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India's Biofuel Policies: *Progress or Boondoggle?*

"In biofuels, the country has a ray of hope in providing energy security": National policy on biofuels, Ministry of New & Renewable Energy, Government of India

The government of India approved the National Policy on Biofuels on December 24, 2009. The aim of the policy was to supplement transport fuels with an "indicative target to replace 20% of petroleum fuel consumption with biofuels (gasoline with bio-ethanol and diesel with bio-diesel) by 2017". Today at the brink of 2014, halfway to target the deadline, it is appropriate to assess the relevance and the performance of the policy, say Asit K. Biswas and Nishtha Manocha

To start with, the biofuels in India enjoy massive subsidies and funding. Even then, India is nowhere near to achieving its set targets. Currently India's ethanol production allows blending of only 2.9%. The National Biodiesel Mission that focuses only on the production of biodiesel has not been effective either. The current biodiesel production in India is commercially insignificant, amounting to only 0.01% of blending. If targets are to be achieved, they must be based on reality and not on ambitions.

India mainly produces ethanol from sugarcane. Sugarcane production in India has been normal in the recent past. 2014-2015 is expected to be the fifth consecutive year of excess sugarcane production (relative to demand) in India. How can then a target for biofuels that is 70% higher than what production can support be justified?

For biodiesel production, Jatropha was experimented with. The demonstration phase of the Jatropha program was allocated 300 million dollars and 400,000

hectares of land. The reported yields of Jatropha were nowhere near the yields that the government claimed was achievable. This was attributed to the lack of high yielding seeds due to insufficient research and development efforts. Thus, the target for biodiesel appears to have been decided upon not on serious studies, but on somewhat shoddy research and development, making it a 300-million dollar boondoggle bound to produce negative results.

Jatropha is a relatively new crop, which because of heavy subsidies is being extensively planted in India. However, its mismatch of targets should have been anticipated by any rational and knowledge person. The extent of shortfall is truly disgraceful.

Even though sugarcane is well established in Indian agriculture, the yawning deficit in ethanol production does not have an excuse. Sugarcane yields in India stand at the average global mark. In 2012, the average yield of sugarcane in India was 68.3 tonne/ha. Australia had the best global yield at 76.7 tonne/ha. Even miraculously increasing productivity to the Australian levels would not enable India to achieve its totally unrealistic target.

Based on recent performance, there is absolutely no way that India will even come close to its blending targets by 2017. The fundamental question that must be answered is on what basis were the targets set at such an unrealistically high level? Was it just meant to be an academic exercise or was it a matter of political expediency which could claim that India is on par with the West in regard to the use of biofuels?

Keeping the targets aside, the national biofuel policy also outlines the manner in which the biofuels are to be produced. Some of the salient features of the National Biofuels Policy are as follows:

• Derive biofuels from non-edible feed stock that is grown on degraded soils or

wasteland that are not suited to agriculture, thus avoiding the food versus fuel conflict.

• Strengthen India's energy security while contributing to climate change mitigation.

• Create employment opportunities and promote rural development.

• Set up a national Biofuel Coordination Committee headed by the Prime Minister, to provide guidance and coordination.

• Set up a Biofuel Steering Committee, chaired by Cabinet Secretary, to oversee the implementation of the Policy.

• Foster research, development and demonstration on biofuel feedstock. Creating a National Biodiesel Fund, if necessary, for providing financial incentives to advanced biofuels.

Following the policy recommendations to achieve food security, India does not use food grains for the manufacturing of biodiesel. The National Policy on Biofuels recommends planting of Jatropha, a non-edible crop, on marginal lands, i.e., lands unfit for growth of food crops. However, with no proper channel to "classify" marginal lands in India, the agricultural lands are often being taken over by Jatropha crops to cater to human greed because of subsidies. Evidence of such land grabs for Jatropha cultivation is now widely available. With plantations encroaching agricultural land, it is wrong to assume that the food versus fuel debate is invalid in the Indian biofuel context.

