



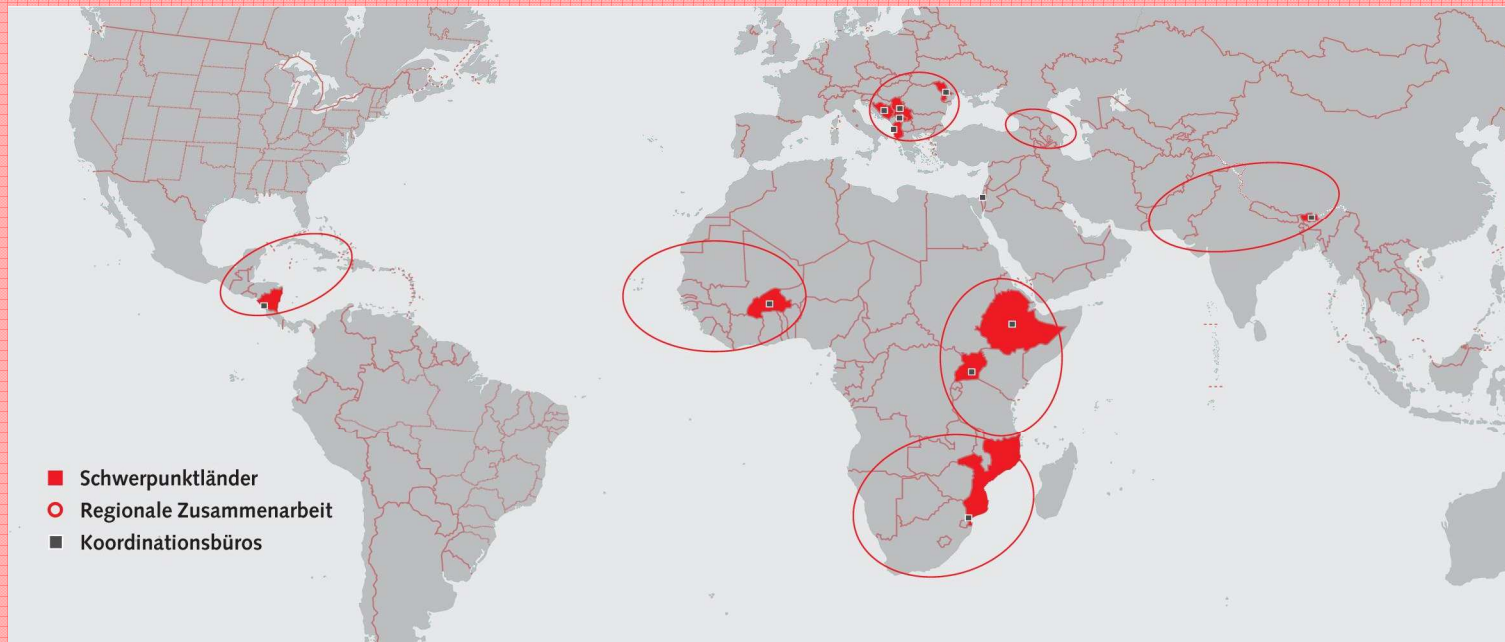
# Developing Countries Programs and Lessons learned Austrian Development Agency (ADA)

Mr. Hannes Bauer, Sustainable Energy

March 2011

## Priority Countries and Regions

- Nicaragua (bis 2013)
- Burkina Faso
- Ethiopia, Uganda
- Mosambik
- Bhutan
- Albania, Bosnia and Herzegovina, Kosovo, Macedonia, Montenegro, Serbia
- Moldova; Armenia, Georgia
- Palestinian Territories



# Millennium Development Goals (MDGs)

**Overall Goal: Half poverty by 2015**

**In 2000 all 192 UN Member States have agreed to achieve by 2015:**

Goal 1: Eradicate extreme poverty and hunger

960 Mio human beings are malnourished or have to hunger in 2008

Goal 2: Achieve universal primary education

Goal 3: Promote gender equality & empower women

Goal 4: Reduce child mortality rate

Goal 5: Improve maternal health

Goal 6: Combat HIV/AIDS, malaria, and other diseases

Goal 7: Ensure environmental sustainability

Goal 8: Develop a global partnership for development



WB 2008: The effects of the food and fuel crisis on malnutrition and schooling can undermine years of progress on the MDGs\*

