensation	Farms must pay legal or regional minimum wage or higher and pay salaries and benefits equal or more than the legal minimum. Payment policies and labor contract must be given.	
Health and safety	Access to medical services during working hours and in case of emergency. All certified farms must have an occupational health and safety program	
Discrimination (sex, age, handicap, religion, nationality)	The farm must not discriminate in its labor and hiring policies and procedures along the lines of race, color, gender, age, religion, social class, political tendencies, nationality, syndicate membership, sexual orientation, marital status or any other motive as indicated by applicable laws, ILO Conventions 100 and 111, and this standard. The farm must offer equal pay, training and promotion opportunities and benefits to all workers for the same type of work. The farm must not influence the political, religious, social or cultural convictions of workers	
Training – capacity building, development of skills	The farm must implement an educational program directed towards administrative and operative personnel (farm workers) and their families that encompasses three topics: the general objectives and requirements of this certification; environmental and conservationtopics related to this standard; and fundamental health and hygiene concepts. The program must be designed for the culture, language and educational level of those involved.	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Certified farms work hard to offer employment opportunities and education to people in neighboring communities. The farm must respect areas and activities that are important to the community socially, culturally, biologically, environmentally and religiously; these must not be affected by farm activities	
Struggle against poverty (Equitable distribution of returns)	Fair wages and compensations to the employees	

Fair trade conditions	Fair wages and compensations to the employees	
Complain mechanism	Not addressed	
Others		
Environmental land-use issues		
Conservation of Biodiversity	The farm must have an ecosystem conservation program. An inventory of wildlife and wildlife habitats found on the farm must be created and maintained	
Protection species/ecosystems	The integrity of natural ecosystems must be protected; destruction of or alterations to the ecosystem is prohibited. Ecosystems that provide habitats for wildlife living on the farm, or that pass through the farm during migration, must be protected and restored. Hunting, capturing, extracting and trafficking wild animals must be prohibited	
Soil – erosion	Certified farms carry out activities that prevent or control erosion and only establish new production areas on land that is suitable for agriculture and the new crops, and never by cutting forests.	
Water resources – depletion/loss	Depositing solid substance in water channels is prohibited. Protection of natural water channels. The farm must have a water conservation program that ensures the rational use of water resources. The farm must keep an inventory and indicate on a map the surface and underground water sources found on the property. Recording of the annual water volume provided by these sources and the amount of water consumed by the farm	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Integrated Pest Management addressed. Only permitted agrochemicals can be used on certified farms. There must be a minimum separation of production areas from natural ecosystems where chemical products are not used.	
GMOs (genetically modified organisms)	Transgenic crops are prohibited	
National land use regulations	Production areas must not be located in places that could provoke negative aspects on national parks, wildlife refuges, biological corridors, forestry reserves, buffer zones or other public or private biological conservation areas	
High nature values addressed	Production areas must not be located in places that could provoke negative aspects on national parks, wildlife refuges, biological corridors, forestry reserves, buffer zones or other public or private biological conservation areas	
Others	New agricultural production must be located on land suitable for that use. Visual impacts are addressed.	
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	Not addressed	
Removed ressources balance addressed (nutrients, organic matter)	Not addressed	
Water resources – contamination	The discharge of untreated wastewater into bodies of water is prohibited.	
Soil – contamination	The farms have fertilization programs based on the crop requirements and soil characteristics. The use of vegetative ground cover and crop rotation reduces dependency on agrochemicals for the control of pests and weeds	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO_2 emission / more complex approach)	Not addressed	
Air pollution (NOx, SO2, POP, others...)	Not addressed	
Waste management	There are programs for managing waste according to its type and quantity, through recycling and waste reduction and reuse. The final destination of waste on the farm is administered and designed to minimize possible environmental and human health impacts. Certified farms have evaluated the transportation and treatment services supplied by contractors and know the final destination of the waste generated on the farm	
Others		

EUREP-GAP

FRAMEWORK

Basics		
Name	EurepGAP	
Responsible body	Euro-Retailer-Produce-Working Group (Eurep)	
Website	www.eurepgap.org	
Foundation (year and participants)	1997 founded on the basis of an initiative of retail establishment	
Scope of the system (product-wise)	Operations of agriculture companies	
Scope of the system (geographically)	International	
Type of system (certification system, law, …)	Certification system	
Objectives (vision, mission, goals)	Mission: to develop accepted standards and processes for international certification of Good Agriculture Practice (GAP)	
Governance		
Governance structure	The "Board", a controlling body, has the supervision. An independent an voted chairman is superior to the board. The work of the committee and the controlling body is supported of the non-profital FoodPLUS GmbH, which personates the secretary of EurepGAP. The controlling is sector-specific warranted by EurepGAP Steering Committees. A independent chairman is superior of the EurepGAP Steering Committees. The standard-concept as well as the controll-concept are adopt by the technical advisory board as well as the steering committee of the respective product range.	
Basis for participation (e.g. voluntary)	Representation of the committees by retailer and producers each with 50%	
Representation / members	Traders, producers, suppliers and aiding members of the agriculture service area	
Standard setting		
Standard setting bodies	Developing and revision by an appropriate sector-committee. Representation of the committees by retailer and producers each with 50%	
Standard setting process	EurepGAP consists of normative documents, appropriate to accreditation compliant with international recognized ISO Guide 65 criteria of certification. The elaboration was a co-operation of international representatives from all areas of the food chain of custody.	
Stakeholder participation	Stakeholder from non-industry organizations like consumers and environmental organizations and governances were involved in the standard setting	
Approval		

MONITORING

Verification		
Reviewer	EurepGAP accredited third-party certifier	
Evaluation Process	Contacting the certifier, sending of the guidelines and contracts, signing of the contracts and reconsignment to the certifier, registration in the EurepGAP database, confirmation of the registration, intern self-inspection and forwarding the results to the certifier, audit enforced by the certifier, award of the certificate	
Local stakeholder involvement	Not addressed	
Publication of results	Publication of producerdatas	
Monitoring	Not addressed	
Renewal	Annual inspections to confirm the certificate	
Qualification of verification bodies		
Accreditation bodies	EurepGAP first-party accreditation	

Accreditation process	Application to the accreditation-office. Accreditation under EurepGAP Gudelines must start within 6 months after application. Audit of the documents of the company, requirements of the EurepGAP-certification must be implemented and exactly documented in the practices of the certification-system. The approved certification body must appoint a EurepGAP contact person.	
Monitoring	The certification body must send out a qualified auditor of the EurepGAP assessment-team to an annual obligate EurepGAP-Certification-Body workshop.	
Renewal	Not addressed	
Claims and Product Tracking		
Claim	Guarantee of implementation of an responsible and regardful association of the agriculture production regarding to food, saftey, environment, social-issues and animal welfare.	
Material tracking	As soon as leaving the production, the product will be controlled by other QA or certification systems spezialising in package and manufacture. That way the product can be traced from the producer to the consumer.	
Validity of claims	Market products complying with the EurepGAP standard must be traceable and handled, to eliminate mistakes or mixing with non-EureppGAP products.	
Labelling	EurepGAP is a „Business-to-Business“ certification. For the consumer the label is not directly visible	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Two meetings should be addressed for companies with more than 5 employees to discuss about healthy, safety and social issues. Documentation of the meetings should be archived.	
Land rights (Indigenous peoples, local communities, …)	Not addressed	
Freedom of association, collective bargaining	Not addressed	
Labour conditions, basic treatment	Employment conditions must comply with local and national regulations with regard to wages, workers age, working hours, working conditions, job security, unions, pensions and all other legal and health requirements	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Not addressed	
Wages and compensation	Not addressed	
Health and safety	Training and special clothing and equipment for employees carry out dangerous work. Accident and emergency procedures must exist and instructions must be clearly understood by all workers.	
Discrimination (sex, age, handicap, religion, nationality)	Not addressed	
Training – capacity building, development of skills	Employees must be trained and introduced to implement their work	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Not addressed	
Struggle against poverty (Equitable distribution of returns)	Not addressed	
Fair trade conditions	Not addressed	
Complain mechanism	Online Complaint Procedure addressed. A complain document must be accessible at the farm	
Others		
Environmental land-use issues		

Conservation of Biodiversity	Enhancement of environmental biodiversity on the farm through a conservation management plan should be given. This could be a regional activity rather than an individual one	
Protection species/ecosystems	Not addressed	
Soil – erosion	Maintain soil condition, growers must recognize the value of crop rotations and seek to employ these whenever practicable; where rotations are not employed, growers must be able to provide adequate justification. Field cultivation techniques that minimize soil erosion must be adopted	
Water resources – depletion/loss	Water removal from not-sustainable sources should be avoid. Supporting documents of communication with the water authority must be available.	
Chemicals – nutrients/pesticides (how addressed, what is affected)	No ICP addressed, pesticide treatments must be recorded, use of chemicals are clear defined	
GMOs (genetically modified organisms)	Use of GMO cultivars must be agreed with individual customers prior to planting. Suppliers must inform all customers of any developments relating to the use or production of products derived from genetic modification before engagement	
National land use regulations	Not addressed	
High nature values addressed	Not addressed	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	Companies should implement energy-policy and should demonstrate an efficient energy-use.	
Removed ressources balance addressed (nutrients, organic matter)	Managementplan should optimize the input of mineral and organic fertilizer.	
Water resources – contamination	A action plan must be developed setting out strategies to minimize all identified risks in new agricultural sites, such as spray drift or water table contamination. Safe storage of fertilizers. Untreated sewage water must never be used for irrigation. A documented waste disposal plan water should be implemented	
Soil – contamination	Maintain soil condition, reduce reliance on agrochemicals and maximize plant health. A documented waste disposal plan soil should be implemented	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emission / more complex approach)	Not addressed	
Air pollution (NOx, SO2, POP, others...)	A documented waste disposal plan, including air should be implemented	
Waste management	An extensive and current documentation of avoidance, disposal and recycling of waste should be implemented.	
Others		

SQF

FRAMEWORK

Basics		
Name	Safe Quality Food Institute (SQFI)	
Responsible body	Food Marketing Institute (FMI)	
Website	www.sqfi.com	
Foundation (year and participants)		
Scope of the system (productwise)	Food	
Scope of the system (geographically)	International	

Type of system (certification system, law, …)	Certification program	
Objectives (vision, mission, goals)	Managing food safety and enhancing quality systems throughout the food chain	
Governance		
Governance structure	Food Marketing Institute (FMI)	
Basis for participation (e.g. voluntary)	Voluntary	
Representation / members	Retailers and wholesalers from around the world	
Standard setting		
Standard setting bodies	Safe Quality Food (SQF) Program	
Standard setting process	An SQF Technical Committee made up of retailers, wholesalers, fresh food suppliers, manufacturers, trainers and auditors monitors the program and provides feedback on changes and improvements. For selected commodities, the SQF Institute has designated technical subcommittees to ensure that the SQF Program is developed for specific application to that industry, such as salmon farming, egg production and fruit and vegetable growers. In addition, the SQF program is subject to review and revision in accordance with the Global Food Safety Initiative (GFSI).	
Stakeholder participation		
Approval	SQF Technical Committee	

MONITORING

Verification		
Reviewer	Managed by internationally accredited Certification Bodies who are licensed by the SQF Institute	
Evaluation Process	Certification Bodies oversee the activities of their SQF Auditors, ensuring that they are qualified and apply a professional audit service. Auditors are permitted only to audit food systems for which they have been registered, based on training and experience. The results of an audit are reviewed by the certification body expert review panel and an SQF Certificate is then issued. The applicant must achieve 3 levels (Food Safety Fundamentals, Accredited HACCP Food Safety Plans, Comprehensive Food Safety and Quality). After achieving Level 1, thereby immediately alerting their customers of their achievement and helping to raise customer confidence and support.	
Local stakeholder involvement		
Publication of results		
Monitoring	All suppliers who wish to be SQF-certified must have an expert trained and registered by SQF available as their advisor – a qualified person responsible for the management and maintenance of the SQF system after the auditor leaves	
Renewal	Renewed annually following a re-certification audit, for SQF 2000 there is an 6 month surveillance audit	
Qualification of verification bodies		
Accreditation bodies	Recognized third-party accreditation bodies	
Accreditation process	The verifier must meet the requirements of ISO/IEC Guide 65/IEC:1996 and the SQF Guidance Document for Certification Bodies. The Certification Body must be accredited by an IAF accreditation body that is approved by the SQF Institute	
Monitoring	Follow up visits are addressed	
Renewal		
Claims and Product Tracking		
Claim	SQF Certification provides an independent and external validation that a product, process or service complies with international, regulatory and other specified standard(s) and enables a food supplier to give assurances that food has been produced, prepared and handled according to the highest possible standards	
Material tracking		
Validity of claims		
Labelling	SQF 1000 for primary producers and SQF 2000 for manufacturers	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)		

Socio-economic issues		
Social aspects by stakeholder consultation		
Land rights (Indigenous peoples, local communities, …)		
Freedom of association, collective bargaining		
Labour conditions, basic treatment		
Not permanent employed (Seasonal Workers, contract and non-documented workers)		
Child labour; forced labour		
Wages and compensation		
Health and safety		
Discrimination (sex, age, handicap, religion, nationality)		
Training – capacity building, development of skills		
Change of way of life, economy and culture, (important stakeholders indigenous people)		
Struggle against poverty (Equitable distribution of returns)		
Fair trade conditions		
Complain mechanism		
Others		
Environmental land-use issues		
Conservation of Biodiversity		
Protection species/ecosystems		
Soil – erosion		
Water resources – depletion/loss		
Chemicals – nutrients/pesticides (how addressed, what is affected)		
GMOs (genetically modified organisms)		
National land use regulations		
High nature values addressed		
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed		
Energy balance (whole the production chain)		
Removed ressources balance addressed (nutrients, organic matter)		
Water resources – contamination		
Soil – contamination		
Safeguard subject climate addressed		
GHG balance: (only CO2 emission / more complex approach)		
Air pollution (NOx, SO2, POP, others...)		
Waste management		

Others		

BIOLAND

FRAMEWORK

Basics		
Name	Bioland e.V.	
Responsible body		
Website	www.bioland.de	
Foundation (year and participants)	1976, ancestor was "bio-gemüse e.V."	
Scope of the system (product-wise)	Agriculture products	
Scope of the system (geographically)	National (Germany)	
Type of system (certification system, law, …)	Certification system	
Objectives (vision, mission, goals)	Organic production according to bioland is based on the exact observation of biological connections of the effects between soil – plants – animals and humans with the aim of achieving optimum care of biological regulation systems in the agricultural field. Agricultural products are generated within as closed a business operating cycle as possible in the sense of a true original production.	
Governance		
Governance structure	Executive board consists of the current general managers of the national association, the federal state association and the steering committee and is the link between them. The federal state association represented the farmers and the national association represented the policy of the members.	
Basis for participation (e.g. voluntary)	Bioland agriculture companies must be member of Bioland	
Representation / members	Agriculture companies	
Standard setting		
Standard setting bodies	Bioland e.V.	
Standard setting process	Guidelines and standards of the ecological cultivation (IFOAM, EG-Bio-regulation...) are the basic of the standard.	
Stakeholder participation	Participation of stakeholders is given. Recommendations of the agriculture stakeholders are considered in the standard setting process.	
Approval	The basic concepts and the major contents of the general processing standards and the branch-specific standards are passed by resolution at the Federal Delegates' Assembly.	

