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The Nuclear Energy Juggernaut: An Alternative Stand?

For further information, please contact us at:

Consulting Connoisseurs
Office 4, Sai Baba Plaza
Sector-15, Airoli
Navi Mumbai 400 708
India
Tel: +91 961 942 8209
info@consultingconnoisseurs.com
www.consultingconnoisseurs.com

THE QUALITY OF BEING PREDICTABLE WITH GREAT CONFIDENCE

Introduction

In recent times, a lot of effort has been made to understand technology and the sustenance of societal growth. One of the limiting factors, among many others, is that of energy. Energy considerations have become vital for every country today. According to a study by MIT, the growth in global energy demand is expected to be around 75% by 2020 (ref. 2002) and it is assumed that this will be met by many diverse sources like hydroelectricity, thermal power, wind power, solar power and nuclear power to name a few. However, the projection on the increase in the use of nuclear power is a meager 5% of the 75%! Let us revisit some of the developments in this area to understand the actual challenges involved from an Indian perspective.

There are two fundamental stages that differentiate businesses in the energy sector: (a) generation and (b) transmission and distribution. With T&D losses running high across the country (around 33% national average), we are way beyond our 'role models' or our global counterparts who have losses around 2% (in Japan and Germany). Further, the absence of reliable power supply at the consumer level only compounds the issue. Which also means two things: (a) Distribution losses are a cost to the society and ultimately requiring compensation through the consumers and (b) Reliable power would mean a quest for alternative sources that avoid the distribution element and are more dependable (solar power, captive power plants, etc.). This is a different market in itself; although not commercially the best, it is still a promising competitor to other available sources. Just as private satellite dishes are now a fast-growing market over the traditional cable operations, the technologies that would eliminate the traditional transmission and distribution could grow rapidly; provided they are economic at the retail scale and easy to operate and maintain.

The strategic roadmap of the Indian nuclear power strategy calls for an increase in generation capacity of up to 63 000 MW by 2032. This translates into 4-6 nuclear power plants each year!!! The very number raises a lot of questions in the minds of the common man... However, given these challenges, a number of issues from a project management perspective emerge.

Major Drivers/Impediments to Growth

To delve into some of these issues in a little more detail, it is essential to understand the dynamics of the industry. From a practical standpoint, there are some very specific drivers (or limiting factors) to harnessing nuclear power more effectively.

Major Drivers/Impediments to Growth (Cont'd)

■Technology:

Although there have been significant developments on the technology front, we still seem to rely on foreign technology for a lot of needs in this area. As the sector is only recently opening up to the private sector, it also means that the exposure to this technology has been limited and the potential of the Indian industries to contribute needs to be seen. Further, technology transfer in most industries is taking a state of 'absorbing' rather than 'developing' in the initial years, thereby, causing a delay in the innovation cycle. The gaps widen with time, causing further dependencies. In short, importation as a 'jump-start' strategy has often ended up as a 'sustenance' strategy!

■Political Perceptions on Risks and Safety:

Probably no other industry is as seriously affected by disasters as the nuclear industry. And this is for good reasons that stem out of experiences. However, with the extent of political dimension that such projects often carry, especially due to the low probability and yet, high adversity of risks, it is difficult to build public consensus. This puts an additional dimension on the feasibility of the project. Further, an environment sensitive to such political 'minefields' isn't going to be the best battleground for most companies.

■Proliferation Risks limiting Fuel Supply:

The one most important aspect is that of fuel supply. While on the one hand, it is easy to build the reactors, the absence of adequate amounts of continuous and un-interrupted fuel supply would change the cost equations significantly. This is another fact that needs to be secured before one goes on to build these potential 'white elephants'.

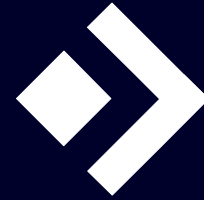
■Fuel Waste Disposal:

One of the key areas that affect the overall costs is the waste disposal cycle. Efforts are on to make these more effective. With a country that has a population density of around 360 persons / sq. km. As compared with the global average of 46 persons / sq. km., finding such a secluded area is definitely going to be a challenge!

All in all, the odds against seem to be greater at this stage!

