

## Energy and expansion: The Tata story



Tata is a household name in India. Starting well over a century ago, the Tatas began their foray into industry, and the brand represents more than a diversified conglomerate. The Tatas are well-respected, having endeared themselves in every walk of Indian life. Their businesses are all-pervasive, from building automobiles and generating electric power to making steel and building supercomputers. Their charitable trusts and endowments are as extensive as their businesses. They have founded and funded outstanding educational institutions and human welfare organizations, and they have supported research on alleviating human suffering. The incumbent of the Tata Group is Ratan Naval Tata, a Cornell University graduate in architecture. In the 20 years since he took over the mantle, he has set the Tata industries on a steep growth trajectory, increasing the revenue of the Tata industries 12-fold, making automobiles—the famed Nano—available at very affordable prices in India, and introducing efficient steelmaking. The business empire he heads, the Tata Group, has over 90 companies with footholds in 80 countries. In the midst of his busy globe-trotting schedule, we managed to steal an hour of his time at the Tatas' "Bombay House" headquarters for him to tell us how he sees the global energy challenges and the opportunities they create.

**MRS BULLETIN: Congratulations! Mr. Tata, we understand that Cambridge University recently presented you with the Doctor of Law *honoris causa*. How did the convocation go?**

RATAN N. TATA: Oh! It was a very formal function. You cannot receive the doctorate in absentia; you need to be physically present. The Orator presented me to the Chancellor with a preamble in Latin before the degree was conferred, and it was a big town and gown affair.

**The Tata industries are both large consumers and large generators of energy. With the present global energy challenges, do you see a crisis?**

There is going to be a crisis of energy in various areas and there will be the challenge of finding alternate sources of energy. But energy is going to be part of our lives. As we prosper, the demand for energy will increase. But the energy

mix may be in a form different from what we know today.

**Everybody is talking about the Nano. Are there any special considerations with respect to oil consumption?**

We are already looking at an electric version of the Nano; in fact, the prototypes are running now. We also have a diesel version of the Nano, with a higher fuel efficiency that will be available very shortly. The electric version will be available a little later. However, in the near future, we may no longer look at oil as the only fuel.

Even outside the automobile space, the long-term energy portfolio is going to be different. We now have coal-based power, and I am hoping in the course of time, it will be gas and nuclear based. We should also have another look at hydroelectric power without environmental degradation for generating electrici-

ty. There are also novel ways of looking at wind power. An interesting option is tethered balloons at high altitudes that are designed to act as wind generators, with vanes that rotate and transmit power to the ground. All of these may be unviable today, but they will become more viable with the maturing of technology and as conventional energy sources become more expensive.

**We did a back-of-the-envelope calculation that indicates that if one in four households in India as well as in China has a Nano, the petroleum reserves of today will not last for more than a decade or two.**

This is a very large number of cars! Even our target of a million Nanos in India per year is very ambitious. To get to the numbers you suggest with one million new Nanos per year would take more than 60 years. Even for the lower numbers we expect, it would be crazy to look at gasoline only as the fuel for the Nano. Why not consider hydrogen, for instance?

**We understand you were the convener of a hydrogen task force for India?**

Yes, I was, and I am still a great believer in hydrogen. I have this dream of finding a way of splitting water on board the vehicle at room temperature.

**Directly, you pour water into the car, produce hydrogen, and drive away? This is highly ambitious.**

Yes. If that cannot happen, then you will have all of the problems of producing, transporting, and storing hydrogen. But it will be hydrogen, liquid petroleum, or electric. And electric requires energy to recharge it.

**Any additional demand for electricity is troublesome. India already has acute power shortages in spite of a production capacity of over 160 gigawatts of electrical energy. This is not considering the demand from electric and plug-in hybrid motor vehicles.**

You are only talking about energy, but what about lithium? Because that will run out quicker than [oil].

**Yes. I thought the Tatas were thinking of collaborating with the Bolivian Government. The U.S. magazine *The New Yorker* recently published an interesting article titled “Lithium Dreams” describing Bolivia as a large resource of lithium. Or we can play with fundamental principles to determine substitutes for lithium by other materials such as the rare earths, because we have them in large quantities?**

The rare earths. Yes, yes.

**The Indian atomic energy program began by the Tata Trust funding the Tata Institute of Fundamental Research (TIFR). Do you have similar ambitions for other areas of energy?**

Globally, we are supporting work at a few universities to study the splitting of water, similar to photosynthesis but with faster kinetics.

**So you are looking for some unique catalyst?**

Catalysts. That is right.

Another interesting area for energy storage is liquid aluminum.

**Now they use molten salt; you are talking about molten aluminum.**

We are also looking at geothermal energy. We have invested in Australia in this area and are exploring areas in India looking for geothermal heat. Unfortunately, in India, wind power is limited to a few regions. We are also into solar power, but using conventional

photovoltaic silicon thin films that are less expensive compared to single crystal silicon.

**India and the world depend on coal for a very large fraction of their energy needs. Can India afford to give up on coal as India’s Western friends encourage?**

No, coal makes the most sense to India at present because of our large reserves; at the same time, if we are concerned with the carbon footprint of coal, then we need to look at what to do to capture CO<sub>2</sub> and sequester it. We must also find an efficient biological means of absorbing CO<sub>2</sub> waste or converting it into feedstock.

**What do you suggest should be the focus for emerging economies in countries such as India and China?**

I would not like to make a value judgment now. There is a multitude of alternatives on the horizon that ought to fall into place before we decide the mix that is most suitable for India. We need to support those alternatives even though they seem unviable or not so viable. Otherwise they will rise and fall with the price of crude oil.

**How do you see materials playing a role in addressing the energy challenge?**

It seems we are looking at materials to replace other engineering materials. We are not looking at the materials that go through chemical transformation

and back—which would be the ultimate renewable or ultimate reusable material.

**Plants do that...**

I know. But we have not really determined for which engineered materials we can make that happen. I think this is the 50-year view that one needs to have.



**I think one area that we have not touched upon yet is nanotechnology and the intersection of it with energy and materials. Are the Tatas looking at nanotechnology in their businesses?**

Nanotechnology and applications on the nanoscale cover a large area. I don’t know to what extent nanotechnology will apply to energy, other than to miniaturize a function or change the conditions and properties to make something else happen. Nanotechnology would probably first find its place in enhanced materials capabilities on the nanoscale and in medicine rather than in energy.

**We briefly touched upon the Tata Trusts. Are you planning support on energy?**

We have not identified any one technology that uniquely addresses problems in this area. Indirectly though, we have been doing a fair amount of work in terms of harvesting and conserving water, all of which indirectly help reduce energy consumption in many communities. I think the Trust would support something when there is an emerging technology that seems to hold promise and needs support.

Ratan N. Tata was interviewed by *MRS Bulletin* representatives, V.S. Arunachalam and Gopal R. Rao.