MONITORING

Verification		
Reviewer	Bioland-Anerkennungskommission (Aufgaben gemäß§ 11 der Satzung des Bioland e.V)	
Evaluation Process	Prerequisite for the conclusion of a contract is membership in BIOLAND e.V. When a contract is issued, a visit is made to the business by a person authorised by BIOLAND. Each processor is regularly inspected in regard to compliance with general and branch-specific processing standards. The processor will place the inspection results according to EU regulation 2092/91 at the disposal of BIOLAND e.V., so that the BIOLAND inspections can be based on them.	
Local stakeholder involvement		
Publication of results		
Monitoring		
Renewal		
Qualification of verification bodies		
Accreditation bodies	Bioland e.V.	
Accreditation process	The certification bodies are accredited by Bioland e.V. per contract of inspection. Assessment to participate on an annual Bioland instruction.	
Monitoring	Continuous evaluations of the certification bodies	

Renewal		
Claims and Product Tracking		
Claim	Environmental-friendly an sustainable food-production	
Material tracking	No own track and trace system. Implementation of track and trace systems from the Bioland-partners. Bioland track and trace is part of the EG-Bio-track and trace system. The processor has to take all required measures to ensure the identification of BIOLAND products or parts by clear labelling of the product to prevent co-mingling, contamination or confusion of BIOLAND products with Non-BIOLAND products.	
Validity of claims	Ingredients from conventional production are not permissible. Exclusion: If it is proven that certain ingredients from organic production are not available, conventional ingredients may be used in exceptional cases to a part of a maximum of 5 % as far as these are listed in the EU regulation 2092/91, annex VI, part C.	
Labelling	Contractual businesses are obligated to mark their products at distribution to BIOLAND contractual partners, produced in accordance with the standards, with the trade mark BIOLAND. BIOLAND e.V. designs marking and packing material.	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Not addressed	
Land rights (Indigenous peoples, local communities, …)	The mutual tasks of organic biological cultivation consist of creating the basis for the maintenance and development of independent farming structures.	
Freedom of association, collective bargaining	The legal stipulations of the social and labour law are valid for all persons working on BIOLAND operations (adequate addressed in the named laws)	
Labour conditions, basic treatment	The legal stipulations of the social and labour law are valid for all persons working on BIOLAND operations (adequate addressed in the named laws). Human rights and social responsibility built the basis for the production and processing of BIOLAND products	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Children may only be occupied appropriate to their development, supervised by persons in charge, as well as considering the legal stipulations	
Wages and compensation	The legal stipulations of the social and labour law are valid for all persons working on BIOLAND operations (adequate addressed in the named laws)	
Health and safety	The legal stipulations of the social and labour law are valid for all persons working on BIOLAND operations (adequate addressed in the named laws)	
Discrimination (sex, age, handicap, religion, nationality)	People working on a BIOLAND business receive equal opportunities independent of race, faith and sex.	
Training – capacity building, development of skills	The legal stipulations of the social and labour law are valid for all persons working on BIOLAND operations (adequate addressed in the named laws)	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Not addressed	
Struggle against poverty (Equitable distribution of returns)	Not addressed	
Fair trade conditions	Not addressed	
Complain mechanism	Not addressed	
Others		
Environmental land-use issues		
Conservation of Biodiversity	The location must be designed in accordance with ecological points of view. For example, by planting and maintaining hedges, creating nesting possibilities and ensuring provision of shelter for insects, beneficial animals are to be encouraged and the self-regulation within the ecological system improved. The treatment of the harvested products with chemical storage protection agents are forbidden	
Protection species/ecosystems	Not addressed	
Soil – erosion	Soil preparation must be carried out in such a manner that the natural soil structure is not excessively disturbed	

Water resources – depletion/loss	Water resources are not to be used excessively, the effects of water extraction are to be observed. Wherever possible, rainwater shall be collected and used. Any agricultural measures may not lead to salinisation of soil and water. Treatment and processing of raw materials processes must ensure the most economical use of resources such as water, air and energy sources.	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Use of chemical synthetic nitrogenous fertilisers, easily soluble phosphates and other fertilisers not listed in 10.1 and the use of synthetic pesticides and growth regulators is prohibited.	
GMOs (genetically modified organisms)	Not allowed	
National land use regulations	Not addressed	
High nature values addressed	Not addressed	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	Not direct but: Agricultural products are generated within as closed a business operating cycle as possible. Organic material from the business itself forms the basis of fertilisation.	
Removed ressources balance addressed (nutrients, organic matter)	Crop rotation is to be planned in such a variable and balanced manner that this fulfils the maintenance of soil fertility.	
Water resources – contamination	In regard to the type, the amount and the time of applying fertiliser, care must be taken to avoid placing loads on the water (e.g. through heavy metals and nitrates).	
Soil – contamination	In regard to the type, the amount and the time of applying fertiliser, care must be taken to avoid placing loads on the soil (e.g. through heavy metals and nitrates). Treatment and processing of raw materials processes must ensure the most economical use of resources such as water, air and energy sources.	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emission / more complex approach)	Not direct but: animal transport distances should be as short as possible. The aim is not to minimize CO2-emission but to reduce stress. Treatment and processing of raw materials processes must ensure the most economical use of resources such as water, air and energy sources.	
Air pollution (NOx, SO2, POP, others...)	It is not permissible to burn used plastic in the fields.	
Waste management addressed	Covering material like mulch and silo foils, forcing foils, fleeces, cultivation guard nets etc. may only be used if produced on basis of polycarbonates (e.g. polyethylene, polypropylene). Used foils shall be recycled if feasible.The packaging volume must be reduced and recycled. Non-returnable packing may not be used if returnable packaging is possible and feasible.	
Others		

EU BIO label

FRAMEWORK

Basics		
Name	BIO	
Responsible body	European Union	
Website	www.bio-siegel.de	
Foundation (year and participants)	1991	
Scope of the system (product-wise)	A) Unprocessed agricultural crop products; also livestock and unprocessed livestock products. B) Processed agricultural crop and livestock products intended for human consumption. C) Feedingstuff	
Scope of the system (geographically)	Europe	
Type of system (certification system, law, …)	Certification System	

Objectives (vision, mission, goals)	A framework of Community rules on production, labelling and inspection will enable organic farming to be protected in so far as it will ensure conditions of fair competition between the producers of products bearing such indications and give the market for organic products a more distinctive profile by ensuring transparency at all stages of production and processing, thereby improving the credibility of such products in the eyes of consumers;	
Governance		
Governance structure	The council of the european community, the EU commission, national inspection authorities, approved private bodies	
Basis for participation (e.g. voluntary)	Voluntary	
Representation / members	EU members	
Standard setting		
Standard setting bodies	The council of the european community	
Standard setting process	Based on "PRINCIPLES OF ORGANIC PRODUCTION AT FARM LEVEL"	
Stakeholder participation	Not addressed	
Approval	EU commision	

MONITORING

Verification		
Reviewer	Inspection authorities and/or by approved private bodies	
Evaluation Process	Member States shall set up an inspection system operated by one or more designated inspection authorities and/or by approved private bodies. For the application of the inspection system operated by private bodies, Member States shall designate an authority responsible for the approval and supervision of such bodies.	
Local stakeholder involvement	Not addressed	
Publication of results	Not addressed	
Monitoring	Annual audits, Moreover, the inspection body or authority shall carry out random inspection visits, announced or not	
Renewal	Annually	
Qualification of verification bodies		
Accreditation bodies	An authority designated by the member states	
Accreditation process	Approval of a private inspection body if standard inspection procedure to be followed is in place, penalties which the body intends to apply, appropriate resources in the form of qualified staff, administrative and technical facilities, inspection experience and reliability; objectivity of the inspection body	
Monitoring	After an inspection body has been approved, the competent authority shall monitor the inspection body. The inspection body shall send to the competent authority each year a list of operators subject to their inspection and present to the said authority a concise annual report. Unlimited accreditation, no annual inspections	
Renewal	Not addressed	
Claims and Product Tracking		
Claim	Products from ecological agriculture, minimum comply with the EU-Öko-Verordnung	
Material tracking	Member States ensure necessary traceability of products during the entire production chain. The operators shall ensure that products may be transported only in appropriate packaging in such a manner that substitution of the content cannot be achieved. Regulations for preparation units handling also products not from organic production.	
Validity of claims	For Product Group A) 100% organic. For Product Group B) at least 95 % of the ingredients of agricultural origin of the product are of the origin of organic production or are imported from third countries (special arrangements). All the other ingredients of agricultural origin of the product are included in an annex or have been provisionally authorized by a Member State. Requirements for conversion to the organic production method and adequate indication.	
Labelling	One label for the thee different product groups	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Not addressed	
Land rights (Indigenous peoples, local communities, …)	Not addressed	
Freedom of association, collective bargaining	Not addressed	
Labour conditions, basic treatment	Not addressed	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Not addressed	
Wages and compensation	Not addressed	
Health and safety	Not addressed	
Discrimination (sex, age, handicap, religion, nationality)	Not addressed	
Training – capacity building, development of skills	Not addressed	
Change of way of life, economy and culture, (important stakeholders indigenous people) -	Not addressed	
Struggle against poverty (Equitable distribution of returns)	Not addressed	
Fair trade conditions	Not addressed	
Complain mechanism	Not addressed	
Others		
Environmental land-use issues		
Conservation of Biodiversity	Not addressed	
Protection species/ecosystems	Not addressed	
Soil – erosion	Not addressed	
Water resources – depletion/loss	Not addressed	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Organic or mineral fertilisers may, exceptionally, be applied. Pests, diseases and weeds shall be controlled by a combination of measures without pesticides. Only explicit mentioned products are allowed in defined special cases.	
GMOs (genetically modified organisms)	Prohibited	
National land use regulations	Not addressed	
High nature values addressed	Not addressed	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	Not addressed	
Removed ressources balance addressed (nutrients, organic matter)	Ecological farms fulfill the humic- and nutritional requirement of the acreage	
Water resources – contamination	Not addressed, but in nutrients and pesticide requirements integrated	
Soil – contamination	The fertility and the biological activity of the soil must be maintained or increased	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emission / more complex approach)	Not addressed	
Air pollution (NOx, SO2, POP, others...)	Not addressed	

Waste management addressed	Not addressed	
Others		

CCCC

FRAMEWORK

Basics		
Name	Common Code for the Coffee Community	
Responsible body	International Steering Commitee	
Website	www.sustainable-coffee.net	
Foundation (year and participants)	2002, Gesellschaft für Technische Zusammenarbeit (GTZ) and Deutschen Kaffeeverband (DKV)	
Scope of the system (product-wise)	Coffee	
Scope of the system (geographically)	International	
Type of system (certification system, law, …)	Code of Conduct / voluntary self-commitment	
Objectives (vision, mission, goals)	Continuously improving the level of sustainability in the production, processing and trading of all green coffee	
Governance		
Governance structure	Multistakeholderstructure:: 3 equal groups of producers, trading and civil society (NGOs and labour union). Every group nominate a commentator, to organize the communication between the groups and between groups and Project-Office. This 3 groups are the basic of the Steering Committee and 3 Expert Working Groups (social, economy, environmental). One more group, a kind of receptacle of the 3 basic groups composed to solve existing problems and to include new members in the process.	
Basis for participation (e.g. voluntary)	Voluntary	
Representation / members	3 equal groups of producers, trading and civil society (NGOs and labour union)	
Standard setting		
Standard setting bodies	3 Expert Working Groups	
Standard setting process	Develop the matters of the Codex on 5 levels (dimensions, categouries, principals, criterias, indicators). The dimensions are cut into the environmental, economic and social area. 3 Expert Working Groups developed the content of the standard. Available code of conducts were the basis vor the 4C, which were evaluated by the Project-Office	
Stakeholder participation	Participation by stakeholders of the coffee chain and beyond (producers, trading and civil society (NGOs and labour union)	
Approval	International Steering Commitee	

MONITORING

Verification		
Reviewer	Approved and registered third-party verifier	
Evaluation Process	First step is a self-assessment. It is a declaration of having received, read, understood and accepted the relevant documents as well as having excluded all "Unacceptable Practices". Approved and registered third-party verification of the self-assessment, with checking the compliance with the requirements of the Common Code. Feeding back the results to a National Common Code Body as well as to the Common Code Unit. Level Yellow is the requirement to get certified. On the basis of the successfull certification the Common Code Unit develops a management plan to remove all remaining "Reds". A re-verification after max. two years checks the level of compliance with the standard.	
Local stakeholder involvement	NGOs support the self-assessment and the development of the management plan of the potential candidate	
Publication of results	No publication of the verification report.	
Monitoring	Unnanounced random audits at all levels	
Renewal	4 years	
Qualification of verification bodies		

Accreditation bodies	Registered and approved by the International Common Code Managing Body independent third-party-auditors	
Accreditation process	Training and workshops for potential independent third-party verifiers, progressed by 4C	
Monitoring	Unannounced random audits at al levels over a two-year period	
Renewal	Every 1-2 years	
Claims and Product Tracking		
Claim	To foster sustainability in the "mainstream" green coffee chain and to increase the quantities of coffee meeting sustainability	
Material tracking	Chain of Custody	
Validity of claims	The supply chain is part of the economic dimension. The coffee should be traceable from 4C Unit to cup.	
Labelling	3 Versions of the logo: 4C-plain-logo, 4C-circle-logo and 4C-text-logo. The Logos and the "The 4C general statement" may not printed on Coffee-endproducts, only "The 4C members' statement". The members may use the logo along the coffee chain or for publication	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Not addressed	
Land rights (Indigenous peoples, local communities, …)	Prohibiting of forced eviction without adequate compensation	
Freedom of association, collective bargaining	Workers and producers have the right to found, to belong to and to be represented by an independent organization of their choice. Workers have the right to bargain collictively	
Labour conditions, basic treatment	Adequate housing where required and appropriation of potable water to all workers is addressed. Working hours comply with national laws / international conventions. Living conditions and education are addressed	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Workers receive a labour contract. Seasonal and piece rate workers are equitably treated	
Child labour; forced labour	Not allowed (reffering to ILO Convention)	
Wages and compensation	Wages comply with national laws or sector agreements. Overtime work is remunerated	
Health and safety	Employer assures proper occupational health and safety conditions for workers	
Discrimination (sex, age, handicap, religion, nationality)	All actors along the chain implement positive action to secure equal rights with respect to sex, religion, ethnicity and political views	
Training – capacity building, development of skills	Workers are entitled to receive training to improve their skills and capacities. Cooperatives, Unions and associations work towards skills development and improvement of capacities	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Not addressed	
Struggle against poverty (Equitable distribution of returns)	Reasonable earnings, for all in the coffe chain, free access to markets and sustainable livelihoods	
Fair trade conditions	Reasonable earnings for all in the coffe chain	
Complain mechanism	Not addressed	
Others		
Environmental land-use issues		
Conservation of Biodiversity	Conservation of wildlife and endangered species is facilitated and supported	
Protection species/ecosystems	Prohibition of cutting primary forest or destruction of other forms of natural resourcesthat are designated by national and/or international legislation (protected areas). Native flora is protected and enhanced	
Soil – erosion	Soil conservation practices are in place. Full implementation and periodical review of a soil management plan is evident	
Water resources – depletion/loss	Water ressources are conserved in regard to quality and quantity aspects. Wastewater management is in place	