The Key Factor of Production

Additionally, there is another factor of production that is extremely important – people. The sheer training cycles involved average over 6 years. So, with an attrition rate of 10% each year, it would imply that companies will have to groom at least twice the talent right from day 0. Now, this is contrary to conventional project management theories where the intent is to relieve the cash situation by spending on training sometime close to commissioning! With a construction cycle of around 5 years, this would mean that the people cycle would exceed the other factors of production. In other words, the only other way of getting people would be to recruit from existing agencies or from retired personnel. This would not be favorable for an industry, although it might help bring in a hairline possibility of a feasible solution, rather a stopgap arrangement.



Development Paradigms

So, on the one hand, we are talking of improving the involvement of the private sector and, on the other hand, we are having strong stumbling blocks that are not too easy to overcome. All said there is a need to innovate on the development paradigm. Our fundamental development paradigm has been the 'trickle down' paradigm. Under this paradigm, development follows excellence that 'trickles' down the layers of society, thereby, causing two effects: (a) a potential increase in economic disparity and (b) a possible problem in defining the source from where the 'trickle' begins! The PSUs, pillars of our economy, were founded to help overcome these factors and create adequate involvement of the people. In addition, they also 'financed' their way through these stumbling blocks through taxes. In short, they were having one of the most lucrative incentive packages for any business in our independent history!

Today, we are talking about improving the roles and positions of private players. Lets face it! With technology as a major constraint, the only option left would be for a private agency to identify global partners and overcome the shortcomings of technology. Due to the relatively low cost of labour, even 'human capital' would be invested through the global partners. This model has multiple disadvantages as the risks involved can potentially translate to long-term costs for the country (read economic disparity). The other problem is that it will act as an 'expansion' for the global partner rather than 'growth' of the capabilities of the Indian partner. Cross border factors could further increase the risk exposure unnecessarily (read political factors). The onus of development will be with the local industry – a situation similar to making a car run real fast on a road full of potholes! In short, the local industry needs support to reach the apex of the trickle down pyramid and at the same time has an increased risk of being on an 'explosive' pile of factors that could radically increase the economically disparity over the years.

If we look at the technology development cycle in the context of such projects, we need to adequately cover the following steps:

1. Fundamental Research and Development
2. Technological Commercialization
3. Build
4. Own
5. Operate
6. Innovate
7. Develop
8. Implement

There are two essential loops in this: an overall technology loop that runs through 1-8 and a smaller loop of technology absorption and 'small scale innovation' that goes for 5-8. Under the current paradigm, companies would choose an international partner and directly start with stage 3. The end result will be that they will not be able to walk along the entire loop. Thus, fundamental innovations will largely continue along the importation model. Since the domain is new, it will always be a 'jump-start' for the companies.

Working Around using A New Paradigm

How should one change the situation? The best way to understand the sector is to actively BE in it! In other words, an exposure to the operations is a good starting point to understand the technology, the nuances of the business and get a clear direction towards essential areas of research and development. So, if the private players have the opportunity to directly take over operations of an existing setup, they will get a handle of the core functioning of the industry. This can then help them with the expansion perspective, give them some understanding of the technology, the commercial processes and the research and development expected in the future. In short, starting a new nuclear power plant from scratch would be a more complex situation than running an existing facility and sequentially developing the investment to a new power plant. From an administrative and managerial perspective, this can be considered some kind of 'on-the-job-training' that can benefit the private players. It will have multiple advantages:

1. Getting a talent pool of human resource that may not be easy to get from the open market. This talent pool can help develop the pool for the subsequent expansion.
2. Assisting companies understand the control systems and procedures that are necessary for operating such plants. Since policy issues will be dominant with the opening of the sector, this model will enable the companies to understand how this works and setup or replicate the processes in their new facility.
3. It will help companies ease their cash flows by giving them a 'first hand' account of how revenues are generated in the sector. Since the unit price is one of the major factors determining the viability or sanctioning for any new project, this will help the companies understand the costs and ease their spending through the revenue generation.
4. For the government, it eases their role as a regulator because it 'trains' the companies to follow existing systems, thereby making the whole regulation process quick and controlled.
5. It also frees capital for the government for other activities.
6. It will ensure that the operational risks with respect to fuel supply are minimal and will help expansion by assisting companies develop credibility.

In short, it is an overall win-win situation: a simple case where one can try to divest existing governmental facilities that are generating nuclear power.

Further, considering that the existing agencies like NPCIL, DAE, BARC, etc. have set-up 19 such units in India, it is, but natural, to assume that their rich experience in this sector will have brought with it specialized expertise in handling the multitude of risks and the special know-how that is required to manage the projects strategically well. So, instead of using the current model, proposed by the government, where the private player is asked to start from scratch, will it not make sense to think of a direct disinvestments of some of the facilities to private agencies?

