

Project group Sustainable production of
biomass

Criteria for sustainable bio- mass production



Final report of the Project group 'Sustainable production of biomass'

July 14th 2006

Foreword

The expectations with regard to biomass as a source of sustainable energy are high. However, there are also certain risks attached to the large-scale use of biomass. It may lead to damage to nature and the environment and to detrimental social and economic effects. That is why the Dutch government has expressed its intention to incorporate sustainability criteria for biomass in relevant policy instruments. In the short term this regards the arrangement Environmental Quality Electricity Production (MEP) (Milieukwaliteit ElectriciteitsProductie) and the obligation for biofuels for road transport. In the longer term a broader application of these sustainability criteria is envisaged.

In preparation for the above policy the project group “Sustainable Production of Biomass” has been set up by the Interdepartmental Programme Management Energy Transition.

The task of the project group “Sustainable Production of Biomass” was to formulate a set of sustainability criteria for the production and conversion of biomass for energy, fuels and chemistry. The report before you is the result. The project group is aware that the proposed sustainability criteria must be integrated into political and policy frameworks at the national, European and mondial level. As far as possible this has been taken into account when working out the sustainability criteria.

In the report before you the project group makes a number of recommendations for further elaboration and application of the drafted sustainability criteria. It is prepared to contribute towards such an elaboration in the second half of 2006.

This report could not have come into being without the active commitment of the members of the project group, the accurate official and secretarial support, the know-how of a group of experts and the contribution of all those who have taken the trouble to give their views during meetings and the working conference and by means of a questionnaire. I herewith would like to thank everyone for their contribution to this final report. The responsibility for its contents, however, lies exclusively with the project group “Sustainable Production of Biomass”.

Prof.dr. Jacqueline Cramer, chair of the project group “Sustainable Production of Biomass”

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Summary

The project group “Sustainable Production of Biomass” has been commissioned by the Interdepartmental Programme Management Energy Transition to formulate sustainability criteria for the production and processing of biomass for energy, fuels and chemistry. In this report the project group describes the result of its activities.

The project group has compiled a set of generic sustainability criteria and corresponding sustainability indicators. For this they have followed the triple P approach (people, planet, profit) and aimed at keeping in line, as much as possible, with already existing conventions and certification systems. In the elaboration no distinction has been made between imported biomass and biomass that is produced in the Netherlands. However, the criteria only hold good for biomass that is applied in the Netherlands, not for possible transit.

By means of a web survey and a working conference a great number of Dutch stakeholders have been consulted on the plan of approach and the drafted sustainability criteria and indicators. This consultation proved that there exists a broad support base for the chosen starting-points and, broadly speaking, also for the drafted criteria and indicators. Suggestions for improvement have been incorporated in the final version wherever possible.

In the system that was developed sustainability criteria for 2007 are distinguished from those for 2011. In the criteria for 2007 minimum requirements have been formulated to prevent unacceptable biomass flows from being used. The criteria for 2011 have been tightened and are aimed at providing an active protection of nature and the environment and of the economic and social circumstances. For some sustainability criteria it proved impossible to formulate performance indicators. In such cases a system has been chosen in which in 2007, where necessary, use is made of a reporting obligation in order to gain more insight into the effects of biomass production. The project group sees all this as an intermediate phase: on the basis of the experience that will be gained with this reporting obligation performance indicators can be developed for 2011.

The criteria and indicators have been divided into six themes. The first three themes are specific themes, relevant for biomass. The last three themes relate to the triple P approach (people, planet, profit), which are the starting-points for corporate social responsibility. The six themes are the following:

- Greenhouse gas balance
- Competition with food, local energy supply, medicines and building materials
- Biodiversity
- Economic prosperity
- Social well-being
- Environment

To make testing for sustainability possible the origin of the physical biomass flow must be known. A certification system must preferably be based on a track-and-trace system, in which the traceability of the biomass is guaranteed. A point of attention here is that in the short term this is not completely feasible. Therefore a transition period will be necessary, in which an increasing percentage of traced biomass is required for inclusion for subsidy or obligations. An internationally watertight monitoring and registration system will be needed. In the longer term it may be considered if a system in which the sustainability certificate is separated from the physical flow would offer any advantages.

The project group is aware that the proposed sustainability criteria must be integrated into political and policy frameworks at the national, European and global level. As far as possible this has been taken into account in working out the sustainability criteria. However, the preparation for this incorporation lies beyond the scope of its assignment.

Recommendations

The project group makes the following recommendations.

General

Biomass offers great opportunities for the transition to a sustainable energy management. However, a rapid global increase of the production and use of biomass may possibly entail great ecological, social and/or economic risks. Therefore the project group argues for a careful development of the use of biomass for energy, transport and chemistry, so that undesirable effects can be avoided. In this context it is important that the Dutch government, together with other EU countries, should take the initiative in the setting up of national and/or worldwide Monitoring programmes to be able to recognize negative effects in time.

The project group has not taken up a position on the use of Genetically Modified Organisms (GMOs). The views with regard to GMOs are divided, also in the project group, and the discussion about this is beyond the field of activity of the project group. In the future the results of the discussion held around the subject of food may help to clarify the views on biomass production.

The drawing-up of clear sustainability requirements for the production of biomass is of great importance for the agrarian sector. Cultivation for the production of energy can generate financial resources, which subsequently make possible further-reaching professionalizing and efficiency in regions with conventional agriculture. This is essential in eventually preventing competition between biomass for food, energy and feedstock, as well as degradation of farmlands.

The project group has developed sustainability criteria for biomass for chemistry, fuels and the generation of energy. Food, feed and fuel are, however, difficult to look at separately. It is important that eventually also sustainability criteria are developed for food and cattle feed to prevent shift effects taking place.

Translation into policy instruments

A careful translation of the sustainability criteria into policy instruments is essential. Here a transitional phase would seem desirable for existing contracts for transportation fuels, to be terminated as of 1 January 2008. In the case of the MEP (Environmental Quality Electricity Production) the terms for the existing orders cannot be changed. Apart from this it is important that for the application of policy the currently still incomplete traceability of biomass should carry due weight.

When introducing it as an instrument of policy, it would seem advisable to make the subsidy within the context of the Dutch MEP and the inclusion in the obligation with regard to biofuels strongly dependent on the extent to which greenhouse gas emissions have been reduced. This differentiation will concern only the greenhouse gas balance and not the other sustainability criteria. The latter criteria are minimum requirements which have to be met.

Apart from the financial instruments accommodating policy will be necessary to guarantee a good implementation of the sustainability criteria. This concerns, among other things, communication instruments to give sufficient publicity to the sustainability criteria and to see to a broad support base.

Follow-up activities

It will be necessary to develop the proposed sustainability indicators further in the second half of 2006 to enable integration into government policy. This concerns the elaboration of the protocols for the reporting obligations, the calculation methods for the greenhouse gas balance, the selection and planning of pilot projects, the policy of dialogue with stakeholders and the planning of a structure to enable certification and further elaboration of performance indicators. It would seem desirable also to involve stakeholders from the countries producing biomass, when working out further the protocols and indicators.

To develop performance indicators for 2011 built on a scientific basis further research would seem necessary. For this purpose use can be made of the information that will become available as a result

of the obligatory reports between 2007 and 2011. In order to complete formulating performance indicators in time, it will be necessary to start the necessary research at an early date. This can be set up in co-operation with other working groups in the Energy Transition.

The project group is prepared in its present composition to take care of the execution of the above follow-up activities. In view of the complexity of the subject and the know-how acquired there may be added value in having the present project group carry out this assignment. In addition to this use can be made of the existing consultative structure between the project group and the major Dutch stakeholders. In the discussions this has proved to be very useful .

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1 Introduction

Biomass as a source of renewable energy

In the Netherlands biomass can become an important sustainable raw material. The use of biomass offers a solution for both the depletion of the fossil fuels and the climate problem. Both in the application in chemistry and in transport and the generation of energy, biomass offers great chances for the conservation of the Dutch energy management. Currently biomass already is the most important source of sustainable energy in the Netherlands. In the next twenty years a huge growth is anticipated of the amount of biomass to be used. However, the Netherlands is too small for the production of large quantities of biomass. The bulk of the biomass will, therefore, originate from abroad.

At the moment the possibilities for testing biomass for its sustainability are inadequate. If this situation does not change, this will entail various risks. Thus the production of biomass may cause damage to nature and the environment. The way in which biomass is produced can also have adverse effects socially and with regard to health for local farmers, workers and their families. These risks can seriously damage the image of biomass as a sustainable energy carrier and thus hamper the large-scale application of biomass in both the present and the future provision of energy and raw materials.

This problem is beginning to gain public recognition. In reaction to this a number of background studies have already been carried out and various initiatives have been taken to arrive at criteria and/or certification for the sustainability of biomass. Examples of this are FSC hout (wood certification system), Roundtable for Sustainable Palm Oil, Round Table for Responsible Soy, BRL hout (wood certification system), IEA Bioenergy Task 40 and Essent Green Gold. However, there is no agreement as yet among the various stakeholders about the criteria and indicators that would have to apply to a sustainable application of biomass in the Dutch energy supply. Incidentally, it should not matter for the application of the criteria if the biomass is of Dutch, EU or non-EU origin. The term "import" has therefore been deliberately removed from the original assignment of the project group.

The Dutch government has expressed its intention to incorporate sustainability criteria for biomass into relevant policy instruments. In the short term this concerns the MEP arrangement (Milieukwaliteit ElectriciteitsProductie, Environmental Quality Electricity Production) and the obligation for biofuels. In the longer term wider application of these sustainability criteria would seem desirable.

In preparation for the above policy the project group "Sustainable Production of Biomass" has been set up by the Interdepartmental Programme Management Energy Transition. The project group "Sustainable Production of Biomass" is a broadly based project group consisting of representatives of the private sector, social organizations, financial institutions and the government. The task of the project group is to formulate a set of sustainability criteria for the use and the application of biomass in energy, fuels and chemistry. This report describes the advice of the project group to the Interdepartmental Programme Management Energy Transition.