Chemicals – nutrients/pesticides (how addressed, what is affected)	Use of pesticides and the effect on the environment is minimized. Prohibition of the use of pesticides banned under the Stockholm convention and listed in the Rotterdam Convention on Persistent Organic Pollutants	
GMOs (genetically modified organisms)	Not addressed	
National land use regulations	Not addressed	
High nature values addressed	Not addressed	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Social issues must be comply in the whole chain	
Energy balance (whole the production chain)	Preferential use of renewable energy, saving energy is addressed	
Removed ressources balance addressed (nutrients, organic matter)	Application of fertilizers is in accordance with the needs of the crop derived from monitoring and soil/plant analyses, encouraging the use of organic material without depleting nutrient stocks in other areas	
Water ressources – contamination	Water ressources are conserved in regard to quality and quantity aspects. Water conservation practices are implemented	
Soil – contamination	Fertilizers are used appropriately, use of pesticides are minimized, organic matter management is in place	
Safeguard subject climate adressed	Not addressed	
GHG balance: (only CO2 emission / more complex approach)	Not addressed	
Air pollution (NOx, SO2, POP, others...)	Not addressed	
Waste management	Safe waste management is addressed. Waste generation is minimized, reuse and recycling is maximi-zed. Safe disposal of waste is ensured.	
Others		

ETI BASE CODE

FRAMEWORK

Basics		
Name	The ETI Base Code	
Responsible body	Ethical Trading Initiative	
Website	http://www.ethicaltrade.org/	
Foundation (year and participants)	1998. Companies (f.e.: Chiquita Brands, Marks and Spencer, Sainsbury, The Body Shop International), Trade Unions (f.e.: International Trade Union Confederation, International Textile, Garment and Leather Workers` Federation, Trades Union Congress, Unitiing Food, Farm and Hotel Workers World Wide), NGO`s (f.e.: Oxfam GB, The Fairtrade Foundation, Save the children).	
Scope of the system (product-wise)	The ETI membership is considered especially appropriate for companies operationg in sectors which manufacture, market or distribute consumer products.	
Scope of the system (geographically)	International	
Type of system (certification system, law, …)	Code of labour practice - reflecting the most relevant international standards with respect to labour practices which will be used as the basis of its work.	
Objectives (vision, mission, goals)	ETI members believe that this collaborative approach provides the opportunity for making significant progress in promoting the observance of internationally recognised labour standards, in particular fundamental human rights throughout global supply chains.	
Governance		
Governance structure	ETI is constituted as a distinct, not-for-profit, legal entity. Its Governing Board is made up of equal representation from the three main categories of members, companies, trade union organisations, and NGOs.	

Basis for participation (e.g. voluntary)	Voluntary	
Representation / members	The three main categories of members are companies, trade union organisations, and NGOs. Memberhip will be on an annual basis.	
Standard setting		
Standard setting bodies	The code of labour practice is based on national law and the internationally agreed labours standards of ILO.	
Standard setting process	The code of labour practice is based on national law and the internationally agreed labours standards of ILO.	
Stakeholder participation	Experimental projects provide the corporate, trade union and NGO members the opportunity to work together to identify and promote good practice in specific aspects of code implementation, often in collaboration with their suppliers and partners.	
Approval	Annual reporting process.	

MONITORING

Verification		
Reviewer	The ETI member companies are expected to adopt the ETI Base code. ETI members accept general principles on implementation of ETI Base Code, monitoring, verification and reporting.	
Evaluation Process	Annual reporting process.	
Local stakeholder involvement	In case of smallholder farmers is a participatory process intended.	
Publication of results	ETI will publish an Annual Report that summarises progress, drawing on the experience of its members, as well as covering developments in related aspects of ethical trade..	
Monitoring	The implementation of codes will be assessed through annually monitoring and verification.	
Renewal	Member companies commit themselves, on the basis of knowledge gained from monitoring	
Qualification of verification bodies		
Accreditation bodies	Not in place	
Accreditation process	Not in place	
Monitoring	Not in place	
Renewal	Not in place	
Claims and Product Tracking		
Claim	The ETI Base Code is communicated throughout the company and to its suppliers and sub-contractors (including closely associated self- employed staff).	
Material tracking	Not in place	
Validity of claims	Not in place	
Labelling	Not in place	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Not addressed	
Land rights (Indigenous peoples, local communities, …)	No special regulation	
Freedom of association, collective bargaining	Workers have the right to join or form trade unions of their own choosing and to bargain collectively. The employer adopts an open attitude towards the activities of trade unions and their organisational activities. Workers representatives are not discriminated against and have access to carry out their representative functions in the workplace. Where the right to freedom of association and collective bargaining is restricted under law, the employer facilitates, and does not hinder, the development of parallel means for independent and free association and bargaining.	
Labour conditions, basic treatment	Working hours comply with national laws and benchmark industry standards, whichever affords greater protection.	

Not permanent employed (Seasonal Workers, contract and non-documented workers)	To every extent possible work performed must be on the basis of recognised employment relationship established through national law and practice. Obligations to employees under labour or social security laws and regulations arising from the regular employment relationship shall not be avoided through the use of other contractings.	
Child labour; forced labour	There shall be no new recruitment of child labour. Children and young persons under 18 shall not be employed at night or in hazardous conditions. These policies and procedures shall conform to the provisions of the relevant ILO standards. There is no forced, bonded or involuntary prison labour.	
Wages and compensation	Wages and benefits paid for a standard working week meet, at a minimum, national legal standards or industry benchmark standards, whichever is higher. Meeting of basic needs and provide some discretionary income. All workers shall be provided with written and understandable Information about their employment conditions.	
Health and safety	A safe and hygienic working environment shall be provided. Minimising and prevention of accidents and injury to health should be addressed. Workers shall receive regular and recorded health and safety training. Access to clean toilet facilities and to potable water, and, if appropriate, sanitary facilities for food storage shall be provided.	
Discrimination (sex, age, handicap, religion, nationality)	There is no discrimination in hiring, compensation, access to training, promotion, termination or retirement based on race, caste, national origin, religion, age, disability, gender, marital status, sexual orientation, union membership or political affiliation.	
Training – capacity building, development of skills	All relevant personnel are provided appropriate training and guidelines that will enable them to apply the code in their work.	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Not addressed.	
Struggle against poverty (Equitable distribution of returns)	Not addressed.	
Fair trade conditions	Not addressed.	
Complain mechanism		
Others		
Environmental land-use issues		
Conservation of Biodiversity	Not addressed.	
Protection species/ecosystems	Not addressed.	
Soil – erosion	Not addressed.	
Water ressources – depletion/loss	Not addressed.	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Not addressed.	
GMOs (genetically modified organisms)	Not addressed.	
National land use regulations	Not addressed.	
High nature values addressed	Not addressed.	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	The ETI Base Code is communicated throughout the company and to its suppliers and sub-contractors (including closely associated self- employed staff).	
Energy balance (whole the production chain)	Not addressed.	
Removed ressources balance addressed (nutrients, organic matter)	Not addressed.	
Water ressources – contamination	Not addressed.	
Soil – contamination	Not addressed.	
Safeguard subject climate addressed	Not addressed.	

GHG balance: (only CO2 emission / more complex approach)	Not addressed.	
Air pollution (NOx, SO2, POP, others...)	Not addressed.	
Waste management	Not addressed.	
Others		

FLO

FRAMEWORK

Basics		
Name	Fairtrade Labelling Organizations International (FLO)	
Responsible body	FLO e.V.	
Website	http://www.fairtrade.net	
Foundation (year and participants)	founded in 1997 as an umbrella organization of 17 national fair-trade labelling initiatives.	
Scope of the system (product-wise)	Primarily typical agricultural products	
Scope of the system (geographically)	International, limited to 17 member countries	
Type of system (certification system, law, …)	Certification System	
Objectives (vision, mission, goals)	To contribute to the Social and Economic Development of Farmers and Workers in the Global South through a credible and competent Certification System	
Governance		
Governance structure	FLO-CERT GmbH with Certification Committee, Appeals Committee, Director, Producers Certification Unit, Trade Certification Unit, Finances & Central Services, Regional & Local Inspectors in the Producer Countries; FLO e.V. with Standards Committee, General Director, Standards Unit, Producer Business Unit, Finances & Central Services, Local Liason Officers in the Producer Countries; Board of Directors; FLO Stakeholder Forum; Meeting of Members; Producer Networks	
Basis for participation (e.g. voluntary)	voluntary	
Representation / members	Asociación del Sello de Productos de Comercio Justo, Comercio Justo México (associate member), Fair Trade Association of Australia and New Zealand, Fairtrade Österreich, Fairtrade Ireland, The Fairtrade Foundation, Max Havelaar Belgique, Association Max Havelaar France, Max Havelaar Danmark, Stichting Max Havelaar, Fairtrade Max Havelaar Norge, Max Havelaar-Stiftung (Schweiz), Reilun kaupan edistämisyhdistys, Rättvisemärkt, TransFair Canada, TransFair Deutschland, TransFair Italia, TransFair Japan, TransFair-Minka Luxembourg, TransFair USA	
Standard setting		
Standard setting bodies	FLO e.V. with Standards Unit and Standards Committee	
Standard setting process	The Standards Unit or the FLO Standards Committee initiates a research phase to prepare a set of standards and/or a Fairtrade Minimum Price proposal. For major standards issues the FLO Standards Committee meets to discuss the proposal. It is published for formal consultation in line with the ISEAL Code of Practice on Standards Setting. The final draft of proposals for major issues goes to the Standards Committee for decision taking, otherwise the Standards Unit will decide. Criteria are divided into minimum criteria, to be met before inscription, and process criteria that should be met over a defined time scale. Specific criteria for small farmers and hired labour.	
Stakeholder participation	relevant producer organizations, traders and other stakeholders can signal need for development or revision of standards and are asked to give their input for draft proposal	
Approval		

MONITORING

Verification		
Reviewer	FLO-CERT GmbH	

Evaluation Process	Either a physical inspection meaning, that the operators are inspected regularly by inspectors with auditing techniques, or a "Desk-Top" review of compliance, meaning, that the operator does not receive a physical visit, but is requested to send specified documents, which carefully be evaluated by the inspector. The next step is awarding the certification decision.	
Local stakeholder involvement	Not addressed	
Publication of results	Not addressed	
Monitoring	Unannounced inspections can take place when the need arises	
Renewal	Renewal Certification Cycles vary between one year and 3 years	
Qualification of verification bodies		
Accreditation bodies	Currently preparing for ISO accreditation	
Accreditation process	Not in place	
Monitoring	Not in place	
Renewal	Not in place	
Claims and Product Tracking		
Claim	The International Fairtrade Certification Mark (CM) guarantees a very rigorous process of certifying products as complying with international Fairtrade standards set by FLO.	
Material tracking	FLO undertakes the monitoring and inscription of producers while the national initiatives are responsible for the control of fair trade labels and registering importers/retailers. In order to grant the use of the fair trade label, the national initiative must ensure that retailers have complied with fair trade contracting conditions.	
Validity of claims	The Fairtrade Mark is only awarded to products and does not make any statement about companies or organizations selling them	
Labelling	The International Fairtrade Certification Mark is a product-label intended mainly for use on packaging of consumer end-products, licensed by the Labelling Initiatives (LIs). With appropriate permission, it can also be used on wholesale packaging as well as for promotional use (e.g. posters, leaflets, web pages, etc.).	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Not addressed	
Land rights (Indigenous peoples, local communities, …)	Not addressed	
Freedom of association, collective bargaining	FLO follows ILO Conventions 87 and 98 on freedom of association and collective bargaining. Workers and employers shall have the right to establish and to join organisations of their own choosing, and to draw up their constitutions and rules, to elect their representatives and to formulate their programmes.	
Labour conditions, basic treatment	All workers are employed under legally binding labour contracts. The organisation works towards all permanent workers having the benefits of a provident fund or pension scheme. An adequate sick leave regulation is put in place. A working hours and overtime regulation is put in place. Salaries are gradually increased to levels above the regional average and official minimum.	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Local and migrant, seasonal and permanent workers receive equivalent benefits and employment conditions for equal work performed. Differences in the conditions of employment for casual, seasonal and permanent workers are progressively diminished.	
Child labour; forced labour	FLO follows ILO Conventions 29, 105, 138 and 182 on child labour and forced labour. Forced or bonded labour must not occur. Children may only work if their education is not jeopardised. If children work, they must not execute tasks, which are especially hazardous for them due to their age.	
Wages and compensation	FLO follows ILO Plantation Convention 110, ILO Conventions 100 on equal remuneration and 111 on discrimination. All employees must work under fair conditions of employment. The producer organisation must pay wages in line with or exceeding national laws and agreements on minimum wages or the regional average.	

