

## **National Policy on Taluka Energy Plan – A Historical Perspective**

(Chapter from the book [“Romance of Innovation”](#))

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In March 1986, Shri. Sharad Pawar, the former Chief Minister of Maharashtra and at that time leader of Congress (S), arranged a major conference in Mumbai to develop future strategies for Maharashtra. I was invited by the organizers to present my view on the future strategy on energy.

This conference was inaugurated by Shri. Rajiv Gandhi and for three days very active deliberations took place on a whole horde of issues including urbanization, water conservation, unemployment and energy, among others. Though the who's who of Maharashtra very actively contributed ideas for solving the problems of Maharashtra, this conference had a political agenda and so nothing came out of its deliberations!

My major thesis, [in the paper presented](#), was that through biomass (either agricultural residues or that specially grown for energy) we could produce all the energy needs, including electric power, for a taluka. The thinking behind taluka plan was that small villages did not have financial and administrative power to provide energy and hence were a sink for resources. While on the other hand big cities were so big that biomass-based power plants could not fulfill their energy requirements. Thus taluka administrative block with biomass available locally provided a nice “middle path” approach to the development model and energy solution.

Besides we also thought that taluka energy plan could be a step towards developing decentralized energy strategy for the country. Both these ideas were quite revolutionary at that time and had not been thought of in the Indian context. Now there is a good deal of talk about using decentralized energy strategies and making

taluka as a focus of development for rural areas. Our strategy of taluka as the unit for development came because of the work we had done in gathering the data on the energy needs of Phaltan Taluka.

I used to regularly give lectures in the Mechanical Engineering Department at the Indian Institute of Technology (IIT), Bombay. One of the students in my class, Aziz Lookman - a first year B.Tech. student, wanted to do something useful and meaningful during his summer vacation. He therefore came to our Institute in summer of 1984 and was our first intern! I gave him the project of collecting data of energy use in Phaltan Taluka. So in the 40°C + heat of summer in Phaltan he would bicycle all over the town, going to government offices and to petrol stations collecting data on how much electricity, petrol, diesel and kerosene the inhabitants of Phaltan Taluka consumed.

This to my knowledge was the **first energy data collected for a taluka in India** and paved the way for the detailed survey that we did in 1990. Based on this data we developed a strategy for replacing fossil fuel-based energy like petrol, diesel, LPG and electricity, consumed in Phaltan by renewable energy and hence our [thesis on biomass-based power plants](#).

Biomass-based power plants are very similar to the regular coal-fired plants with the difference that instead of coal as fuel they use biomass which consists of wood and agricultural residues. Since the biomass has different density and energy than coal the fuel handling and combustion part of biomass power plants slightly differ from those of coal.

Research and letters from my U.S. contacts also showed that U.S. was active in this field and that a 1-2 MW biomass-powered plant had been installed in the Philippines by a U.S. company as a part of a USAID project.

Hence I requested Department of Non-Conventional Energy Sources (DNES), Government of India (GOI) for funding a possible trip to visit this plant in the Philippines and extending this concept of biomass power projects for India. So a two member team comprising of one Dr. K. S. Rao, Director of Gujarat Energy

Development Agency (GEDA) and myself was sent in 1986, as FAO experts, to the Philippines and Thailand to study their biomass programs. This included looking at their biomass gasification programs, briquetting, biomass-powered stoves, besides visiting the power plant. It was quite an educational trip and showed that South-East Asian countries were ahead of India in the use of biomass energy.

The power plant in the southern part of the Philippines was shut down and in quite a run down condition. The official line was that adequate biomass was not available. But the main reason was that it was in an area which was heavily infested by the communists and so nobody wanted to work there. Anyway it gave me some idea on what a biomass-based power plant looks like. We wrote a detailed report on our visit with specific recommendation to DNES that India should set up an experimental 1-2 MW biomass-based power plant. But nothing came out of this recommendation.

The trip to the Philippines and Thailand was my first trip to South-east Asia and gave me an opportunity to see these countries. I and Dr. Rao travelled separately to Manila. On reaching Manila airport I took a taxi to the hotel where I was staying. When I told the taxi driver the name of the hotel I could see that he knew that most of the foreign guests in this hotel were with UN and other international agencies and so were “rich”.

