RENEWABLE ENERGY FACT SHEET

Bioenergy at a small scale

Pacific energy projects: Impacts on nature and people

Are you planning to fund, build or manage a bioenergy project?
Have you considered the environmental, social and economic issues this can raise?
Are you prepared to manage these issues?

TYPICAL BIOENERGY PROJECTS

Natural materials can be used to produce energy, providing an alternative to fossil fuels. Targeted approaches to bioenergy can be divided amongst:

- Biomass – solid material used directly, such as burning, or indirectly in a boiler, to produce electricity, steam, heat or a combination.
- Biofuels – where materials are processed to make liquids such as alcohols and oils which can be used in vehicles or generators.
- Biogas - where decomposition releases methane or other gases, which then can be used directly for cooking and lighting, or substitute for products like LPG.

Bioenergy crops are often described as:

First generation: energy sources derived from typical food growing practices, such as edible oils, corn starch, and sugar cane products, or simple processes such as biogas from sewage.

Second generation: energy sources derived from inedible crops, woody or agricultural residues, such as cellulose, lignin, Jatropha oil, often with more complex processing.

Basic, unprocessed, fuels such as wood or charcoal for cooking are not always discussed as formal bioenergy projects, however are important for many peoples' livelihoods.

BIOENERGY PROJECT DEVELOPMENT

Planning

Bioenergy projects have complicated interactions with the environment. From choosing the crop, selecting the site, to transport and processing, each stage of the lifecycle may have different, site-specific issues and stakeholders. Growing, harvesting and transporting bioenergy crops can be similar to other large-scale or commercial agriculture, while processing and uses such as electricity generation may be similar to industrial activities.

Decision-making needs to be integrated with policies such as land, water, soils, food security and biodiversity.

♦ Environmental impacts

The demand for bioenergy can encourage conversion of ecosystems to cropland, introduce species – deliberately or accidentally – and promote irrigation and chemical use. The lower energy density of bioenergy compared to fossil fuels means increased material inputs: a little over 3 rugby fields of coconut plantations are needed for enough coconut oil to provide the same energy as a typical fuel truck. Processing the biomass by direct combustion, sulphuric acid, methanol or other chemicals, can create solid waste and pollute air and water. All these can affect the ecosystems that provide bioenergy and other services.

♦ Social impacts

Bioenergy builds on existing agricultural skills to build a self-sufficient energy supply, particularly in remote areas. Unlike solar or wind power, bioenergy usually needs a business or community approach and can involve many people. Where these crops use productive land, this can affect food production. Producing fuels such as coconut oil may be labour intensive, so the benefits of a local fuel may not meet the expectation of an easier life.

♦ Cumulative impacts

Continually removing biological material from an ecosystem is unlikely to be sustainable as energy and nutrients are lost. As with other agricultural systems, pesticides and fertilisers may be used for productivity. Across a catchment or area, this can impact soil fertility, erosion and waterways. Bioenergy often replaces fossil fuels and so avoids greenhouse gas emissions. Using a lifecycle approach compares these savings with other emissions such as land use change or fuel for harvesting.

KEY ISSUES!

Land and water use – The basic material used for bioenergy must be grown, and like any crop requires land, water, and labour. First generation, edible, crops, may be seen as a negative impact on food markets, or as an alternate market. Second generation crops may be purpose grown, but compete with food crops for land and water, especially where expected to have higher value or promoted by the authorities.

Ecosystems effects – Commercial scale bioenergy plantations are usually monocultures , and may introduce new crops or species. Qualities of bioenergy crops – robust, pest-resistant, easy to propagate, suited to local soils and climate –often risk invasiveness or negative interactions with local ecosystems. Another risk is the introduction or spread of pests or fungi in the planting stock. A Weed Risk Assessment is one approach to assess and manage these risks strategically.

Community cooperation – From farm workers, vehicle drivers, mechanics to land and resource owners, businesses, electricity utilities and government departments, a wide range of stakeholders may be relevant to a bioenergy project. This can create a challenge to respect the concerns of each person, and share the efforts, costs and benefits fairly. A thoughtful approach and inclusive consultation is needed. If the idea is 'sold' there may be high expectations and later disappointment if these are not met. For example, in a drought if crops fail or produce little oil, the impact may affect many people. Ideally a country or region should be resilient to the natural variations in bioenergy production.

Chemicals and wastes – Transport, handling, storage and especially use of chemicals can cause their release into the environment. While one risk is accidental release through spills and leaks, runoff from excess fertiliser application, biologically enriched wastes and sludges, and dust from stockpiled material can all impact on adjacent ecosystems. Consideration must be given to safe practices for fertilisers, pesticides, methanol, catalysts, acids and other chemicals. Wastes can be reduced or avoided through improved production processes, and capture and treatment used for the remainder. Be aware that biofuels produced, such as biodiesel, can pollute waterways if released into creeks and streams, and must also be stored and handled carefully.

Risk management - While disasters and emergencies can't be avoided, they can be prepared for. Prior planning, adequate supplies, and trained staff can greatly reduce the consequences of a cyclone, flood, fire, drought, spill or other event.

FOR FURTHER INFORMATION

There is a vast amount of information 'out there', which often reflects the perspective of the stakeholders who prepared the information - we encourage you to read carefully. Information can generally be grouped into:

1. Generalist, multi stakeholder groups (like the Roundtable on Sustainable Biofuels)
2. Various tools applicable for bioenergy, from UN policy tools through to weed risk assessments; IUCN compiled a reference document in 2008.
3. Inter-governmental organisations (such as Food and Agriculture Organisation or International Energy Agency) have produced useful references.
4. Organisations and industry groups such as Sustainable Agriculture Network, Bonsucro or the Roundtable on Sustainable Palm Oil have targeted information on specific aspects of bioenergy, such as a specific crop, or specific step in the chain.
6. As always, compliance with the relevant EIA and other legislation for your country is essential.
5. For links and more detailed information, please visit IUCN's website: http://ow.ly/9TsZG

Please note, this factsheet provides general guidance only and is not legal advice. Please see the references and seek assistance for technical or legal advice for your specific needs.

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CONTACT US:

International Union for Conservation of Nature
Oceania Regional Office
Private Mail Bag, 5 Ma'afu St, Suva,
Fiji Islands

P: (+679) 3319 084
F: (+679) 3100 128
E: oceania@iucn.org
www.iucn.org/oceania