Health and safety	FLO follows ILO Convention 155 which aims "to prevent accidents and injury to health arising out of, linked with or occurring in the course of work, by minimising, so far as is reasonably practicable, the causes of hazards inherent in the working environment."	
Discrimination (sex, age, handicap, religion, nationality)	FLO follows ILO Convention 111 on ending discrimination of workers. The Convention rejects "any distinction, exclusion or preference made on the basis of race, colour, sex, religion, political opinion, national extraction or social origin, which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation" (art. 1). As far as applicable, FLO extends these principles to members of organisations.	
Training – capacity building, development of skills	The participation of members in the organisation's administration and internal control is promoted through training and education - and improves as a result. The representation and participation of the workers is improved through training activities. These are also aimed at improving the workers' awareness of the principles of Fairtrade.	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Not addressed	
Struggle against poverty (Equitable distribution of returns)	Fairtrade revenues will promote social and economical development of small farmers. Of every Fairtrade-certified product sold by the organisation, more than 50% of the volume must be produced by small producers. The organisation must be an instrument for the social and economical development of the members, and in particular the benefits of Fairtrade must come to the members. The organisation must therefore have a democratic structure and transparent administration, which enables an effective control by the members and its Board over the management, including the decisions about how the benefits are shared. Furthermore, there must be no discrimination regarding membership and participation. To the best of its ability, the organization supports the environmental and infrastructure projects of the local and regional authorities or other non-governmental organizations and programmes to improve the living conditions of its members (e.g. housing, drinking water supply, roads, reforestation, sewage treatment, garbage and waste collection, transportation, community infrastructure etc.). The FLO system functions through a social premium that the importer pays on top of the market price or a fair trade minimum price, whichever is highest at the time. This social premium is to be used for activities that promote social and socio-economic justice as well as ecological protection.	
Fair trade conditions	Trader Standards stipulate that traders that buy directly from the Fairtrade producer organizations must: Pay a price to producers that at least covers the costs of sustainable production: the Fairtrade Minimum Price; Pay a premium that producers can invest in development: the Fairtrade Premium; Partially pay in advance, when producers ask for it; Sign contracts that allow for long-term planning and sustainable production practices	
Complain mechanism	Not addressed	
Others		
Environmental land-use issues		
Conservation of Biodiversity	New planting in virgin forest areas is prohibited. Producers are expected to prevent the use of fire in ways that adversely affect natural systems.	
Protection species/ecosystems	Identification of conservation areas, buffer zones around water bodies and watershed recharge areas appropriate to the region, which will not be cultivated and to which agrochemicals will not be applied. Harvesting must be done in a manner that assures the sustainability/survivability of the species. The organization ensures that its members do not gather from protected areas or which has been propagated in contravention of national and international regulations.	
Soil – erosion	Procedures and practices designed to reduce and/or prevent soil erosion caused by wind, water, and/or human or animal impact should be undertaken.	
Water ressources – depletion/loss	The organization ensures that its members use irrigation methods and systems minimize water consumption as much as is feasible for the operation in question and avoid the lowering of the groundwater level or any other negative effect on the availability of drinking and irrigation water for the surrounding communities and farmers.	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Producers are expected to continually reduce the volumes and types of agrochemicals used in production to the maximum possible extent. FLO Prohibited Materials List addressed. Correct using, handling, recording and storage of agrochemicals should be implemented by trained persons.	
GMOs (genetically modified organisms)	Producers do not use GMOs or GMO derived products in either the production or processing of products. Monitoring of possible GMO usage by neighbours and where necessary take additional precautions.	
National land use regulations	Not addressed	
High nature values addressed	Not addressed	

Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	The consumption of energy (electricity, heating oil, natural gas, etc.) is kept to a minimum. Wherever possible, renewable energy should be used.	
Removed ressources balance addressed (nutrients, organic matter)	Not addressed	
Water ressources – contamination	Not addressed	
Soil – contamination	Not addressed	
safeguard subject climate addressed	The consumption of energy (electricity, heating oil, natural gas, etc.) is kept to a minimum. Wherever possible, renewable energy should be used.	
GHG balance: (only CO2 emission / more complex approach)	The consumption of energy (electricity, heating oil, natural gas, etc.) is kept to a minimum. Wherever possible, renewable energy should be used.	
Air pollution (NOx, SO2, POP, others...)	The organization ensures that its members do not burn waste if there is an environmentally less damaging alternative.	
Waste management	Producers are expected to reduce, reuse, recycle and compost waste in a manner that is appropriate to the materials in question.	
Others		

FLP

FRAMEWORK

Basics		
Name	Flower Label Program (FLP)	
Responsible body	FLP e.V., Siegfriedstr. 1-3, 50678 Cologne, Germany	
Website	www.fairflowers.de	
Foundation (year and participants)	FLP was founded 1998 by the Association of German Importersand Wholesalers BGI, several NGOs (Bread for the World, FIAN, terre des hommes) and a German Trade Union (IG BAU). By initiating the programme trade reacted on broad public campaign of NGOs and Trade Unions accusing horticultural sector of bad social and envirionmental conditions in flower production.	
Scope of the system (product-wise)	Cut flowers, plants and foliage	
Scope of the system (geographically)	International	
Type of system (certification system, law, …)	Certification and Labelling System	
Objectives (vision, mission, goals)	The objective of the Flower Label Program is to improve labor, social, health and safety standards for farm workers; improve the use of chemicals and pesticides used on the flowers; and to follow stringent standards to protect the environment. Additionally it aims at raising consumer awareness about the higher value of environmentally and socially sustainable flower production	
Governance		
Governance structure	FLP has four chambers: 1) Chamber of Human Rights Organisations, 2) Chamber of Trade Unions, 3.) Chamber of Trade, 4) Chamber of Producers; each chamber sends one representative in the FLP board that meets at least 4 times a year	
Basis for participation (e.g. voluntary)	One juristical persons can become full member, in chamber 1 to 3 membership is voluntary, in chamber 4 production in accordance with FLP standard is pre-condition	
Representation / members	Voting per chamber; only the certification decision is done by a certifcation committee by representatives of those organisation that habve no economic interest (only chamber 1 and 2) as well by other invited experts	
Standard setting		
Standard setting bodies	Proposal by certification committee (only chamber 1 and 2), decision by FLP Board	

Standard setting process	Based on latest ICC Upgrade (done by International Flower Campaign; international Trade Unions and NGOs)	
Stakeholder participation	Through communication within the association	
Approval	through certification comittee	

MONITORING

Verification		
Reviewer	Independant audit organisation (Agrar Control or National Organisations like for example BCS Ecuador or Centro de Estudios y Assesoria de Salud)	
Evaluation Process	The audit is no checklist visit but a whole day visit by an auditing team with at least two auditors (both sexes); they audit though random interviews, document check and meetings with workers comittee and management	
Local stakeholder involvement	Network with local NGOs or Trade Unions (Ecuador: Juventud Obrero Christiano; Kenya: KPAWU)	
Publication of results	In direct communication to the producers; audit report has to given in copy also to workers comittee; on webpage all approved conmpanies are published	
Monitoring	Annual follow-up inspections by ACG; annual inspections and unannounced spot checks by human rights groups and trade unions	
Renewal	each year (regulary), additional random spot checks (unannounced)	
Qualification of verification bodies		
Accreditation bodies	Auditing organisation for first audit have to have ISO Guide 65	
Accreditation process		
Monitoring		
Renewal		
Claims and Product Tracking		
Claim	Socially and environmentally sustainable flower production	
Material tracking		
Validity of claims		
Labelling	In every unit of FLP-certified flowers at least one stem has to be marked by a seal with the FLP-Logo, the membership number of the farm and the name of the farm. Labels are also usually placed on boxes; retailers may place the label in their store	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Workers, trade unions and NGOs have the right to join the inspections	
Land rights (Indigenous peoples, local communities, …)	Not addressed	
Freedom of association, collective bargaining	The rights of all workers to form and join trade unions and to bargain collectively shall be recognised (ILO Conventions 87 and 98). Workers representatives shall not be subject of discrimination and shall have access to all workplaces necessary to enable them to carry out their representation functions. (ILO Convention 135)	
Labour conditions, basic treatment	Hours of work shall comply with applicable law and industry standards. Maximal working days and hours are addressed, overtime should be voluntary.	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Work, which is by its nature not seasonal or temporary, shall be done by workers on permanent contracts. Provisions for non-permanent and seasonal workers, including freedom of association, should be not less favourable than for permanent workers.	
Child labour; forced labour	There shall be no use of child labour comply with ILO Convention 138 and no fourced labour comply with ILO Conventions 29 and 105	
Wages and compensation	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 workers and their families and to provide some discretionary income. Pay should be in cash, direct to the workers, promptly and in full. Information to wages shall be available to workers in an understandable and detailed form.	
Health and safety	A safe and hygienic working environment shall be provided. Free and appropriate protective clothing and equipment, trained and allowed to investigate safety issues and the work with dangerous chemicals, supply drinking water, provide clean toilets and offer showers and washing facilities (ILO Convention 170 , 110).	

Discrimination (sex, age, handicap, religion, nationality)	Workers shall have access to jobs and training on equal terms, irrespective of gender, age, ethnic origin, colour, marital status, sexual orientation, political opinion, religion or social origin (ILO Conventions 100 and 111). Physical harassment or psychological oppression, particularly of women workers, must not be tolerated.	
Training – capacity building, development of skills	Workers shall have access to jobs and training	
Change of way of life, economy and culture, (important stakeholders indigenous people)	The company should make efforts to protect the environment and the residential areas inside and surrounding the farm together with their inhabitants from harmful effects and nuisance.	
Struggle against poverty (Equitable distribution of returns)	Within its capacity the company shall support the environmental and infrastructure projects of the local and regional authorities, which improves the situation of the workers (e.g.drinking water supply, roads, (re)forestation, sewage treatment, transportation, community infrastructure etc.).	
Fair trade conditions	Not addressed	
Complain mechanism	Complaints regarding labour and working conditions should be forwarded, free of charge, to the Workers' Representatives or to an external independent body accepted by all parties involved	
Others		
Environmental land-use issues		
Conservation of Biodiversity	Special attention must be given to the protection of the fauna and flora inside the farm and the surrounding areas.The company should make efforts to protect the environment and the residential areas inside and surrounding the farm together with their inhabitants from harmful effects and nuisance	
Protection species/ecosystems	Special attention to the protection of the fauna and flora inside the farm and the surrounding areas. Wildlife Toxicity (Annex IV) has to be taken into account, especially when spraying pesticides in the open field. To protect the surroundings and to encourage wildlife, trees and bushes should be planted especially at the farm 's boundaries.	
Soil – erosion	A programme has to be elaborated by the company for conserving the environment and the sustainable use of natural resources (water, soil, air).	
Water ressources – depletion/loss	An environmental water management system, which minimizes water consumption and conserves ground and surface water should be implemented. The consumption of water and energy has to be recorded and documented. Rainwater should be collected in water reservoirs of adequate capacity. The lowering of the ground water level or any other negative effect on the availability and quality of drinking and irrigation water for the surrounding communities and farmers must be avoided. A safety distance of not less than 100 meters from the residential areas and houses to the greenhouses or pesticide/chemical application areas must be maintained.	
Chemicals – nutrients/pesticides (how adressed, what is affected)	Pollution of soil, water and air with pesticides, fertilizers, chemicals and waste must be avoided wherever possible. The re-use and storage of chemicals is addressed.	
GMOs (genetically modified organisms)	Not addressed	
National land use regulations	Not addressed	
High nature values adressed	Not addressed	
Others		
Life-cycle aspects		
Social-issues in life-cycle adressed	Not addressed	
Energy balance (whole the production chain)	The consumption of energy (electricity, heating oil, natural gas) must be kept at a minimum. Wherever possible renewable energy and energy recycling should be used.	
Removed ressources balance addressed (nutrients, organic matter)	Organic waste, particularly flower waste material, should be composted in an appropriate manner and reused on the farm. It is strictly forbidden to feed animals with pesticide contaminated material (flower foliage, ferns, etc.)	

Water ressources – contamination	Pollution of water with pesticides, fertilizers, chemicals and waste must be avoided wherever possible. A programme has to be elaborated by the company for conserving the environment and the sustainable use of natural resources (water, soil, air). Special and effective measures have to be taken to protect drinking water sources, springs, ground water, surface water, rivers, dikes and lakes have to be taken. All wastewater, especially those contaminated with pesticides and/or chemicals have to be specially treated before safe disposal in accordance with the law.	
Soil – contamination	Pollution of soil, water and air with pesticides, fertilizers, chemicals and waste must be avoided wherever possible. A programme has to be elaborated by the company for conserving the environment and the sustainable use of natural resources (water, soil, air).	
Safeguard subject climate adressed	The consumption of energy (electricity, heating oil, natural gas) must be kept at a minimum. Wherever possible renewable energy and energy recycling should be used.	
GHG balance: (only CO2 emission / more complex approach)	Not addressed	
Air pollution (NOx, SO2, POP, others...)	Air pollution and unpleasant smells due to pesticide or chemical application or incineration in the open air near housings must be strictly avoided. A programme has to be elaborated by the company for conserving the environment and the sustainable use of natural resources (water, soil, air).	
Waste management	Waste and pollution reduction must be given high priority. A proper waste management system for the separation and disposal must be established in the company. Waste deposit must conform to the requirements of the law. Monitoring must be carried out by a properly instructed supervisor	
Others		

GSL

FRAMEWORK

Basics		
Name	Grüner Strom Label	
Responsible body	Grüner Strom Label e.V.	
Website	www.gruenerstromlabel.org	
Foundation (year and participants)	1999, BUND, Bund der Energieverbraucher, Deutscher Naturschutzring DNR, Die Verbraucher Initiative, EUROSOLAR, IPPNW, NABU and the Naturwissenschaftler-Initiative	
Scope of the system (product-wise)	Green electricity	
Scope of the system (geographically)	National (Germany)	
Type of system (certification system, law, …)	Certification system	
Objectives (vision, mission, goals)	Upgrading the power production from renewable energy in Germany	
Governance		
Governance structure	The board of directors consists of one chairman and two representatives. One of the representatives is chairman of the certification committee. The members are complimentary.	
Basis for participation (e.g. voluntary)	voluntary	
Representation / members	Members of the organization are associations which serve the purpose of environmental protection, advance of renewable energy and efficient and preservate use of energy.	
Standard setting		
Standard setting bodies	The certification committee	
Standard setting process	Every 4 months conference of the board of director. Presentation of revision proposals of the criteria. Information of the labeluser. The certification committee develop technical execute statements. This statements must be adopt by the general meeting of the members	

Stakeholder participation	Criteria and the process is publisized for stakeholders.	
Approval	The certification committee	

MONITORING

Verification		
Reviewer	The Zentrum für Sonnenenergie- und Wasserstoffforschung (ZSW)	
Evaluation Process	The ZSW evaluates the Grüner Strom provider in regard to the compliance with the criteria. The board of directors evaluate the results and award the label.	
Local stakeholder involvement	Broad stakeholder participation	
Publication of results	Process is publisized for stakeholders.	
Monitoring	Annual accounting	
Renewal	2 years	
Qualification of verification bodies		
Accreditation bodies	General meeting of the members	
Accreditation process	Application of the certifier. Determination of the general meeting of the members. Certification committee is the contact person for the certifier	
Monitoring	Not addressed	
Renewal	Every 2 years	
Claims and Product Tracking		
Claim	Guarantee that the additional charge is in use for upgrading the power production from renewable energy.	
Material tracking	Power directly from the producer to the consumer	
Validity of claims	Exclusion of nuclear energy, or companies with negativ attitude in regard to renewable energy.	
Labelling	2 labels. Gold, for 100% renewable energy power. Silver for minimum 50% renewable energy power, the rest of combined heat and power	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Not addressed	
Land rights (Indigenous peoples, local communities, …)	Not addressed	
Freedom of association, collective bargaining	Not addressed	
Labour conditions, basic treatment	Not addressed	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Not addressed	
Wages and compensation	Not addressed	
Health and safety	Not addressed	
Discrimination (sex, age, handicap, religion, nationality)	Not addressed	
Training – capacity building, development of skills	Not addressed	

