



BEFSCI

Bioenergy and Food Security
Criteria and Indicators



Good Socio-Economic Practices in Modern Bioenergy Production

Minimizing Risks and Increasing Opportunities for Food Security



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The examples below are based on information provided directly by producers, which were not verified by the Food and Agriculture Organization of the United Nations (FAO). The photographic material was provided by producers as well, unless otherwise specified. The mention of a specific producer/project does not imply that it has been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned. The information included herein does not imply the expression of any opinion whatsoever on the part of FAO. The views expressed are those of the authors and do not necessarily reflect the views of FAO.

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OVERVIEW

Modern bioenergy development can result in a number of environmental and socio-economic impacts (both positive and negative), creating both opportunities and risks for food security. In order to minimize these risks and increase the opportunities, bioenergy producers can implement a number of “good practices”, i.e. practices that “concretely contribute to environmental, economic and social sustainability of on-farm production resulting in safe and healthy food and non-food agricultural products” (FAO, 2011).

While substantial work has been conducted on good practices in agriculture and forestry, few practical examples of the implementation of good practices – especially socio-economic good practices – in the context of bioenergy production have been documented and analysed.

The FAO’s BEFSCI Project (see box 1) has carried out a survey of bioenergy producers in order to gather examples of the implementation of good socio-economic practices in this sector.

The main socio-economic dimensions that may be impacted by bioenergy production are:

- ACCESS TO LAND
- EMPLOYMENT, WAGES AND LABOUR CONDITIONS
- INCOME GENERATION AND INCLUSION OF SMALLHOLDERS
- LOCAL FOOD SECURITY
- COMMUNITY DEVELOPMENT
- ENERGY SECURITY AND LOCAL ACCESS TO ENERGY
- GENDER EQUITY

Their relevance for specific dimensions of food security (see box 2) is described in this publication. For each of these dimensions, the list of good practices described by the survey respondents and one example of their implementation are included.

The full set of examples submitted by bioenergy producers in response to the BEFSCI survey is available here: www.fao.org/bioenergy/foodsecurity/befsci/gp

The BEFSCI project has also compiled a set of environmental good practices in bioenergy feedstock production¹.

¹ The FAO’S BEFSCI report *Good Environmental Practices in Modern Bioenergy Production - Minimizing Risks and Increasing Opportunities for Food Security* is available here: www.fao.org/bioenergy/foodsecurity/befsci

In addition, BEFSCI has developed a report on *Policy Instruments to Promote Good Practices in Modern Bioenergy Production*, which is available here: www.fao.org/bioenergy/foodsecurity/befsci

Box 1. The FAO’s Bioenergy and Food Security Criteria and Indicators (BEFSCI) Project

The FAO’s Bioenergy and Food Security Criteria and Indicators (BEFSCI) project has developed a set of criteria, indicators, good practices and policy options on sustainable bioenergy production that foster rural development and food security, in order to:

- inform the development of national frameworks aimed at preventing the risk of negative impacts - and increasing the opportunities - of bioenergy developments on food security; and
- help developing countries monitor and respond to the impacts of bioenergy developments on food security and its various dimensions and sub-dimensions.

Box 2. Food Security and its Four Dimensions: Quick Definitionsⁱ

FOOD SECURITY: “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (World Food Summit, 1996). Food security comprises four dimensions: availability, access, utilization and stability.

- *Food availability:* “The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports [...]” (FAO, 2006).
- *Food access:* “Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet [...]” (FAO, 2006).
- *Food utilization:* “Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met [...]” (FAO, 2006).
- *Food stability:* “To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity) [...]” (FAO, 2006).

ⁱ The full definitions can be found here: www.fao.org/bioenergy/foodsecurity/befsci/definitions

ACCESS TO LAND

Access to land (particularly agricultural, forestry and pasture land) is a prerequisite for people's ability to access the resources and ecosystem services provided by such land, which are essential for their food security.

Modern bioenergy development may lead to the conversion of certain land types, including forests and pasture lands. This may lead to a reduction in the access of local communities to the resources and ecosystem services provided by such lands, which are important for their food security and, in some cases, energy security.

