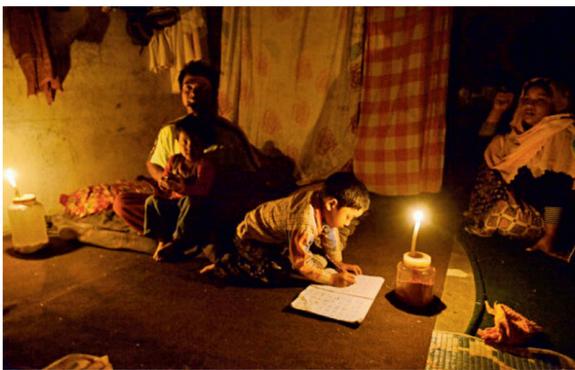


"lifenology" for India

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World over the economic growth is driven by energy, either in the form of finite resources such as coal, oil and gas or in renewable forms such as hydropower, wind, solar and biomass, or its converted form, electricity. This energy generation and consumption powers a nation's industries, vehicles, homes and offices. It also has significant impact on the quality of the country's air, water, land and forest resources. For growth to be sustainable, it must be both resource-efficient and environmentally-safe.

In India, the demand for electricity has always been more than the supply. The importance of electricity



Millions of people in India have no electricity

There is a whole gamut of challenging areas in the power sector that India needs to address on priority in order to meet its growth targets

as a prime driver of growth is very well acknowledged and in order to boost the development of power system, the Indian government has participated in a big way through creation of various corporations such as, State Electricity Boards (SEB), NTPC Limited, NHPC Limited and Power Grid Corporation Limited (PGCL), etc. However, even after this the country is facing power shortage.

There are many problems faced by the power sector and these need to be addressed. One of the issues plaguing the power sector in a big way is shortage of equipment. This has been a significant reason for India missing its capacity addition targets. While the shortage has been primarily in the core components of Boilers, Turbines and Generators, there has been lack of adequate supply of Balance of Plant (BOP) equipment as well. There is a shortage of construction equipment also.

ONE OF THE ISSUES PLAGUING THE POWER SECTOR IN A BIG WAY IS SHORTAGE OF EQUIPMENT. THIS HAS BEEN A SIGNIFICANT REASON FOR INDIA MISSING ITS CAPACITY ADDITION TARGETS

The current power infrastructure in India is not capable of providing sufficient and reliable power supply. Some 400 million people have zero access to electricity since the grid does not reach their areas.

Another problem is unstable power supply. There are frequency fluctuations caused by load generation imbalances in the system and this keeps happening because consumer load keeps changing. Frequency is the most crucial parameter in the operation of AC systems. The rated frequency in India

is 50.0 Hz. While the frequency should ideally be close to the rated frequency all the time, it has been a serious problem in India. Poor power quality control has knock-on effects on equipment operation, including large-scale generation capacity. Equipment damage can, of course, further compromise supply and aggravate the effects of chronic fuel shortages.

To summarize, Indian power sector has made considerable progress in the last decade and has evolved from a nascent market to a developing market led by policy reforms and increased private sector participation. Challenges do exist in the sector, which India has to overcome to evolve from a developing market to a matured market. Meanwhile, the gap between what can be achieved and what is currently present, uncovers a number of possibilities and opportunities for growth.

Energy growth is directly linked to well-being and prosperity across the globe. Meeting the growing demand for energy in a safe and environmentally-responsible manner is a key challenge for all economies. The increasing demand for power has led to a corresponding increase in usage of fossil fuels which has had an adverse impact on environment. In this context, efficient use of energy along with using renewable sources of energy is of paramount importance. This is true for both large industries and small and medium enterprises as well as the commercial and residential sectors. It has now been accepted globally that one of the most important challenges facing the governments and business community the world over is to find cost effective sustainable solutions to their ever-increasing energy needs.

The investment climate is positive in the power sector. The Ministry of Power has set a target of adding 93,000 MW in the 13th Five Year Plan (2017-2022). The industry has attracted FDI worth Rs.43,530.99 Cr (US\$ 7.24 billion) during the period April 2000 to May 2014. India has emerged as one of the fastest growing economies in the world. Its current economic performance reflects a healthy trend based on increased consumption, investment and exports. Over the next five years, this growth is expected to continue. The Government of India has identified the power sector as a key sector to promote sustained industrial growth.