Change of way of life, economy and culture, (important stake-holders indigenous people)	Not addressed	
Struggle against poverty (Equi-table distribution of returns)	Not addressed	
Fair trade conditions	Not addressed	
complain mechanism	Not addressed	
Others		
Environmental land-use issues		
Conservation of Biodiversity	Not addressed	
Protection species/ecosystems	Not addressed	
Soil – erosion	Not addressed	
Water resources – depleti-on/loss	Not addressed	
Chemicals – nutri-ents/pesticides (how ad-dressed, what is affected)	Not addressed	
GMOs (genetically modified organisms)	Not addressed	
National land use regulations	Not addressed	
High nature values addressed	Not addressed	
Others		
Life-cycle aspects		
Social-issues in life-cycle ad-dressed	Not addressed	
Energy balance (whole the production chain)	The provided power should exists exclusively from renewable energies or combined heat and power	
Removed ressources balance addressed (nutrients, organic matter)	Not addressed	
Water resources – contaminati-on	Not addressed	
Soil – contamination	Not addressed	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emis-sion / more complex approach)	The provided power should exists exclusively from renewable energies or combined heat and power	
Air pollution (NOx, SO2, POP, others...)	The provided power should exists exclusively from renewable energies or combined heat and power	
Waste management	Not addressed	
Others		

OK POWER

FRAMEWORK

Basics		
Name	EnergieVision e.V.	
Responsible body	EnergieVision e.V.	
Website	www.ok-power.de	
Foundation (year and partici-pants)	2000, Öko-Institut, Verbraucher-Zentrale Nordrhein-Westfalen, World Wide Fund For Nature (WWF) Deutschland	
Scope of the system (product-wise)	Green electricity	
Scope of the system (geo-graphically)	National (Germany)	

Type of system (certification system, law, …)	Certification system	
Objectives (vision, mission, goals)	To advance sustainability, transparency and consumer- and environmental protection in the liberalized power market.	
Governance		
Governance structure	Delegation of one representative each of the founder members to the EnergieVision e.V board of directors. The assignment of the EnergieVision e.V. is perceived by the Öko-Institut.	
Basis for participation (e.g. voluntary)	voluntary	
Representation / members	Science, policy, energy industrie and consumerism	
Standard setting		
Standard setting bodies	Board of directors	
Standard setting process	Draft version of the standard, workshops, pilot certification. Annual recommendation with consultation of power providers.	
Stakeholder participation	Broad stakeholder participation	
Approval	Board of directors	

MONITORING

Verification		
Reviewer	All competent and provider-independent certifiers	
Evaluation Process	First check regarding to applicability with the criteria of the EnergieVision e.V.. Bilateral agreement of ecopower provider and EnergieVision e.V.. Evaluation of the provider regard to the criteria by an independent auditor or certification body. EnergieVision e.V. inspect the outcomes of the evaluation. Review at the end of the year.	
Local stakeholder involvement	Broad stakeholder participation	
Publication of results	Documentation of the verification are transparent as far as possible.	
Monitoring	Not addressed	
Renewal	annually	
Qualification of verification bodies		
Accreditation bodies	No accreditation. Proof of professional competence and independence is required	
Accreditation process	Not formally	
Monitoring	Not formally	
Renewal	Not formally	
Claims and Product Tracking		
Claim	Upgrading the power generation from renewable energy sources and efficient combined heat and power.	
Material tracking	Directly from the provider to the consumer	
Validity of claims	The label can only be used from the provider to sell exclusively the Ok-power to the consumer.	
Labelling	Ok-power Label	

CRITERIA

Land-use competition		
Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Not addressed	
Land rights (Indigenous peoples, local communities, …)	Not addressed	
Freedom of association, collective bargaining	Not addressed	
Labour conditions, basic treatment	Not addressed	

Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Not addressed	
Wages and compensation	Not addressed	
Health and safety	Not addressed	
Discrimination (sex, age, handicap, religion, nationality)	Not addressed	
Training – capacity building, development of skills	Not addressed	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Not addressed	
Struggle against poverty (Equitable distribution of returns)	Not addressed	
Fair trade conditions	Not addressed	
Complain mechanism	Not addressed	
Others		
Environmental land-use issues		
Conservation of Biodiversity	Not addressed	
Protection species/ecosystems	Not addressed	
Soil – erosion	Not addressed	
Water resources – depletion/loss	Not addressed	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Not addressed	
GMOs (genetically modified organisms)	Not addressed	
National land use regulations	Not addressed	
High nature values addressed	Not addressed	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	The power consists of 100% renewable energy sources.	
Removed ressources balance addressed (nutrients, organic matter)	Not addressed	
Water resources – contamination	Not addressed	
Soil – contamination	Not addressed	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emission / more complex approach)	The power consists of 100% renewable energy sources.	
Air pollution (NOx, SO2, POP, others...)	The power consists of 100% renewable energy sources. SO2 and NOx standard values for combined heat and power.	
Waste management	Not addressed	
Others		

GREEN-E

FRAMEWORK

Basics		
Name	Greenpeace Energy	
Responsible body	Greenpeace e.V.	
Website	www.greenpeace-energy.de	
Foundation (year and participants)	1999 Greenpeace e.V.	
Scope of the system (product-wise)	Green electricity	
Scope of the system (geographi-cally)	National (Germany)	
Type of system (certification sys-tem, law, …)	Local service concept, without certification	
Objectives (vision, mission, goals)	A future without nuclear- and coal-fired power plant	
Governance		
Governance structure	Greenpeace Energy is an registered association. A private company belong to the members of the association which merge to a joint business establishment. The board of directors, the general assembly and the governing body are elements of the asso-ciation. Capital of the association is insert by the members.	
Basis for participation (e.g. volun-tary)	voluntary	
Representation / members	Every member can, independent of the capital brought in, only cast one ballot on the general meeting.	
Standard setting		
Standard setting bodies	Greenpeace e.V.	
Standard setting process	2 years definition of the criteria and 4 years on-road tests. Final check regarding to ecological regard and the development at the power market.	
Stakeholder participation	Not addressed	
Approval	Not addressed	

MONITORING

Verification		
Reviewer	Greenpeace Energy eG	
Evaluation Process	No certification, Greenpeace Energy provides power from Greenpeace-accepted sources.	
Local stakeholder involvement	Not addressed	
Publication of results	Not addressed	
Monitoring	Not addressed	
Renewal	Not addressed	
Qualification of verification bodies		
Accreditation bodies	Independent evaluators, like Stiftung Warentest or TÜV Nord approve Greenpeace Energy eG	
Accreditation process	Implementation-inspection of the accomodation of the customers by Greenpeace Energy eG and compliance with the criteria in regard to mixing.	
Monitoring	Annual	
Renewal	Annual	
Claims and Product Tracking		
Claim	Accomodation with power of Green Energy eG is clean and safe.	
Material tracking	Greenpeace Energy eG provides power from production, trade and accomodation.	
Validity of claims	Advertising with their reputation	
Labelling	No label in place	

CRITERIA

Land-use competition

Land-use competition (energy vs. competing land uses)	Not addressed	
Socio-economic issues		
Social aspects by stakeholder consultation	Not addressed	
Land rights (Indigenous peoples, local communities, …)	Not addressed	
Freedom of association, collective bargaining	Not addressed	
Labour conditions, basic treatment	Not addressed	
Not permanent employed (Seasonal Workers, contract and non-documented workers)	Not addressed	
Child labour; forced labour	Not addressed	
Wages and compensation	Not addressed	
Health and safety	Not addressed	
Discrimination (sex, age, handicap, religion, nationality)	Not addressed	
Training – capacity building, development of skills	Not addressed	
Change of way of life, economy and culture, (important stakeholders indigenous people)	Not addressed	
Struggle against poverty (Equitable distribution of returns)	Not addressed	
Fair trade conditions	Not addressed	
Complain mechanism	Not addressed	
Others		
Environmental land-use issues		
Conservation of Biodiversity	Not addressed	
Protection species/ecosystems	Not addressed	
Soil – erosion	Not addressed	
Water resources – depletion/loss	Not addressed	
Chemicals – nutrients/pesticides (how addressed, what is affected)	Not addressed	
GMOs (genetically modified organisms)	Not addressed	
National land use regulations	Not addressed	
High nature values addressed	Not addressed	
Others		
Life-cycle aspects		
Social-issues in life-cycle addressed	Not addressed	
Energy balance (whole the production chain)	The provided power exists exclusively from renewable energies.	
Removed ressources balance addressed (nutrients, organic matter)	Not addressed	
Water resources – contamination	Not addressed	
Soil – contamination	Not addressed	
Safeguard subject climate addressed	Not addressed	
GHG balance: (only CO2 emission / more complex approach)	The provided power show a maximal carbon dioxide emission of 230 gram/kilowatt hour.	
Air pollution (NOx, SO2, POP, others...)	Not addressed	
Waste management	Not addressed	
Others		

ANNEX C: Analysis of socio-economic issues

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
Social aspects by stakeholder consultation/ Change of way of life, economy and culture, (e.g. important stakeholder groups, indigenous people)	Basel Criteria for Responsible Soy production (similar in FSC principles 4: community relations and workers' rights)	4.1.1 An assessment of social impacts should be carried out and the result taken into account in management planning and operational procedures. (Does not apply to individual smallholders). General Guidance: Assessment of social impacts may be carried out by independent experts or internally by the grower as appropriate to the situation. It should be sufficient to ensure that all actual and potentials impacts (both positive and negative) are identified. This should include adequate consideration of the impacts on the customary or traditional rights of local communities and indigenous people, where these exist. Management planning should incorporate the findings of the social impact assessment and these plans should be implemented in operational procedures. As social impacts are particularly dependent on local social conditions, it is very important that the national interpretation should provide identify what issues should be considered as well as appropriate methodologies for col-	Language-related and cultural differences make it difficult to communicate at the same level. In order to adequately identify and solve problems it is essential do develop an understanding of the local context. Affected local communities usually consist of different interest groups, which should be equally addressed. However, it can be difficult to find adequate representatives for communication and consultation (e.g. regarding woman, children, poor).	Assessment of social impacts by independent experts about actual and potential impacts must be carries out. The assessments must include adequate consideration of customary or traditional right of local communities and indigenous people. The findings must be incorporated in management planning and operations. The companies must create an effective communication and consultation mechanisms with local communities and other interested parties. There must be a document communication strategies

[25] * Fundamental right in 1998 ILO Declaration on Fundamental Principles and Rights at Work, member states are obliged to promoting it
° Convention for ratification

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		lecting data and using the results. 4.1.2 There should be an effective method for communication and consultation with local communities and other affected or interested parties. (Does not apply to individual smallholders). General Guidance: There should be a documented consultation and communication strategy, a nominated manager responsible, a list of stakeholders, records of all communications and records of actions taken in response to input from stakeholders. Communication and consultation mechanisms should be designed or agreed with local communities and other affected or interested parties. Local interpretation should consider issues such as appropriate level of consultation and the types of organisations or individuals that should be included.		and processes.
Social aspects by stakeholder consultation/ Change of way of life, economy and culture	FSC principles 4: community relations and workers`rights	4.5 Appropriate mechanisms shall be employed for resolving grievances and for providing fair compensation in case of loss or damage affecting the legal or customary rights, property, resources of livelihoods of local peoples. Measures shall be taken to avoid such loss or damage.		The companies ??? must establish appropriate mechanisms for fair compensation whenever legal or customary rights, property or resources of livelihoods of local peoples are affected.
Social aspects by stakeholder consultation/ Change	C169° – Indigenous and Tribal Peoples, 1989	1. In applying the provisions of this Convention, governments shall: (a) consult the peoples concerned, through appropriate procedures and in particular through their representative		Establish means for local communities to participate in decision-making for policies and programs which

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
of way of life, economy and culture		institutions, whenever consideration is being given to legislative or administrative measures which may affect them directly; (b) establish means by which these peoples can freely participate, to at least the same extent as other sectors of the population, at all levels of decision-making in elective institutions and administrative and other bodies responsible for policies and programmes which concern them; (c) establish means for the full development of these peoples' own institutions and initiatives, and in appropriate cases provide the resources necessary for this purpose. 2. The consultations carried out in application of this Convention shall be undertaken, in good faith and in a form appropriate to the circumstances, with the objective of achieving agreement or consent to the proposed measures. 7.1. The peoples concerned shall have the right to decide their own priorities for the process of development as it affects their lives, beliefs, institutions and spiritual well-being and the lands they occupy or otherwise use, and to exercise control, to the extent possible, over their own economic, social and cultural development. In addition, they shall participate in the formulation, implementation and evaluation of plans and programmes for national and regional development which may affect them directly. 7.3. Governments shall ensure that, whenever appropriate, studies are carried out, in co-operation with the peoples concerned, to assess the social, spiritual, cultural and environmental impact on them of planned development		concern them (→prior informed consent).

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		activities. The results of these studies shall be considered as fundamental criteria for the implementation of these activities. 30.1. Governments shall adopt measures appropriate to the traditions and cultures of the peoples concerned, to make known to them their rights and duties, especially in regard to labour, economic opportunities, education and health matters, social welfare and their rights deriving from this Convention.		
Struggle against poverty (Equitable distribution of returns)	C169° – Indigenous and Tribal Peoples, 1989	7.2. The improvement of the conditions of life and work and levels of health and education of the peoples concerned, with their participation and co-operation, shall be a matter of priority in plans for the overall economic development of areas they inhabit. Special projects for development of the areas in question shall also be so designed as to promote such improvement.		Improve living and working conditions for local population.
Struggle against poverty	FSC principle 4: Community relations and workers rights	Forest management operations shall maintain or enhance the long-term social and economic well-being of forest workers and local communities.		Maintain or enhance the long-term social and economic well-being of forest workers and local communities.
Struggle against poverty	Basel Criteria for Responsible Soy production	4.3.4 Growers should invest in local development by: • Maximising local employment, • Using local goods and services wherever possible, • Paying for goods and services promptly, • Supporting, as far as is practical, any project that improves local infrastructure or facilities. This criterion does not apply to individual smallholders.		Maximising local employment. Using local goods and services wherever possible. Paying for goods and services promptly. Supporting, as far as is practical, any project that

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		Local interpretations should identify any other specific activities, as well as any minimum thresholds which would be appropriate.		improves local infrastructure or facilities.
Land rights (Indigenous peoples, local communities, …)	C169° – Indigenous and Tribal Peoples, 1989 (similar in FSC Principle 3: Indigenous peoples` rights)	13.1. In applying the provisions of this Part of the Convention governments shall respect the special importance for the cultures and spiritual values of the peoples concerned of their relationship with the lands or territories, or both as applicable, which they occupy or otherwise use, and in particular the collective aspects of this relationship. 14.1. The rights of ownership and possession of the peoples concerned over the lands which they traditionally occupy shall be recognised. In addition, measures shall be taken in appropriate cases to safeguard the right of the peoples concerned to use lands not exclusively occupied by them, but to which they have traditionally had access for their subsistence and traditional activities. Particular attention shall be paid to the situation of nomadic peoples and shifting cultivators in this respect. 15.1. The rights of the peoples concerned to the natural resources pertaining to their lands shall be specially safeguarded. These rights include the right of these peoples to participate in the use, management and conservation of these resources. 16.1. Subject to the following paragraphs of this Article, the peoples concerned shall not be removed from the lands which they occupy. 16.2. Where the relocation of these peoples is considered necessary as an exceptional measure, such relocation shall take place only with their free and informed consent.	→ILO texts do not provide general guidance on tenure arrangements, only refer to rights of indigenous and tribal peoples →local communities that are not indigenous or tribal face the same situation and therefore should be included When is relocation necessary? who decides?	Recognize rights of ownership and possession. Respect cultural and spiritual relationship with lands and territories. Safeguard the right of the peoples to use lands not exclusively owned by them, but traditionally accessed. Relocation only in necessary cases with prior informed consent and full compensation.

