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## The Future is After “Mimicking Nature”



**Anil K. Rajvansh — Director and Hon. Secretary of the Nimbkar Agricultural Research Institute (NARI).** Mr. Rajvanshi has been a member of many prestigious committees of the Government of India (Office of the principal Scientific Advisor to the GOI, Advisory Board of Energy, MNES, etc.) and Government of Maharashtra (State Planning Commission, Maharashtra Electricity Regulatory Commission, etc.)

### Why alternative “green” energy is crucial today?

It's crucial because the lifestyle of the Western countries, especially Europe and the United States, is consuming much more than what the world can produce. And developing countries like India and China and others want to catch up with the life style of the developed world. So, everybody is fighting for the same resource. That resource is not enough, so that is why it's crucial that people develop some other resource which is alternative energy. In fact, all the resources of the world have come from solar energy except for, maybe, nuclear energy. Everything has solar energy: solar energy today or solar energy many years ago. For example petrol is 100 million years old solar energy. Wind, tidal and all other kinds of renewable energy are all solar energies.

### What role national governments play in developing new energy sources?

Government plays a very important role because initially renewable energy is very costly. Therefore no private party would like to spend high initial capital cost. Government's role as catalyst becomes extremely important. It initially starts the program and once this program gets going then naturally the private parties come in. That has been the case in the United States, in Europe, especially Germany. That is what is happening in India also. Government has a crucial role in starting and promoting clean energy.

### What is the ratio of public/private investments in India?

I think it's very high. The amount of public investments is much bigger than those from private parties. I don't know the exact number, but I would say public to private investment would be in the ratio of 90/10 or somewhere near to it. Government investments are very high.

### Are there any new government programs aimed at supporting research in this field?

In fact, in India all research in this sphere is supported by the government. And the same thing is happening in China. There are research programs in all areas: wind energy, solar energy, new fuels like bio fuels, and development of energy devices etc. You name any sphere of renewable energy and the government does the pushing in research.

### What are the latest technological trends? Can you elaborate on some recent breakthroughs?

I did my graduate work in solar energy in the United States back in 1970's. At that time the focus was mostly on solar thermal. Photovoltaic was just coming up. My laboratory was, probably, the only laboratory in the United States which was pushing for solar thermal. And I'm very happy to tell you that now one of the fastest growing solar electricity production technology is by solar thermal. You must have seen such electricity producing plants in the United States, Spain and other parts of Europe. And now they are putting very huge plants in Africa. That is a very major thing which is going on. But even more fascinating thing than this is how we have started mimicking nature. You have to follow nature since it has taken millions of years to perfect the solar energy conversion design. Nature uses solar energy by “green” plants. Researchers all over the world are working on this and billions of dollars are being spent on the research. They are trying to convert solar energy via the same photosynthetic process to produce new fuels like alcohol and other useful liquids. This is a major program and the latest technology. So, one is direct conversion of solar energy to electricity through photovoltaic and solar thermal, and another is conversion of solar energy via biochemical route into fuels like alcohol and others.

### What are the latest programs in the sphere of clean energy at NARI?

We have done a lot of work in the sphere of renewable energy, especially in producing power from biomass. Our work on electricity production via biomass has become a part of national policy. We have also been working for some time on use of sweet sorghum as a source for ethanol production. Our scientists have bred varieties which produce grain and high sugar in stem so that the sugary juice can be fermented to produce ethanol. Our sweet sorghum has been grown all over the world. There is a huge interest in the United States and Europe in sweet sorghum.

### How cost-effective this technology is?

This is very cost-effective. As you know, the major production of ethanol comes from sugar cane. And now sweet sorghum is becoming alternative crop for ethanol production. It matures in 4 months and uses about 50% less water than sugarcane. It's a major initiative.