This report is composed as follows:

- Chapter 1 describes the project assignment, aim and approach of the project group.
- Chapter 2 examines the vision and starting-points for the elaboration of sustainability criteria and indicators.
- Chapter 3 gives a short explanation and elaboration of each criterion/indicator .
- Chapter 4 elucidates each criterion more extensively.
- Chapter 5 describes the shaping of the thoughts of the project group with respect to certification.
- Chapter 6 describes what follow-up activities the project group foresees for the second half of 2006 and in the longer term.
- Chapter 7 rounds off with conclusions and recommendations.
- Appendices:
 1. References to conventions and certification marks
 2. Results web survey
 3. Report working conference "Sustainable Production of Biomass", 15 June 2006
 4. Stakeholders consulted
 5. Calculation greenhouse gas balance

2 Project assignment and approach

2.1 Objective

The objective of the survey of the project group “Sustainable Import of Biomass” is:

- Developing a socially supported long-term vision on what sustainably produced biomass that is imported as raw material and energy source, is. The vision will contain a general framework (with starting-points for food, feed, fuel), which can be translated into testable criteria;
- The formulation of verifiable criteria for sustainably imported biomass;
- Providing the national government with a set of testable criteria that can be applied in legislation around Dutch MEP and biofuels;
- Starting a mental process to arrive eventually at the desired certification. Developing a certificate is a long-term undertaking and will, therefore, continue even after the termination of this project assignment;

Derived objectives are:

- The planning of a structure in which know-how is shared, consultation takes place and recommendations are formulated to make possible the transition to renewable, imported biomass;
- The creation of a support base among authorities, market parties and NGOs for process, testing criteria, certification methods and the applications in policy. A broad public support will be necessary, since the government itself can only influence a limited part of the playing field. If parties should fail to come to an agreement, the national government will nonetheless incorporate sustainability criteria into the relevant legislation (Dutch MEP, biofuels for road transport);
- Advising on the question how electricity from biomass can still be regarded as green power, if the biomass should not meet sustainability criteria. This concerns among other things the communication with the consumer.

The assignment for the project group concerns the period 1 January – 1 July 2006 and comprises the following elements:

1. Organize a stable structure of consultation and cooperation with the stakeholders concerned, if this is not sufficiently covered by existing initiatives;
2. Formulate a vision on the sustainability of imported biomass in 2020;
3. Bring about from this vision that testable and broadly supported criteria are agreed upon for the production and trade of sustainably produced biomass. Get stakeholders sufficiently involved in this and pay sufficient attention to the international context;
4. Design a universal framework that can subsequently be applied to the various biomass flows;
5. Provide the national government with an operable set of sustainability criteria that are suitable for application in legislation. What must be primarily thought of here are the MEP and the biofuels for road transport;
6. Start shaping thoughts about certification;
7. Select at least three pilot projects in which the criteria can be applied and tested from 1 July 2006.
8. See to it that in this process the government operates as a unit and nationwide;
9. Report as of 1 July 2006 on the results that have been achieved in the project and formulate recommendations for the way in which the stakeholders can carry on with the structure of consultation and co-operation.

Here the following definitions are used. The project will be aimed at:

- Biomass flows
- Especially non-food applications, this means energy, transport and chemistry, with the remark that it would not be practical to make an artificial distinction between food and non-food.

- The whole chain from production up to application. The project is, therefore, aimed at the production and transport of biomass flows. An exception to this is the 'greenhouse gas balance' theme. Here the application is included, since a comparison is made with a reference situation. A further explanation of this can be found in 4.2.
- People, planet and profit aspects that are specifically aimed at energy related sustainability issues.

The project is not aimed at:

- The availability of biomass.

2.2 Approach

The project group has been put together with care to be a good representation of private companies, social organizations, financial institutions and the government. The project group has been kept small deliberately, to enable it to function effectively as a working group. The members of the project group have participated in a private capacity, but have undertaken to communicate with their colleagues during the process. As an independent chairperson Jacqueline Cramer, professor of sustainable entrepreneurship at Utrecht University, has directed the process and seen to the overall coordination as regards contents.

The project group has begun by drawing-up a vision statement with regard to sustainability and by formulating the basic principles for the elaboration of sustainability criteria and indicators. After that, the sustainability criteria and indicators have been formulated, with support as to contents of experts from Ecofys, the Copernicus Institute of Utrecht University and CE.

During the process stakeholders have been consulted on a number of occasions:

- Two meetings have been organized with parties who indicated they felt committed to the process, but did not form part of the project group. One meeting was organized notably for private companies, the other meeting for NGOs. At both meetings the starting-points of the sustainability criteria have been subject of discussion.
- A web survey among approx. 250 Dutch stakeholders has been posted, in which these stakeholders were asked extensively to give their opinion on the system for sustainability criteria and the levels of quality the criteria must guarantee. A summary of the results has been included in Appendix 2.
- A working conference has taken place on 15 June 2006. Prior to this conference the sustainability criteria have been sent to the participants and during the conference the criteria have been discussed in six thematic workshops. A summary of the results has been included in Appendix 3.
- There has been one conversation with the European Commission to gain some insight into the thoughts of the Commission with respect to the 'sustainability of biomass' subject. During the conversation the European Commission turned out to be interested in the subject, but so far they have not yet started to put this into effect.

The results of above consultations have been incorporated into the advice of the project group as it lies before you now. A list of stakeholders that have been consulted during the meetings has been included in Appendix 2 C.

3 Stating-points

3.1 Long-term vision

In the long-term vision of the project group, biomass is an essential energy source in the transition to a sustainable energy supply. To meet the future demand for biomass high-value production and use of biomass will be necessary. This must take place in such a way that competition with food production and deterioration of biodiversity is avoided. At the same time biomass production with high energy returns must be stimulated, preferably on soils that are not, or hardly, suitable for food production. In addition as high-value a use of biomass as possible must be aimed at, only then to be followed by lower quality applications ('cascading usage'). Finally large-scale application must comply with the starting-points of good social corporate governance (people, planet and profit).

The project group realises that a rapid increase of the production and use of biomass entails opportunities and risks. Therefore, it argues for a careful development of the use of biomass for energy, transport and chemistry, so that positive effects on energy supply, development of agriculture and local development and economic prosperity will be made possible. In this way action can be taken well in advance, if serious negative impacts should occur. Then there will also be sufficient time to stimulate the necessary efficiency improvement in the agricultural sector.

In view of the possible risks it is important to follow effects on the macro level (global impacts) Monitoring of market developments, fluctuations in the prices of food and biomass flows and detrimental social and economic effects and/or damage to nature and the environment must, therefore, be an essential part of the large-scale use of biomass. The Dutch government, together with other EU countries, must take the lead in setting up national and/or worldwide monitoring programmes.

3.2 Basic Premises

In the selection and elaboration of sustainability criteria and corresponding indicators for the sustainable production and trade of biomass the project group has started from the following basic premises:

- Biomass plays a large and growing part in the supply of sustainable energy and materials. Because the Netherlands is not suitable for the production of large quantities of biomass, the import of biomass will become increasingly important. In particular the production of raw materials may lead to sustainability risks. These risks can be limited by testing biomass flows against sustainability criteria.
- Apart from risks, the production and use of biomass also offers chances for the producing countries. This concerns, among other things, soil recovery, rural development, improvement of agricultural efficiency and increase of the economic prosperity and the social well-being of the local population.
- The focus of the vision is on achieving sustainability in the long term (2020-2040). Sustainability in the long term can only be achieved, if a start is made with it now.
- On the basis of the vision, concretely applicable and testable sustainability criteria and corresponding indicators are developed for the production and the transport of biomass. The phase of the application of biomass is only included in the calculation of the greenhouse gases balance. The criteria are not applicable to biomass that is not applied in the Netherlands.
- A universal framework of sustainability requirements is needed, with the emphasis on non-food applications (chemistry, transportation fuels and the generation of energy). The sustainability criteria and indicators developed here can also be of importance to assess food production with regard to its sustainability aspects. Avowedly, in the case of biomass feed, food and fuel are difficult to look at individually. To prevent shift effects it is important also to develop sustainability indicators for food and fuel.
- This non-discriminatory framework fits in as much as possible with international initiatives, such as existing legislation, conventions and certification marks. In addition to this it will already give implementation to the necessity the European energy ministers expressed in the Energy Council of June 2006 to develop sustainability criteria for biomass.

- The indicators have been formulated in such a way that they will be valid for all biomass flows and countries. Exclusion of product/country combinations is undesirable. On the basis of the proposed sustainability criteria, specific biomass flows can be excluded, however, since they do not meet the minimum requirements. For the testing of this generic framework, information is also requested specific to countries and/or raw materials, in which the dialogue with local stakeholders is of importance .
- The system to be developed must offer a long-term certainty about the direction desired. This means that a preview is given of how the system will be adjusted/extended in the future.
- The system concerns testable criteria for the use by the government (regulation), which, however, can also find a wider application on a voluntary basis with the various sectors/market parties. In some cases these criteria and their corresponding indicators are still in the making.
- The sustainability criteria express a lower limit (minimum requirements), with a scenario to impose stricter conditions later on. For this purpose testable milestones are put up, among which the elaboration of a certification pathway.
- An increase of the efficiency of agricultural systems is a condition for large-scale biomass production for energy, transport and chemistry. Eventually it will be necessary for management systems, also of conventional agriculture, to be improved.
- Within the certification process there will be sanctions, if basic conditions are not met. Parties are at liberty to distinguish themselves with (much) higher requirements than the lower limit. The burden of proof with reference to meeting the (basic) conditions lies with the provider of the bio-energy or biofuel in the Netherlands (applicant for MEP subsidy, obliged party in biofuel obligation).
- The criteria must be applied to the major sustainability problems and opportunities that occur at the moment in the production and trade of biomass, or those anticipated for the future.
- The sustainability requirements apply both to biomass originating from the Netherlands and to imported biomass. No distinction is made between residual flows and cultivation either.
- Attention must be paid to the effect of subsidies granted for the routes those biomass flows follow, and to the high quality of the eventual application.
- All biomass meeting the conditions of the EU directive for renewable electricity also counts for the Dutch renewable electricity objective. The application of sustainability criteria does not change this in any way.
- The testing of the sustainability indicators must be manageable. Only the necessary information will be asked for.
- Criteria that are drawn up must be verifiable and enforceable. In some regions the enforcement of local legislation is insufficient. The application of the criteria will then serve as an incentive to improve this situation.
- The policy instruments should contain incentives to increase the traceability of biomass.
- The system of criteria and indicators will gradually have to fit in with developments on EU level. At the moment the Netherlands with some other countries is running ahead of these developments. The Netherlands will have to play an active part in disseminating the sustainability indicators, so that more countries will be following and an international system can be set up.