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		Where their consent cannot be obtained, such relocation shall take place only following appropriate procedures established by national laws and regulations, including public inquiries where appropriate, which provide the opportunity for effective representation of the peoples concerned. 16.5. Persons thus relocated shall be fully compensated for any resulting loss or injury.		
Land rights	Basel Criteria for Responsible Soy production (similar in FSC: Principle 2: Tenure and Land rights responsibilities)	4.4.1 The right to use the land can be demonstrated and does not diminish the legal or customary rights of other users. General Guidance: The right of the grower to the land must be clear. This should be demonstrated through proof of ownership or use right. Where there are disputes, additional information to provide proof of legal acquisition of title and fair compensation of previous owners and occupants may also be needed. Where there are other potential rights, the grower must demonstrate that theses rights are understood and not being threatened or reduced. For local interpretations any customary land use rights or disputes which are likely to be relevant should be identified. Long term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.		Documentation of land rights, legal acquisition, fair compensation and conflict resolution mechanisms.
Freedom of association, collective bar-	C87* – Freedom of Association and	2. Workers and employers, without distinction whatsoever, shall have the right to establish and, subject only to the rules of the organisation concerned, to join organisations	→Freedom of Association and Collective Bargaining have highest priority if minimum standards are to be	Workers and employers must have the right to establish and, to join organisa-

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
gaining	Protection of the Right to Organize, 1948	of their own choosing without previous authorisation. 3.1. Workers' and employers' organisations shall have the right to draw up their constitutions and rules, to elect their representatives in full freedom, to organise their administration and activities and to formulate their programmes.	further defined by plant-level workers' representatives → **e.g.: Various reasons for non-existence of unions in Ecuadorian Flower sector, instead: promote alternative forms to unions, high mobilization capacity of indigenous organizations, criterion: 'Are steps taken toward workers' representation?' (and not: 'Have unions been formed?')** →Criterion of free speech can not be monitored in yearly inspection with few workers, instead: regular meetings documented in writing and interviews, check attendance protocols to discover repression, elect workers' delegates for issues such as health, safety and personal issues, check election procedures (Frank on FLP in Scherrer/Greven 2001: 119)	tions of their own choosing.
Freedom of association, collective bargaining	C98* – Right to Organize and Collective Bargaining, 1949	1.1. Workers shall enjoy adequate protection against acts of anti-union discrimination in respect of their employment. 4. Measures appropriate to national conditions shall be taken, where necessary, to encourage and promote the full development and utilisation of machinery for voluntary negotiation between employers or employers' organisations and workers' organisations, with a view to the regulation of terms and conditions of employment by means of	In some countries are no workers organisations or it is not common to join them. Even in Germany more and more companies are leaving the employer association. The whole system of collective bargaining is week. In the agriculture sector it doesn` t exist "on the field" in Germany. There bargaining is individuell.	

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		collective agreements.		
Freedom of association, collective bargaining	C141° – Rural Workers' Organizations, 1975	2.1. For the purposes of this Convention, the term *rural workers* means any person engaged in agriculture, handicrafts or a related occupation in a rural area, whether as a wage earner or, subject to the provisions of paragraph 2 of this Article, as a self-employed person such as a tenant, sharecropper or small owner-occupier. 2.2. This Convention applies only to those tenants, sharecroppers or small owner-occupiers who derive their main income from agriculture, who work the land themselves, with the help only of their family or with the help of occasional outside labour and who do not-- (a) permanently employ workers; or (b) employ a substantial number of seasonal workers; or (c) have any land cultivated by sharecroppers or tenants. 3.1. All categories of rural workers, whether they are wage earners or self-employed, shall have the right to establish and, subject only to the rules of the organisation concerned, to join organisations, of their own choosing without previous authorisation. 3.2. The principles of freedom of association shall be fully respected; rural workers' organisations shall be independent and voluntary in character and shall remain free from all interference, coercion or repression. 4. It shall be an objective of national policy concerning rural development to facilitate the establishment and growth, on a voluntary basis, of strong and independent organisations of rural workers as an effective means of ensuring the participation of rural workers, without dis-	In some countries are no workers organisations or it is not common to join them. Even in Germany more and more companies are leaving the employer association. The whole system of collective bargaining is week. In the agriculture sector it doesn` t exist "on the field" in Germany. There bargaining is individuell.	The principles of freedom of association shall be fully respected; rural workers' organisations shall be independent and voluntary in character and shall remain free from all interference, coercion or repression.

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		crimination as defined in the Discrimination (Employment and Occupation) Convention, 1958, in economic and social development and in the benefits resulting therefrom.		
Labour conditions, basic treatment	C1° – Hours of Work (Industry) Convention, 1919	The Hours of Work Convention requires - subject to a wide range of exceptions – that working hours shall be limited to eight hours a day and forty-eight hours a week. 2. The working hours of persons employed in any public or private industrial undertaking or in any branch thereof, other than an undertaking in which only members of the same family are employed, shall not exceed eight in the day and forty-eight in the week, with the exceptions hereinafter provided for: (a) the provisions of this Convention shall not apply to persons holding positions of supervision or management, nor to persons employed in a confidential capacity; (b) where by law, custom, or agreement between employers' and workers' organisations, or, where no such organisations exist, between employers' and workers' representatives, the hours of work on one or more days of the week are less than eight, the limit of eight hours may be exceeded on the remaining days of the week by the sanction of the competent public authority, or by agreement between such organisations or representatives; provided, however, that in no case under the provisions of this paragraph shall the daily limit of eight hours be exceeded by more than one hour; (c) where persons are employed in shifts it shall be permissible to employ persons in excess of eight hours in any one day and forty-eight hours in any one week, if the av-	Ethicode, SASA Experience	In principle the working hours shall be limited to eight hours a day and forty-eight hours a week

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		erage number of hours over a period of three weeks or less does not exceed eight per day and forty-eight per week.		
Labour conditions, basic treatment	C30° – Hours of Work (Commerce and Offices) Convention, 1930	The Weekly Rest Conventions – again subject to exceptions – provide that workers should be entitled to one full day's rest every week.		
Labour conditions, basic treatment	C106° – Weekly Rest (Commerce and Offices) Convention, 1957			
Labour conditions, basic treatment	C14° – Weekly Rest (Industry) Convention, 1921			
Labour conditions, basic treatment	C158° – Termination of Employment Convention, 1982	The employment of a worker shall not be terminated unless there is a valid reason for such termination connected with the capacity or conduct of the worker or based on the operational requirements of the undertaking, establishment or service.	On the field mostly seasonal workers will be employed with less stronger protection from dismissal.	
Labour conditions, basic treatment	C181° – Private Employment Agencies	Recalling the need to protect workers against abuses, and Recognizing the need to guarantee the right to freedom of association and to promote collective bargaining and so-		

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
	Convention, 1997	cial dialogue as necessary components of a well-functioning industrial relations system, and Recalling the provisions of fundamental rights		
Labour conditions, basic treatment	C184° – Safety and Health in Agriculture Convention, 2001	20. Hours of work, night work and rest periods for workers in agriculture shall be in accordance with national laws and regulations or collective agreements. 19. National laws and regulations or the competent authority shall prescribe, after consultation with the representative organizations of employers and workers concerned: (a) the provision of adequate welfare facilities at no cost to the worker; and (b) the minimum accommodation standards for workers who are required by the nature of the work to live temporarily or permanently in the undertaking.		
Labour conditions, basic treatment	C110° – Plantations Convention, 1958	1.1. For the purpose of this Convention, the term *plantation* includes any agricultural undertaking regularly employing hired workers which is situated in the tropical or subtropical regions and which is mainly concerned with the cultivation or production for commercial purposes of coffee, tea, sugarcane, rubber, bananas, cocoa, coconuts, groundnuts, cotton, tobacco, fibres (sisal, jute and hemp), citrus, palm oil, cinchona or pineapple; it does not include family or small-scale holdings producing for local consumption and not regularly employing hired workers.		
Labour conditions, basic treatment	SASA	3. It is the responsibility of the certification applicant to ensure that subcontractors comply with the same standards and labour regulation as the certification applicant. Sub-contracted workers working on the farm enjoy the		

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		same rights and working conditions as those employees hired directly by the company.		
Not permanent employed (Seasonal Workers, contract and non-documented workers)	C97° – Migration for Employment, 1949	6.1. Each Member for which this Convention is in force undertakes to apply, without discrimination in respect of nationality, race, religion or sex, to immigrants lawfully within its territory, treatment no less favourable than that which it applies to its own nationals in respect of the following matters: (a) in so far as such matters are regulated by law or regulations, or are subject to the control of administrative authorities-- (i) remuneration, including family allowances where these form part of remuneration, hours of work, overtime arrangements, holidays with pay, restrictions on home work, minimum age for employment, apprenticeship and training, women's work and the work of young persons; (ii) membership of trade unions and enjoyment of the benefits of collective bargaining; (iii) accommodation;		
Not permanent employed	C143° – Migrant Workers, 1975	10. Each Member for which the Convention is in force undertakes to declare and pursue a national policy designed to promote and to guarantee, by methods appropriate to national conditions and practice, equality of opportunity and treatment in respect of employment and occupation, of social security, of trade union and cultural rights and of individual and collective freedoms for persons who as migrant workers or as members of their families are lawfully within its territory.		Companies should promote and guarantee equality of opportunity and treatment in respect of employment and occupation, of social security, of trade union and cultural rights and of individual and collective freedoms for persons who as migrant workers or as members of their families are occupied.

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
Not permanent employed	C184° – Safety and Health in Agriculture Convention, 2001	17. Measures shall be taken to ensure that temporary and seasonal workers receive the same safety and health protection as that accorded to comparable permanent workers in agriculture.		Measures shall be taken to ensure that temporary and seasonal workers receive the same safety and health protection as that accorded to comparable permanent workers in agriculture
Not permanent employed	C175° – Part-time Work Convention, 1994	Measures shall be taken to ensure that part-time workers receive the same protection as that accorded to comparable full-time workers in respect of: (a) the right to organize, the right to bargain collectively and the right to act as workers' representatives; (b) occupational safety and health; (c) discrimination in employment and occupation. Measures appropriate to national law and practice shall be taken to ensure that part-time workers do not, solely because they work part time, receive a basic wage which, calculated proportionately on an hourly, performance-related, or piece-rate basis, is lower than the basic wage of comparable full-time workers, calculated according to the same method.		
Child labour	C138* – Minimum Age, 1973	2.1. Each Member which ratifies this Convention shall specify, in a declaration appended to its ratification, a minimum age for admission to employment or work within its territory and on means of transport registered in its territory; subject to Articles 4 to 8 of this Convention, no one under that age shall be admitted to employment or work in any occupation. 2.3. The minimum age specified in pursuance of para-	→Differentiation between child labor on farms, contracted child labor (not acceptable because of too little protection), young workers (age 14-17) Child labor on family farms only if it does not present a hazard to health and safety and does not jeopardize a child's educational, moral social and	The minimum age specified in pursuance of paragraph 1 of this Article shall not be less than the age of completion of compulsory schooling and, in any case, shall not be less than 15 years.

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		graph 1 of this Article shall not be less than the age of completion of compulsory schooling and, in any case, shall not be less than 15 years. 2.4. Notwithstanding the provisions of paragraph 3 of this Article, a Member whose economy and educational facilities are insufficiently developed may, after consultation with the organisations of employers and workers concerned, where such exist, initially specify a minimum age of 14 years. 3.1. The minimum age for admission to any type of employment or work which by its nature or the circumstances in which it is carried out is likely to jeopardise the health, safety or morals of young persons shall not be less than 18 years. 3.3. Notwithstanding the provisions of paragraph 1 of this Article, national laws or regulations or the competent authority may, after consultation with the organisations of employers and workers concerned, where such exist, authorise employment or work as from the age of 16 years on condition that the health, safety and morals of the young persons concerned are fully protected and that the young persons have received adequate specific instruction or vocational training in the relevant branch of activity.	physical development (SASA 4.) What about communally organized work? Prohibition of child labor may push children into dangerous informal employment sectors →important to offer alternatives, e.g. educational programmes financed by license fees (Scherrer/Greven 2001: 132-133)	
Child labour	C184° – Safety and Health in Agriculture Convention, 2001	16.1. The minimum age for assignment to work in agriculture which by its nature or the circumstances in which it is carried out is likely to harm the safety and health of young persons shall not be less than 18 years. 16.3. Notwithstanding paragraph 1, national laws or regu-		

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		lations or the competent authority may, after consultation with the representative organizations of employers and workers concerned, authorize the performance of work referred to in that paragraph as from 16 years of age on condition that appropriate prior training is given and the safety and health of the young workers are fully protected.		
Child labour	C182* – Worst Forms of Child Labour, 1999	1. Each Member which ratifies this Convention shall take immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour as a matter of urgency. 3. For the purposes of this Convention, the term *the worst forms of child labour* comprises: (a) all forms of slavery or practices similar to slavery, such as the sale and trafficking of children, debt bondage and serfdom and forced or compulsory labour, including forced or compulsory recruitment of children for use in armed conflict; (d) work which, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of children.		Companies must take immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour as a matter of urgency.
Forced labour	C29* – Forced Labour, 1930	1.1. Each Member of the International Labour Organisation which ratifies this Convention undertakes to suppress the use of forced or compulsory labour in all its forms within the shortest possible period. 2.1. For the purposes of this Convention the term forced or compulsory labour shall mean all work or service which is exacted from any person under the menace of any penalty and for which the said person has not offered himself voluntarily.		Companies must suppress the use of forced or compulsory labour in all its forms within the shortest possible period.