**How is clean energy R&D incorporated into national innovation systems in general?**

Right now it's not very much incorporated. In national scheme of energy production in India "green" energy production is less than 1%. This is very small. But recently the government of India has started a major initiative to produce energy from solar energy. The mission called Jawaharlal Nehru National Solar Energy Mission envisages to produce 20 thousand megawatt by year 2022. If that happens then we shall see a substantial portion of national energy coming from renewable energy. But at the moment the renewable energy production in India is less than 1 % of the total.

this area. I'm sure our long standing friendship with Russia will help us move forward. We would like to have access to your technology. As you know Russia and India have collaborated for many years on many things. Russia is a good partner in the sphere of nuclear energy.

**Whose positive experience may Russia use as a guideline?**

Major portion of Russia is a very cold country and you need to have a large amount of heating of buildings in winter. I think use of solar energy to do that will be very beneficial. I think that Russia should follow the example of Germany. Germany has done very well in renewable energy. They've been working mostly on photovoltaic

## INNONEWS

***BT Pushes Boundaries of Super-Fast Broadband***

*BT has unveiled its latest plans for super-fast broadband further supporting the government's vision of creating the best super-fast broadband network in Europe by 2015.*

*The company plans to conduct a technical trial of one gigabit fibre broadband in Kesgrave, Suffolk and the inclusion of up to 40 rural market towns in the next phase of BT's deployment of super-fast fibre broadband.*

*The trial will start in early 2011 and will see BT deliver some of the fastest residential speeds over fibre broadband anywhere in the world today.*

[www.btplc.com](http://www.btplc.com)

***Businesses Should Support Innovation***

*Innovative businesses in Russia cannot exist at the expense of the state and entrepreneurs should take an active role in developing innovation in Russia, President Dmitry Medvedev said on Tuesday, December 14.*

*«Undoubtedly state funds should exist and they should be invested but this cannot last forever,» Medvedev said at a meeting with the national modernization commission.*

*«Absolutely private, freely running companies independent from the government should arise as a result of these investments,» the president added.*

[www.en.rian.ru](http://www.en.rian.ru)

***The Second International Forum on Intellectual Property Expopriority'2010***

*On December 7, Expocentre held an opening ceremony of the Second International Forum on Intellectual Property Expopriority'2010.*

*The Forum is important not only for Russia, but also for the World Intellectual Property Organization (WIPO) which delegated its experts to participate in the Forum. On behalf of WIPO and its General Director Francis Gurry, the WIPO Administration Director Michal Svantner welcomed the Expopriority'2010 participants.*

[www.expo-priority.ru](http://www.expo-priority.ru)

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**Germany has done very well in renewable energy. They've been working mostly on photovoltaic and solar thermal. They had a very strong program starting in 1990's**

You see, government is the one that starts the process of innovation through R&D projects. But we hope that the private sector will come in and do it in a very big way. And then we should see a major program. But the private sector can only come if they find that there is enough money to make like it takes place anywhere in the world.

**Will private sector come in?**

It will come in because the government gives a lot of tax incentives like income tax exemption, reduction in import duties, tax holiday etc. All these measures will hopefully make the private sector realize that they can make profits on renewable energy in the near future. Plus the government is also trying to help them by giving soft interest loans and part grants. So, all these things hopefully will make them to enter renewable energy sector.

**What is your knowledge of the situation in Russia?**

Russia has a very large and successful program in nuclear energy. India wants to work with Russia in

and solar thermal. They had a very strong program starting in 1990's. Spain at one time was doing very well in setting up renewable energy projects but now because of economic crisis quite a number of these projects have stopped. Some Scandinavian countries like Norway, Sweden etc. are doing well in renewable energy too. They have very large programs in biogas. Sweden is using biogas in running cars, buses and even trains. In Iceland there is a large program in geothermal energy. One of the things Russia can learn from India is that you should try to reduce the demand for energy. If Russians live a simple life and not copy the consumptive life style of Americans then you will have adequate energy for everybody. The motto should be "Simple living and high thinking".