3.3 Selection of Criteria and Indicators

On the basis of above vision six themes have been designated with criteria and indicators to assess the sustainability of biomass. The first three themes are specific themes, relevant for biomass. The last three relate to the triple P approach (People, Planet, Profit), which is considered the guiding principle for corporate social responsibility in general. These are the following themes:

- Greenhouse gas balance
- Competition with food, local energy supply, medicine and building materials
- Biodiversity
- Economic prosperity
- Well-being
- Environment

To be able to link these themes to criteria and indicators for sustainable production of biomass, use has primarily been made of existing conventions (GRI, ILO) and certification marks that have already been developed, or certification marks being developed (FSC, RSPO, RTRS and SAN¹). In appendix 1 an overview with references has been included. Since these certification marks are continuously under development, the most current version is referred to. Apart from this the project group has provided additional criteria and indicators.

The sustainability criteria are applicable to the chain of production as far as application. An exception to this is the 'Greenhouse gas balance' theme. Here the application is included, since a comparison is made with a reference situation. A further explanation of this can be found in 4.2.

The criteria have been formulated for application in 2007 and 2011. The 2011 date has been chosen, since the European directives for renewable electricity and for biofuels have a duration up to and including 2010.

For each theme the most important sustainability criteria have been selected, as well as the corresponding indicators. On the basis of these indicators the criteria can be assessed. Here a distinction can be made between performance and process indicators. Performance indicators are minimum guidelines and standards with regard to the performance that must be delivered. Process indicators are the procedures that must be followed. Together these indicators form the management system.

For the time being a number of criteria cannot be translated into testable indicators. In these cases an obligatory reporting procedure has been decided on. On the basis of the reports a further development of performance indicators can begin. Apart from this a reporting obligation enhances the transparency, facilitates the local dialogue, and meets the principles of corporate social responsibility. The reporting must at least prove that the criterion laid down is met. In the reports attention must also be paid to the commitment of local communities or NGOs. For each theme these may be different groups. In the course of time, as criteria are getting tougher, and certification proves to be possible, the necessity for the reporting obligation will become less urgent. The project group will work out the protocols for the reporting obligation in the second half of 2006.

In almost all themes (with the exception of the greenhouse gas balance) the dialogue with local stakeholders is required.

Sustainability is a continuous process of improvement and adjustment. In this report proposals are made for the situations from 2007 and from 2011 (see tables below).

- The proposed criteria for 2007 are minimum requirements that can be implemented in 2007 in the various policy instruments. Where possible the basic principle is to meet existing obligations according to international law, as well as to local legislation. Where international and/or local legislation regulations give us too little to go on, we have aimed at the formulation of other performance requirements. Where even this has turned out to be impossi-

¹ GRI: Global Reporting Initiative. ILO: International Labour Organisation. RSPO: Roundtable Sustainable Palm Oil. FSC: Forest Stewardship Council. SAN: Sustainable Agricultural Network. For references see appendix 1.

ble, process indicators have been formulated, aimed at the testing of obligatory reporting. With this the burden of proof in the reporting lies with the applicant.

- The criteria for 2011 go one step further and require active protection. Some criteria are not yet testable at this level. In the years up to 2011 work should be done to arrive at a good scientific substantiation of performance indicators. It is also important to mobilise further international support in this period. Evaluation of the operation of the criteria in 2010 is desirable to implement improvements in the system in 2011 effectively. From 2011 it will be possible to demand stricter requirements for cultivation for the production of energy, since the expected transition to perennial crops (second generation) has many advantages for, for instance, biodiversity and environmental themes. Moreover there will by then have been opportunities to hold discussions in a European context about sustainability criteria in possible new directives with regard to renewable electricity and transportation fuels.

The effects of the production of biomass can take place at various levels: micro level (effects of a particular plantation or industrial facility), meso-level (effects for the people living in the neighbourhood, residents in a region) and macro level (effects outside the immediate sphere of the production of raw materials that can nonetheless be attributed to it). Effects at the micro level have been included, while effects at the meso and macro levels have been taken into account where possible and relevant.

Although the survey has proved that many respondents attach importance to an indicator aimed at Genetically Modified Organisms (GMOs), no indicator has eventually been included for this. The views with regard to GMOs are divided, also in the project group, and the discussion about this is beyond the field of activity of the project group. In the future the results of the discussion held around the subject of food may help to clarify the views on biomass production.

Table 1. Criteria and indicators for sustainable biomass production from 2007.

Criterion	Indicator / procedure
<p>1. Greenhouse gas balance Net emission reduction compared with fossil reference, inclusive of application, is at least 30%. Here a strong differentiation of policy instruments is assumed, in which for instance a better performance would lead to more financial support.</p>	<ul style="list-style-type: none"> • Testing with the aid of calculation methods (Appendix 5). • Use of standard values for different steps in standard chains.
<p><i>For all the themes below a dialogue with national and local stakeholders is required.</i></p>	
<p>2. Competition with food, local energy supply, medicines and building materials Insight into the availability of biomass for food, local energy supply, building materials or medicines must not decrease.</p>	<ul style="list-style-type: none"> • Reporting obligation on the availability of biomass for food, local energy supply, building materials or medicines. Protocol for this will be worked out further.
<p>3. Biodiversity No deterioration of protected areas or valuable ecosystems</p>	<p>Comply with local requirements:</p> <ul style="list-style-type: none"> • Plantations must not be located in or in the immediate vicinity of 'gazetted protected areas' (areas protected by the government) or areas of 'High Conservation Value'. Reference year for ligneous feedstocks is 1994 [FSC 10.9], for palm oil 2005 [RSPO 7.3], and for other feedstocks 2006. • Reporting obligation in which other aspects of biodiversity come up for discussion. The protocol for this will be worked out further.
<p>4. Economic prosperity Insight into possible negative effects on the regional and national economy.</p>	<ul style="list-style-type: none"> • Reporting obligation according to, among other things, the Economic Performance Indicators, as expressed in the Global Reporting Initiative. A protocol for this will be worked out, in which indirect effects on the meso and macro-economy are taken into account.
<p>5. Well-being No negative effects on the social well-being of the workers and local population, taking into account:</p>	<ul style="list-style-type: none"> • Comply with Social Accountability 8000 and with the Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy compiled by the International Labour Organisation. • Comply with the Universal Declaration of Human Rights (concerning: non-discrimination; freedom of association; child labor; forced and compulsory labor; disciplinary practices; security practices and indigenous rights). • Comply with the following requirements: <ul style="list-style-type: none"> • No land use without the consent of sufficiently informed original users. • Land use is carefully described and officially laid down. • Official property and use, and customary law of the indigenous population is recognized and respected. • Reporting obligation about the social effects of biomass cultivation for local population, according to a protocol that will be worked out further. • Companies in the supply chain comply with the Business Principles for Countering Bribery.
<p>5a Working conditions of workers</p>	
<p>5b Human Rights</p>	
<p>5c Property rights and rights of use</p>	
<p>5d Insight into the social circumstances of local population</p>	
<p>5e Integrity</p>	

Criterion	Indicator / procedure
6. The Environment	
No negative effects on the local environment.	
This relates to:	
6a Waste Management	<ul style="list-style-type: none"> • Comply with local and national legislation and regulations. • Apply Good Agricultural Practice guidelines on integrated crop management.
6b Use of agro-chemicals (including fertilizer).	<ul style="list-style-type: none"> • Comply with local and national legislation and regulations.
6c Insight into the prevention of erosion and soil exhaustion, and conservation of the fertility level.	<ul style="list-style-type: none"> • Reporting obligation in which the following aspects come up. <ul style="list-style-type: none"> • Erosion management plan • Prevention of extensive cultivation on steep slopes, marginal or vulnerable soil. • Monitoring of the condition of the soil and management plan. • Nutrient Balance <p>The protocol for the reporting will be worked out further.</p>
6d Insight into the conservation of quality and quantity of surface and ground water	<ul style="list-style-type: none"> • Reporting obligation in which attention for use of water and water treatment. The protocol for this will be worked out further.
6e Emission to air	<ul style="list-style-type: none"> • Comply with local and national legislation and regulations.

Table 2. Criteria and indicators for sustainable biomass production from 2011.