Contribution of Austria: Minister Spindelegger shorted the budget for Development Co-operation (ADA) 2011-2014: 10% annually



[www.entwicklung.at](http://www.entwicklung.at)

\* Source: RISING FOOD AND FUEL PRICES, ADDRESSING THE RISKS TO FUTURE GENERATIONS, October 12, 2008  
Human Development Network (HDN), Poverty Reduction and Economic Management (PREM) Network, The World Bank



**MILLENNIUMSZIELE 2015**

Gemeinsam entwickeln - Zukunft sichern

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# Background on Biofuels

**Bioethanol** mainly from sugarcane or maize; blended with gasoline

**Biodiesel** mainly from rapeseed and palm oil

**Biofuels account for > 1 percent of road transport fuels** and are expected to account for 4 - 7 percent by 2030

**Biofuel generation booming**, in response to high energy prices and driven by gov. blending targets and subsidies, justified by energy security concerns and the wish to increase energy independence and government; consequences for poverty reduction

**Biofuels have potential to create rural employment and contribute to rural development** by providing decentralized small-scale sources of energy (off-grid rural electrification, substitution of diesel)

**Tropical countries have highest potential to produce biofuel crops; e.g. Brazilian Ethanol program** economically successful, but missing social & ecological standards

**Tripling of oil prices** since 2000 has severely affected net importers among developing countries, forcing them to divert funding from critical development needs such as health and education, and increasing public debt

**Energy efficiency measures, intelligent transport and fuel switching** (e.g. away from coal) offer much greater and cheaper potentials for climate change mitigation than expansion of biofuel production.

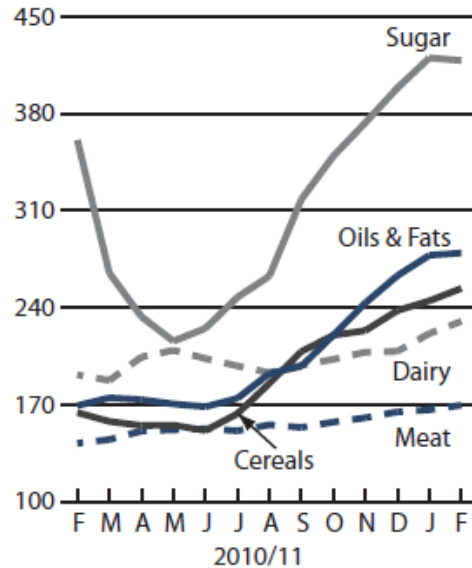
**Biofuel production from food crops**, along with rising food demand in emerging countries have already led, and **will continue to lead, to food price increases**. This is a threat to the urban poor and to non-self sufficient farmers, but may also be an opportunity for farmers in the South