In addition, portions of public land used by local communities either through formal or informal mechanisms may be allocated by developing country governments for bioenergy-related investments. Bioenergy development may also lead to an increase in land concentration, due to the significant economies of scale required for certain types of feedstock production. Both these factors may lead to a reduction in access to land for smallholder farmers and vulnerable groups, particularly in areas characterized by insecure land tenure.

Finally, bioenergy development may contribute to increasing land value, with benefits for landowners and potential negative effects on people with insecure land tenure. This increase in land value, however, may provide an incentive to identify and map land rights, including customary ones, with potential positive effects on the security of land tenure.

Good Practices to Safeguard Access to Land for Local Communities

Examples of the following good practices were submitted by bioenergy producers:

- [Consultation](#)
- [Mapping of customary land rights](#)
- [Fair compensation to landowners/users](#)
- [Conflict resolution mechanisms](#)
- [Inclusion of smallholders in bioenergy supply chain](#)

Implementation Example. Extensive Public Consultation and Mapping of Customary Land Rights ADDAX BIOENERGY, Sierra Leone

Addax Bioenergy (ABSL), a company in the bioenergy division of the international energy corporation, The Addax & Oryx Group Ltd (AOG), is developing a greenfield integrated agricultural and renewable energy project at Makeni in central Sierra Leone, which will produce anhydrous fuel ethanol from sugarcane and electric power. Addax Bioenergy has conducted an extensive analysis of the environmental, social, and health impacts of the project (ESHIA) including fourteen specialist studies. In parallel with the ESHIA process, ABSL commenced a public land lease process consisting of two layers of documentation (Land Lease and Acknowledgment Agreements). To ensure a fair and transparent process two law firms were engaged, one to represent Addax Bioenergy and one selected by the communities and Chiefdom Councils to represent their interests and to ensure that the lease agreements were well understood by all affected.

The land lease draft was discussed and negotiated in several meetings over a period of eleven months. It was first introduced to the Districts and Chiefdom officials and traditional landowners, who in turn were tasked with discussing the document further with their communities. Meetings were subsequently held with affected villages. Invitations to meetings were sent out to landowners and transport costs were provided by ABSL to attend meetings. The land leases were officially registered in the Office of the Administrator & Registrar-General. Land lease payments were made to the District Administrator and are split accordingly between landowners, Chiefdom Councils, District Administrations and the Government of Sierra Leone. The direct payments to landowners are public and transparent and their share in the lease is sixty-four percent. ABSL is conducting a survey of village boundaries for fair compensation to the traditional landowners through the mapping of customary land rights.



The information included in this box is based on information provided directly by producers and not verified by FAO.

The full example can be found here:

<http://www.fao.org/bioenergy/foodsecurity/befsci/gpse/addax.pdf>

EMPLOYMENT, WAGES AND LABOUR CONDITIONS

Employment and wages are one of the most important means through which people may acquire the financial resources they need in order to purchase food. Employment quality and labour conditions are also important, as they may affect who has access to employment and whether (and which) workers benefit from it.

Modern bioenergy development may create new employment opportunities along the entire supply chain and in particular in bioenergy feedstock production (especially with low mechanization levels). Most of the jobs created in bioenergy feedstock production will be concentrated around the harvest season, and might therefore result in an increase in the flow of migrant workers – who tend to be particularly vulnerable - if sufficient human resources are not available locally. At the same time, bioenergy production may displace other economic activities and the jobs associated with them, and it might compete, in terms of labour requirements, with other types of agricultural production, including for food. If bioenergy production leads to an increase in labour demand, wages might be positively affected. However, if good practices are not implemented, bioenergy production may have a negative impact on wages and labour conditions, especially in bioenergy feedstock production. This is due to the fact that feedstock production accounts for a significant share of total bioenergy production costs. In a highly competitive industry and market, this may put a downward pressure on wages and labour conditions. Given their vulnerability, migrant workers might be particularly affected.

