JATROPHA HANDBOOK

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ANNEX TO CHAPTER 6 (OF 6)

Project implementation

Multilateral funding agencies

The following multilateral agencies provide programs to accelerate and facilitate investments in renewable energy programs. The support can consist of grants, loans or guarantees.

Agency	Name Program	Website	Focus / conditions
European Commission (EC)	ENRTP[1]	http://ec.europa.eu/europeaid/where/worldwide/environment/working-documents_en.htm	Environmental protection
	GEEREF	http://ec.europa.eu/environment/jrec/energy_fund_en.htm	Renewable energy; fund of funds: no direct project funding
Global Environ-ment Facility (GEF)	Small Grant Program (SGP)	http://sgp.undp.org/	Projects up to 50 000 US$
	Medium-Sized Projects (MSPs)	http://www.gefweb.org/interior_right.aspx?id=16674	Projects up to 1 million US$
	Full-Sized Projects (FSPs)	http://www.gefweb.org/interior_right.aspx?id=16674	Projects over 1 million US$
World Bank	Climate Investment Funds (CIF)	www.worldbank.org/cif http://go.worldbank.org/58OVAGT860	
Global Village Energy Program (GVEP)		http://www.gvepinternational.org/funding/	See website
AfDB (African Development Bank)	FINESSE	http://finesse-africa.org/	FINancing Energy Services for Small - Scale Energy Users
	Clean Energy Investment Framework (CEIF)	http://www.afdb.org/en/topics-sectors/sectors/environment/climate-change-mitigation/	See website
ADB (Asian Development Bank)	Clean Eergy Program	http://www.adb.org/Clean-Energy/funds-partnerships.asp	Various funds, see website
IADB (Inter-American Development Bank)	FOMIN	http://www.iadb.org/mif/We_fund.cfm?lang=en	Latin America, enterprise development, mixed grants/loans possible
	SECCI	http://www.iadb.org//secci/	Latin America
BCIE	ARECA	http://www.bcie.org/spanish/banca-inversion-desarrollo/desarrollo-competitividad/areca.php	Central America, "Acelerando las Inversiones en Energía Renovable en Centroamérica"
SICA	AEA	http://www.sica.int/energia	Central America, grants up to 50 000 EUR
UNEP	SEFI	http://www.sefi.unep.org/	Organises funders; no direct project funding
UNIDO	Renewable and Rural Energy	http://www.unido.org/index.php?id=o24839	See website

Development organisations

The following list gives an overview of development organizations (both private and public) that have funding lines for renewable energy projects in particular. Development organizations generally

[1] Thematic Programme for Environment and Sustainable Management of Natural Resources, including Energy.

provide grants. The project must have clear social objectives and innovative elements (pilot project or demonstration project) in order to be successful. For large scale replication, social venture capital may be a more appropriate source. The following gives an overview of some of the many funding sources.

Agency	Name Program	Website	Focus / conditions
REEEP		http://www.reeep.org/	See website
UN Foundation	Clean Energy Development	http://www.unfoundation.org/global-issues/climate-and-energy/clean-energy-development.html	See website
Senternovem (The Netherlands)	Daey Ouwens Fund	http://www.senternovem.nl/daeyouwensfund/index.asp	Small-scale renewable energy projects in Least Developed Countries. € 100 000 to 2 500 000. Max 50% of total cost.
Dutch Ministry of Foreign Affairs	Private Sector Investment Program (PSI)	http://www.evd.nl/business/programmes/programmaint_psi.asp?land=psi	Investment subsidy (up to 50-60%) for investments in developing countries
Shell Foundation		http://www.shellfoundation.org	See website
Energy Foundation		http://www.ef.org/app_guidelines.cfm	Only China (and USA).
Blue Moon Fund	Rethinking Consum-ption and Energy	http://www.bluemoonfund.org/	Asia and Latin America
Rockefeller Brothers Fund	Cross-Programmatic Initiative: Energy	http://www.rbf.org/	Only South Africa and China (and USA)

Many development organizations that do not have a particular focus on renewable energy projects, have funded such projects in the past.