The image of a wasteland is often that of a barren land with cracked earth or land with nothing but sand that stretches long distances. The fact is that such land cannot support Jatropha cultivation. Even though the plant survives, it does not produce good yields if not cared for with good soil, water and fertilizer. The best soil for Jatropha is loamy and aerated sandy soil. With good soil management practices, this type of soil can be one of the most productive types of soil with the ability to grow an array of valuable and much needed food crops.

The policy only "discourages" the use of agricultural lands. It does not prohibit it legally. The potential land chalked out for use by national mission on Jatropha biodiesel, is as follows (million hectares):

Forest areas	Agriculture (Boundary Plantation)	Agriculture (Intercrop)	Cultivable fallow lands	Wastelands under integrated watershed development	Strip lands such as roads, railways, canal banks	Total	Additional wastelands
3.6	30	2.0	24	20	10	114	4

Additionally, the "idle" government owned wastelands diverted to feedstock growth are largely classified as common property resources (CPR). These lands serve as a source of livelihood for local communities who use them to gather food, wood for fuels and building materials, and/or use them as pasture lands for cattle. Studies show that these lands can contribute to as much as a quarter of the income of the rural poor who are dependent on them.

One of the important perceived advantages of the current biofuel policy is the ability to contribute in climate change mitigation. Recent studies have proved otherwise. The life-cycle estimates that claim that biofuels are green have one major common flaw. They do not take into account carbon emissions connected with land use changes. When an area is cleared for biofuel production, it incurs a carbon debt. Carbon debt is measured by the years it will take for the biofuel to compensate the carbon displaced in the clearing process. Every hectare of forest conversion releases 600-1,000 tonne of greenhouse gasses into the atmosphere while every hectare of grassland converted releases about 300 tonne of greenhouse gases. In different parts of the world, depending on the biofuel crop grown and the original vegetation cover of the land used, it may take from one to several hundred years to clear the incurred carbon debt.

Further adding to the problem is NOx associated with the tailpipe emission and fertilizer use in growing biofuel crops. Nitrogen Oxides are potent greenhouse gases which are 298 times stronger than CO2. Although burning biodiesel in place of diesel reduces the Carbon Monoxide, particulate matter and un-burnt hydrocarbons, its emissions of NOx are higher than those of conventional diesel. At 20% blending, the increase in the NOx emissions can be up to 2%. Using pure biodiesel increases the NOx emissions by 10%. At the projected quantities of biodiesel required, the emissions become a serious cause for concern. NOx-reducing technologies must be mandatory to curb these emissions. This is unlikely in the foreseeable future in India.

The current policy propelled biofuel without serious research, logical thinking and due diligence, resulting in more harm than good for the country on a long-term basis. Biofuels in India are a comparatively new concept. They need considerable research and development before they can contribute to energy security in a cost effective and truly sustainable significant manner. The policy also considers advanced second and third generation biofuels.

The National Policy on Biofuels states that these "are environmentally friendly fuels and their utilization would address global concerns about containment of carbon emissions". How can the Indian bureaucrats and policy-makers got the basics so wrong?

India has raced ahead with the first generation of biofuels. The life cycle estimates are wrong, the calculated outputs are far, far away from reality, the ecological impacts are devastating and the social implications are disturbing.

The question is that why did the government enunciate a policy fundamentally flawed from so many different policy angles? Why were the implications not pondered upon before enormous subsidies and funding were sanctioned for biofuels? Why was no thorough analysis carried out before such massive and costly implementation was decided upon? If the basic numbers are not right and aims are not achievable, then how can the government justify spending enormous amounts of taxpayers' money on a policy whose costs overwhelms the benefits by a very significant margin?