Good Practices to Ensure Decent Work

Examples of the following good practices were submitted by bioenergy producers:

- **Adherence to:**
 - [ILO Declaration on Fundamental Principles and Rights at Work² and related Conventions³](#)
 - [ISO 26000 - Social Responsibility⁴](#);
 - [Social Accountability \(SA\) 8000⁵](#)
- **Living wage**

² www.ilo.org/declaration/lang--en/index.htm

³ ILO Conventions: 87: Freedom of Association and Protection of the Right to Organise, 1948; 98: Right to Organise and Collective Bargaining, 1949; 29: Forced Labour, 1930; 105: Abolition of Forced Labour, 1957; 138: Minimum Age, 1973; 182: Worst Forms of Child Labour, 1999; 100: Equal Remuneration, 1951; 111: Discrimination (Employment and Occupation), 1958.

Implementation Example. Retraining of Sugarcane Cutters UNICA, Sao Paulo, Brazil

UNICA, the Brazilian sugarcane industry association, is a nonprofit organization that acts domestically and internationally in the name of Brazil's leading producers of sugar, ethanol, and bioelectricity located in the South-Central region of the country. For centuries manual harvest has been the main practice in sugarcane fields around the world. However, technological advances and environmental concerns have increased demand for mechanized harvesting as it eliminates the need of the use of fire, improves soil condition and reduces emissions. As manual harvest is replaced by mechanization the sugarcane industry has focused on retraining workers involved in manual planting and harvesting for new activities. In 2009, the Renovação program (Renewal in English) was launched. Coordinated by UNICA and FERAESP (Union of the Agricultural Workers of São Paulo), the program aims to requalify 3 000 former sugarcane cutters and community members per year for highly skilled jobs in the sugar and ethanol plants and also in other sectors of the economy. The industry and the workers jointly define the types of requalification courses, varying from harvest operators and welders to horticulture and digital inclusion, depending on the labor demand of a given region. The multi-stakeholder characteristic of the program is further enhanced as the Renovação program is also supported by Case IH, John Deere, Syngenta and Iveco - all key companies in the sugarcane industry supply chain – as well as Solidaridad, a Dutch NGO, and the Inter-American Development Bank (IADB). Since its launching, the program has trained more than 4 000 professionals, of which 56% were immediately re-employed after the courses. It also has served as an example as more than 15 000 additional workers have been qualified in similar programs by individual UNICA's members, inspired in the Renovação model.



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*The full example can be found here:
www.fao.org/bioenergy/foodsecurity/befsci/gpse/unica.pdf*

⁴ www.iso.org/iso/iso_catalogue/management_and_leadership_standards/social_responsibility.htm

⁵ www.sa-intl.org/index.cfm?fuseaction=Page.ViewPage&PageID=937

INCOME GENERATION AND INCLUSION OF SMALLHOLDERS

Non-wage income (i.e. self-employment) may be an important means through which people obtain the resources they need in order to purchase food.

Modern bioenergy development may create new business and income-generating opportunities, including for smallholder farmers⁶ and for small and medium enterprises, along the entire supply chain.

However, there are significant economies of scale often required in the production of bioenergy. This may lead to concentration in bioenergy feedstock production and a push towards vertical integration, thereby excluding smallholders from potentially lucrative global bioenergy markets.

The challenges that smallholder farmers may face in participating in bioenergy certification schemes – which represent a prerequisite to access certain markets – may reinforce this tendency.

Good Practices to Promote Income Generation and Facilitate the Inclusion of Smallholders

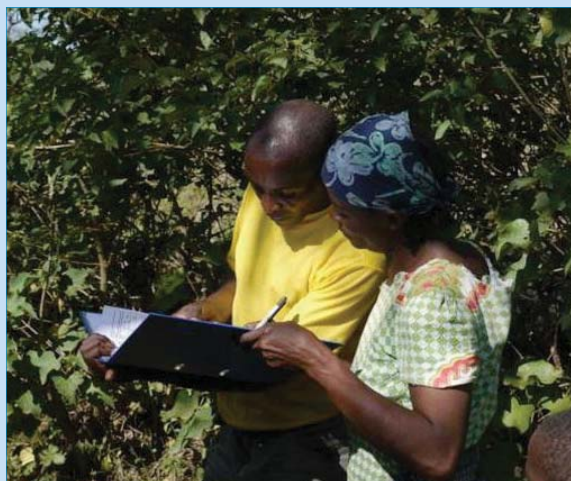
Examples of the following good practices were submitted by bioenergy producers:

- **Contracts with local goods and service providers**
- **Freedom of association and collective bargaining**
- **Access to credit**
- **Fair and transparent pricing**
- **Profit sharing**
- **Conflict resolution mechanisms**

For an in depth analysis of the issues of smallholder inclusion based on three case studies, and related recommendations, see the BEFSCI report *Smallholders in Global Bioenergy Value Chains and Certification - Evidence from Three Case Studies*, which is available here: www.fao.org/bioenergy/foodsecurity/befsci

Implementation Example. Ensuring Smallholder Inclusion DILIGENT, Tanzania

Diligent Tanzania Ltd is a commercial company which produces Jatropha oil and by-products. Diligent promotes jatropha cultivation by smallholder farmers and guarantees a market for a minimum price. The farmers are encouraged to plant jatropha as a hedge around their fields, and to harvest the seeds on the hedges which are already present. The hedge protects their crops from livestock and functions as demarcation of their fields. The smallholder farmers pick the fruits, remove the hulls and sell the seeds to a local collection centre and receive cash on delivery. Diligent collects the seeds from the collection centre and transports the seeds to the Diligent premises in Arusha. The seeds are then pressed in one of the mechanical presses. The jatropha oil is filtered, stored and sold to local clients or exported. The press cake is pressed into briquettes which are sold on the local market to be used as cooking fuel.



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The full example can be found here:

<http://www.fao.org/bioenergy/foodsecurity/befsci/gpse/diligent.pdf>

⁶ There are an estimated 500 million smallholder farms worldwide comprised of less than 2 hectares each. Smallholders land is often underutilized due to lack of technical capacity and market access.

LOCAL FOOD SECURITY

Modern bioenergy development may have repercussions for local food security, through the multiple socio-economic effects discussed in this brief.

In addition, bioenergy demand may contribute to an increase in agricultural production, through land expansion and/or intensification. This may result in an increase or a decrease in the local supply of staple crops for food, depending on the land and the crops/feedstock used for bioenergy, and the extent to which staple crops are displaced or diverted to bioenergy production.

Bioenergy feedstock production may alter the demand for resources and inputs, such as land, water and fertilizers that are used in the production of staple crops for food, potentially competing with the latter.

Last, but not least, modern bioenergy development may create a number of employment and income-generating opportunities for local communities, thereby increasing access to food.

Good Practices to Safeguard or Enhance Local Food Security

Examples of the following good practices were submitted by bioenergy producers:

- [Integrated Food and Energy Systems](#)
- [Subsistence plots](#)
- [Provision of improved agricultural inputs and/or equipment](#)
- [Trainings on good agricultural practices](#)
- [Provision of food](#)
- [Improved cookstoves](#)

For a set of indicators to assess both positive and negative effects of bioenergy on food security at national and operator level, see the BEFSCI report *Impacts of Bioenergy on Food Security - Guidance for Assessment and Response at National and Project Levels*, which is available here: www.fao.org/bioenergy/foodsecurity/befsci

Implementation Example. Improving food and energy security for rural smallholder farmers GIZ, Malawi

As part of the Integrated Food Security Programme (IFSP) implemented in the Mulanje district between 1996 and 2004 by GIZ, Pigeon Peas (*Cajanus Cajan*) were promoted for intercropping with the local staple food maize. This crop diversification activity was complemented with the introduction of very simple energy saving clay stoves. Many people in the community have not purchased firewood in over five years as a result of using cookstoves with pigeon peas stalks as fuel. In the case of IFSP Mulanje, the promotion of new pigeon pea varieties was part of the crop diversification programme. The promotion of improved stoves and cooking practices was part of the food processing and food utilization component of the programme, thus no additional resources were needed for the implementation. People came up with the idea of using the stalks themselves, as they realized the benefits of this. This was not an intended objective of the programme, but an observed additional benefit. The planting of pigeon peas with maize has provided an additional protein-rich food crop with a good potential for sale and income generation from the same plot. In addition, the soil has improved through nitrogen fixing, mulching of leaves (improvement of water retention capacity) and decrease of soil erosion (prolonged groundcover).