Social Venture Capital

The past year the number of private funding institutions that invest in sustainable and socially responsible enterprises in developing countries has increased. Some focus specifically on renewable energy, such as E+Co, Triodos Renewable Energy for Development Fund and the African Bio-Energy Fund. Other finance a broader range of entrepreneurial activities. Large energy companies, pension funds etc. are also known to have co-invested in Jatropha undertakings in developing countries, as part of their Corporate Social Responsibility. These institutions do generally not provide grants but shareholder capital or loans. The list of organizations providing social venture capital is long and growing. For an updated list of organizations with a special focus on sustainable energy, see the Sustainable Energy Finance Directory (http://www.sef-directory.net/). For a member list of the European European Social Investment Forum (Eurosif), see: http://www.eurosif.org/member_affiliates/list_of_member_affiliates.

Useful Links:

The **Sustainable Energy Finance Directory** is a free-of-charge online database of lenders and investors who actively provide finance to the sustainable energy (renewable energy and energy efficiency) sector worldwide. Free registration is required.
http://www.sef-directory.net/

For a list of bilateral development banks and agencies that deal with Renewable Energy projects, see:
http://go.worldbank.org/X33QHLOH70

For a list of Ethical Banks that may be interested in investments in ecologically sustainable and socially just enterprises:
http://en.wikipedia.org/wiki/Social_Investment_Forum

The World Bank Renewable Energy Toolkit (REToolkit) provides a broad set of tools to improve the design and implementation of renewable energy (RE) projects.
http://go.worldbank.org/Y20OGSRGH0

Natural Resources Canada provides the **RETScreen Clean Energy Project Analysis Software. This** free software that can be used to evaluate the energy production and savings, costs, emission reductions, financial viability and risk for various types of Renewable-energy and Energy-efficient Technologies (RETs). Free registration is required.
http://www.retscreen.net/ang/home.php

Presentation of Fundraising for renewable energy projects by Judy Siegel, President, Energy & Security Group, April 19, 2006.
http://www.abanet.org/environ/committees/renewableenergy/teleconarchives/041906/Siegel_Presentation.pdf

"Overview of existing funding schemes for renewable energies" by Dr. Christine Wörlen, Head of Renewable Energy Department, German Energy Agency (DENA). Conference on Renewable Energies for Embassies in Germany, Berlin, June 26, 2007.
http://www.dena.de/fileadmin/user_upload/Download/Veranstaltungen/2007/07/2.3._Overview_of_existing_funding_schemes_dena_Dr._Ch_Woerlen.pdf

"Innovative Financing Mechanisms for Renewable Energy Systems in Developing Countries", Norberth Wolgemuth, *UNEP Collaborating Centre on Energy and Environment, Denmark*
http://www.earthscape.org/r2/ES14477/won01.pdf

echnical assistance

We hope that this manual contributes to the dissemination of realistic and reliable information on how to design and run a Jatropha project. If you wish more information on specific subjects, the FACT website (www.fact-fuels.org) contains a large and well-selected literature section on many specific subjects related to the jatropha production chain. The wider internet is of course also a powerful information source, but beware for (often commercial) websites that state unrealistic yields and oversimplified descriptions of the biofuel chain. However, even with all this information available, the step from knowing to doing is often big to make alone.

The following **development organizations** may be able to provide free or low-cost technical assistance to initiatives which involve small farmers. For more information, please consult their websites and, if existing, their representative in your country.