# Global food price monitor (FAO)

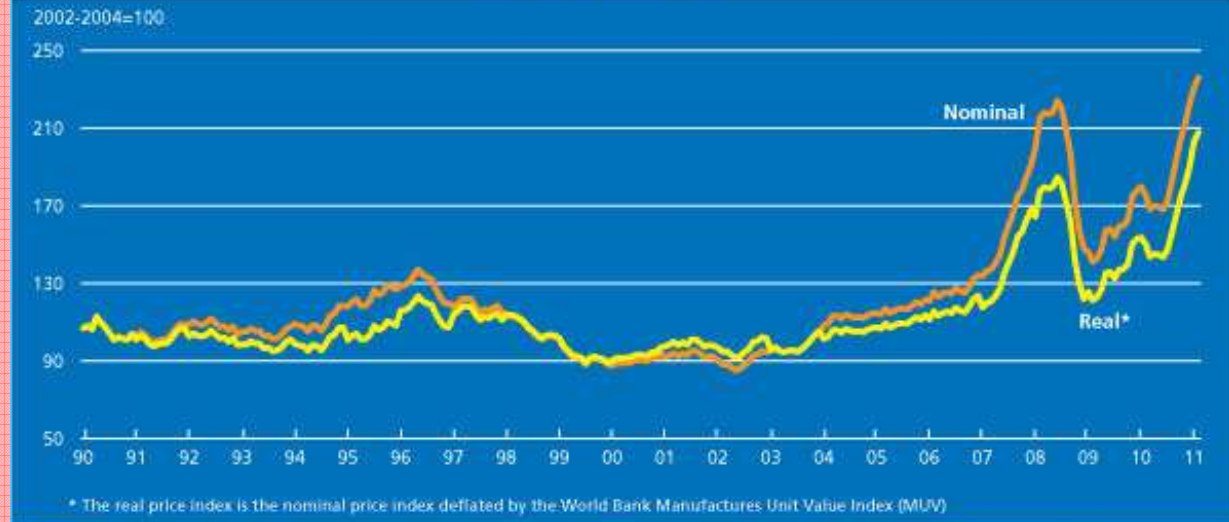
Food Commodity Price Indices

2002-2004=100



**Within 10 Month in 2010:  
Sugar increased 4 times  
Cereal increased twice**

FAO Food Price Index

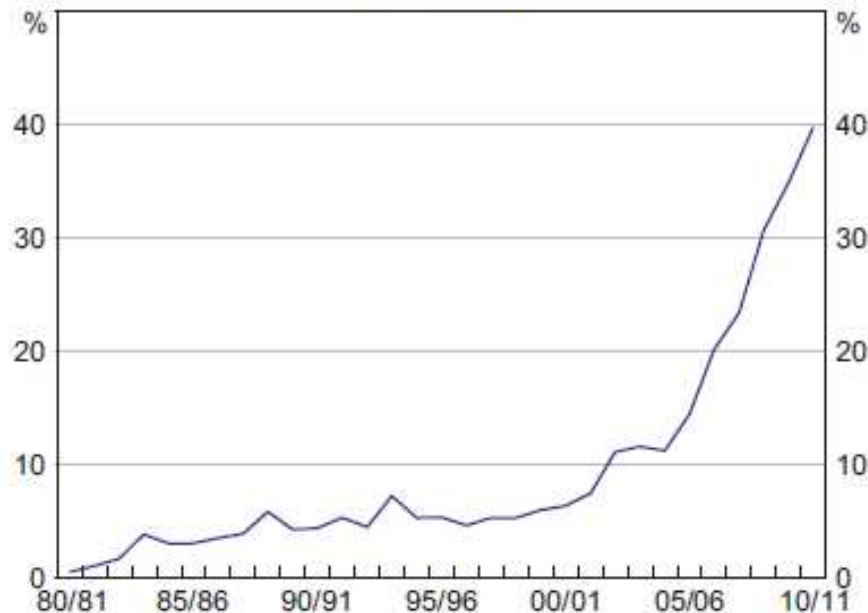


**FAO Food Price Index (FFPI):** av. 236 points in 2-2011 as the highest rate since 1-1990, the inception date of the index, driven mostly by higher prices of cereals, meat and dairy products

# Background in Biofuels and Food

## US Corn Used in Ethanol Production

As a ratio to total US corn production\*



\* Market year data (September - August); estimate for 2010/11  
Sources: RBA; United States Department of Agriculture

**2000-2010: US Corn for ethanol  
Increased 4 times**



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Source: FAO and Reserve Bank of Australia

- **Food: the poor in LDC countries cannot afford increasing food prices**
- Food intake p.c. in China doubled in 40 Years
- New pressures through increasing meat intake e.g. in China cause food crises, malnourishment and increasing civilization diseases
- Highest Food intake p.c. in US and Europe

## Per Capita Daily Food Intake\*



\* These data represent each region's total caloric value of food supplied to retail firms and households divided by its population  
\*\* The world's 49 least developed countries  
Sources: FAO; RBA

# Biofuels concerning poverty reduction (1)

- Influences on Security of alimentation and cultivation of staple crops
- Biofuel for 75% of increasing of food prices responsible

A note on rising food prices, 2008 by IBRD International Bank for Reconstruction and Development (IBRD), World Bank Group

- More demand on food, animal feed, biofuels and industrial feedstock cause pressure on food crops areas and food prices
- Biofuels may be interesting when local population can benefit:
  - additional income generation
  - diversify agriculture
  - fuel also/primarily for local use (motor vehicles, stat.applications, etc)
  - positive interactions in the existing system
  - Strong consideration of social and ecological standards
- Critical review large scale cultivation and (investor driven) exports
- National & local authorities and NRO should be involved

## Biofuels concerning poverty reduction (2)

- Holistic Assessment of biofuel generation in disponible land areas
  - Ownership
  - Area „used“ as fallow?
  - Are there temporal nomads or pastoralists?
  - Is there a risk of any other displacement or migration?
  - Influences on ground and sub terrain water
  - Moving in of people in ecological areas (e.g. tropical rain forest)
  - Water rights, land using rights legally considered
- Partnerships between agroindustry and local population / farmers
- Considering of social and ILO standards

International Labour Organization (ILO) is a specialized agency of the United Nations. An example are the partnerships and good / healthy labour conditions concerning fair trade coffee.