Criterion	Indicator / procedure
<p>1. Greenhouse gas balance Net emission reduction compared with fossil reference, inclusive of application, is at least 50%. Here a strong differentiation of policy instruments is assumed, in which a better performance would lead to more financial support.</p>	<ul style="list-style-type: none"> • Testing with the aid of calculation methods (Appendix 5). • Use of standard values for different steps in standard chains.
<p><i>For all the themes below a dialogue with local and national stakeholders is required.</i></p>	
<p>2. Competition with food, local energy supply, medicines and building materials Availability of biomass for food, local energy supply, building materials or medicines must not decrease.</p>	<ul style="list-style-type: none"> • Comply with minimum requirements testable by means of performance indicators. These are developed on the basis of obligatory reporting from the period 2007-2010.
<p>3. Biodiversity No deterioration of protected areas or valuable ecosystems</p> <p>Insight into active protection of the local ecosystem</p>	<ul style="list-style-type: none"> • Comply with minimum requirements testable by means of performance indicators. These are developed on the basis of obligatory reporting from the period 2007-2010. • Further comply with the following requirement: <ul style="list-style-type: none"> • Plantations must not be located in or in the immediate vicinity of protected areas or valuable ecosystems. Reference year for ligneous feedstocks is 1994 [FSC 10.9], for palm oil 2005 [RSPO 7.3], and for other feedstocks 2006. • Reporting obligation on a "management plan for active protection of the local ecosystem".
<p>4. Economic prosperity No negative effects on the local and regional economy</p> <p>Insight into the active contribution to the increase of local prosperity</p>	<ul style="list-style-type: none"> • Comply with minimum requirements testable by means of performance indicators. These are developed on the basis of obligatory reports from the period 2007-2010. • Reporting obligation on the way in which active contribution is made to local prosperity. Here an open and transparent communication is expected with and, in consultation with, the local population.
<p>5. Well-being No negative effects on the social well-being of the workers and local population, taking into account:</p> <p>5a Working conditions of workers NO TIGHTENING</p> <p>5b Human Rights NO TIGHTENING</p> <p>5c Property rights and rights of use NO TIGHTENING</p> <p>5d Insight into the social circumstances of local population</p> <p>Insight into the active contribution to improvement of social circumstances of local population</p> <p>5e Integrity NO TIGHTENING</p>	<ul style="list-style-type: none"> • Comply with Social Accountability 8000 and with the Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy compiled by the International Labour Organisation. • Comply with the Universal Declaration of Human Rights (concerning: non-discrimination; freedom of association; child labor; forced and compulsory labor; disciplinary practices; security practices and indigenous rights). • Comply with the following requirements: <ul style="list-style-type: none"> • No land use without the consent of sufficiently informed original users. Land use is carefully described and officially laid down. • Official property and use, and customary law of the indigenous population is recognized and respected [FSC 3]. • Comply with minimum requirements testable by means of performance indicators. These have been developed on the basis of obligatory reports from the period 2007-2010. • Reporting obligation in which is described how an active contribution to the social circumstances of the local population is made. Here an open and transparent communication is expected with and, in consultation with, the local population. • Companies in the supply chain comply with the Business Principles for Countering Bribery.

Criterion	Indicator / procedure
<p>6. The Environment</p>	
<p>No negative effects on the environment. This relates to:</p>	
<p>6a Waste Management NO TIGHTENING</p>	<ul style="list-style-type: none"> • Comply with local and national legislation and regulations. • Apply Good Agricultural Practice guidelines on integrated crop management.
<p>6b Use of agro-chemicals (including fertilizer).</p>	<ul style="list-style-type: none"> • Comply with the strictest local, international and EU rules and regulations
<p>6c Prevention of erosion and soil exhaustion</p>	<ul style="list-style-type: none"> • Comply with minimum requirements testable by means of performance indicators. These have been developed on the basis of obligatory reports from the period 2007-2010.
<p>6d Insight into the conservation of quality and quantity of surface and ground water</p>	<ul style="list-style-type: none"> • Comply with minimum requirements testable by means of performance indicators. These have been developed on the basis of obligatory reports from the period 2007-2010.
<p>6e Emission to air</p>	<ul style="list-style-type: none"> • Comply with EU regulations.

4 Explanation of each sustainability theme

4.1 General

Below there will follow some general explanations of the sustainability criteria and indicators as formulated in tables 1 and 2:

- When reference is made to existing conventions and certification marks the most current version is always referred to. Most conventions and certification marks are still being developed; adjustments will also be followed in this system.
- In almost all themes (with the exception of the greenhouse gas balance) the dialogue with local stakeholders is required. To support businesses in the dialogue required here, the project group will develop a protocol for this in the second half of 2006.
- Information on the effects at the micro level (with regard to the business chain) can be delivered in a simple way by the companies within the chain; for information on effects at the meso level (local economy) it is essential that local stakeholders should be consulted. Apart from this it is important to follow effects at the macro level (global effects); The project group thinks it important that for this purpose national and/or worldwide monitoring programmes are set up preferably by governments. Development of knowledge and further insight into the practical applicability of criteria is desirable.

4.2 Greenhouse gas balance

Greenhouse gas emission reduction is one of the reasons to stimulate the use of renewable energy from biomass. However, during the production of some biomass raw materials substantial emissions of greenhouse gases are taking place, for example as laughing gas (nitrous oxide) during the production and application of fertilizer and as CO₂, when using energy for the production of raw materials or the conversion of forest to agricultural land. The quantity of greenhouse gases that is produced in a biomass supply chain, therefore, also carries weight in the assessment of this biomass.

To make demands on the greenhouse gas balance it will be necessary to be able to calculate the greenhouse gas performance unambiguously. To make a comparison possible with a reference situation it is important for the whole chain from cultivation to end use to be included. This means that the greenhouse gas emission reduction can only be calculated, once the application of the biomass is known. It is true the greenhouse gas emissions entailed by the cultivation and transport of the biomass can be calculated separately, but this says little about the degree of sustainability of this biomass. For greenhouse gas emissions are strongly dependent on the preliminary treatments that the biomass in the chain has already undergone.

Greenhouse gas performance is primarily important when determining the policy stimulating the use of biomass/biofuels. For one of the main objectives of the obligation for the admixture of biofuels for road transport and the Dutch MEP is the reduction of the CO₂ emissions. That is why it is also important to review the whole chain. Because of this the sustainability criterion greenhouse gas balance has a character that differs fundamentally from the other sustainability criteria. With the other sustainability criteria a sustainable production (cultivation) and trade is paramount. Important here are the sustainability preconditions that must be set out for the production and transport of biomass. The greenhouse gas performance is measured along the whole chain and is therefore dependent on the national reference. It is, therefore, not an absolute measure for the sustainability of a specific biomass flow, but a relative concept, dependent on its application and national circumstances.

Although the greenhouse gas performance is measured along the whole chain, it may be advisable also to report as far as the application what the CO₂ load is of each biomass route up to that moment in the chain. However, a relative judgement will not be given, since not the whole chain is considered. For the application phase of the biomass route can still change the greenhouse gas balance completely, both positively and negatively. To what degree the biomass can be qualified as sustainable for the (degree) of assignment of (Dutch MEP) subsidy or can qualify for the implementation of the obligation with regard to the use of biofuel for transport will, therefore, be determined on the basis of the greenhouse gas balance along the whole chain, inclusive of its application.

At an earlier stage CO₂ calculation methods have been developed by the Dutch government, for example for the UKR (Unieke Kansen Regeling) (Unique Chances Scheme). Initially the UKR method can be used; in a testing phase it can be refined and further standardized. Here the experiences gained in Wallonia may be useful. In the Walloon Region a system is in operation to appraise the CO₂ efficiency for bio-electricity.

The calculation methods, that will be discussed further in Appendix 4, take into account:

- Energy and fertilizer use during the production of raw materials, regulated by standard (tabulated) emissions
- Emissions involved with (indirect) change of land use
- Standard load per km international transport
- Energy use involved with conversion and conversion yield
- Economic allocation involved with by-products (on the basis of tabulated economic value). This, therefore, means that with the use of residual flows only limited greenhouse gas emissions are attributed
- The production and use of heat.

In the second bullet indirect change of land use is also included. Stimulating of biomass production may lead to the crowding out of other plants, which subsequently leads to the deterioration of biodiversity elsewhere. Soya that is cultivated on new plantations where there used to be primeval forests may, for instance, be the result of the fact that biomass for cultivation for the production of energy has taken up the original space. Only one small 'crowding out' may already lead to a negative CO₂ balance. In the calculation methods these negative greenhouse gas effects will be included. Indirect change of land use is also of importance for the 'biodiversity' sustainability criterion.

When calculating the CO₂ reduction, the efficient use of waste heat is also appraised. During the appraisal a link can be made with the existing CO₂ index for combined heat and power production.

To prevent having to carry out this calculation for each (small) biomass flow, a standard value can be calculated and published in advance for a set of standard chains (raw materials - product combinations). If an owner of biomass thinks that he is performing better than the standard value of a whole chain or of a part, he will have to prove this with the aid of the pre-determined methodology. The procedure for disputing generic parameters will, of course, also have to be established unambiguously.

Preferably the indicators and standard values will be determined annually. The standard value must start from the 'lower limit' of the uncertainty margin for each standard chain, since otherwise the greenhouse gas performance could wrongfully be estimated too high and, for example when the DUTCH MEP is applied, too much subsidy could wrongfully be granted. There is no danger that in this case the standard value would be determined too low, since the owner of biomass himself can prove he is performing better. However, it is important here to pay attention to the relation between the administrative burden of the reporting and the costs of higher standard values (subsidies wrongfully granted). Here the fact may be considered that businesses even in the case of 'only' following the standard values, will at all events have to report on the product and the chain (system limits) to be able to establish within which standard chain the product falls.

In the calculation method the greenhouse gas emission along the biomass chain will be compared with a relevant fossil reference chain. The comparison will take place on the basis of equal end use, for example:

- Compare ethanol with petrol
- Compare biodiesel with diesel
- Wood for electricity production with a reference that fits in with the protocol "Monitoring Sustainable Energy" used for determining the Dutch objective.

The emission reduction requirement for 2007 compared with a reference has been put at 30%: the use of biomass must reduce the greenhouse gas emission to at most 70% (100 – 30) of the emission of the fossil reference. The 30 % requirement corresponds with what may be reasonably expected of the present generation of biofuels from oil, starch and sugar crops, on the basis of well-known LCAs. After determining the exact method, the project group recommends this percentage for 2007.

On the basis of LCAs carried out earlier, taking into account relatively easily achievable efficiency improvements and the development of new fuels, it is reasonable to put the minimum requirement for 2011 at about 50 % greenhouse gas emission reduction.