Organization	Area of expertise	Website	Jatropha pilot projects
DED (Germany)	Jatropha cultivation, PPO technology	www.ded.de	Honduras, Peru, Sudan

GTZ (Germany)	Jatropha cultivation, PPO technology	www.gtz.de	Africa and Lat. Am.
Engineers without borders (Int'l)	Soap making, engine adaptation, oil filtration	www.ewb-international.org/	Mali, Uganda, Tanzania,
Full Belly project (USA)	Manual Jatropha dehullers	www.fullbellyproject.org	Honduras, Mali
STRO (The Netherlands)	All stages from project formulation to evaluation	www.stro-ca-org www.gotaverde.org	Central America
Practical Action	Technical advisory	http://practicalaction.org/practicalanswers/technical_enquiry_service.php	Free online technical enquiry service

The following sites gives an overview of Jatropha projects worldwide and may give orientations for finding technical assistance in your geographical area:
http://www.jatropha.org/projects.htm
http://www.jatropha-platform.org/

Commercial enterprises engaged in establishment of jatropha plantations may be interesting as a source of information, market for seeds or source of finance (especially ownership models B and C). The five largest are[2]:

Enterprise	Website	Geographical focus
D1-BP Fuel crops	www.d1bpfuelcrops.com	Asia and Africa
Mission Biofuels	www.missionnewenergy.com	Asia
Sunbiofuels	www.sunbiofuels.co.uk	Ethiopia, Tanzania
ESV Bio-Africa Lda	www.esvgroup.com	Mozambique
GEM Biofuels	www.gembiofuels.com	Madagascar

Government promoted National Jatropha Programs
The largest jatropha initiatives at this moment are actually government promoted poverty reduction schemes that generally promote outgrowing schemes target among small farmers selling to regional (public or privately owned) processing firms. The Indian and Chinese schemes are, due to the size of their population, the largest in absolute terms. Some of these schemes are highly controversial due to the food-fuel conflict that rises when planting vast areas with Jatropha as a monocrop. Some programs also have very little funding in comparison to their ambitious targets and have to be considered rather as political statement than as a real driving force. Please inform with your Ministry of Agriculture or Ministry of Energy if such a jatropha program exists in your country and what facilities it offers.

[2] Source: http://www.jatropha-platform.org/documents/GEXSI_Global-Jatropha-Study_FULL-REPORT.pdf

ANNEX: Sustainability of Jatropha projects

Main author Mara Wijnker

When looking at the sustainability of Jatropha projects, most of the issues mentioned within the sustainability criteria of the Cramer commission and RSB are important. The issues can also be arranged according to the fields that are most commonly used to define sustainability, namely environmental, social and economic issues. Some of the issues belong to two or even three of the fields, but are mentioned in only one. Instead of a conceptualisation as criteria, the issues are here discussed in view of the potential impact on Jatropha projects.

Environmental	**Social**	**Economic**
Biodiversity	Workers rights	Wages
GHG emission	Working relationships	Improvement of income
Land use	Community involvement	Commercial interests
Impact on soil, water, air	Land rights	Food vs. Fuel
		Transport

Table: sustainability aspects of Jatropha projects

"Jatropha projects" need to be explained better. When considering sustainability, a distinction between small scale (up to for ex. 1500 hectares of Jatropha plantations) and large scale, monoculture plantations should be made. Large scale plantations imply making use of economies of scale with higher level of mechanisation and therefore employing fewer people, acting out of commercial interest.
As the impacts of large scale, monoculture plantations are much larger, these are discussed here. At the end a comparison is made between the impacts caused by large and small scale plantations

Next to the area of the plantations, there are many other characteristics that should be taken into account when looking into detail at Jatropha projects, like the technologies used, number of (local) people involved, organisational system (own plantation, outgrowers or cooperation) etc. This paragraph will give a brief overview of general applicable sustainability aspects of Jatropha projects, as mentioned in the table above.