# Running Energy Activities financed by ADA

## Energy Programs:

- EEP Energy and environmental partnership in Southern & Eastern Africa  
[www.eepafrica.org](http://www.eepafrica.org)
- EEP Energy and environmental partnership in Central America  
[www.sica.int/energia](http://www.sica.int/energia)
- ECREEE - ECOWAS Regional Centre for Renewable Energy and Energy Efficiency: 15 Countries of the ECOWAS region in West Africa  
[www.ecreee.org](http://www.ecreee.org)

## Conferences:

- GFSE Energy between Danube and Caucasus The role of Renewable Energy and Energy Efficiency as a key issue for economic development, 28th-29th of April 2011, Vienna
- Energy for All – Time for Action 21-23 June 2011, Austria

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# Jatropha Project in Guatemala

## POTENTIAL FOR ECONOMICAL AND SOCIAL IMPACT

- **Excellent alternative to marginal areas:** low watering need, high adaptability to soils with low nutrient concentrations
- **High oil content:** 1500 to 1900 l / ha per year
- Sufficient water and fertilizer necessary for good harvests
- **Low implementation costs**, with **long lifespan** (30-50 years)
- **Common in Guatemala**, where it is used in **fences**
- **High economical value: biodiesel and Sub-products** (organic fertilizer, *briquettes*, biogas)
- **New opportunities for the women in the communities**, who are responsible for the sub products

Green fruit



*Jatropha fence*



*Jatropha bush*

Source: EEP, TechnoServe - Guatemala



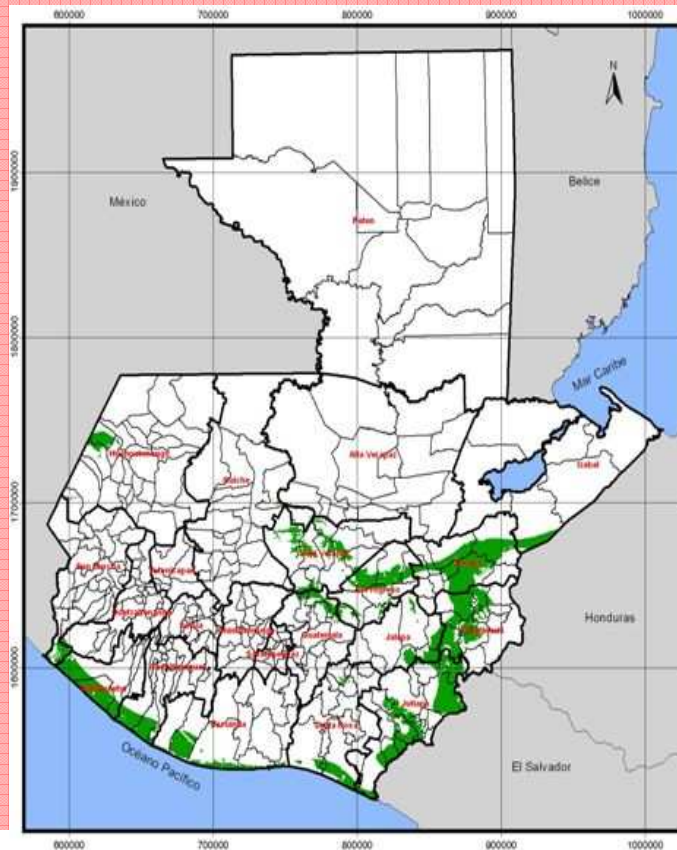
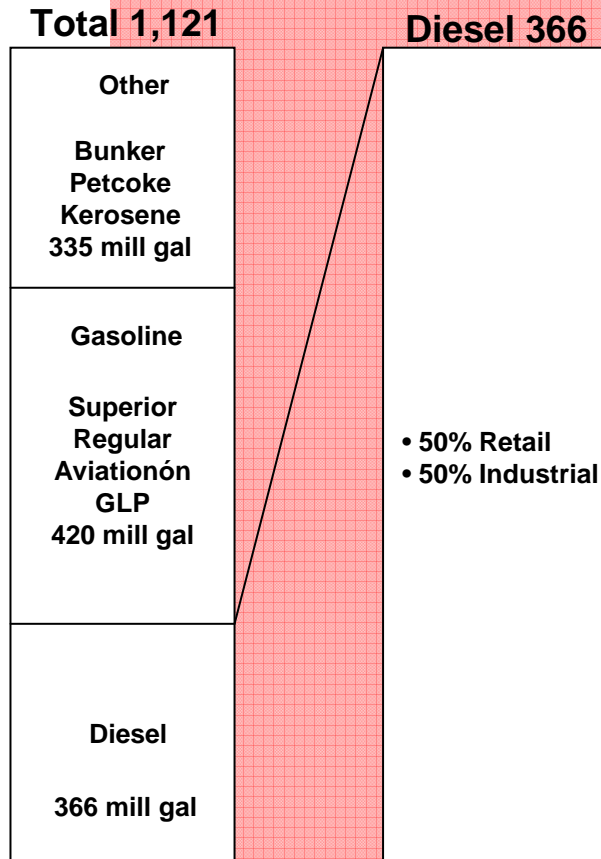
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# GUATEMALA IS HIGHLY DEPENDENT ON FOSSILE FUELS; PLANTING JATROPHA MAY BE A VIABLE ALTERNATIVE