When determining the minimum requirement (30% emission reduction for 2007 and 50% emission reduction for 2011), the starting point is a set of supporting instruments which is dependent on the degree of emission reduction on top of these percentages. Above the minimum requirement, the recommendation of the project group is, to let the subsidy, the minimum requirement, or inclusion for the obligation be strongly dependent on the extent to which the greenhouse gas emission is reduced, in a way still to be determined. This differentiation will only be dependent on the greenhouse gas emission reduction, and not on the other sustainability indicators. The latter criteria are minimum requirements which have to be met.

When working out the calculation methods, we will exemplify by means of a number of cases which variables are decisive in the calculation of the greenhouse gas balance.

In the long term the alternative use of the biomass in the reference situation should be taken into account. In other words: What would have happened to the biomass, if it had not been used in the Netherlands? If raw materials can realize a greater greenhouse gas emission reduction in the country of origin than in the Netherlands, it may be undesirable to transport them to the Netherlands. It will be examined to what extent cascading usage can be incorporated into the sustainability criteria for 2011.

The project group considers it desirable to realize, in the long term, at least 70 % emission reduction compared with the fossil references. This is possible by the application of innovative biofuels. In the case of electricity generation such percentages are already possible at the moment.

4.3 Competition with food, local energy supply, medicines and building materials.

The production of biomass for energy purposes may lead locally to competition with the production of food, building materials, energy supply and medicines. This involves competition for production factors such as raw materials, land, water and labour. This must be avoided wherever possible. The translation of this theme into criteria and indicators is uncharted territory, however, and so far it has not been included in any of the existing certification systems.

For the present a testing of this theme can only take place on the basis of obligatory reporting, in which the availability at local and regional levels of biomass for food, energy supply, building materials or medicines, and the relation, if any, with this cultivation for the production of energy is described. A protocol for this obligatory reporting will be compiled later. The project group considers the following subjects important to be included in this protocol:

- an analysis of possible effects on the prices for food, energy sources, building materials and medicines;
- the energy return per ha. It is important to gain an insight into the efficiency of the biomass production to guarantee that as few as possible farmlands will be lost for food production. However, here the type of soil used is of great importance. Stimulating energy return per ha may have the undesirable effect of the best farmlands being used for cultivation for the production of energy. The production of energy crops on marginal soils (not or hardly suitable for food production) is perhaps to be preferred, although the energy return is lower.

An extensive reporting obligation will only be required in cases where social and/or economic problems are to be expected by biomass production. This can be evaluated on the basis of the welfare standard of the region in which the activity takes place, for instance on the basis of the designation "developing country" of the United Nations. In the protocol guidelines for this will be included.

The project group emphasizes that it is important to give an early warning of possible competition with food production. The (global) monitoring of market developments and price fluctuations, preferably by governments will, therefore, be necessary.

4.4 Biodiversity

Biodiversity has to do with the variability of living organisms in ecological systems. For bio-energy especially the land and freshwater ecosystems are important. This concerns primarily the protection of endangered species, primaeval and tropical forests. The cultivation of biomass can contribute both negatively and positively towards biodiversity.

Biodiversity is seen globally as one of the cornerstones of sustainable development. This is formulated in the core objectives of the Biodiversity Convention of the UN:

- The conservation of biological diversity
- The sustainable use of the components of this biological diversity
- The fair and equal division of the proceeds of the use of genetic sources.

For this theme the demand is made that plantations must not be located in or in the immediate vicinity of 'gazetted protected areas' (areas protected by the government) or areas of 'High Conservation Value'. The reference year for this is, for ligneous feedstocks 1994 (in conformity with FSC criterion 10.9), for palm oil 2005 [RSPO 7.3], and for other feedstocks 2006. This can be checked on the basis of existing data on land use.

In addition to this for this theme a reporting obligation is proposed, in which elements are incorporated where as yet performance indicators are lacking. This obligatory reporting will examine the following themes:

- Change of land use
- Biodiversity
- Protection of the local ecosystem

The protocol for the obligatory reporting will be worked out further. In it an explanation will also be given of the above requirement. This concerns clear-cut definitions of 'gazetted protected areas' and 'High Conservation Value', and also where information can be found on which regions have this status. Other elements of the obligatory reporting can be (also see RSPO 5.2):

- The status of rare or endangered species, and of valuable habitats within the sphere of influence of the plantation or factory.
- The way in which the plantation/factory deals with this in management plan and in practice.

An important focus of attention with this theme is the indirect deterioration of biodiversity. Due to shifts in the market deforestation may, for instance, take place elsewhere. In the protocol this item will also be included.

The Natuur- en Milieuplanbureau (The National Institute for Public Health and the Environment) has worked out a method with which the biodiversity of a region can be quantified. The Natural Capital Index (NCI) is a combination of the abundance of species and the size of the area. This method also offers possible clues for the protocol that is to be developed.

The protection of the local ecosystem is described further under the theme Environment.

4.5 Economic prosperity

The economic prosperity theme concerns the influence of the activity (plantation, factory, etc.) on the local economy. Since performance indicators are lacking as yet, a reporting obligation will apply.

An extensive reporting obligation will only be required in cases where social and/or economic problems are to be expected by biomass production. This can be evaluated on the basis of the welfare standard of the region in which the activity takes place, for instance on the basis of the designation "developing country" used by the United Nations. In the protocol guidelines for this will be included.

A protocol is still being worked out for the reporting obligation. In this, among other things, the Economic Performance Indicators, as expressed in the Global Reporting Initiative will be included. These indicators relate to the country where the production of raw materials takes place. Elements for the obligatory reporting are:

- Costs of purchased goods, materials and services;
- Payments to (the most important) suppliers;
- Contribution to the economy in the form of wages and pensions, investment in human capital;
- Payment of taxes due and subsidies received;
- Donations to the community.

These reports can then be used for future minimum requirements. In these reports local circumstances, which can differ greatly, must be taken into account.

As an addition to the GRI report as from 2011 there will be included a description of how an active contribution to the local economic prosperity is supplied. Here an open and transparent communication is expected with and, in consultation with, the local population.

4.6 Well-being

Social well-being is subdivided into 5 sub themes:

- Working conditions of workers
- Human rights
- Property rights and rights of use
- Social circumstances of the local population
- Integrity

The ILO (International Labour Organisation) indicates the international standard for the working conditions of workers.

In principle sustainable biomass is impossible when human rights are violated during the biomass production and/or transport. For this it has to be tested if, during the biomass production, the Universal Declaration of Human Rights is respected.

The use of forest or land is not possible without the consent of the original users, on the basis of their informed consideration. The customary law of the indigenous population, whether or not officially laid down, must be observed. To assess this aspect FSC and RSPO are followed, who have formulated process indicators for this (RSPO 2.3; FSC 2 and 3).

To be able to assess the effects on the social circumstances of the local population a reporting obligation will apply initially. The protocol for this reporting will be worked out further. On the basis of the results minimum requirements can be formulated for the period from 2011. From then on an active contribution towards the improvement of the social circumstances of the local population is, therefore, expected, in co-operation with the local community. Obligatory reporting must take place on this.

Companies in the supply chain must comply with the Business Principles for Countering Bribery of the OECD. This means, among other things, that no exceptions to the local laws are accepted, and no bribes will be paid and/or received.

4.7 The Environment

The environment primarily relates to:

1. Waste management
2. Use of agro-chemicals (including fertilizer)
3. Prevention of erosion and soil exhaustion
4. Active improvement of the quality and quantity of surface and ground water
5. Emissions to air

For 2007 the environment management of the plantation with regard to the first four sub themes must comply with international or EU regulations/conventions and/or local/national legislation and regulations. For the sub themes 3 and 4 legislation and conventions are lacking. For this reason there will be obligatory reporting on these sub themes. The protocol for this will be worked out further. For this a link can be made with the requirements of conventional agriculture, as these are described in the Good Agricultural Practical guidelines of for instance EUREPGAP:

- Integrated Crop Management (ICM)
- Integrated Pest Control (ICP)
- Quality Management Systems
- Hazard Analysis and Critical Checking Points (HACCP)
- Health of workers, security, social well-being and environmental pollution and conservation.

In part a link can also be made with for instance RSPO: Prevention of extensive cultivation on steep slopes, marginal or vulnerable soils (RSPO 7.4).

For 2011 for the last two sub themes minimum requirements can be formulated on the basis of the reports from the period 2007-2010.

5 Certification

5.1 Introduction

The sustainability criteria as formulated in this report are part of a broader certification pathway for biomass. The sustainability criteria and indicators are the quality requirements that are set out for biomass. The certification system guarantees that these quality requirements are met.

The setting up of a certification system is a long-term process, and is, therefore, beyond the scope of the assignment of the project group. However, the assignment does imply starting the thinking process about certification. This chapter goes into the various possibilities for a certification system and what steps must be taken to work this out further.

The following section examines the various types of certification systems in greater depth. Apart from this the costs of a certification system have also come up for discussion in the project group. Section 3 goes into the additional costs of meeting sustainability criteria and the costs for certification itself. Section 4 rounds off with conclusions, recommendations and follow-up activities.

5.2 Certification systems

Certification can be based on different systems of following the biomass in the production and transport chain. Here can be distinguished:

- Chain of custody (Track-and-trace)
- Temporary decoupling
- Full decoupling

Chain of custody (Track-and-trace)

“Chain of custody” certification is the independent monitoring of a complete product chain from the source (for example forest) up to the last point of sale. Along the supply chain information is collected to map the whole chain of owners. The methods for monitoring that are being used comprise among other things:

- Annual chain monitoring of biomass producers/suppliers
- Statements by producers/suppliers
- Inspection of the chain of biomass deliveries
- Inspection of the quality of delivery and means of forwarding/transport
- Verification of documentation
- Combined monitoring methods leading to a closed monitoring chain.

The information collected does not necessarily “travel” with this transported biomass, but is usually registered in a database. “Track-and-trace” is the possibility to follow a product on its journey. The principle is very commonly accepted with respect to packages such as parcel-post packages. Biomass flows can also be followed, albeit to a more limited extent. The terms “Chain of custody” and “Track-and-trace” are often used indiscriminately, but in fact the latter is a necessary part of the former.