1.1.1.1. Environmental aspects

1.1.1.1.1. Biodiversity and conservation areas

Biodiversity is an important issue in all plantations made for production of bio fuels as usually this is done in monoculture and after clearing of the land. Therefore, the impact on the biodiversity depends on previous land use and intensity of production. If the land was previously covered with primary natural vegetation it is different as when it was recently

cropped before or left some time as bad land. The impact on biodiversity can for most countries be mapped out. In most countries all sort of maps have been prepared with areas with high biodiversity potential. Often this coincides with the countries protection of areas with special nature conservation values, that cannot be used. In fact, often it requires all these high value and protected areas to be projected on one map. As a result the zones left out of the biodiversity/conservation/protection areas might be considered for production. In some cases some of the protected areas however allow for planting of trees for the local population, for animal protection and so on. A case of Tanzania projecting all the claimed areas showed that most area of the country was not available for Jatropha plantations.
A good example is the study of Pro Forest ltd. that looked at *savannah woodland*, *miombo woodland*, *mopane woodland* or *dryland forest* biodiversity [3].

Biodiversity can be changed positively or negatively when wasteland only covered with little vegetation is replaced by Jatropha. (Ref Kumar on Jatropha workshop of FACT). The Jatropha plants might improve soil structure over time providing a habitat for some species, reducing some others. Biodiversity is about the variety of species in a habitat. In some cases it is difficult to assess the balance.

1.1.1.1.2. GHG emissions

GHG emissions of Jatropha can be in the plant production area, in the conversion to a fuel, in the distribution to the end user in the form of electricity, soap, bio-fertilizer , or other end products. Some of the end products result on more GHG emissions as others. Eg. 90% of the lifecycle GHG emissions of Jatropha biodiesel are a result of the end-use.

In each of these production parts of the chain, different conditions can rule per project. It is therefore not possible to refer to one Life Cycle Analysis (LCA) outcome for Jatropha. Each project will have to be done using the typical conditions of the project. In order to compare the different effects of different Jatropha planting projects it is important that one LCA methodology is arrived at over time. This will help the Jatropha practitioners community to choose the best options balancing economics and GHG emission reductions. A number of LCA's and CO2 emission estimation methods have been developed by different research institutions. Such as University of Leuven, Belgium, EMPA[3], which is an interdisciplinary research and services institution for material sciences and technology, Switzerland, Chiang Mai University[4], Thailand, etc..

When looking at the LCA's some factors seem to be more prominent as others. Herunder some will be discussed

[3] Simon Gmünder (EMPA)M. Classen, R. Zah P. Mukherjee, S. Bhattacharjee (Winrock India)**Life Cycle Assessment (LCA) of Jatropha-based Rural Electrification*Case Study: Village Ranidhera, Chhattisgarh***

[4] Life Cycle Management of Jatropha Bio-Diesel Production in Thailand**,** Sate Sampattagul1, Chonticha Suttibut, Sadamichi Yucho and Tanongkiat Kiatsiriroat, Faculty of Engineering, Chiang Mai University
Thermal System Laboratory, Department of Mechanical Engineering, Faculty of Engineering, Chiang Mai University, Thailand 50200 Corresponding Author: sate@eng.cmu.ac.th

- GHG emissions of changing land-use for Jatropha production should also be taken into account, as the site is cleared of its original growth. Magnitude of contribution to the carbon emissions depends very sharply on the kind of original land. It can be expected that when changing wasteland, the carbon sequestration in the soil will be improved, while changing woodland into Jatropha plantations, GHG emissions are caused.

- Plant nutrients needs to be used in some amount as the soil will become poorer from production of Jatropha plants. It is possible to use the Jatropha press cake as an organic fertilizer, but then the cake will have to be brought back from the processing unit to the land where Jatropha was produced. Depending on the organisation of the project, this is possible or not, with transportation costs as an important parameter. From a sustainability point of view this is a good option. If organic fertilizer can be used, or fertilization with N fixing leguminous cover crops can be applied, this is to be preferred above chemical fertilizer, as especially the production of chemical N fertilizer requires a lot of energy, which today is most fossil based.

