

Establishing Bamboo Supply Chains for Renewable Biomass Energy in Developing Countries

Overview: According to the UN WHO and World Bank's Carbon Initiative, about 3 billion people are relying on the traditional use of biomass (charcoal) for cooking every night. This is a leading cause of preventable death due to indoor air pollution, excessive environmental destruction including CO2 output and severe deforestation which causes soil erosion, mud slides, and famine.

The IPCC, IEA, US EPA and others miscategorize this as Forest Use and attribute to it 17% of CO2 output, while putting all fossil fuels for energy at 26% of CO2 output.

The WHO says In 2013, an estimated 1.5 million people died from HIV-related causes globally while over 4 million people die prematurely from illness attributable to the household air pollution from cooking with solid fuels. More than 50% of premature deaths among children under 5 are due to pneumonia caused by particulate matter (soot) inhaled from household air pollution. An additional 3.8 million premature deaths annually from noncommunicable diseases including stroke, ischaemic heart disease, chronic obstructive pulmonary disease (COPD) and lung cancer are attributed to exposure to household air pollution.

The deaths, environmental devastation and excessive pollution are all PREVENTABLE.

Approach: 1) Grow biomass, 2) use efficient industrial processes for conversion to usable, distributable fuels, 3) improve the stoves.

1 - Create sustainable communities of growers, provide them with training and materials to be long-term sustainably successful.

2 - Apply modern technology and methods to processing biomass to distributable fuel

3 - Apply modern technology and methods to stove design for low cost, materially efficient stoves

Details:

1 - Grow Biomass

The highest bio-mass per acre is Bamboo. It doesn't require irrigation. It doesn't die when harvested, it regenerates (its a grass), so the soil gets held in place. It grows from the tropics to the temperate zones

It is also usable for building materials, composites, textiles, a protein food and as soil amendments. So, the community could have multiple sources of income and complete use of the sustainably harvested biomass while eliminating deforestation and soil erosion.

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Depending on the locality and legal environment, various structures could be applied to creating Sustainable communities of growers. Similar to Coffee Collectives, we seek to establish farmer owned for-profit Bamboo Growers Societies (collectives) (Similar to Ocean Spray for cranberry farmers). These organizations would pay farmers per tree to grow bamboo. The organization would buy the bamboo from the farmers for processing into a range of valuable outputs including energy, building materials, etc.

The owners (farmers and partners) would share in the economic returns generated. The Bamboo Societies will work with the farmers to sustainably grow, manage and harvest the forest and provide and attract community level resources for industrial scale, clean processing and distribution of the harvest into energy, charcoal, liquid fuels, textiles, soil amendments, building materials and protein food. Commercial companies will be approached for industrial scale supply contracts for building materials, flooring and textiles. These will enhance the overall economic output of the sustainable harvest. Sustainable method for water management and forest management will support long term economic development for the community.

Through partnering, the co-ops can gain access to the other resources necessary to enable the World Bank Carbon Initiative funding and other Carbon Credit funding.

As a first approach, in Tanzania, we are studying the creation of a farmer owned for-profit collective - Kilimanjaro Mianzi Society. KMS intends to sign up more than 10,000 small farmers of the 100,000 in the region. They will get paid to plant bamboo, will be trained on its cultivation, and agree to sell the harvest back to KMS for processing and distribution. KMS is applying to KPMG's AECF Africa Fund for such endeavors, which requires 50% matching funds from other sources.

2 - KMS Processing and Distribution

KMS will organize community scale processing of the harvest and engage in source-of-supply agreements with industrial scale consumers of building materials, composites, textiles, protein foods, and soil amendments.

Tanzania is a Charcoal Energy Economy. So, the usable form of distributable energy is charcoal. Industrializing the process vs the current baseline will reduce the biomass needed (and CO2 generated) by 80%. In addition, the industrial high temperature charcoal is a better fuel than the existing low temperature fuel resulting in less pollution and less fuel use.

In addition, the excess heat from making charcoal will be used to generate electricity locally and perform other bamboo processing. Example -- use the charcoal kiln to create steam -- use the steam to create bamboo fiber for textiles or to run a generator. The Generator condenses the steam which could become a clean water supply.

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3 - Stove Design

KMS will partner with existing projects already developing improved, low cost stoves and flues. It will train its farmers and energy customers as well. Stove design and reduce fuel consumption (and CO2 output) by 50% and clean up the indoor air pollution.

What's Needed?

This project is looking for funding and partners to develop local leadership to create communities committed to sustainable methods for creating renewable, clean biomass fuel - mostly in the 46 Least Developed Countries. We will establish sustainably harvested Bamboo Forests as the economic engine to alleviate poverty, grow renewable energy, and reverse the environmental effects both locally and globally.

Why Bamboo? Bamboo is one of the highest biomass/acre plants available. Its harvestable in 3 to 5 years as a hardwood. Unlike trees, bamboo can be harvested without killing the plant, so it grows back the next season. Its grass like root structure, which remains after harvesting, accounts for 50% of the biomass generated. As harvesting leaves the plant alive, the remaining root structure prevents soil erosion, unlike tree harvesting. Unlike other crops, bamboo requires little or no pesticides to grow, because of a natural bio-agent that is bound to the plant at the molecular level.

The world bamboo building materials and furniture market is expected to double by 2015 (from USD \$10 billion to USD \$20 billion) (Xuhe, 2003).

Port-au-prince, Haiti consumes 115,000 Tons of charcoal annually for cooking at a value of approximately \$3 million. Sustainably Harvested Bamboo Forest can create an estimated 4 Tons of charcoal per acre, meaning that the demand in Port-au-Prince can be satisfied by planting approximately 29,000 acres of Bamboo.

In addition to actual economic value of sustainably harvested bamboo forests, there are additional funds available through the World Bank Carbon Initiative and Carbon Credit Exchanges. Recently, the United Nations launched a major initiative to pay developing countries for reduced deforestation. The program, known as REDD+ (Reducing Emissions from Deforestation and Degradation), may be incorporated into global carbon markets under the next international climate treaty, resulting in billions of dollars in payments from wealthier countries for forest conservation.

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