Temporary decoupling

At some points in the chain of the biomass deliveries the physical flow cannot be followed exactly. For example in a sawmill, the sawdust of FSC certified wood cannot be separated from non-FSC certified wood. The practical solution here is that if x % of the wood that goes into the sawmill is of FSC origin, also x % of the produced sawdust is supposed to be of FSC origin.

Biofuels for motor vehicles are often produced from a mixture of feedstocks, for example biodiesel from rape seed oil, palm oil and soya. It is then impossible, for instance, to declare a part of the product physically palm oil-free. On an administrative basis this can be done.

When international shipments take place, there would be an opportunity to change the cargo between different ports. That is why the shipment is “fingerprinted”, i.e. its characteristics (exact chemical composition) are measured in both ports, and these ought to be the same.

For situations where more than one product flow come together, where product flows are split, or where product flows cannot be followed temporarily, clear rules must be formulated. These are included, among other places, in Essent’s Green Gold Label.

Full decoupling

Within the electricity sector the principle of the physical traceability of the product is entirely departed from: “the green electrons cannot be distinguished from the grey ones”. In principle such a guarantee-of-origin system is possible for all kinds of products, also for tangible biomass feedstocks. In that case we also speak of a “book-and-claim” system. A plantation certified as sustainable sells its product on the regular market, in which the sustainability of the physical product is invisible. Instead of this it is recorded in a central database that a certain quantity of the sustainable product has been placed on the market. A buyer of a similar product elsewhere can buy and claim the sustainability, independent of the actual origin of the physical product he has bought.

An advantage of the system is that no closed “chain of custody” is needed anymore. The product can be transported, mixed and split up without limitation. The physical product flow can, however, in principle be followed. A drawback of the system is, therefore, that a product of which can be demonstrated physically that it has not been produced in a sustainable way at all, can be made sustainable by buying such a certificate.

Conclusions and recommendations

In view of the present discussions in the media, the project group expects that at the moment no social support base exists for full decoupling of the biomass flow and the sustainability certificate. Moreover there is a great difference between electricity production (where book-and-claim is actually being used) and the biomass market. With regard to electricity production there exists a certification strongly sanctioned by the government. This is lacking with biomass. Apart from this the market for biomass is developing rapidly and biomass production will increase sharply in the years to come. Therefore a strong incentive for biomass producers to produce sustainably will be necessary.

The project group is of the opinion that the origin of the physical biomass flow must be known to be able to test it for sustainability. Therefore it is necessary to set up a track-and-trace system for the years to come, since at the moment the tracing of flows is not completely possible yet. In the second half of this year it must become clear how much biomass can be traceable in 2007 and at what pace the traceability would have to increase. For this it has to be made transparent for each business what part of the biomass is traceable. If necessary a distinction will be made between different biomass flows. In the longer term it can be considered if a system in which the sustainability certificate is temporarily decoupled from the physical flow would offer any advantages.

5.3 Additional Costs of Certification

The additional costs of certification of biomass can be divided into two different cost aspects:

- additional costs to meet sustainability criteria for the production and transport of biomass. Examples are measures against soil erosion, or an investment in a wastewater purification plant in a factory.
- the costs of monitoring the compliance with the sustainability criteria and the physical traceability of the product. Components of these costs are, for example, the costs of field study by a certifier or administrative costs. In addition to this there are the costs of physical traceability (chain of custody/track-and-trace), for instance the sampling of palm oil during loading and unloading.

Below some rough cost estimations are given of the above aspects.

Costs to meet sustainability criteria

Research by Utrecht University shows that the costs for meeting sustainability criteria can be substantial. Estimates vary between 8-65% additional costs, but there are also examples in the food processing industry of declining costs. The height of the costs is greatly dependent on the number of and the strictness of the criteria, the costs of production land and labour, the type of biomass and possible by-products.

Costs for certification and traceability

Costs for enforcing and monitoring are greatly dependent on the scale of the production company. Large companies can easily pay the costs of monitoring, small companies less so. The possibility of group certification of several small companies at the same time is, therefore, important. The costs are also greatly dependent on the number of sustainability criteria and the expertise required. For instance, an FSC-inspection will cost about five times as much as, for instance, an inspection for ISO standards. Estimations of costs amount to between 0.1 - 1% of the overall costs of the main product. In the bulk markets for agrarian feedstocks a track-and-trace system will, however, lead to the necessary logistical and practical problems and the costs involved. This applies particularly to the liquid fuels, in which it will be difficult and very expensive to keep the different parties apart. How, in this light, a certification system would have to be given shape must, therefore, be worked out further.

5.4 Conclusions and recommendations for a certification system to be developed

On the basis of discussions in the project group and during the working conference, the project group makes the following recommendations:

- A certification system must initially be founded on a track-and-trace system, in which the traceability of the biomass is guaranteed. A consideration here is that complete traceability in the short term is practically impossible. That is why a transition period will be necessary. Another focus of attention are residual flows, because possibly their traces may be less simple to recover.
- It is of great importance that there should exist possibilities for group certification, to guarantee that small producers are not excluded. Even a supplement to the price for the biomass on the basis of a certificate can serve as an incentive for small businessmen, in which case, as a matter of fact, the uneconomic top for the application of the biomass will increase.
- The possibilities must be examined if a company can have itself certificated, and how this relates to the certification of the biomass flow.
- As much as possible a link must be made with existing certification systems, to limit the administrative burdens and costs wherever possible. A connection can be made with systems such as the Green Gold Standard (Essent, Solidaridad). Here it is also important to learn as much as possible from other initiatives, such as the system that is being developed in the US for the second generation of transportation fuels.

- Within the project group there is a difference of opinion about the development of the certification system. On the part of the trade in liquid fuels a system of marketable certificates is advocated. The majority of the project group sees track-and-trace as a desirable perspective.

The elaboration of a certification system is a responsibility of the market. To support the market in the first steps towards a certification system, the government can:

- contact reliable certifiers
- share expertise in a workshop
- gain experience in pilot projects.

6 Follow-up activities project group

With the selection and description of testable sustainability indicators the project group has completed its assignment. In the short term, however, a further elaboration will be necessary to be able actually to incorporate the sustainability indicators into Dutch policy, such as the DUTCH MEP and the obligation biofuels. There is a great need for practicable protocols to be able to report on the sustainability criteria and indicators. Unfortunately the project group has not got round to selecting at least three model projects to test the criteria.

The project group anticipates the following activities for the second half of 2006.

1. Elaboration of a protocol for the required dialogue with local/national stakeholders with respect to the reporting on sustainability indicators. Relevant to this is a current study of some NGOs, funded by the Ministerie van VROM (the Department of Housing, Spatial Planning and the Environment), into the perspectives of various stakeholders in countries producing biomass for export to Europe².
2. Elaboration of protocols for reporting obligations with the various sustainability indicators (see also chapters 3 and 4):
 - Competition with food, local energy supply, medicines and building materials
 - Biodiversity
 - Economic prosperity
 - Well-being: section 'Social Circumstances' (5d)
 - Environment: sections 'Prevention of Erosion' (6c) and 'Water' (6d).
3. Determining calculation methods for greenhouse gas balance. Here insight will be provided into which biomass technology combinations can meet the minimum requirements and which cannot.
4. Identification and preparation of pilot projects, incl. (financial) structure and supervision. This would have to take place in close cooperation with the "Platform Groene Grondstoffen" (the Platform Green Raw Materials), one of the platforms of the Energy Transition. The aim of the pilot projects is to develop and test performance indicators for 2011 and to gain the necessary practical experience with them. These are, therefore, ambitious projects that are in need of additional financial support. In the second half of 2006 insight will have to be gained into the performance indicators that would have to be tested in the pilot projects. This can be done by translating the reporting obligations into (examples of) performance indicators. By means of the pilot projects the scientific substantiation of the sustainability criteria will be enhanced.
5. Setting up a structure to guarantee a further development of sustainability indicators. In the second half of 2006 the project group can prepare a recommendation for a structure, in which the following activities must find a place:
 - Monitoring and evaluation application sustainability indicators 2007
 - Developing performance indicators for 2011 on the basis of sufficient scientific substantiation
 - Following pilot projects
 - Starting a certification process, in which solutions are sought for the impediments that currently exist for the traceability of biomass.

The project group proposes that the above activities be worked out by the present project group "Sustainable production of biomass" in close consultation with the various stakeholders.

² Import biomass: contribution to social discussion from the point of view of producing countries; CREM, Both Ends, Stichting Natuur en Milieu en COS Nederland

7 Conclusions and recommendations

Conclusions

The project group has formulated a set of generic sustainability criteria and corresponding indicators. For this they have followed the triple P approach (people, planet, profit) and aimed at keeping in line, as much as possible, with already existing conventions and certification marks. Via a web survey and working conference a great number of stakeholders have been consulted on the approach and the drafted sustainability criteria. This consultation proved that there is a broad support base for the starting-points that were chosen and, broadly speaking, also for the sustainability indicators. Suggestions for improvement have been incorporated wherever possible in the final version. Representatives of NGOs have indicated by a letter of 12 July to the chairperson of the project group that, as far as they are concerned, the level of ambition should lie higher than proposed by the project group. In the system that was developed sustainability criteria for 2007 are distinguished from those for 2011. In the criteria for 2007 minimum requirements are formulated to prevent unacceptable biomass flows from being used. The criteria for 2011 have been tightened and are aimed at providing an active protection of nature and the environment and of the economic and social circumstances. For some sustainability criteria it has proved impossible to formulate performance indicators. In such cases a system has been chosen in which in 2007, where necessary, use is made of a reporting obligation. On the basis of the experience that will be gained with this reporting obligation performance indicators can be developed for 2011.

To be able to test for sustainability it will be necessary for the origin of the physical biomass flow to be known. A certification system must preferably be based on a track-and-trace system, in which the traceability of the biomass is guaranteed. A focal point of attention here is that, in the short term, this would seem not to be completely feasible. That is why a transition period will be necessary. In the longer term it can be considered if a system in which the sustainability certificate is temporarily separated from the physical flow would offer any advantages.