The Roadmap using the New Paradigm

Using the possible new paradigm, the private agency will be granted full management control of an existing facility. This will ease their cash flow situation and help ensure fuel supply for the operations. So, instead of going through the phase where revenue generation is only after the commissioning of the new facility, the private agency will be able to have a source of income right from Day 1 – a luxury, but a necessary requirement, considering the fact that the private sector will not have any experience otherwise and will have to solely rely on their technology / JV partner. However, giving such a jumpstart to the private sector, one should also help them leverage their position to the benefit of the industry. In short, we are talking about expanding. So, each company that procures a facility will be given an additional responsibility of developing a second facility of a targeted size within a stipulated time frame. This will ensure that the skills of the people are not redundant until the plant is in operation. A suitable PPP model can be envisioned under these circumstances. The PPP model will help the 'inexperienced' industry develop within the country and will help protect the interests of the society for subsequent agreements with other global players.

Lets delve into the PPP model in a little more detail. Like any other model, there are several options possible. Lets talk of one of them: a reverse BOOT concept. Whereby the governmental agencies will build, own and commission the facility. The successful commissioning and the ramp-up phases would be followed by a Transfer by means of a 'sale' to the private sector. The advantages of this model are several fold: (a) It would enable companies to enter the sector relatively easily (b) It would help retain the strategic position from both a technological and political standpoint with the apex agency and (c) It would ensure better compliance of codes due to the rich experience and justified methods of cost control, a subject matter of debate when it comes to Unit Energy Costs. For the government, however, this model obviously involves greater responsibility and will not particularly be of interest due to the 'low' returns that would be expected at the end of the day. However, this model would mitigate a lot of risks for the private sector, allowing the government agencies to streamline and acts as facilitators and feeders of growth. In other words, they will continue to work as the top of the trickle down chain, but would be propelled by the private sector to ensure a 'quicker' trickle down. It will also ease the government spending equations by creating adequate capital for subsequent projects – an important parameter in a cash strapped country like India. This would help the government tune its existing program with lesser funds and enable a smooth transfer of operations to the private sector.

Variant Paradigms of Interest

Another possible PPP concept could be the growth oriented reverse BOOT concept. This is similar to the first model. The only additional condition will be that the acquiring company must have a Greenfield expansion plan within a stipulated time of the acquisition. The additional advantages of this model would be: (a) Increased experience in the operations or the core business of nuclear power plants (b) A steady need of professionals that could be built-upon with the help of the existing workforce and (c) Easing the project cash-flows to ensure long term development of the acquiring entity as well as the industry. For the government, this model would clearly mean a 'positive' trickle down from the aegis of the governmental agencies to the private sector, thereby, enabling the private sector to participate in the growth.

The next possible paradigm is the direct participation PPP Venture. Here the government agency (DAE, NPCIL, etc.) will be responsible for the development of the project, but the private party will pay for the services. In other words, it will be a reverse governmental contract mechanism. This mechanism would help expedite issues that required different ministries to come together like land acquisition, permits and clearances and tie-ups with electricity distribution agencies. It would also allow DAE, NPCIL to plan their resources in a much better way, so as to ensure that there is no delay in the whole process; either due to manpower or other governmental constraints.

Conclusion

It is usually seen that private party involvement brings in a lot of benefit to the country at a far advanced rate than governmental agencies. However, in a sensitive area like nuclear power, this may not entirely be the case. With the high reliance on know-how provided by foreign companies, it might make sense to bring in a viable PPP environment to safeguard the interests of the industry and complement the growth through the currently proposed paradigms. This can help propel growth and ensure that the targets set by the government are achieved in the planned timeframes. Currently, we are at the beginning of the juggernaut. Its time to innovate and set sail before we realize that we have missed the wave and hit the rocks of economic imperialism; the next phase of globalization!!!

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About the Author



Rotarian Nikhil S. Gurjar is the President of Consulting Connoisseurs, a new generation management consulting company based out of Navi Mumbai. The company specializes in providing solutions based on both conventional methods in management consulting as well as the state of the art tools using modeling and simulation. With several years of experience in Europe and the US, Nikhil Gurjar is one of the few experts in the country who understands and uses these tools for business applications and policy research. He is also associated with agencies like CII, PPMAI, MSME for different types of services. Before the launch of the company, Nikhil was the Head of Planning at a very large Greenfield steel project in the US. For more details, visit www.consultingconnoisseurs.com.