- Biodiesel production increases the amount of GHG emissions compared to the production of oil as an additional step is added, in which chemicals and more energy is used. Furthermore, this is also an expensive step in the process and slightly complicated as some processing equipment needs to be used. For these reasons small scale projects in rural areas usually produce only bio-oil. When looking at the energy balance, the production of biodiesel does not gain as much in energy as is used during its production. So, from the energy balance point of view, it's less beneficial to add this step.

1.1.1.1.3. Impact on soil, water, air

In marginal land Jatropha will have a positive influence on the state of the soil as it will improve the vegetative structure and biodiversity and the roots will provide a structure protecting against soil erosion. The reverse can be expected when woodlands or savannah lands are changed into Jatropha plantations though.
Furthermore, when no nutrients are brought back to the plantations after harvesting, the soil will become poorer. So Jatropha's impact on the soil will be depending on what was the previous vegetation, what are the cultivation techniques of Jatropha, etc.

Jatropha can survive in climates with a steady rainfall of at least 600.. To bear fruits more rain is needed though. Depending on the climate no irrigation might be necessary although yields can be improved much through sufficient water supply. Use of water can be limited for Jatropha, it will then shed its leaves, and can resist drought. However with no leaves no serious photo synthesis takes place.
Jatropha plantations can be used to introduce water catchment methods as well, such as earth boundaries and small dams on sloping terrain, contributing to a raise in ground water level with all beneficial results. This was a common use of Jatropha in some Sahel countries.
Most important impact on air has been discussed in previous the section, but here there relation is to be made with not only the emissions of the agricultural and transport activities for Jatropha establishment and operation, but also in the area of combustion of Jatropha

PPO in engines and the processing in Biodiesel and its use as well as in the biogas use from the Jatropha press cake.

1.1.1.2. Social aspects

Because of the labour-intensive way of harvesting Jatropha, jobs can be created for communities. Large scale plantations create work for local inhabitants. When harvesting will be done mechanically though, in the near future, less employment creation can be expected, but higher wages. In the longer run mechanised harvesting is a condition for social progress. Harvesting labour cost is the single most important cost item in jatropha oil production. The low labour productivity in harvesting makes that profitable jatropha production is currently only feasible in very low income countries (< 2,50 US$ per day). This is insufficient to provide decent living standards. Moreover, labour shortages are to be foreseen if plantations expand and other (more productive) economic sectors develop.

Job creation does of course not necessarily imply that working conditions are good. If the number of people within the area willing to work within the plantations exceeds the necessary number of people, management of the plantation will have a strong position and doesn't necessarily have to take care well of his/her personnel in terms of wages, labour conditions etc.
Setting-up processing facilities by investors, local or foreign, also can create jobs for communities, and if there is a long term involvement of communities it would ensure long term stability.
FACT's project in Mali is a good example of this as production of Jatropha, production of oil and electricity production and use are integrated in the village area of Garalo, whereby project ownership has been established in the village. Another example is BYSA, the Honduran biofuel processing enterprise that is owned 49% by supplying farmers and 51% by a non-profit rural enterprise development institution (FUNDER). Within small scale projects community ownership and continuous involvement is necessary to make a project sustainable. In large scale projects, the relations with farmers might be less tight, e.g. in the case of seasonal contracting of workers involvement of the community might be minimal.

1.1.1.2.1. Land rights

Because of the large commercial interests of foreign companies influencing governments of Southern countries, sometimes rights of people living in remote areas are ignored. Often the government owns the land and rents it out to foreign companies who might be paying more than sufficiently. People originally living or working at these lands might then evicted. Therefore most sustainability criteria add the land right issue, stating that the local land rights and ownership (formal and informal) should be respected.