The project group is aware that the proposed sustainability criteria must be integrated into political and policy frameworks at the national, EU and WTO levels. The preparation of this integration is, however, outside the scope of its assignment.

Recommendations

The project group makes the following recommendations.

General

Biomass offers great opportunities for the transition to a sustainable energy management. However, a rapid global increase of the production and use of biomass may possibly entail great ecological, social and/or economic risks. That is why the project group argues for a careful development of the use of biomass for energy, transport and chemistry. In this way adjustments can be made well in advance, if undesirable effects should occur. Apart from this it is important to identify the positive effects of biomass. Cultivation for the production of energy can generate financial resources that create the possibility of further-reaching professionalizing and efficiency in regions with conventional agriculture. This is essential in eventually preventing competition between biomass for food, energy and feedstock, as well as degradation of farmlands. In this context it is of importance that the Dutch government together with other EU countries should take the initiative in the setting up of national and/or worldwide monitoring programmes to be able to recognize negative effects in time.

The project group has not taken up a position on the use of Genetically Modified Organisms (GMOs). The views with regard to GMOs are divided, also in the project group, and the discussion about this is beyond the field of activity of the project group. In the future the results of the discussion held around the subject of food may help to clarify the views on biomass production.

For a transition to large-scale use of biomass for energy, transport and chemistry improvements in conventional agriculture will be necessary. An improvement of agricultural efficiency is required to

avoid competition with food production. This also means an opportunity for conventional agriculture. The biomass market offers (financial) possibilities to focus on improvements in agriculture. This can be influenced by eventually tightening up the sustainability requirements for the production of biomass.

The project group has developed sustainability criteria for biomass for chemistry, transportation fuels and the generation of energy. Food, feed and fuel are, however, difficult to look at separately. It is important that eventually also sustainability criteria should be developed for food and cattle feed to prevent shift effects taking place.

Translation into policy instruments

A careful translation of the sustainability criteria into policy instruments is essential. Here a transitional phase is needed for existing contracts for transportation fuels. In the case of the DUTCH MEP applies that for already existing orders the terms will not be changed.

When introducing it as an instrument of policy, it would seem advisable to make the subsidy within the framework of the Dutch MEP and the inclusion in the obligation biofuels dependent on the extent to which greenhouse gas emissions have been reduced. This differentiation will concern only the greenhouse gas balance and not the other sustainability criteria. The latter criteria are minimum requirements which have to be met.

In addition to the financial instruments accommodating policy will be necessary to guarantee a good implementation of the sustainability criteria. This concerns, among other things, communication instruments to give sufficient publicity to the sustainability criteria and to see to a broad support base.

Follow-up activities

It will be necessary to develop further the proposed sustainability indicators in the second half of 2006 to enable integration into government policy. This concerns the elaboration of protocols for the reporting obligations, the calculation methods for the greenhouse gas balance, the selection and planning of pilot projects, the policy of dialogue with stakeholders and the setting up of a structure to make certification and further elaboration of performance indicators possible. It would seem desirable also to involve stakeholders from the countries producing biomass, when working out further the protocols and indicators.

To develop performance indicators for 2011, built on a scientific basis, further research would seem necessary. For this purpose use can be made of the information that will be available in the obligatory reports in 2007. In order to complete formulating performance indicators in time, it will be necessary to start the necessary research at an early date. This can be set up in co-operation with the "Platform Groene Grondstoffen" (the Green Raw Materials Platform), one of the platforms of the Energy Transition.

The project group is prepared in its present composition to take care of the execution of the above follow-up activities. In view of the complexity of the subject and the know-how acquired there will be added value in having the present project group carry out this assignment. Moreover a structure has been set up in which the members of the project group will communicate on a regular basis with the major stakeholders from their own backgrounds. In the discussions this has proved to be very useful.

Appendix 1. References to conventions and certification marks

GRI: Global Reporting Initiatives: www.globalreporting.org

ILO: International Labour Organisation: www.ILO.org

RSPO: Roundtable Sustainable Palm Oil: www.sustainable-palm oil.org

RTRS: Roundtable on Response Soy: www.responsiblesoy.org

EUREPGAP: Euro-Retailer Production Working Group (EUREP) Good Agricultural Practices (GAP):
www.eurepgap.org

FSC: Forest Stewardship Council: www.fsc.org

SAN: Sustainable Agricultural Network: www.rainforest-alliance.org/programs/agriculture/san

Appendix 2: Results web survey

It is important that the criteria to be drawn up should have a broad social support base. That is why the project group has posted a questionnaire to ask the opinion of a large number of respondents on this subject. The web survey has been carried out by the environmental consultancy CE, solutions for environment, economy and technology.

The web survey has been posted among 250 Dutch stakeholders. The list of stakeholders has been compiled with the aid of the members of the project group, who each provided the major stakeholders from their own background. In all 104 respondents have reacted (over 40%). This is very high for such a digital questionnaire. The response of the different groups: NGO, government, private sector, financial institutions and knowledge centres was sufficient to be able to make a distinction when processing the results. The results of the survey are described in the report "Results Survey Sustainable Import Biomass" (CE, June 2006). Below there follows a summary.

Sustainability test in general

- A majority of the respondents consider a sustainability test for biomass possible, provided adequate sustainability requirements are set out (68%).
- Practically all respondents think that the sustainability criteria must apply to all applications with regard to biomass (90%). It would, therefore, seem advisable to examine what part the sustainability criteria drawn up can eventually play a part in other sectors (food, products and cattle feed).
- The issue if sustainability criteria must be dependent on the production region is judged very differently by the respondents (half for, half against).
- Many NGOs think that sustainability criteria should be specific for each biomass flow (50%), in contrast to the private sector, which argues for an equal set of criteria for all flows.
- A majority of the respondents thinks that biomass criteria must apply to both projects with and those without subsidy.
- A large majority indicates that subsidy for biomass must be dependent on the degree of sustainability (72%) and then notably also on the CO₂ emission reduction, because this is seen as the most important factor.

Aspects in the sustainability test

- The eight aspects ('food supply', 'nature', 'economic prosperity and social well-being', 'working conditions', 'environmental conservation', 'soil quality' and 'water quality') that were proposed originally by the project group, gain massive support with percentages between the 88% and 100%.
- With respect to the importance attached to the different aspects, it is remarkable that the CO₂ reduction scores best with 20%, immediately followed by nature and biodiversity (13%) and food supply (11%).
- NGOs clearly attach a more uniform importance to the different aspects than the overall group and the private sector.
- The six additional aspects provided by NGOs score differently, but a majority of the respondents thinks that 'deterioration of nature by shift effects', 'self-determination and fundamental rights', 'participation and human rights' and 'integrity corruption and fraud' should be part of every sustainability test. However, less importance is attached to these aspects. The advice is, therefore, to include these as subsaspects along with the eight aspects already selected by the project group.
- With respect to the GMO aspect there is a great difference of opinion between NGOs and businesses. Approx. 75% of the NGOs wishes to include this and only 10% of the companies. For a good support base it would seem advisable to meet the NGOs halfway in this matter. This can for example be done for the environmental protection aspect by reducing the risks of GMO, by setting out American requirements in 2007 and EU rules from 2010.
- Spontaneously a number of aspects have also been added. Remarkably often attention for small-scale family farming and as high a yield as possible and CO₂ reduction per hectare agricultural land are mentioned. This last item can be used to give practical shape to the aspect 'prevention of competition with food production'.

Criteria for each aspect in the sustainability test

On the basis of the answers of the respondents it is recommended to use the following criteria for 2007 and 2010. Here the response that, on the average, is mentioned most is always recorded or alternatively the median of the responses.

Aspect	Recommended criterion for 2007	Recommended criterion for 2010
CO ₂ balance:	Minimum reduction 30%	Minimum reduction 45%
Food supply	Locally no scarcity of food, energy, medicines and building materials due to biomass production	Locally no scarcity and disruption of the food, energy, medicines and building materials supply
Nature and Biodiversity	Businesses must report on the biodiversity effects of biomass plus no deterioration valuable nature reserves	The 2007 requirement plus active protection of the local ecosystem where biomass production is taking place.
Economic prosperity and well-being	Businesses must report on the economic prosperity and social well-being effects of the biomass they produce + rights local population are respected	The 2007 requirement + that biomass production will in principle not be at the expense of economic prosperity and social well-being of the local population. Decline will be compensated
Working conditions	Working conditions meet local legal requirements / workers can organise themselves in a trade union	The preceding requirement plus that working conditions meet ILO (International Labor Organization) requirements
Environmental protection	Compliance with local legislation in the field of waste materials, pesticides and herbicides, fertilizer, noise, stench, emissions and safety. Compliance with the American GMO legislation	Compliance with local and EU legislation in the field of waste materials, pesticides and herbicides, fertilizer, noise, stench, emissions, GMOs and safety and the obligation of ISO 14001
Soil quality nutrient balance	Meet local legal requirements	The preceding requirement plus the use of an erosion management plan / no decline of soil thickness, carbon storage and fertility
Water quality	Meet local legal requirements	The preceding requirement plus retaining the quality and availability of surface area and ground water

- With practically all aspects the testing of these criteria gave the same picture. For 2010 there is reasonable agreement about criteria. NGOs want to be somewhat stricter than the rest of the respondents. For 2007 NGOs clearly want stricter criteria than the average respondent and businesses clearly less strict ones. In the above table it is indicated which criterion on the basis of the survey is the best selection for 2007 and 2010.

Appendix 3: Report working conference “Sustainable production of biomass”; 15 June 2006

To make possible a good response from the actors involved the draft sustainability indicators have been discussed during a working conference on 15 June 2006. The results of the survey that had been conducted had already been incorporated in this draft. The list of Dutch stakeholders has been compiled with the aid of the members of the project group, who each provided the major stakeholders from their own background. In addition to this a great number of stakeholders were invited, because they had shown an interest in attending the working conference. In all 72 persons have participated in the working conference.