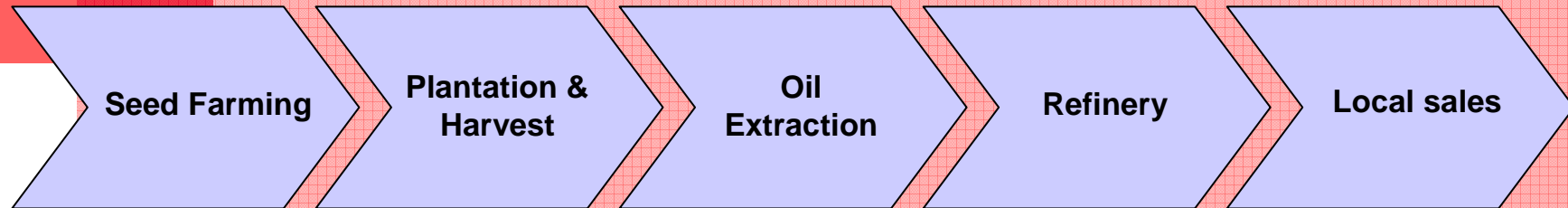
**Fossil fuels consumption**  
Millions of Gallons / year (2007)

**620,000 ha of unproductive land,  
suitable for Jatropha production**



**Potential do  
produce 260  
million gallons (6  
million barrels) of  
biodiesel per  
year, substituting  
80% of the  
imported diesel**

# BIOFUEL'S APPROACH: A THREE PILLAR STRATEGY ALONG THE VALUE CHAIN



## Pillar 1 Small producers

**Partners:** ADA Austria, EC, Finland within the running program EEP (energy & environmental partnership)  
**Projects:**  
• Biodiesel for rural development  
• Combined production systems (tilapia + biodiesel)

### Partners:

- ICTA
- FAUSAC
- Univ. del Valle
- Bayer
- Winrock

### Projects:

- Fodecyt
- Multicyt
- Subproduct development
- Technological packs (agriculture and industrial)
- Farmer to Farmer

## Pillar 2 R&D

## Pillar 3 Large scale investors

### Partners:

- Jatrolil
- Other investors

### Projects:

- Financial models
- Central America comparison

Source: EEP, TechnoServe - Guatemala



## Jatropha Project in Guatemala - summary

- The **Guatemalan biofuels program** can have a significant impact in the country's development, by reducing **poverty**, providing opportunities to strengthen **gender** equality, **diversifying** the country's **energy matrix** into **sustainable alternatives** and creating a **base to propel development** in other areas through the **reduction of imports**.
- Currently, small rural producers focus on planting corn, and farming cattle, both directed to subsistence consumption. The productive areas are not enough to generate income to lift families out of poverty. However, by introducing Jatropha in marginal areas, **not substituting food production**, these new cash crop can generate **additional income** for the **rural families**.
- A sustainable industry can be built on marginal areas, when based in a vegetable oil production clusters. In this **model**, **producers** are organized to generate scale for the industrial process, **without utilizing areas previously allocated to food crops**. Additionally, this production model allows for the **financing of the necessary equipment**, which can be purchased among a large selection of commercially available machines.
- The development of **vegetable oil production** can be used to foster new initiatives, especially higher return projects limited by fuel prices for being energy intensive, such as fish farming and rural electrification programs.
- Policy makers interest in fostering a biofuels program should, among others, foster smart **incentive programs** distributed over several steps of implementation, including **scalable vegetable oil production in marginal lands by communities**, **re-forestation programs utilizing Jathropha (fixes Nitrogen)**, **sub-products production and commercialization (fertilizer, brickets)** Special care needs to be taken on **environmental impact at each step** of implementation
- **Early taxation** of this nascent industry will **avoid growth**.