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The full example can be found here:
www.fao.org/bioenergy/foodsecurity/befsci/gpse/giz.pdf

COMMUNITY DEVELOPMENT

Modern bioenergy development may provide much needed capital investment to rural areas, thus contributing to the economic and social development of local communities. In addition, bioenergy companies may implement community development programmes.

The effectiveness of these programmes will depend on the extent to which they reflect local socio-economic conditions and customs, as well as the specific needs, capacities, and desires of the targeted communities. If not properly designed, these programmes may lead to perverse outcomes, with negative effects on local communities.

Good Practices to Enhance Community Development

Examples of the following good practices were submitted by bioenergy producers:

- **Development or improvement of local infrastructure**
- **Training and education programmes**
- **Health and safety equipment/devices and information**
- **Microlending and financial support mechanisms**



Implementation Example. Enchancing Local Livelihoods through Community Development MARKALA SUGAR PROJECT, Mali

The Markala Sugar Project in Mali is a Public Private Partnership (PPP) which will involve the development of 14 132 hectares of sugarcane plantation to produce 190 000 tonnes of sugar, 15 million litres of ethanol, and the cogeneration of 30 MW of electricity annually. The project's main objective is to enable Mali to be self-sufficient in sugar and therefore reduce imports with a direct positive effect on its balance of payment situation. The project will also have substantial development impact on the local population.

The project will create a technology centre, which will encourage population to stay in the area, therefore reducing rural exodus. The involvement of local communities as independent sugarcane farmers will encourage greater ownership of the project by local communities and more harmonious and balanced local and regional development. In addition, farmers will benefit from the sprinkler irrigation system to irrigate rice and vegetables crops which will enable farmers to diversify and secure their production. As part of the project's Environment and Social Impacts Management Plan (ESMP), a poverty alleviation plan (PAP) was prepared for communities affected by the project. This ten-year plan is a government medium-term commitment to assist 6 012 households from 85 localities of the MSP project area in pursuing or starting profitable economic activities and thus contribute to the sustainable economic development of the communities with a view to achieving the Millennium Development Goals (MDGs). The PAP gives priority to identified vulnerable persons. Within the framework of the PAP, the project will provide one dispensary, three schools, nine waterpoints, ten training centres, three equipped multi-purpose centres, two hundred kilometers of pastureland, ten cattle inoculation centres, ten hectares of fish-farming ponds, ten village nurseries, fifteen warehouses, twenty shea butter presses and twenty shellers fully built or procured by the end of the project. This plan will enable the development of the outgrower scheme with a positive impact on food security in the area and in addition, the project will provide electricity to local communities.

The information included in this box is based on information provided directly by producers and not verified by FAO.

The full example can be found here:

www.fao.org/bioenergy/foodsecurity/befsci/gpse/markala.pdf

ENERGY SECURITY AND LOCAL ACCESS TO ENERGY

The security of energy supply may affect the vulnerability of countries to demand and supply shocks in energy markets. These shocks may affect, especially in developing countries, the trade balance and overall macroeconomic stability, with potential repercussions on food security.

If modern bioenergy development leads to a more diverse energy mix, this may contribute to increase the security of energy supply, with positive effects on the ability of these countries to achieve and maintain the food security of their people over time.

Access to energy, especially to modern energy services, is essential for both social and economic development and thus for food security. Access to energy affects the productivity of the agricultural sector and thus food production/availability. Access to modern energy services for cooking is also important for food preparation/utilization.

Modern bioenergy development may increase access to energy and modern energy services for both productive uses (such as crop and livestock production) and household uses (such as cooking), especially in rural areas, with positive effects on local livelihoods and food security. If modern bioenergy development contributes to reducing the dependence on traditional unsustainable bioenergy sources such as fuelwood and charcoal, this may have positive effects on human health and thus on people's food utilization.