He therefore politely informed me during the drive that I looked very tired and that he can cure such tiredness by getting me massaged by a Philippino girl! He continued pestering me and so to get rid of him I took his number and told him that I will contact him. When I told this to the hotel manager he said that these taxi drivers are pests – little knowing that the whole hospitality industry including taxi drivers and hotel workers in the Philippines and Thailand in early 1980s were involved in prostitution business.

To see the biomass power plant we flew from Manila to the southern island of Mindanao. This was an island infested by the communists and to see the plant we had to go by jeep over almost a non-existent road; it was full of boulders and so in the evening when we returned very tired to the run-down hotel we just wanted to have an early dinner and sleep.

I told Dr. Rao that I will go to the room, freshen up and come to the restaurant for food and told him to order whatever he wanted. Since he was a pure vegetarian he had a hard time finding vegetarian dishes in those times in the Philippines and Thailand.

When I came to the restaurant after ten minutes I saw a good looking woman sitting at our table and chatting with Dr. Rao. She was also drinking a big glass of orange juice. I immediately told Dr. Rao (in Hindi) that she maybe a prostitute and he should not be pally with her. Dr. Rao get very upset with me saying that I have a dirty mind and this lady wanted to come to India to study spirituality and join the Hare Krishna movement!

Very soon she left and when we finished our meal and paid the bill we found that her one glass of orange juice was two times the cost of our meal since it was scotch whiskey! After this episode Dr. Rao became a very docile disciple of mine!

Similarly in our trip to Thailand we were pestered by the staff of the four star hotels (that we stayed in) about getting a massage either by Thai or European girls. I felt really sad that in those days the economy of both these countries was mostly based on prostitution.

On this trip we travelled extensively by road and saw the green countryside of both the Philippines and Thailand, but did not get a chance to spend time visiting their natural beauty sites.

In 1987, I went on an extended trip of U.S. on my own and one of the major programs was to see the biomass-based power plants in California. In late 1980s California had 6000 MW installed capacity of biomass-based power plants – the largest in the world!

I identified a party called Yanke Energy from Idaho who had set up a couple of biomass-based plants in northern California and went to visit them. Their chief engineer Mr. Shultz and I became good friends and he gave me a complete tour of his plants including the detailed drawings and design of the 10 MW units.

On my return and armed with this information, I approached the chairman of the local cooperative sugar factory and suggested that he can easily make his factory into a power plant besides producing sugar. This was in 1987 and far ahead of the time when the cogeneration in sugar factories became fashionable in late 1990s. He was least interested in the scheme and wanted to know what was in it for him!

In fact most of these cooperative sugar factories in Maharashtra have been used for political purposes to provide money for fighting elections. This siphoning off of the funds from them is the main reason why these factories have become sick and very few of them are solvent.

I then prepared a small note on biomass power generation in Maharashtra and sent it to Shri. Sharad Pawar who was at that time the leader of opposition in Maharashtra. He passed on that note to the Chairman of Maharashtra State Electricity Board (MSEB), who replied in detail saying that this is the most ridiculous scheme he had seen and that MSEB would collapse if it had to take energy from small power stations of 10 MW each! I guess this was the age of dinosaur mentality among electricity officials who had not understood the power of decentralized energy production. Anyway nothing seemed to be moving though I was convinced of the merit of this strategy.

10 MW biomass power plant in California. 1990

So when an opportunity came in the form of an ICICI-based PACER project which was funded by USAID, I wrote a proposal for a full study on biomass-based power plant for Phaltan Taluka. [In this study](#) we carried out a detailed mapping of the agricultural residues available in Phaltan



Taluka and then went to the U.S. for a comprehensive study of the biomass power plants. Our study showed that Phaltan Taluka had enough agricultural residues available to produce 10-15 MW power year round and one of the recommendations

was that similar study of biomass availability should be done for all the talukas in the country.

After the study, which we finished in the middle of 1991, we arranged for a [small workshop](#) to evaluate, debate and discuss the findings. We invited Dr. R. K. Pachauri from Tata Energy Research Institute (TERI), Mr. B. B. Vohra (former Chairman of Advisory Board on Energy), officials from MSEB, DNES and ICICI, among others. One of the key recommendations was that few such power plants be established in different talukas. However, in the absence of funding it was difficult to see why anybody would want to set up such plants and thus this concept remained on paper.