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		2.2. Nevertheless, for the purposes of this Convention, the term forced or compulsory labour shall not include-- (a) military service (b) normal civic obligations (c) consequence of a conviction in a court of law (d) work or service exacted in cases of emergency, (e) minor communal services		
Forced labour	C105* – Abolition of Forced Labour, 1957	1. Each Member of the International Labour Organisation which ratifies this Convention undertakes to suppress and not to make use of any form of forced or compulsory labour-- (a) as a means of political coercion or education or as a punishment for holding or expressing political views or views ideologically opposed to the established political, social or economic system; (b) as a method of mobilising and using labour for purposes of economic development; (c) as a means of labour discipline; (d) as a punishment for having participated in strikes; (e) as a means of racial, social, national or religious discrimination.		Companies do not make use of any form of forced or compulsory labour.
Wages and compensation	C131° – Minimum Wage Fixing, 1970	3. The elements to be taken into consideration in determining the level of minimum wages shall, so far as possible and appropriate in relation to national practice and conditions, include-- (a) the needs of workers and their families, taking into account the general level of wages in the country, the cost of living, social security benefits, and the relative living standards of other social groups;	Who determines the minimum wage and how? Formulas (too static) or bargaining between local actors (difficult to audit) Suggestion: based on local costs of living, number of dependent persons based on demographic data, local legislation, collective bargaining	The minimum wages are taking into account the general level of wages in the country, the cost of living, social security benefits, and the relative living standards of other social groups.

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		(b) economic factors, including the requirements of economic development, levels of productivity and the desirability of attaining and maintaining a high level of employment. 2.1. Minimum wages shall have the force of law and shall not be subject to abatement, and failure to apply them shall make the person or persons concerned liable to appropriate penal or other sanctions. 4.1. Each Member which ratifies this Convention shall create and/or maintain machinery adapted to national conditions and requirements whereby minimum wages for groups of wage earners covered in pursuance of Article 1 thereof can be fixed and adjusted from time to time.	agreements and positions of local NGOs and unions (Steele 2001 in Köpke/Röhr 2003: 128-129)	
Wages and compensation	C95° – Protection of Wages Convention, 1949	3.1. Wages payable in money shall be paid only in legal tender, and payment in the form of promissory notes, vouchers or coupons, or in any other form alleged to represent legal tender, shall be prohibited. 4.2. In cases in which partial payment of wages in the form of allowances in kind is authorised, appropriate measures shall be taken to ensure that-- (a) such allowances are appropriate for the personal use and benefit of the worker and his family; and (b) the value attributed to such allowances is fair and reasonable. 12.1. Wages shall be paid regularly. Except where other appropriate arrangements exist which ensure the payment of wages at regular intervals, the intervals for the payment of wages shall be prescribed by national laws or regulations or fixed by collective agreement or arbitration award.		

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
Health and safety	C155° – Occupational Health and Safety, 1981	16.1. Employers shall be required to ensure that, so far as is reasonably practicable, the workplaces, machinery, equipment and processes under their control are safe and without risk to health. 16.2. Employers shall be required to ensure that, so far as is reasonably practicable, the chemical, physical and biological substances and agents under their control are without risk to health when the appropriate measures of protection are taken. 16.3. Employers shall be required to provide, where necessary, adequate protective clothing and protective equipment to prevent, so far is reasonably practicable, risk of accidents or of adverse effects on health.	Experiences Ethicode, CCC	Employers shall be required to ensure that the workplaces, machinery, equipment and processes under their control are safe and without risk to health.
Health and safety	ILO Code of Practice on Safety and Health in Forestry	Covers contractors, self-employed and forest farmers. Employers should reduce hazards, comply with laws etc., establish safety and health committee, policy, management system, promote stability in workforce, apply training to contractors, ensure safe equipment, safe means of transport and adequate camps and shelters.		
Health and safety	C184° – Safety and Health in Agriculture Convention, 2001 and Recommendation 190	7. In order to comply with the national policy referred to in Article 4 of the Convention, national laws and regulations or the competent authority shall provide, taking into account the size of the undertaking and the nature of its activity, that the employer shall: (a) carry out appropriate risk assessments in relation to the safety and health of workers and, on the basis of these results, adopt preventive and protective measures to ensure that under all conditions of their intended use, all agricultural activities, workplaces, machinery, equip-		

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		ment, chemicals, tools and processes under the control of the employer are safe and comply with prescribed safety and health standards; (b) ensure that adequate and appropriate training and comprehensible instructions on safety and health and any necessary guidance or supervision are provided to workers in agriculture, including information on the hazards and risks associated with their work and the action to be taken for their protection, taking into account their level of education and differences in language; and (c) take immediate steps to stop any operation where there is an imminent and serious danger to safety and health and to evacuate workers as appropriate. 8.1. Workers in agriculture shall have the right: (a) to be informed and consulted on safety and health matters including risks from new technologies; (b) to participate in the application and review of safety and health measures and, in accordance with national law and practice, to select safety and health representatives and representatives in safety and health committees; and (c) to remove themselves from danger resulting from their work activity when they have reasonable justification to believe there is an imminent and serious risk to their safety and health and so inform their supervisor immediately. They shall not be placed at any disadvantage as a result of these actions. 13.1. National laws and regulations or the competent authority shall ensure that there are preventive and protective measures for the use of chemicals and handling of		

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		chemical waste at the level of the undertaking. 14. National laws and regulations shall ensure that risks such as those of infection, allergy or poisoning are prevented or kept to a minimum when biological agents are handled, and activities involving animals, livestock and stabling areas, comply with national or other recognized health and safety standards. 18. Measures shall be taken to ensure that the special needs of women agricultural workers are taken into account in relation to pregnancy, breastfeeding and reproductive health. 21.1. In accordance with national law and practice, workers in agriculture shall be covered by an insurance or social security scheme against fatal and non-fatal occupational injuries and diseases, as well as against invalidity and other work-related health risks, providing coverage at least equivalent to that enjoyed by workers in other sectors.		
Health and safety	Women's Reproductive Health Challenges in the manufacturing environment. www.bsr.org/womenshealth			
Discrimination (sex, age, handicap,	C111* – Discrimination (Occupation	1.1. For the purpose of this Convention the term *discrimination* includes-- (a) any distinction, exclusion or preference made on the	Difficult to monitor	The companies must avoid any distinction, exclusion or preference made on the

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
religion, nationality)	and Employment), 1958	basis of race, colour, sex, religion, political opinion, national extraction or social origin, which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation; (b) such other distinction, exclusion or preference which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation as may be determined by the Member concerned after consultation with representative employers' and workers' organisations, where such exist, and with other appropriate bodies. 1.3. For the purpose of this Convention the terms *employment* and *occupation* include access to vocational training, access to employment and to particular occupations, and terms and conditions of employment. 2. Each Member for which this Convention is in force undertakes to declare and pursue a national policy designed to promote, by methods appropriate to national conditions and practice, equality of opportunity and treatment in respect of employment and occupation, with a view to eliminating any discrimination in respect thereof.		basis of race, colour, sex, religion, political opinion, national extraction or social origin, which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation.
Discrimination	C100* – Equal Remuneration, 1951	2.1. Each Member shall, by means appropriate to the methods in operation for determining rates of remuneration, promote and, in so far as is consistent with such methods, ensure the application to all workers of the principle of equal remuneration for men and women workers for work of equal value.		Equal remuneration for men and women workers for work of equal value.
Discrimination	C169° – Indigenous and Tribal Peoples,	2. Governments shall do everything possible to prevent any discrimination between workers belonging to the peoples concerned and other workers, in particular as re-		Companies must do everything possible to prevent any discrimination between

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
	1989	gards: (a) admission to employment, including skilled employment, as well as measures for promotion and advancement; (b) equal remuneration for work of equal value; (c) medical and social assistance, occupational safety and health, all social security benefits and any other occupationally related benefits, and housing; (d) the right of association and freedom for all lawful trade union activities, and the right to conclude collective agreements with employers or employers' organisations.		workers belonging to the peoples concerned and other workers.
Training – capacity building, development of skills	C142° – Human resources Development, 1975	4. Each Member shall gradually extend, adapt and harmonise its vocational training systems to meet the needs for vocational training throughout life of both young persons and adults in all sectors of the economy and branches of economic activity and at all levels of skill and responsibility.	Awareness raising and training are the most important instruments to improve problematic situations in companies. Often this is underestimated and no strategy for training exists.	The companies shall gradually extend, adapt and harmonise its vocational training systems to meet the needs for vocational training throughout in all sectors of the economy and branches of economic activity and at all levels of skill and responsibility.
Training	C169° – Indigenous and Tribal Peoples, 1989	22.1. Measures shall be taken to promote the voluntary participation of members of the peoples concerned in vocational training programmes of general application. 22.2. Whenever existing programmes of vocational training of general application do not meet the special needs of the peoples concerned, governments shall, with the participation of these peoples, ensure the provision of special training programmes and facilities. 22.3. Any special training programmes shall be based on		

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
		the economic environment, social and cultural conditions and practical needs of the peoples concerned. Any studies made in this connection shall be carried out in co-operation with these peoples, who shall be consulted on the organisation and operation of such programmes. Where feasible, these peoples shall progressively assume responsibility for the organisation and operation of such special training programmes, if they so decide.		
Fair trade conditions	FLO	Purchases must be made directly from producers' organisations, with purchasing agreements that extend beyond a harvest cycle. Importers must guarantee the FLO minimum price and pay a social premium in addition to the minimum price, or pay the world market price, whichever is higher; certified organic coffee receives an additional premium. The social premium should be dedicated to social projects selected by the membership e.g. to improve cooperative infrastructure, health services or education Importers must if requested offer pre-financing equal to 60 percent of the contract value. Producers must have access to the logistical, administrative and technical means to bring a quality product to the market.	In order to achieve the intended benefits, FLO requires farmers and workers to be organized Fair trade often remains an abstract concept to many farmers The social premium is often used to cover operational costs or is distributed among farmers pre-financing often mixed with other credits and not identified as fair trade benefit (Murray et al. 2006: 188-189)	
Complaint mechanism			In-plant grievance procedure cannot replace independent monitoring, because employees under threat of exploitation are not in the position to make use of such mechanisms. Therefore it must be assured that workers	

Socio-economic issues	ILO convention/ Others[25]	Main contents	Problems/Comments	Recommendations for biofuels
			have: - access to information - an understanding of the different criteria and their violation - means to document their complaints - mastery of the language - assurance of no negative consequences →Auditing firms are rarely suited to identify labor rights violations that occur “off paper” →NGOs lack financial resources for more than spot-check monitoring (Scherrer/Greven 2001: 130-131)	

ANNEX D

Background data for the default values in annex 2 of the German Biomass Sustainability Regulation

Table D1 Determining the default values for land use change for seven cases of generating biofuels. Source: IPCC 2006

		wheat Europe	Maize / corn North America	Sugar cane trop. Latin America	Sugar beet Europe	rapeseed Europe	soybean trop. Latin America	soybean North America	Palm oil South East Asia
previous use		**grassland**	**grassland**	**Savannah**	**grassland**	**grassland**	**savannah**	**grassland**	**trop. rain forest**
Change of C-storage									
biomass total	**t C/ha**	**70**	**70**	**134.0**	**70**	**70**	**134.0**	**70**	**265**
above ground	t C/ha	6.3	6.3	66.0	6.3	6.3	66.0	6.3	165
below ground	t C/ha			21.0			21.0		40
Soil	t C/ha	63.0	63.0	47.0	63.0	63.0	47.0	63.0	60
Use		**cultivated land**	**cultivated land**	**cultivated land**	**cultivated land**	**cultivated land**	**cultivated land**	**cultivated land**	**plantation**
biomass total	**t C/ha**	**55**	**55**	**55**	**55**	**55**	**53**	**55**	**110**
above + below ground	t C/ha	5	5	7.5	5	5	5	5	50
Soil	t C/ha	50	50	47.5	50	50	48	50	60
Changement [a]	**t C/ha**	**-15**	**-15**	**-79**	**-15**	**-15**	**-81**	**-15**	**-155**
time span	a	20	20	20	20	20	20	20	20
	t C/(ha*a)	0.75	0.75	3.95	0.75	0.75	4.05	0.75	7.75
Result (emission)	**t CO_2 /(ha*a)**	**2.75**	**2.75**	**14.5**	**2.75**	**2.75**	**14.8**	**2.75**	**28.4**
required area									
not allocated	ha/GJ	0.0174	0.0131	0.0121	0.0089	0.0200	0.0607	0.0632	0.0079
Allocated	ha/GJ	0.0095	0.0072	0.0107	0.0057	0.0107	0.0168	0.019	0.0038
emission referring to biofuel									
not allocated	**kg CO_2-eq./GJ**	**47.8**	**36.1**	**175.5**	**24.5**	**54.9**	**901.1**	**173.8**	**223.9**
Allocated		26.2	19.8	154.7	15.6	32.8	282.4	54.5	106.6

a) negative values are given in case of a loss of carbon storage
b) Taking the allocation into consideration according to the lower heating value via the production chain down to the final product (ethanol, FAME)

Table D2 Basic data concerning carbon stock in diverse natural areas and land use types; source: IPCC 2006

previous use		C storage total	biomass above ground	biomass below ground	Soil organic carbon
Grassland moderate zone	**t C/ha**	**70**	6.3		63
Savannah Latin America (high carbon content)	t C/ha	**134**	66	21	47
Trop. secondary forest	t C/ha	**165** [a)]	65	45	60
Trop. rainforest SE Asia (mineral soil)	t C/ha	**265**	165	40	60
Trop. Rainforest SE Asia (wetland)	t C/ha	1,400 [a,b)]	165	40	1,200 [a,b)]
Degraded land SE Asia	t C/ha	40 [a,c)]	10		30

supplementary sources:
a) Wuppertal-Inst., IFEU, FUER (2007)
b) Hoijer, A. et al. (2006)
c) Lasco, R.D. et al (2002)

Table D3 Calculation of default values for emissions from the slash-and-burn due to land use change; Source: IPCC 2006, UNFCCC 2007

		sugar cane Latin America	soybean Latin America	Palm oil SE Asia
previous use		**savannah**	**savannah**	**trop. rainforest**
Biomass total [a)]	**t C/ha**	**134**	**134**	**265**
biomass above ground	t C/ha	66	66	165
Emission factor für burning [b)]				
Methane (CH_4)	t/t biomass	0.0023	0.0023	0.0068
Laughing gas (N_2O)	t/t biomass	0.00021	0.00021	0.0002
emission per area [c)]				
Methane (CH_4)	t /ha	0.161	0.161	1.194
	t CO_2-eq./ha	2.9	2.9	21.8
Laughing gas (N_2O)	t /ha	0.015	0.015	0.035
	t CO_2-eq./ha	4.6	4.6	10.9
time span	Years	20	20	20
emission referring to biofuel				
not allocated	kg CO_2-eq./GJ	**4.56**	**22.8**	**12.87**
allocated [d)]	kg CO_2-eq./GJ	4.02	7.1	6.13

a) conversion factor biomasse to carbon: 0,47; according to IPCC Guidelines 2006, Volume 4, Chapter 4, Table 4.3;
b) data from IPCC Guidelines 2006, Volume 4, Chapter 2, Table 2.5;
c) 50% taken into account
d) allocation according to heeting value along the complete production chain