Good Practices to Increase Energy Security and Local Access to Energy

Examples of the following good practices were submitted by bioenergy producers:

- **Development or improvement of energy infrastructure**
- **Provision of energy for local and/or domestic use**
- **Improved cookstoves**

Implementation Example: Increasing Energy Access in Africa NOVIS, Senegal

NOVIS is a private company that develops plants for the production of power, heat and cooling from renewable sources in developing countries. NOVIS currently has two projects in Senegal: a biogas project in the Casamence region and a rural electrification pilot project in the Fatick region. Casamence region: In addition to the households of the villages, the project will provide, 24 hours per day, energy to primary schools, small clinics, a radio station, a drinking water supply system, street lights and a range of agricultural processing businesses, shops and other small enterprises. This project will contribute to achieving the objectives set by the Senegalese Government in terms of providing access to renewable energy to rural communities, thus contributing to their social and economic development. In particular, the availability of electricity is expected to attract new businesses and create new employment, thereby reducing the outmigration of young people. Fatick region: NOVIS has developed an independent power production system and has installed an island network in order to provide the lacking power supply to this area. The business model and the electricity supply have been developed in a way that is self-sustaining in the long-term, without additional means of the project owner or the involvement of third parties. Since project implementation there has been a substantial improvement of living conditions: security, health, income, etc. The project has also provided a way to promote and raise awareness about renewable energies, especially biomass, in Senegal. Since August 2009, the project has not been subsidized by the Senegalese Government and has not resulted in price increases for the consumers.

The information included in this box is based on information provided directly by producers and not verified by FAO.

*The full example can be found here:
www.fao.org/bioenergy/foodsecurity/befsci/gpse/novis.pdf*

GENDER EQUITY

Modern bioenergy development may affect men and women within households, and male and female headed households differently, depending on the specific socio-economic and policy context considered. This reflects men and women's different roles and responsibilities, as well as pre-existing gender-based, socio-economic inequalities, particularly in terms of access to and control of land and productive assets in general, as well as historic discriminatory practices.

Women and female-headed households may be more likely than men and male-headed households to be excluded from modern bioenergy supply chains. This is due to widespread and persistent gender-based inequalities in most developing countries, particularly in terms of access to - and control over – the following resources and assets: land, water and other natural resources; agricultural inputs and equipment; agricultural extension services; credit, particularly formal credit schemes; and markets.

If women and female-headed households are excluded from the benefits of modern bioenergy developments – while potentially being exposed to the risks of the latter – their food security may be affected.

Good Practices to Ensure Gender Equity:

Examples of the following good practices were submitted by bioenergy producers:

- **Gender-sensitive corporate conduct**
- **Gender-related corporate policies and programmes**
- **Women in leadership positions**

Implementation Example. Ensuring Gender Equity **GODAVARI SUGAR MILLS, India**

The Godavari Sugar Mills Ltd is active in a number of sectors – including sugar, power and industrial alcohol – and has plants located in the states of Karnataka and Maharashtra in India. The company has over 15 000 growers (each covering 2–5 acresⁱ) serving its biorefinery in Karnataka, which produces 1.5 million tonnes of cane per yearⁱⁱ. Godavari seeks to ensure that women have equal access to the education and community development services that the company has developed. For example, the adult education centres providing lessons during the evening have separate courses for both women and men throughout the various villages in the Godavari Biorefineries area of operation. The *Help A Child To Study Project*ⁱⁱⁱ was established in 2002 to assist students to complete their higher education. Scholarships are given to the students for courses after the 10th grade and covers a variety of courses from junior college up until medical and engineering schools. *Help A Child* does not discriminate between students based upon caste, religion or gender. The only criteria for sponsorship are the student's own poverty and that they have scored highly in their studies, above 70 percent for girls and above 75 percent for boys. The students have thereby already shown their potential to succeed within education and that they have the enthusiasm to do so.

The information included in this box is based on information provided directly by producers and not verified by FAO.

The full example can be found here:

www.fao.org/bioenergy/foodsecurity/befsci/gpse/godavari.pdf

ⁱ *For perspective, a similar size refinery in Brazil might have one hundred growers at most.*

ⁱⁱ *The production capacity was recently increased to over 3 million tonnes per year.*

ⁱⁱⁱ *For more information on the organization and on sponsoring a child, visit: www.helpachild.in*





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For more information
www.fao.org/bioenergy/foodsecurity/befsci/en