

Village-level Production of Biodiesel - Technical and Legal Challenges

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Abstract

By and large the focus of all, or shall we say *almost all*, biodiesel projects in India has been, and continues to be, the development and potential use of biodiesel (read *Jatropha curcas*) as an alternative to petroleum diesel in the transportation sector. Notwithstanding the strategic importance of such an approach, and the need to develop a well-defined roadmap to achieve it, no doubt reflected in the convening of well-attended and international conferences such as this, one is tempted to ask: “*Is that it!!? What else can we do with biodiesel?*”

We submit that there exists at least one other strategic benefit that is ripe for picking. However, a few policy level obstacles remain without whose removal, or at least provision of means to side-step them, the promised fruit may wither away without ever quenching the thirst of its target beneficiaries: the tribal folk of Orissa.¹

We will present to you the progress, trials and tribulations of an ongoing project^{2,3,4} in a couple of villages within Gram Vikas’ operational areas that aims to achieve the following:

- Village level extraction of oil from underutilized oil seeds collected from the forest and/or grown in waste land, agricultural and kitchen garden patches.
- Village level conversion of such oil into biodiesel using the transesterification route.
- Biodiesel-fuelled water pumping, either through a (bio)diesel pump-set or through a (bio)diesel generator set and electric pump. A detailed assessment of community needs versus resource (seeds) availability to ensure that an appropriately sized technology package is installed in the village.

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¹ A large number of tribal villages in Orissa are relatively small (< 30 households) and lack easy access except by foot. Their remoteness and (miniscule) size together rule out the feasibility of the government ever being in a position to extend the grid to these tribal villages in an *economical* manner.

² The Gram Vikas-CT_x GreEn Biodiesel Project was initiated February 2004 in Orissa, with seed funding won from the World Bank Development Marketplace (DM2003) competition www.developmentmarketplace.org; browse the site for further details on project 001551: *Carbon-neutral Biodiesel-fuelled Energy System*.

³ CT_x GreEn has been named a 2005 Tech Museum Awards Laureate for the Intel Environment Award. For more information on the awards and Laureates, visit <http://www.techawards.org>.

⁴ Presentation published in the Proceedings of the International Biofuels Conference organized by Winrock International India, New Delhi, Sept. 2004.

- Human-powered machines for grinding oil seeds, pressing oil from seeds and converting oil into biodiesel, all operated by villagers trained in operation and maintenance by core staff from the Gram Vikas Mohuda pilot plant.
 - Press is hand-operated, while grinder and biodiesel reactor are pedal-operated.
 - We started out with a press driven by a mechanical-jack and a press-and-hold action, but the productivity fell very short of the desired 2-5 l/h oil output
 - Recently, we have imported the Mafuta Mali press from Kenya.⁵ Made by KickStart (formerly ApproTEC), this press works well for niger. Further trials are ongoing to adapt the press for karanja and tullo (mahua) seeds.
- Village level utilization of by-products such as oil cake and glycerin leading to a progressive improvement in the productivity of land-based agricultural activities.
- Eventual move away from shifting agriculture (slash-and-burn, locally called *bogodo*), towards stable forms of agriculture, with associated land/forest regeneration possibilities.
- Local value addition opportunities, *e.g.*, selling oil instead of oil seeds to traders, retaining valuable oil cake for local agricultural use and as cattle/poultry feed; net gain in wealth generation, greater recirculation of wealth within the local community.
- Strengthening and empowerment of SHG's to play an active role in all aspects of seed collection, processing and fuel use.
- Alternative ownership models for the entire set of activities, ranging from volunteer-driven approaches and cooperatives to entrepreneurial models.
 - A context-sensitive Socially-responsive Environmentally-friendly Techno-Economic (SETE) feasibility assessment tool that will help define critical parameters essential for the long-term sustainability of such renewable energy based "*total quality of life*" improvement packages.
 - The context in each village will be provided by the villagers' needs and the resources available to them, and their present reality versus future aspirations.
- A powerful addition to Gram Vikas' toolkit of renewable energy technologies for the rapid replication of their internationally recognized Rural Health and Environment Programme (RHEP)⁶ as a part of their Integrated Tribal Development Programme (ITDP) in non-grid tribal villages.
- Mobilization of activities necessary to seek and obtain policy support essential for long-term sustainability.
 - To start with obtain necessary permits that will facilitate the economical purchase of ethanol and/or methanol at required purity levels (<0.5% water).
 - Progress towards a situation that will facilitate local production of the required fuel-grade ethanol, in a suitably denatured form to safeguard against potential abuse, from locally available waste biomass (*e.g.*, waste fruits) for long-term sustainability.

The paper will conclude by making a case for policy level support from different levels of government to ensure the sustainability of *biodiesel-fuelled tribal development in Orissa*.

⁵ For more details on the Kickstart (formerly ApproTEC) Mafuta Mali press, please visit www.kickstart.org.

⁶ The Gram Vikas RHEP has received several citations and awards including a couple of prestigious international awards: Global Development Network (GDN) 2001 Award for Most Innovative Project, Building & Social Housing Foundation (BSHF) World Habitat Award 2002 (presented as part of the UN Habitat Day 2003 in Rio de Janeiro, Brazil). For further details please visit www.gramvikas.org.