In 1994 I presented a paper on the Taluka energy concept in an International conference in Bangalore. This paper was picked up by the mass media and two column news on it appeared in the Indian Express. This was probably read by somebody in Prime Minister Narashimha Rao's office (PMO). So a high-level task force was set up by the Ministry of Non-conventional Energy Sources (MNES) in late 1994 to evaluate this concept and if found feasible, to set up a national policy. I was invited to be a member of this task force and present our findings to the committee.

Before the first meeting of this task force took place a very senior official in MNES asked me how I knew the Prime Minister since this task force was set up on the suggestion of PMO. When I told him that I did not know him at all he was quite surprised but arranged for my meeting with the minister of MNES at his house.

After the task force meeting ended I went to see the Minister. The minister asked me the cost of the project for a taluka. I gave him a rough estimate of Rs. 100 crores per taluka. He told me that I should immediately fax him a two page proposal to set up the power plant and all the necessary funds will be given. When I told him that we still have to deliberate the issues in the task force and then take up the setting up of power plant in few talukas on a trial basis, he did not seem to like the idea. I got a feeling that by giving money to me to set up the power plant he wanted some cut in it! Later on I heard that he and his family were indicted for corruption!

Nevertheless in late 1995 [MNES announced the national policy on Taluka Energy Plan](#). We felt very proud that a small NGO working on a shoestring budget could be a principal author of a national policy. Also later on a very senior ICICI official told me that this was the first time in the history of ICICI that a small project (our PACER project in 1990 was for Rs. 3 lakhs only) had led to a national policy! We also feel that this taluka plan might have helped in formulating the national program of [Provision of Urban Amenities to Rural Areas \(PURA\) in 2003](#).

The Taluka energy plan envisaged that private players can set up 10-15 MW biomass power plants and MNES will give financial help for both setting up the plants and developing a biomass atlas for each taluka in the country. However this was before the new electricity act which came into existence only in 2003. Hence no entrepreneurs were interested in taking this up since they would have to deal with the loss-making State Electricity Boards.

Finally when in 2003 the new electricity act was passed by the Parliament and the laws allowed anybody to produce power and sell it, biomass-based energy power projects picked up. This was also facilitated by generous financial help from the Indian Renewable Energy Development Agency (IREDA), New Delhi.

Thus as of today around 120 biomass-based power plants each of 6-10 MW capacity have been installed all over India. These are in addition to the cogeneration-based power plants in sugar factories.

10 MW Biomass Power Project,  
Gadchiroli Distt. (Maharashtra State);  
Courtesy MNRE



Besides setting up the power plants, Ministry of New and Renewable Energy (MNRE) also asked all the state energy development agencies to develop the biomass energy availability map for each taluka. Funding was also provided to various agencies to develop a national biomass atlas. This was again based on the protocol that we developed in 1990 for [our Phaltan study](#).

Finally it should be pointed out that India produces 600-800 million tons of agricultural residues in its talukas. Theoretically this biomass can produce nearly 70,000 to 80, 000 MW of electricity year round. Thus [agriculture not only can produce food but also power](#) and the taluka energy plan has a great potential of easing the energy situation of India provided very liberal economic incentives are given to the power producers.

### **Future research areas**

1. Besides the taluka energy plan, a simpler solution for rural electrification could be based on demands of each village. Our data showed that [500 kW electric power for each village](#) could take care of the household and agricultural energy demands. Besides such power plants [can also produce potable water](#). The challenge is to produce this power through renewable energy sources like solar, wind or biomass. Thus development of economically viable technologies and solutions will help in rural electrification.
2. There is also a need to develop low temperature (~ 70-90°C) solar thermal power plants. These could be in the range of 100-200 kW and can run on [organic Rankine cycle](#). Presently the [power generation from solar energy suffers](#) because it cannot produce power during night. Organic Rankine systems running on 70-90°C solar-heated water can easily overcome this problem by storing the hot water for night operations. The challenge is to identify suitable organic liquids and to develop leak proof systems. Though the efficiency of these systems will be low but the ease of operation can offset the efficiency handicap.
3. For biomass-based power plants there is a challenge to develop agricultural residues baling and compaction machines. These can reduce the volume and cost



of transportation of biomass to the power plant. Such machines do exist but those powered by fuel produced from farm or even electric power need to be developed.

### **Publications of NARI on Taluka Program**

1. Anil K. Rajvanshi, "[Energy Self-sufficient Talukas – A Solution to National Energy Crisis](#)", Economic and Political Weekly (EPW), Vol. XXX, No. 51, Dec. 23, 1995. pg. 3315-19.
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