# OPPORTUNITIES FOR OTHER DEVELOPMENT PROJECTS

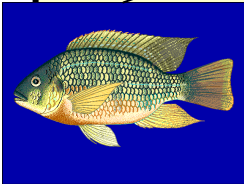
**Example: combined *Jatropha* and fish (Tilapia) production**

```
graph TD; A[Irrigate Jatropha plantations] --> B[Jatropha seed production]; B --> C[Extract oil from seeds]; C --> D[Transesterification of oil to produce biodiesel]; C --> E[Power tilapia tanks with vegetable oil]; D --> F[Sell biodiesel]; E --> G[Sell tilapia];
```

The flowchart illustrates a combined production system. It starts with 'Irrigate Jatropha plantations', which leads to 'Jatropha seed production'. From there, the process splits: one path goes to 'Extract oil from seeds', which then leads to 'Transesterification of oil to produce biodiesel' and finally 'Sell biodiesel'. The other path from 'Extract oil from seeds' goes to 'Power tilapia tanks with vegetable oil', which leads to 'Sell tilapia'. There is also a feedback loop from 'Sell tilapia' back to 'Irrigate Jatropha plantations'.

- Tilapia is a high return production system, however high fuel costs in remote areas can limit the access of small communities to it.
- High complementary between *Jatropha* and tilapia production systems:
  - Estimation of up to 30% costs reduction, by substituting diesel for straight vegetable oil to operate tilapia tanks
  - Over 40% increase in *Jatropha* seed production by watering with water disposed from ponds (rich in nutrients from fish excrements)
- Pilot being implemented in the Zacapa Department, to validate the economical model

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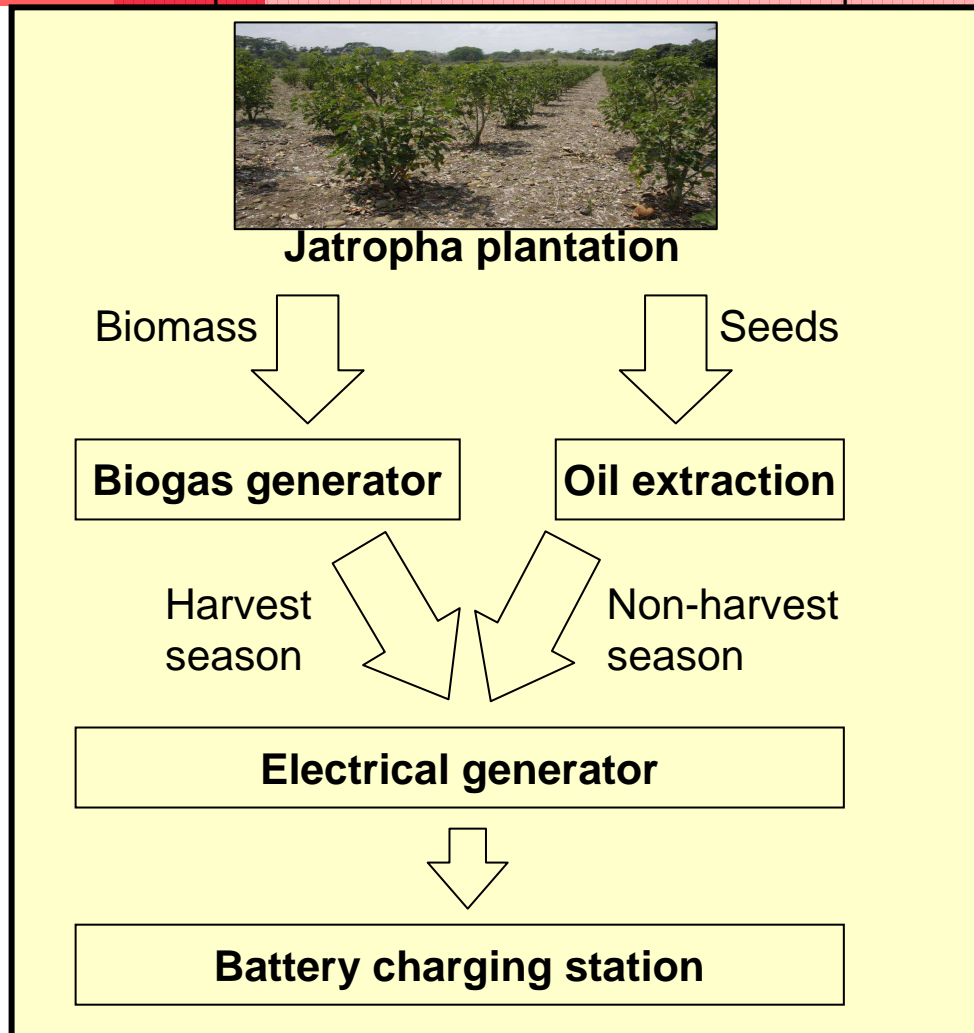


