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Plugging the Demand Supply Gap in the Power Sector- the 'Green Way'

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*"What gets us into trouble is not what we don't know,
 It's what we know for sure that just ain't so"*
 – Mark Twain

We live in a digital world. Everybody is so 'connected'. Power is the base for growth now. From homes to mills and from villages to megacities, people are heavily relying on 'power' to facilitate their needs and wants: politicians get the 'powerful' ticket by launching yet another promising village lighting project, women and children get 'empowered' by access to electricity, water,

proper sanitation etc, and countless businesses both big and small, feed on this most ubiquitous of modern resources to 'rise' higher and higher.

Power is like food, shelter and clothing. Inconspicuous? Maybe, but certainly not abundant. Mark Twain's quote eerily rings true. In the course of researching the electricity industry in India, I have come across a staggering demand supply gap which could have serious implications in the future. Sukhatme (2011) suggests a 'frugal' future annual per capita requirement of 2000 kWh for sustainable development. This, when multiplied by the population estimate of 1700 million, gives the value of 3400 TWh as the minimum requirement of the country by 2070. The electricity consumption p.a. per capita in India is not even 1/10th of that in developed countries. In the next 25 years, India's electricity demand is expected to grow at an annual average rate of 7.4% (World Bank, 2010). The total installed capacity of producing electricity as on 31st Dec '10 was 171,644 MW and electricity produced was 801,828 GWh or 801.8 TWh. We currently are and may continue to rely largely on fossil fuels (mainly coal) to meet our future power needs.

Clearly, the conventional source of power, i.e. coal or lignite based thermal plants cannot alone meet the projected demand in the long term. So can we plug this gap with renewable technology like solar, wind, biogas? It is a conscience clear, mess free way of growth, albeit expensive. A little bit of surveying of research in this direction revealed that if the full potential of all the renewable energy resources is exploited in India, this would generate 1229 TWh of electricity, which is hardly 36% of the projected requirement for 2070 i.e. 3400 TWh, Sukhatme (2011). So, howsoever sincere our effort towards greening the

power technology, we cannot rely on renewable energy resources alone.

The above suggests a glaring gap between the power requirement, its current supply and its potential from renewable resources. We should also not pay a blind eye to the negative externality of greenhouse gas (GHG) emissions of conventional power generation which will end up doing more harm than good in the long run. So what can be done? How do we bridge the gap in a 'green' enough way?

There are two ways, and this is where economics meets technology. One way is to use latest scientific developments to enhance and improve the efficiency of power plants. This comes in the way of introducing super critical technology in India. India currently uses sub critical technology which is slower and has a greater carbon footprint than super and ultra critical technologies, which are operated at higher temperatures, thus speeding up the generation process and cutting back on the GHG emission. Successful supercritical technology backed power plants have been or are being introduced in Indonesia, Malaysia and Canada. This technology is easily available at almost the same cost as sub-critical plants. The government is already planning to install this technology in future plants. These plants will account for 60% of thermal capacity to be built in the 12th plan and 100% in the 13th Plan, thus contributing 50 GW by 2020.

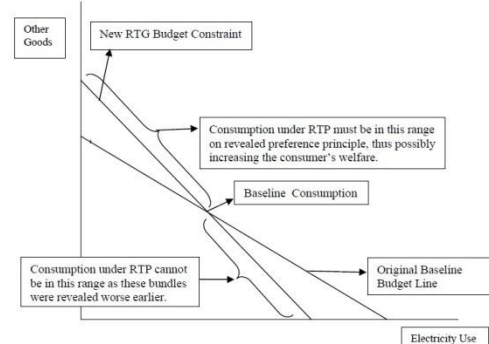
Controlling the ever growing consumer demand is one of the many economic solutions I could think of. People respond to incentives – whether or not in the way you intend them to, but they do respond. The challenge is to set up a pricing system so that those users who are able to reduce

their electricity use have an incentive to do so.

One way of doing this is through Real Time Pricing (RTP) in which large users are provided with special meters that allow the price of electricity to vary minute by minute, depending on signals sent from the electricity generating company. As the demand for electricity reaches capacity, the generating company increases the price so as to encourage users to reduce usage. The price schedule is determined as a function of total demand for electricity.

Georgia Power Company in the US runs the world's largest RTP programme in the world. When electricity is in short supply and real time price increases, the customers who are assigned a baseline quantity/normal usage quantity face a higher price for electricity use the moment they exceed their baseline quantity. But they also receive a rebate if they reduce their electricity use below their baseline amount. This incentivizes them to reduce their consumption of electricity. At the most, they will be as well off as before and possibly they may even improve their welfare by making use of the new trade-off. Such a demand management model is illustrated

below:



The baseline consumption shown here is the endowment bundle through which the budget line pivots under RTP. With suddenly hiked prices, the consumer with a

fixed income can now consume lesser quantity of maximum electricity and shifts this demand to other goods. The overall result of the consumer staying on the upper left segment of the new budget line finally (principle of revealed preferences) is that he now consumes lesser electricity than baseline. Demand, at least on paper, is controlled.

The effectiveness of this demand management model in India, with a lot of different variables, is yet to be seen. However, a test run in a sample city can always be tried out, given the RTP's success in Georgia, USA.

The policies adopted should keep in mind the following:

- 1) They need to be backed by incentives for people to self-regulate themselves.
- 2) To improve efficiency, they must promote technological and institutional innovation, especially development and the introduction of green technology.
- 3) They should not lead to competition for limited land and water resources in the country. This is necessary to avoid an adverse impact on food security and livelihood of the poor.

Clearly, just doing this is not enough. This basic energy policy transition needs to be supported by many measures like using energy efficient appliances, adopting green business models and a sustainable lifestyle as well as a Real Time Pricing strategy to curtail electricity demand. The cost effectiveness of some of these measures (policy and non-policy) is doubtful. Some other measures may face institutional barriers limiting our ability to implement them. A broad consensus along with a supportive institutional set up is necessary, but may not always be forthcoming. Also,

several measures may look attractive on paper, but they may not be adopted by people or firms. However, even small differences can add up to a brighter tomorrow.

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