Table D4 The combination of carbon stock changes and the slash-and-burn emissions

kg CO_2-eq./GJ	Wheat Europe	Maize North Amer-ica	Sugarcane trop. Latin America	Sugar beet Europe	Rapeseed Europe	Soybean trop. Latin Am.	Soybean North Amer-ica	Palm oil South East Asia
emission from carbon stock changes								
not allocated	**47.8**	**36.1**	**175.5**	**24.5**	**54.9**	**901.1**	**173.8**	**223.9**
allocated [a)]	26.2	19.8	154.7	15.6	32.8	282.4	54.5	106.6
slash-and-burn emissions								
not allocated	-	-	4.56	-	-	22.8	-	12.87
allocated [a)]	-	-	4.02	-	-	7.1	-	6.13
Sum								
not allocated	**47.8**	**36.1**	**180.1**	**24.5**	**54.9**	**923.9**	**173.8**	**236.7**
allocated [a)]	26.2	19.8	158.8	15.6	32.8	289.6	54.5	112.8

a) Taking the allocation into consideration according to the lower heating value via the production chain down to the final product (ethanol, FAME)

Table D5 Calculation of default values for production of biomass

		Wheat Europe	Maize North Amer-ica	Sugarcane trop. Latin America	Sugar beet Europe	Rapeseed Europe	Soybean trop. Latin Am.	Soybean North Amer-ica	Palm oil South East Asia
core biomass		grains	grains	cane	beets	rapeseeds	soy beans	soy beans	oil fruits
Yield	t/(ha*a)	7.31	8.77	68.7	56	3.5	2.5	2.4	10.5
co-products		straw	straw	harvest residues	harvest residues	straw	Legum.-N [a)]	Legum.-N [a)]	Empty fruit benches
allocation applied		no	no	no	no	no	yes	yes	no
emission from land									
N_2O	kg/(ha*a)	2.25	2.1	2.02	2.04	2.67	1.18	1.18	1.375
CH_4	kg/(ha*a)	0	0	19.7	0	0	0	0	0
Diesel consumption	kg/(ha*a)	48.9	81.5	56.4	90.8	54.7	48.9	48.9	167
fertilizer consumption									
N	kg/(ha*a)	143	132	58.3	130	170	5	4	87.5
P_2O_5	kg/(ha*a)	58.5	70	36.7	56	63	10	11.9	10.5
K_2O	kg/(ha*a)	43.9	44	100	95	35	20	22	131.3
CaO	kg/(ha*a)	7.3	11	367	27	22.2	0	275	26.2
Pesticides	kg/(ha*a)	4.5	3.0	2	2.1	1.23	1.25	1.25	1.23
Irrigation		no	for 25%	no	no	no	no	nein	no
Diesel	kg/(ha*a)		10						
Drying									
Electricity	kWh/kg grains	0.011	0.011	-	-	0.0117	0.0072	0.0072	-
fuel oil	MJ/kg grains	0.4	0.4	-	-	0.4	0.17	0.17	-

Table D6 Calculation of default values for production of biomass

		Wheat Europe	Maize North Amer-ica	Sugarcane trop. Latin America	Sugar beet Europe	Rapeseed Europe	Soybean trop. Latin Am.	Soybean North Amer-ica	Palm oil South East Asia
Emission									
Field	kg CO_2-eq. /(ha*a)	698	643	986	633	828	366	366	426
Diesel use	kg CO_2-eq. /(ha*a)	186	310	215	346	208	186	186	636
fertilizer prod.	kg CO_2-eq. /(ha*a)	1,038	981	601	990	1,219	58	58	681
PSM-prod.	kg CO_2-eq. /(ha*a)	56	37.11	25	26	15	15	15	15
Diesel irrigation	kg CO_2-eq. /(ha*a)		38						
electricity drying	kg CO_2-eq. /(ha*a)	51	82	0	0	26	5	15	0
fuel oil drying	kg CO_2-eq. /(ha*a)	314	376	0	0	150	46	44	0
SUM	kg CO_2-eq. /(ha*a)	2,342	2,468	1,826	1,995	2,447	676	763	1,759
Emission by biofuel									
not allocated	kg CO2-eq./GJ	40.7	32.4	22.1	17.8	48.8	41.0	48.2	13.9
Allocated	kg CO2-eq./GJ	22.3	17.8	19.5	11.3	29.1	12.9	15.1	6.6

a) Nitrogen produced during soybean growing and accumultaed in the soil (70 kg/ha) is considered to be a co-product and allocated by the energetic value of N fertilizer (49 MJ/kg N).

b) Taking the allocation into consideration according to the lower heating value via the production chain down to the final product (ethanol, FAME)

Table D7 Origin of data on biomass production and categorization of the conservatism when producing biomass

		Data source	Category of conservatism
Crops and co-products		Calculations by IFEU, basis of various LCAs	Median value, no conservatism
Field emissions	N_2O	IPCC (2006)	International standard value, based on newer studies possibly highly underestimated
	CH_4	for sugarcane Macedo (2004)	single literature value, no conservatism
Diesel consumption		Calculations by IFEU, basis of various LCAs	Median value, no conservatism
Fertilizer consumption		Calculations by IFEU, basis of various LCAs	Upper value range (approach analogue to Figure 16)
Pesticides		Calculations by IFEU, basis of various LCAs	Upper value range (approach analogue to Figure 16)
Energy for irrigation		Calculations by IFEU, basis of various LCAs	Median value, no conservatism
Energy for drying		Calculations by IFEU, basis of various LCAs	Median value, no conservatism

Table D8 Calculation of the default values on emissions from Conversion Step 1

		Sugarcane, Latin America	Sugar beet Europe	Rapeseed oil, Europe	Soybean oil, Latin and North America	Palm oil, Southeast Asia
Step 1		Sugar production	Sugar production	Oil mill + refinery	Oil mill + refinery	Oil mill + refinery
Input		**Cane**	**Beets**	**Rapeseed grains**	**Soy beans**	**Palm fruits**
Core product		Sugar (in 45% molasses)	Sugar (in 16% molasses)	Rapeseed oil	Soybean oil	Palm oil
Output Sugar/Oil		10.0%	16.8%	38.9%	18.0%	33.3%
Output bagasse/oil fibers		33.8%				26.4%
Output extraction cake			26.5%	58.5%	80.4%	
Output palm nuts						43.9%
Power consumption						
Electricity Mill/Sugar production	kWh/kg core product	0.105	0.071	0.0953	0.332	0.093
Power refinery	kWh/kg core product			0.0063	0.0063	0.0063
Thermic/Heat, Mill/ Sugar production	MJ/kg core product	3.4	0.54	3.25	5.54	2.71
Thermal, refinery	MJ/kg core product			0.302	0.315	0.303
Fuel		Bagasse		fuel oil	fuel oil	Oil fibres
Excess power	kWh/kg core product	1.08				0.679
Resources						
Hexane	g/kg Oil			0.367	1.11	1.11
Citric acid	g/kg Oil			0.367	1.11	1.11
Fuller’s Earth	g/kg Oil			6	6	6

Table D9 Calculation of the default values on emissions from Conversion Step 1 (continued)

		Sugarcane, Latin America	Sugar beet Europe	Rapeseed oil, Europe	Soybean oil, Latin America	Soybean oil, North America	Palm oil, Southeast Asia
Emissions							
Electricity Mill/Sugar production	kg CO_2-eq./kg core product	0.003	0.045	0.060	0.092	0.283	0.003
power refinery				0.004	0.002	0.005	0.0002
Excess power		0.029					0.0183
Thermal: mill/ sugar prod.		0.008	0.057	0.349	0.594	0.594	0.006
Thermal: refinery				0.032	0.034	0.034	0.001
Resources				0.002	0.002	0.002	0.003
TOTAL		***0.0395***	***0.102***	***0.447***	***0.724***	***0.918***	***0.031***
POME pond emissions	kg CH_4/ kg Oil						0.028
	kg CO_2-eq./kg Oil						0.511
Total	**kg CO_2-eq./kg** core product	**0.04**	**0.102**	**0.447**	**0.724**	**0.918**	**0.5421**
Total without refinery		0.01		0.411	0.688	0.879	0.523
Refinery				0.036	0.036	0.039	0.001
Excess power		0.029					0.018
Emission based on GJ							
Refinery	kg CO_2-eq./GJ			1.0	1.0	1.1	0.023
Excess	kg CO_2-eq./GJ	2.44					0.51
Total							
not allocated	kg CO_2-eq./GJ	**3.32**	**8.6**	**12.1**	**19.8**	**25.1**	**14.96**
Allocated	kg CO_2-eq./GJ	**0.78**	**5.47**	**7.64**	**7.34**	**9.199**	**6.9**

a) DS: Molasses; percentage is based on dry sugar bulk
b) Taking the allocation into consideration according to the lower heating value via the production chain down to the final product (ethanol, FAME)

Table D10 Calculation of the default values on emissions from Conversion Step 2

		Ethanol wheat, Europe	Ethanol maize, North America	Ethanol sugarcane, Latin Amer-ica	Ethanol sugar beet, Europe	FAME rapeseed oil, Europe	FAME soy-bean oil, Latin + N. America	FAME Palm oil, Southeast Asia	Hydro-genated vegetable oil
Step 2		Fermentation	Fermentation	Fermentation	Fermentation	Transesterif.	Transesterif.	Transesterif.	Hydrogenation
Core product		Ethanol:	Ethanol	Ethanol	Ethanol	RME	SYME	PME	
Output core product [a]	kg/GJ Hu	37.45	37.45	37.45	37.45	26.88	27.03	27.32	
	% of input	29.50%	32.50%	44.60%	44.60%	99%	99%	99%	
Output DDGS, vinasse[a]	% of input	40.60%	44.70%	10.40%	10.40%				
Output Glycerin [a]	% of input					9.30%	9.30%	9.30%	
Input Methanol [a]	% of input					10.90%	10.90%	10.90%	
energy consumption									
Electricity	kWh/kg core pr.	0.402	0.402	0.345	0.1	0.046	0.046	0.046	
thermal energy	MJ/kg core pr.	9.76	9.76	9.16	9.76	1.36	1.36	1.36	
Fuel		lignite	gas/fuel oil	Bagasse	lignite	gas/fuel oil	gas/fuel oil	gas/fuel oil	
surplus electricity	kWh/kg EtOH								
Total electricity prod.	*kWh/kg EtOH*			*0.345*					
Auxillaries									
NaOH (g/kg)	g/kg					6	6	6	
HCl (g/kg)	g/kg					5	5	5	
Emission									
Methanol	kg CO_2-Eq./kg core prod.					0.1364	0.136	0.136	
Electricity		0.2534	0.2436	0.0093	0.063	0.0290	0.0290	0.0290	
heat/steam		1.418	0.8756	0.0206	0.876	0.122	0.122	0.122	
Auxiliaries		0	0	0		0.00849	0.00849	0.00849	
SUM		**1.671**	**1.119**	**0.0299**	**0.939**	**0.296**	**0.296**	**0.296**	
Emission related on GJ									
not allocated	kg CO_2-Eq./GJ	**62.6**	**45.6**	**1.12**	**35.2**	**7.95**	**8.0**	**8.08**	**10.5**
allocated [b]	kg CO_2-Eq./GJ	**34.3**	**25.0**	**0.99**	**31.0**	**7.63**	**7.67**	**7.75**	**9.7**

a) Sum of output mass flows does not match with input mass flow because of losses due to CO_2 creation (fermentation), evaporation and effluent discharge.
b) Taking the allocation into consideration according to the lower heating value via the production chain down to the final product (ethanol, FAME)

Table D11 Origin of data on biomass production and categorization of the conservatism for the conversion processes

	Data source	Category of conservatism
Crops and co-products	Calculations by IFEU, basis of various LCAs	Median value, no conservatism
Power and resource consumption	Calculations by IFEU, basis of various LCAs	Median value, no conservatism
Selection of fuels		Assumption of a typical case of unfavourable energy source (Europe: lignite as the case for Germany) → conservative
Treatment of any possible energy excess		Neglect of potential excesses when applying biomass (by-products) → conservative
Emission factors	GEMIS as well as calculations by IFEU	Upper heating value → conservative (approach analogue to Figure 16)

Table D12 Calculation of the default values on emissions from transportation processes (GHG emission factor taken from TREMOD)

Good to be transported	**means of transport**	**Ethanol** wheat Europe km	kg CO_2-eq./GJ	**Ethanol** maize North Am. km	kg CO_2-eq./GJ [a]	**Ethanol** sugarcane Lat. Am. km	kg CO_2-eq./GJ [a]	**Ethanol** sugar beet Europe km	kg CO_2-eq./GJ [a]
Biomass	Truck	100	**1.336**	100	**1.213**	20	**1.75**	50	**2.63**
Biofuel	Truck	150	0.383	300	0.766	500	1.277	150	0.383
	Ship (overseas)			9,500	3.199	11,000	3.704		
	Barge (inland)			500	0.403	200	0.161		
	Truck			150	0.383	150	0.383		
	Total Biofuel		**0.383**		**4.751**		**5.525**		**0.383**
TOTAL									
not allocated			**1.72**		**5.96**		**7.28**		**3.01**
allocated [b]			1.12		5.42		7.07		2.06
		FAME Rapeseed Europe km	kg CO_2-eq./GJ [a]	**FAME** Soybean Latin Am. km	kg CO_2-eq./GJ [a]	**FAME** Soybean North Am. km	kg CO_2-eq./GJ [a]	**FAME** palm oil SE Asia km	kg CO_2-eq./GJ [a]
Biomass	Truck	100	**0.735**	100	**1.600**	100	**1.600**	20	**0.174**
Oil	Truck	100	0.213	500	0.931	500	0.931	300	0.648
	Ship (overseas)			11,000	2.700	9.500	2.332	14,000	3.474
	Barge (inland)			200	0.118	200	0.118	200	0.119
	Truck			100	0.186	100	0.186	100	0.216
	Total Oil		**0.213**		**3.934**		**3.566**		**4.458**
Biofuel	Truck	150	0.275	150	0.276	150	0.276	150	0.279
	Total Biofuel		**0.275**		**0.276**		**0.276**		**0.279**
TOTAL									
not allocated			**1.22**		**5.81**		**5.44**		**4.91**
allocated [b]			0.92		4.59		4.24		4.63

a) Based on 1 GJ biofuel as the final product
b) Taking the allocation into consideration according to the lower heating value via the production chain up to the final product (ethanol, FAME)

Table D13 Origin of data on biomass production and categorization of the conservatism for the transport processes

	Data source	Category of conservatism
Distances	Calculations or estimates by IFEU	Median value, no conservatism
Efficiency and consideration of return transport	Calculations or estimates by IFEU	Full efficiency of the transports is assumed → no conservatism Empty return transports for biomass transport assumed → conservatism No empty return transport for ships assumed → no conservatism
Fuel consumption and emission factors	TREMOD	Median standard values, no conservatism