

## **SUSTAINABLE BIOENERGY: MOVING BEYOND THE FOOD-FUEL CONTROVERSY**

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Production of green energy from plant-based feedstock has become popular in several countries around the world, as a panacea for energy security and rural poverty. Particularly, the decentralized nature of biofuel feedstock production presents many opportunities for rural areas. Biofuel advocates believe that feedstock production, transportation, and processing activities provide additional green jobs. At the same time the skeptics argue that the feedstock production system is still in its infancy; a number of technological, economic and political barriers confront the growth of bioenergy as an alternative, reliable energy source. The barriers include additional pressure on land and water, food-fodder-fuel controversy, and inadequate economic and infrastructure linkage with the broader economy.

This paper applies a sustainability analysis framework to assessing an emerging biofuel feedstock program in India. The analysis raises key questions on the economic viability of alternative feedstock collection systems, provision of rural employment, gender equality, and sustainability of land and water resources. We find that the program heavily on the capacity of policymakers to implement functional linkages and support system, and to establish reliable linkage between diffusive small-scale feedstock production sites and highly centralized urban consumer markets. The fledgling biofuel program in India is taking a cautionary approach by first targeting a large public sector transportation services for biofuel sales. At the feedstock production end, the program has undertaken a multi-pronged approach of building grass-root institutions, training, and input supplies.

A key factor that is critical to its success is the government's ability to stem the possibility of massive conversion of crop land into biofuel feedstock production. The biofuel program is therefore emphasized non-edible oilseed crops such as jatropha, neem and paradise tree. These crops can be incorporated into the existing agricultural systems without compromising food production. Further, the program also attempts to strengthen the grass root institution for feed production and collection. As a pilot case, the state agricultural university and the biofuel development board have joined hands for establishing a network of rural oilseed cooperatives, structured along the lines of the most successful village-level cooperative system in India, i.e., milk cooperatives and state cooperative unions. This study analyzes the role of these cooperatives in undertaking different levels of production, collection and value-added operations. The larger the amount of value-addition that the village cooperatives create, the more ecologically sustainable the program will become. Further, increased degree of value addition could also increase employment and income for women in rural areas. However, such value-addition requires a comprehensive infrastructure development and farmers' training.

Although the program crops may not compete for land with food production, if integrated with existing production systems, we find that they could compete for water and other resource requirements. Therefore, not every oilseed crop would be suitable for regions with high water scarcity.