The most important objective of the working conference was to hold a discussion on the proposed sustainability indicators. During the working conference two sessions of three parallel working groups have taken place:

Session I

1. General aspects
2. Greenhouse gas balance
3. Biodiversity

Session II

4. Competition with food, local energy supply, medicines and building materials
5. Economic prosperity, social well-being and the environment
6. Certification and verification

During the meetings of the working groups constructive discussions have taken place. Where necessary, suggestions and remarks have been adopted in this final report. The following elements have come to the fore in the discussions.

Efficient use of biomass

Do the sustainability indicators stimulate a use of the biomass that is as efficient as possible? Of importance here is the energy return per ha. A number of participants thinks this is an important criterion to include. As a counterargument it is brought forward that this criterion will entail risks. The yield per ha is dependent on the quality of the soil. If yield per ha is aimed at, this can put a huge strain on the best farmlands. The production of energy crops on marginal soils (not or less suitable for food production), with a lower energy yield, is perhaps to be preferred after all. The degree of efficiency is also expressed in the greenhouse gas balance.

Manageability of the system

It is concluded that within the framework of corporate social responsibility much experience has been gained with sustainability criteria. On the basis of this experience it is considered possible to make the indicators testable and manageable. A minority thinks that the system is not practicable. The choice for an integral approach (people, planet, profit) is broadly supported.

Application sustainability indicators

The sustainability indicators will find a wider application than only in the Dutch MEP and the obligation biofuels. During the working conference financial institutions indicated they have a great need for testable criteria for financial services. Property development is stagnating here in the absence of the sustainability indicators.

Traceability biomass flows

At the working conference the question was raised if the traceability of the biomass flow is a requirement for assessing the biomass as sustainable. This is generally seen as the basic principle behind the sustainability indicators. If the origin is not clear, the sustainability indicators cannot be evaluated and the biomass, therefore, does not meet the requirements set out.

Dialogue with national and local stakeholders

Great importance is attached to the dialogue with national and local stakeholders, not only in the obligatory reports, but also in the further elaboration of protocols and performance indicators.

Greenhouse gas balance

The majority of the participants thinks that the sustainability indicators must make it possible that in 2007 the first generation of transportation fuels will be eligible for Dutch MEP subsidy. It is considered important to take into account indirect shift effects (cutting down forests elsewhere) in the greenhouse gas balance.

Competition with food

Due to the great demand for biomass the strain on available agricultural areas will increase. It is essential that the efficiency of agriculture should increase. That is why the gradual development of biomass for energy, transport and chemistry is also important.

Detrimental effects

With many sustainability criteria the formulation 'no detrimental effects to' has been included. At the working conference it came to the fore that attention had better be focussed on improvements of the (local) situation and to allow or encourage compensations of limited negative effects. It is practically impossible to comply with an absolute ban on all negative effects. This would pave the way for one-sided reports, while on the contrary there is a need for honest, transparent information.

Appendix 4: Stakeholders consulted

The list below gives a survey of stakeholders consulted in the working conference and other meetings. In it the respondents of the survey have not been included, since these data have been processed confidentially.

Argos Groep B.V.	Milieudefensie (Dutch Environmental Defence Association)
ASN Bank	Milieufederatie Noord-Holland
Biox	Ministerie van Buitenlandse Zaken (Dutch Foreign Office)
BTG Biomass Technology Group B.V.	Ministerie van Economische Zaken (Ministry of Economic Affairs)
Carboncapital Solutions	Ministerie van LNV Directie Kennis (Ministry of Agriculture, Nature (Management) and Fisheries, Directorate for Knowledge)
Cargill	Ministerie van VROM (Department of Housing, Spatial Planning and the Environment)
Cefetra	Nedalco
CE-Transform	Netherlands Development Finances Company (FMO)
COGEN Project (project group Biomass & WKK)	Nuon Energy Sourcing
Copernicus Instituut, Utrecht University	Oxfam Novib
Cordaid	Platform Bio energie (Platform Bio energy)
COS North Holland	Platform Groene Grondstoffen (Platform Green Raw Materials)
DHV Mobiliteit en Verkeer (DHV Transportation and Infrastructure)	Platform Hout (Platform Wood)
dutCH4	Productschap Margarine, Vetten en Oliën (Commodity Board for Margarine, Fats and Oils)
Ecofys	Rabo Groen Bank B.V.
Eneco Energie	Rabobank
Elektrabel	SenterNovem
Essent Energie BV	Shell Nederland
EuropaBio	SMK
Exxon Mobile/Esso the Netherlands B.V.	Sonac
Gelderse Milieufederatie	Sovion N.V.
GiPP Energy	Stichting Natuur en Milieu (Foundation Nature and the Environment)
Greenpeace	TU Delft
Grontmij Nederland B.V.	Unilever
ICCO	Utrecht University
IUCN	Wageningen UR
Iveco	Wereld Natuur Fonds (World Wide Fund For Nature)
K.O.G. Edible Oils B.V.	WNF
Kema Nederland B.V.	
LLTB/LTO Duurzame energie (LLTB/LTO Sustainable Energy)	
Milieuadviesbureau CE (Environmental Consultancy CE)	

Appendix 5: Calculation greenhouse gas balance

5.1 Development of the calculation methods

- The calculation methods make use of those used for the Nederlandse UKR (Unieke Kansen Regeling) (Unique Chances Scheme), life cycle assessments (LCA) of biomass and biofuels, the advice of the working group CO₂ balance (transition biomass 2004) and experiences in Belgium and the United Kingdom.
- With the module that was developed a number of standard chains (raw materials - product combinations) are evaluated. On the basis of the results the government can determine a minimum score that has to be realised absolutely or on average by all biofuels. The minimum average score can be readjusted annually.
- The owner of the biomass can report the standard value of known raw material-product combination (if known). If he thinks he can score better for certain parts, he can report his score in accordance with the calculation method. In the calculation of the score parties may deviate from the standard values, provided they can prove (by means of chain-or-custody) that they score better with respect to the components in question. By using conservative assumptions in the standard chains, parties are stimulated to prove, via the reporting, they are performing better.
- Some parameters in the calculation module cannot be disputed, but they are subject to change and thus affect the calculation. A procedure will have to be agreed upon for the periodical adjustment of these parameters.

5.2 The calculation method

The calculation method divides the biomass chain into four parts:

- Production of raw materials
- (International) transport
- Conversion
- End use

For each step the greenhouse gas emission is calculated, expressed for each quantity of product supplied at the end of the chain (per GJ fuel).

Production of raw materials

The most important factors in the production of raw materials are the use of machines and of fertilizer.

The use of machines (tractor) will immediately lead to CO₂ emission as a result of the combustion of diesel.

The use of nitrate fertilizer leads to CO₂ emission as a result of production, and N₂O emission as a result of both production and the application of the fertilizer. Dependent on the production technology and emission reduction technologies used, this emission can be much smaller in the future.

Especially when there is a change of land use, soil effects are important for the greenhouse gas balance. With deforestation a lot of the carbon stored in the soil is suddenly released, with negative consequences for the greenhouse gas balance. During the operation of the plantation, carbon is stored in the soil again, but possibly the same storage level will only be attained after many years. In the English calculation module this change in the carbon storage of the soil is taken into account. In this way deforestation is considered from the beginning as a measurable negative factor.

In the long term the alternative use of the biomass in the reference situation should possibly also be taken into account. Especially with biomass that is (or can be) used on the spot as cattle feed, the indirect CO₂ emission due to additional production of other raw materials for this cattle feed is substantial (up to 50 % of the CO₂ emission reduction can be lost with this). When the energy supply in the country of origin, in the absence of the biomass, switches over to, for instance, lignite, while in the Netherlands it replaces a much more efficient application of fossil fuel, then this will contribute negatively to the overall CO₂ balance.

If, however, the alternative generation of energy would, for example, be hydropower, or the wood in

the reference situation would be incinerated or dumped without the generation of energy, then the greenhouse gas balance would be improved additionally by the use in the Netherlands.

For the requirements for 2007 and 2011 it is proposed not to count on hypothetical optimum use of biomass on the spot.

Transport

Generally speaking, the contribution of transport (carriage of feedstock to conversion installations) to the overall greenhouse gas burden is small. Particularly the emission from the international transport of biomass is often smaller than expected, because of the great bulk a sea-going vessel can carry. Sometimes local transport in the country of origin makes a significant contribution, when inefficient transport by truck over long distances takes place.

Conversion

The greenhouse gas emission during conversion is caused by the use of external energy and materials (electricity, gas).

As a consequence of conversion all the emission loads up to just before the conversion point must be divided by the conversion yield.

Furthermore with conversion, primarily the allocation to by-products (on the basis of price) is important, see Section 5.4

5.3 Comparison

The choice for end use determines the comparison on the basis of which the emission reduction can be established.¹ For this it will not be absolutely necessary to make assumptions about the efficiency of the end use, if we assume that the fuels have the same efficiency (per unit of energy) as their reference. For example: running a car 1 km on biodiesel is compared to running a car 1 km on diesel. Since both fuels have practically the same energetic efficiency with end use, 1 GJ biodiesel can also be compared to 1 GJ diesel.

We make the comparison on the basis of the biomass component in the biofuel and compensate for the fossil components in some biofuels, such as methanol in biodiesel and isobutylene in ETBE.

5.4 Further arrangements about allocation

The greenhouse gas calculation takes into account by-products to which a part of the CO₂ load may be attributed. The consequence is that if the value of these by-products changes, for example due to a falling market, the calculation for a chain otherwise remaining the same will lead to a different result.

The value of main products and by-products will, therefore, have to be determined periodically by means of an unambiguous method. This can be done best on the basis of statistics of an existing trading floor accepted by the sector.

The value to be used for all relevant products must be published before the beginning of each year.

In order to cushion possibly temporary and unexpected market fluctuations somewhat, the value to be used can be calculated from the average of the value of the preceding year and the market value found.