

Issues in Food and Energy Security¹

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Shri R.B.Singh, Dr. Ajay Parida, Shri Rajat Narain, Cde. Ambekar ji, distinguished guests, ladies and gentlemen,

I am delighted and honored to be invited to this conference. It is indeed an honor to share the dais with such distinguished scientists. I must therefore thank Shri. Suresh Ambekar for inviting me to this important event.

I am a mechanical engineer from IIT Kanpur with training in renewable energy from U.S.A. I run a small rural NGO working in the area of agriculture and renewable energy. Hence I will speak on food and energy security from agriculture. Thus I will try to show how agriculture can provide both food and substantial portion of energy for sustainable India and in this process provide wealth and employment in rural India. Because when rural poor have money to buy food then the real food security comes

Food security of a country comes when it produces enough affordable food from its land for all its citizens. That can happen when enough land is available for food production and agriculture is remunerative.

With heavy onslaught on the agriculture land by industrialists and builders for putting industrial and IT parks, malls, and huge multi-lane highways etc.; there is a very serious fear that our land use for agriculture may be depleted greatly.

¹ Guest of honor lecture at the inaugural session of [International Conference on Food Security and Hunger Management, Organized by Vishwa Yuwak Kendra, New Delhi, 28-30 July 2011](#)

We cannot have food security by selling software and industrial goods to other countries and importing food. I believe certain section of Government thinks on these lines. With increasing conflict among nations for resources and materials, making food security dependant on food imports is a dangerous concept.

I also believe agriculture can provide both food and energy security of the country provided the productivity of land is increased with high tech agriculture and youth in large number participate in agriculture and its related industries.

I will try to show how this may be possible by the concept of farming for energy.

Farming for Energy

India produces close to 800-1000 million tons/year of agricultural residues. Most of these residues are burnt in fields to solve the waste disposal problem though part of them also go in fertilizer and animal feed. Burning of residues not only creates tremendous air pollution but is a waste of an important energy source. There is enough scientific data available that shows that the biomass residue burning in Indian sub continent is creating a huge brown cloud which is modifying the weather over India.

These agricultural residues can theoretically produce about 150 billion liters/year of ethanol via lignocellulosic conversion. This can take care of about 50% of India's total oil demand. Similarly if we go via pyrolysis oil route then it can provide around 80% of India's diesel demand. Pyrolysis oil is produced by rapid heating of biomass to 600-700 °C and quenching the smoke rapidly to produce oil. This oil with suitable modifications is very close to diesel in characteristics. Both these technologies are near maturation and quite a number of plants the world over are being set up for pyrolysis oil and ethanol production from agricultural residues.

Alternatively if these residues are burnt in the biomass-based power plants they can produce close to 80,000 MW of electricity or nearly 50% of India's total installed capacity. Biomass power plant technology is very well developed and around 60,000 MW of electric power is produced around the world. In India there are close to 91 plants with capacities of 6-10 MW and total installed capacity of about 500 MW. Our Institute [was the principal author of this policy](#) which was initiated by DNES (now MNRE) in 1996.

Besides producing energy, these residues with enough R&D can also become a part of organic fertilizer industry. Thus the use of residues from present agriculture can substantially ease India's present energy crisis and can be a Rs. 2 lakh crore/year industry. At the same time the use of biomass for energy production can also produce about [50 million jobs in rural areas](#). With increasing agriculture to feed our burgeoning population more agricultural residues will be produced which can further help in energy and fertilizer production.

Farming for energy therefore can create huge wealth in rural areas and lead to prosperous India.

However for this to happen two things are necessary. Firstly farmers need to be paid properly for the agricultural residues.

It is a peculiar aspect of farming that only 25-40% of its produce fetches money and the rest 60-75% are agricultural residues and have to be discarded. No industry can run on such norms where 3/4th of its produce is not sold and in fact discarded. Yet for farming we accept these norms.

When agricultural residues are capable of producing very high quality energy like liquid fuels and electricity, they should be given very good price. Our estimates show that with proper pricing of these residues (Rs.3000/ton) a

farmer can easily earn between Rs. 5000 to Rs. 7000/acre/ season by selling them for energy production.

Any marginal farmer can produce agricultural residues even if the main crop fails. The income from these residues can give him benefits even in the case of distress sale of his crop and this is the best hedge against farmers' suicides. I also feel that unless and until the farmer gets remuneration from his entire produce, farming will never become economically viable. This is an aspect of farming which should be understood by policy planners.