1.1.1.3. Economic issues

Most important is the financial susatainablity of a Jatropha project. This depends on a number of issues as the worldmarket price of petrol oil, government policy (e.g. fuel subsidies), the local wage level to be paid to either farmers or seed pickers, costs of transport for seeds and oil/diesel, investment costs of equipment and their efficiency, whether land needs to be cleared, whether irrigation is necessary etc. Furthermore, a

reliable and not overoptimistic prediction of the yield is important. Further reference is made to Chapter Economic and Financial aspects (peter)

Wages cannot be high as margins to make a profit out of Jatropha oil are small. Small farmers are usually paid per kilogram of delivered seed. If farmers decide to cultivate Jatropha next to their “normal” crops an increase in income can be expected, creating possibilities for development.
If local people are working for large scale plantations, their benefit will mostly likely be reduced to their daily wage.

Because of the large interest for use of biofuels in general and Jatropha curcas L. specifically, it is likely that politics will be influenced. Furthermore, if large commercial investors are interested in using for example areas that can be used for foodcrops as well, commercial interests can become more important than social/environmental impacts.

1.1.1.3.1. Food vs Fuel

For farmers it is a decision based on economic reasoning whether they will produce food or fuels. For a country as a whole, or even the world it can become an issue to stimulate farmers to grow food instead of fuels if a lack of food crops exists, see ref [9]

On the controversy of fuel and food, it is clear the issue can play in wrongly designed projects that are focussing on large scale production of biofuels which are often geared to export. However, if in projects of biofuels production and use the local population is served, and attention is paid on combining food and fuels including intercropping, improved food seeds, recycling of nutrients, improved agricultural practices, the same acre can deliver more food and also biofuels as in most current low productivity conditions. In e.g. the FACT projects in Honduras, Mozambique and Mali; the Gota Verde, ADDP Mozambique, and with Mali biocarburant company and MFC agricultural extensionists are promoting this approach.

Where successful intercropping can be developed, Jatropha production will be able to go hand in hand with food production. Furthermore, Jatropha can grow on marginal land which is not used for food production. Often there are other, more important barriers to (efficient) food production, than just the availability of land. Access to credit is known to be such a barrier in the case of small farmers. In chapter 6 an example is given of how jatropha plantations of small farmers can be used as a collateral in a staple crop financing scheme, even without involvement of financial institutions.
The food versus fuel discussion is not very relevant when farmers decide to use land that was not in use before for food production and specifically if this is land that cannot be used properly for food production because of its poor soil. Very small scale plantations as well as use of Jatropha in hedges does not confine to this discussion as well.
The discussion becomes relevant when a large amount of fertile land is used and especially when this land used to be cultivated for food production.
In the view of FACT it should be left to the farmers to decide what to farm, based on informed choices and their balancing of returns and risks. In some cases farmers might use even a strategy to produce a crop that can be used for both

1.1.1.3.2. Transport

In general more transport during each of the steps in the production phase contributes to more GHG emissions as well as to additional costs. It depends very much on the magnitude of the area that is covered within a project and whether seeds are processed solely central or also decentralised/mobile. For large scale production careful planning on the logistics is needed.
For smaller plantation activities small, manual dehullers (separating the seeds form the rest of the fruit) are cheap and have a large capacity (see section 3). They permit farmers to add extra value to their product, while at the same time reducing transport costs. Here again a balance is to be found.

1.1.1.3.3. Impacts compared

The Table above provides in short an overview of the impact of small scale and large scale plantations on the different fields that define sustainability. Normally big large scale projects have proportional big impacts, but many small activities might also have a big impact when counting all together.
As clear from the above, it is not easy to make general judgements on effects of one big project or many small projects that are producing the same. Normally one large scale production of Jatropha should have positive scale effects, but this might be lost due to less motivated staff, bureaucratic inefficiencies, etc.. Many small projects with motivated small entrepreneurs might also gain benefits of scale effects when buying through e.g. a producers association.
The large scale projects that want to be delivering biofuels to the EU market, will have to abide by the sustainability criteria. This will more or less aim to bring them under strict Frame work similar to EU. The extra costs might be compensated by the higher price for sustainanble biofuel. Producers for other markets, local or other regional markets, might not have to abide. Also small farmers might also understand less of the criteria and take wrong decisions, like cutting down forests or enter in conservation areas, to cultivate Jatropha as is was suggested a profit crop.