Source: EEP, TechnoServe - Guatemala

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# RURAL ELECTRIFICATION PROJECTS AS EXAMPLE OF DEVELOPMENT WITH STRAIGHT VEGETABLE OIL

Example: rural electrification based on Jatropha oil



- A **battery charging station can be built based on Jatropha oil and biomass.**

- During harvest season the generator station runs on biogas.
- During the non-harvesting season, the generator runs on stored vegetable oil

- Each **involved family owns two batteries**, and a wiring kit in their house to power light bulbs and small appliances (approximate cost per family of \$400 dollars).

- Model advantages include lower electrification costs for low density area (no transmission costs) and the possibility of families better controlling their energy expenditure.

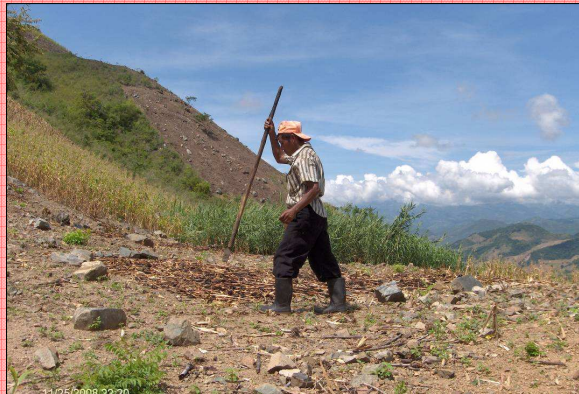
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# OVERALL CONCLUSIONS TO CONSIDER WHEN FOSTERING THE CREATION OF A BIOFUELS INDUSTRY

- A detailed mapping and identification of unproductive arable areas suitable for jatropha crops can ensure that investments are directed toward marginal areas and ensure that no food substitution or deforestation occurs.
- The trans-esterification process produces as a deject water that should be “cleaned” before it can be reintegrated to the environment. This can be substituted by a “dry washing” method, which should be encouraged. To ensure the correct environmental precautions are taken, transesterification plants should be operated by large players, with incentives to comply with regulators and that can be inspected / certified.
- Additional research opportunities are related to substituting the methanol required in a economical way (currently it is not economical interesting to substitute the methanol for ethanol).
- The taxation of different components of the supply chain can make biodiesel not competitive (price –wise) with petroleum derived diesel, or reduce margins throughout the production chain that would limit the benefit received by small producers. As an example, in Mozambique biodiesel can be produced at a cost of \$0,76 / liter. However, after taxation (fuel tax and VAT), the cost of selling is \$ 1.09 / liter, while regular diesel is sold for \$0.97 / liter (2007).
- Sub-products (organic fertilizers, etc.) are needed to ensure the economical attractiveness of jatropha production, and their use and commercialization should be promoted. Additionally, they provide an opportunity to integrate women into the production chain, thus strengthening their social position.
- The creation of a complete, nation-wide and sustainable industry must be constructed in timed steps, initially assuring that the model is economically validated thru pilots and that sufficient research is done, then scaling up until the industry is stable and demand driven.



# EXAMPLE OF GUATEMALAN COMMUNITIES WITH AVAILABLE MARGINAL LANDS



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