Since the farmers presently do not get adequate price for the produce they are being tempted to grow fuel crops. One of the greatest threat of food security to my mind is the diversion of land for fuel crops. The people who have cars have money and they might dictate the use of farm land for growing fuel for automobiles. It is already happening in Africa and Latin America. We as a nation have to guard against the use of our farm lands to be colonized by western countries for growing fuel.

Besides the use of agriculture residues for producing energy, multipurpose crops like sweet sorghum should be grown. Sweet sorghum produces food (grain from its earhead), fuel (alcohol from sweet juice of its stem) and fodder (bagasse) from the same piece of land. No other crop produces all three things together. Our Institute has [pioneered the development of this crop](#). In fact we introduced it in India in early 1970s.

The second aspect of farming is the need for very high science and technology inputs in it.

Thus it is imperative that modernization of agriculture takes place. Presently most of the agriculture in India still exists in stone ages. There is very little mechanization and ancient agronomic practices are used. The problem has also

been compounded by the fact that because of land reforms in India the land holdings have reduced thereby restricting the use of existing big and heavy farm machines. In fact **this farm size reduction could be a boon in disguise since it can allow precision agriculture which can reduce inputs and increase productivity and is becoming popular in western countries.**

Thus very extensive R&D is required for developing efficient farm machinery for small farms. This requires inputs from very bright young scientists and engineers. Presently all the bright students opt for engineering, medicine, MBA, etc. and so agricultural sciences and engineering do not attract them.

Another major problem of farming today is that because it is becoming non-remunerative, farmers' children do not want to get into it. This is also the reason why farmers are ready to sell their farmland to the highest bidders who are going to use the land for non agricultural uses. There is therefore a general refrain in rural areas that farming is not a dignified profession any more and that the sons of farmers are not considered to be a "marriageable commodity"! Besides being uneconomic, farming is also hard work. By developing high technology farming equipment like small combines, harvesters, bailing machines etc., it is quite possible that farming can be made less labor-intensive and more attractive to younger generation. With production of energy from agriculture, farming can also become very remunerative. Besides very concentrated effort needs to be made by the advertisement agencies to make it glamorous. Once farming becomes remunerative it will also become glamorous! This will help in bringing youth to farming and further help in food security.

Water Issues

However, for farming to increase so that it can bear the load of food and energy production, adequate water supply has to be ensured. To my mind supply of adequate water to rural areas and poor regions of the world is a much bigger challenge than even energy availability, and where young and bright engineers

and technologies can play an important role. I feel that rainwater harvesting technology, and management should be a compulsory minor in all agricultural universities and colleges.

With the coming of green revolution in India, there has been an extensive use of water, resulting in shortage in some parts of the country. Not only is there a water shortage, but lack of clean potable water results in millions of deaths every year due to diarrhea. This is despite the fact that there is enough rainfall. Every year India receives ~ 4000 billion cubic meters of rainfall, whereas the present yearly water consumption is only 650 billion cubic meters or 16% of the total rainfall. Thus theoretically we have enough clean water, but the rainfall is not evenly distributed over India and it comes in short spells, thereby pointing to the need for rainwater harvesting and storage programs.

However, the issues of rainwater harvesting and its supply to the community in rural areas raise a question of who will own the water bodies. This is a touchy issue and quite a few developing countries are grappling with it. I feel there is a need for the local governments to develop policies so that rural water utilities can be set up which can harvest the rainwater, store and clean it and then supply this water to a village throughout the year. These water utilities may also be able to buy water from the government through the existing canal system. Presently, all the water utilities in India are owned by the government and this leads to corruption in supply of water and its very inefficient usage. In 2003, the Government of India passed a revolutionary electricity act allowing for the first time the private players to produce, sell and distribute electricity anywhere in the country. This act has allowed power producers to break free from the clutches of inefficient and corrupt government power utilities. **I feel a similar water act will help in the efficient supply of water to rural areas.** Maybe the rural ministry can take this issue up.

I strongly feel that when the farmers are neglected the long term sustainability of the country is threatened. When farms produce both food and fuel then their utility becomes manifold. In India 65% of its population depends on farming and with energy from agriculture as a major focus, India has the potential of becoming a high-tech farming community. This will help improve the rural environment and create better India.

Thank you.

[HOME](#)

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