The Round Table on Sustainable Biofuels: This initiative is initiated by the EPFL (École Polytechnique Fédérale de Lausanne and has both businesses as R&D and practitioners amongst its participants. The principles tough the following aspects of activities in biomass legality, Consultation, Planning and Monitoring, Climate Change and Greenhouse Gas, Rural and social development, Food security, Conservation, Soil, Water, Air, Economic efficiency/ technology/ and continuous improvement, and Land Rights. Details of the criteria can be found in the annex.
The WNF has as part of the RSB aimed to set up a working group on Jatropha. In 2008 a first workshop was held in Brussels on this special Jatropha production and convesion sustainability. Reports that are strongly recommended to look at are: Sustainability standards for bioenergy of WWF

Roundtable on Sustainable Biomass: Ccriteria on Sustainable Biomass, source WIKK, 2008
Legality
1. Biofuel production shall follow all applicable laws of the country in which they occur, and shall endeavor to follow all international treaties relevant to biofuels' production to which the relevant country is a party.
Key guidance: Includes laws and treaties relating to air quality, water resources, soil conservation, protected areas, biodiversity, labor conditions, agricultural practices, and land rights, including for instance ILO, CBD,

UNFCCC, and the Universal Declaration of Human Rights. This standard can go beyond national law, but cannot contradict or contravene national law.

Consultation, Planning and Monitoring

2. Biofuels projects shall be designed and operated under appropriate, comprehensive, transparent, consultative, and participatory processes that involve all relevant stakeholders.

Key guidance: 'Biofuel projects' refers to farms and factories producing biofuels. The intent of this principle is to diffuse conflict situations through an open, transparent process of stakeholder consultation and acceptance, with the scale of consultation proportionate to the scale, scope, and stage of the project, and any potential conflicts. The RSB will develop a scoping process to help determine the extent of the stakeholder consultation based on key criteria. Where many farmers are engaging in the same activity in the same area, there should be flexibility for a group of farmers to combine their work.

Climate Change and Greenhouse Gas

3. Biofuels shall contribute to climate change mitigation by significantly reducing GHG emissions as compared to fossil fuels.

Key guidance: The aim of this principle is to establish an acceptable standard methodology for comparing the GHG benefits of different biofuels in a way that can be written into regulations and enforced in standards. The overriding requirement is therefore a methodology that is not susceptible to subjective assumptions or manipulation. The fossil fuel reference shall be global, based on IEA projections of fossil fuel mixes.

Human and labor rights

4. Biofuel production shall not violate human rights or labor rights, and shall ensure decent work and the well-being of workers.

Key guidance: Key international conventions such as the ILO's core labor conventions and the UN Declaration on Human Rights shall form the basis for this principle. Employees, contracted labour, small outgrowers, and employees of outgrowers shall all be accorded the rights described below. 'Decent work', as defined by the ILO, will be the aspirational goal for this principle.

Rural and social development

5. Biofuel production shall contribute to the social and economic development of local, rural and indigenous peoples and communities.

Food security

6. Biofuel production shall not impair food security.

Conservation

7. Biofuel production shall avoid negative impacts on biodiversity, ecosystems, and areas of High Conservation Value.

Key guidance: HCV areas, native ecosystems, ecological corridors and public and private biological conservation areas can only be exploited as far as conservation values are left intact and can in no case be converted. Definitions of these terms and an appropriate cut-off date will be developed by the RSB.

Soil

8. Biofuel production shall promote practices that seek to improve soil health and minimize degradation.

Water

9. Biofuel production shall optimize surface and groundwater resource use, including minimizing contamination or depletion of these resources, and shall not violate existing formal and customary water rights.