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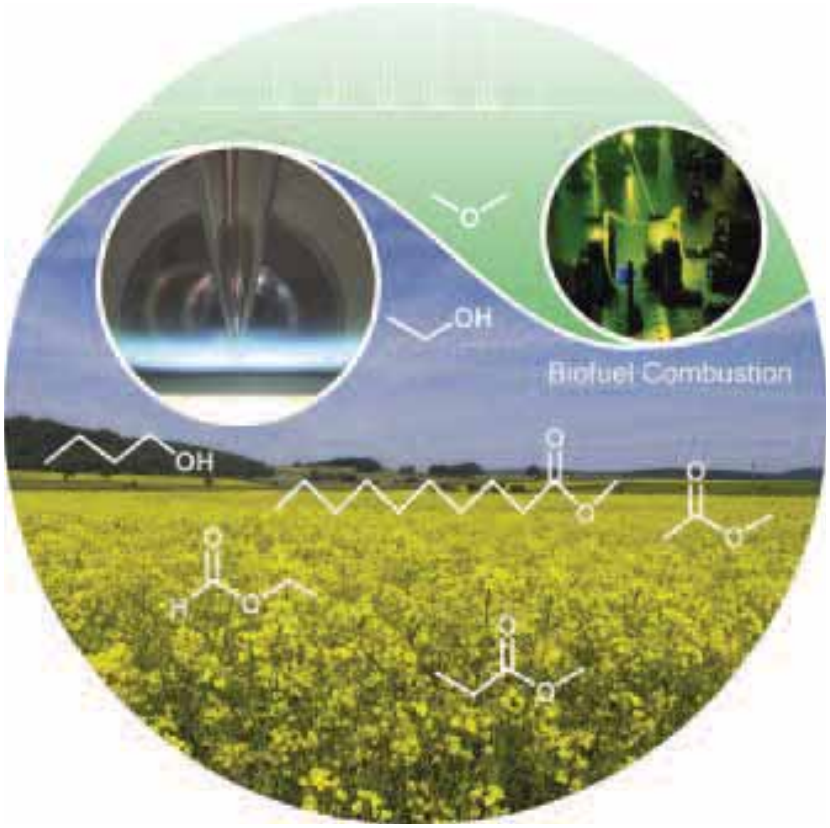
development before they can contribute to energy security in a cost effective and truly sustainable significant manner. The policy also considers advanced second and third generation biofuels. In terms of research, some promising work is being done in many parts of the world. However, it will take many years, at least a decade, for these technologies to be viable in the Indian context. A concrete roadmap has yet to be constructed, if India is to avoid repeating the first generation biofuel mistakes.

The current solutions offered by the national biofuels policy are not robust. Reducing the dependence on foreign fuel and climate change mitigation can also be achieved by decreasing the use of fossil fuels by more efficient use. Involvement of stringent emission standards, development of more efficient engines, effective speed moderation, smart control of traffic patterns and improving public transport systems will go farther in curbing air pollution and carbon emissions than the use of biofuels. Singapore's use of ERP's, with tolls at peak hours, contributes to a significant reduction of cars in the business district. This encourages people to use public transport, thus saving fuel significantly in the process. These alternatives must be addressed as a part of the macro picture to address energy, food water and environmental security, as well as their intricate inter-relationships.

The main reason why biofuels were envisioned was their ability to supplement transport fuels and hence to contribute to energy security. Recent studies concerning energy balances indicate that in cases where ineffective transportation and production are employed, one liter of biofuel may require more energy for production than the energy it can supply. The machines used to transport the raw materials and fertilizers to the field, to harvest the crop and transport it to the production facility, run the factory and then transport the manufactured fuel to the pumping station in India, all run on diesel.



Energy security encompasses more than biofuels. India is facing and will continue to face extreme energy shortages. In 2011, over 300 million Indians did not have access to electricity. India's population is estimated to grow to over 1.6 billion people by 2050. This population ncrease catalyses the need for India to produce more energy and use it more efficiently. Energy consumption per capita increases with development. On average, an Indian's daily consumption of energy is approximately 9% of the energy consumption of an average American and 30% of that of an average Chinese. However, this extra energy must be available and used in a prudent and efficient manner.

If poverty has to be alleviated, employment has to be generated and aspirations of the present and future generations of Indians have to be met, there is no doubt that the country has to increase its energy availability very significantly. However energy security in India will remain a mirage if it continues to be addressed with poorly formulated policies as has been the case with the biofuels policy.

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