Air

10. Air pollution from biofuel production and processing shall be minimized along the supply chain.

Economic efficiency, technology, and continuous improvement

11. Biofuels shall be produced in the most cost-effective way. The use of technology must improve production efficiency and social and environmental performance in all stages of the biofuel value chain.

Land Rights

12. Biofuel production shall not violate land rights.

The Cramer commission has in 2007 produced a report on the topic of biomass sustainability that at the time was considered state of the art. [ref;;;;;] Their report has used sustainability criteria prepared for different biomass sources. For the discussion some essential parts of the report can be highlighted, it becomes clear that:

- The commission has searched to link to existing criteria for sustainable development, rather than inventing the wheel again.
- Many of the criteria still need to be elaborated to operational indicators.
- Greenhouse gas balance; net emission reduction compared with fossil reference, inclusive of application, is at least 30% for now, and up o 50% from 2011.
- In the competition with food and other basic needs, the commission assumes that the biomass will be exported rather than used locally. There should be insight into the availability of biomass for food, local energy supply, building materials or medicine.
- Biodiversity is now focussed on plantations not being located close to protected areas; other aspects still to be elaborated.
- Economic prosperity criteria are limited to ensure that no negative effects are generated by biomass production business, but they are not focused on the contribution to the local economy.
- Well being is much more elaborated in 5 sub points,
    - Aspects on working conditions,
    - Human rights,
    - Property rights,
    - Social effects of the biomass cultivation,
    - Integrity is countering bribery.

The environment points relate to the inputs (integrated crop management) appropriate use of fertilizers, soil conservation and conservation of water (ground and surface water).

So the Cramer commission criteria are applicable to large scale cropping systems, but not on the processing, and not on the effects of market changes or applications due to such large scale biomass production. These points should be included if one wants to consider a chain concept .i.e from a biomass crop to a end product with a market.

Based on the Cramer criteria a workgroup of parties in the netherlands including Standards institutes, Power comapnies, Environmental and Development NGO's have produced a NTA 8080 which is a more specific elaboration of the Cramer criteria. Amazingly the document is in Dutch language. It is well defined but in some cases presumes the existence of data and institutes that are not commonly found in developing countries.
http://www2.nen.nl/nen/servlet/dispatcher.Dispatcher?id=274031&parentid=000009

References

2. Perspective: "Jatropha biodiesel fueling sustainability", WMJ Achten and others, Biofuels, bioproducts & biorefining, ISSN: 1932-104X, 2007

3. Small-scale Production and Use of Liquid biofuels in Sub-Sharan Africa: Perspectives for Sustainable development, Background paper no. 2, UNDESA, Commission on Sustainable Development, New York, 2007

4. Jatropha literature and perspectives review: Main potential social and environmental impacts arising from large scale plantations, May 2008, Proforest ltd.

5. Beleidsnotitie milieu en hernieuwbare energie in ontwikkelingssamenwerking, Ministry of Foreign Affairs, November 2008

6. FACT reactie op “Heldergroene Biomassa”, Stichting Natuur en Milieu, www.fact-fuels.org, 30 januari 2008

7. Empowering rural communities by planting energy, Roundtable on bioenergy enterprise in developing regions, background paper, UNEP, 2008

8. Roundtable on Sustainable Biofuels, Global principles and criteria for sustainable biofuels production, version zero, école polytechnique fédérale de Lausanne, Energy Center, 2008. Title: Version Zero - Principles for sustainable biofuels Version 0.0 (August 2008) RSB-Steering Board (http://cgse.epfl.ch/Jahia/site/cgse/op/edit/lang/en/pid/70341)

9. The state of food and agriculture, biofuels: prospects, risks and opportunities, FAO, 2008, ISSN 0081-4539
10. Discussion Note: Sustainable Biomass for Poverty Reduction etc, 19/07/07 tbv Food en Energy Workshop WR
11. 2 product philosofy prof. Kees Daey Ouwens
12. FACT positioning paper