The Government of India has taken some initiatives to boost the power sector of India. One, it plans to buy the equity of Power System Operation Corporation Ltd (Posoco), a wholly-owned subsidiary of the PowerGrid Corporation of India, at a book

Let there be light in EVERY HOME



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value of around Rs.35 Cr (US\$ 5.82 million). Two, Agence Francoise de Development (AFD) is extending a Line of Credit (LoC) of 100 million (US\$ 134.73 million) for a tenure of 15 years to M/s Indian Renewable Energy Development Agency Ltd. (IREDA) to finance renewable energy and energy efficiency projects in India. Three, there has been an introduction of new online forms for submission of applications, which would help the Ministry function in a more transparent manner. Four, the Electricity Supply Companies (ESCOM) of Karnataka and Andhra Pradesh Power Generation Corporation (APGENCO) have signed a power purchase agreement (PPA) for sharing 230 MW power generated from the Priyadarshini Jurala hydro power project. Five, the Government of India has joined hands with IIT Bombay to implement cost-effective solar-powered lighting solutions for the rural population, which will help save 36 million litres of kerosene.

Overall, there is a need for improvement in generation and

transmission/distribution of electricity by adapting new, innovative strategies. First, there is a need for renovation and modernisation of generation equipment, i.e., improving the performance of existing old power plants. There is a need to increase the efficiency of coal-based power plants. Currently the average fuel conversion efficiency of the existing thermal power stations is around 30 per cent. In order to increase the transmission capability of power, there needs to be development of National Grid. Then, a significant thrust on renewable energy is needed. To boost investment in renewable energy, it is essential to introduce clear, stable and long-term support policies. A number of policy measures at national level, which could be applied concurrently, would significantly improve the framework for renewable energy in India.

After all, India's rapid and enduring economic growth is intrinsically linked to the increasing consumption of energy and natural resources.

In the past few years, in spite of various initiatives, power situation still remains one of the core challenges for India. What are the factors responsible for it?

Electricity is one of the basic constituents for the economic growth of a country and as you said there are various initiatives taken in the country in the past few years to improve the power situation. Toshiba's major expansion of power business in India is also a result of this. One of the biggest concerns is the gap in the demand and supply of power in India. There are several barriers that pose a challenge to the Indian power sector. The first challenge is land acquisition; not only for the power sector but for any industry. The second challenge is speedy environmental clearance.

The third challenge is availability of coal. Half of the Indian power generation depends on coal as a source and the production of coal has not increased to match the demand. And the fourth challenge is financial crisis. Because of the recent economic slowdown, financing for new projects have become tougher, especially for Independent Power Producers (IPPs). There was no order from IPPs in the last fiscal year.

After the last general elections in India, there is a huge expectation, both from the general public and the industry that things will improve. At present Power, Coal and New & Renewable Energy ministries are functioning under a single leadership. It means more focused and better co-ordination among these ministries and ultimately improvement in the power situation is expected.

In your opinion, how does it impact the economic growth of the nation?

The Indian economy is in the trajectory of



OUR MAIN FOCUS IS TO PROVIDE TURNKEY EMPCS SOLUTIONS TO THE INDIAN POWER SECTOR

upward growth. To keep up the momentum of this growth, availability of uninterrupted power supply is a must. As a growing economy, India not only just requires to light bulbs, but needs electricity to fuel the growth of every industry, be it large-scale or small-scale, manufacturing, healthcare or education. All of this impacts the economic growth of the nation and it doesn't end here. It is one of those key components that facilitate our

INTERVIEW YOSHIAKI INAYAMA

We create 100% INDIGENOUS Power Solutions

Yoshiaki Inayama, Managing Director, Toshiba JSW Power Systems Pvt. Ltd. (TJPS) speaks to *Dipti Srivastava* about the challenges of power sector in India and Toshiba's commitment in solving the problems through innovative technologies

everyday life. In the current world it has a large impact on human life.

Toshiba has been contributing in many ways to provide power solutions in India. What have been the main focus areas and important breakthroughs in terms of performance in the power sector?

Our main focus is to provide turnkey Engineering, Manufacturing, Procurement, Construction and Services (EMPCS) solutions to the Indian power sector.

Toshiba, with its highly-experienced manpower and energy-efficient and reliable power generation equipment, has been providing similar turnkey solutions across the globe for more than 60 years.

In the power sector, there are three main processes that are important: generation, transmission and storage and Toshiba has

efficient solutions in all the three categories. Our manufacturing facility, Toshiba JSW Power Systems Private Limited in Chennai, focuses on manufacturing efficient power generation equipment. This plant is well-equipped and the employees are trained at Toshiba, Japan, to achieve the same level of quality standards as in Japan.

Toshiba is actively engaged in developing the reliability and quality standards of Indian raw material suppliers and other vendors. This initiative of Toshiba will ensure India's excellence in manufacturing sector over a period of time.

I am sure that in the coming years, we will provide 100% indigenous power plant solutions from India not only for the Indian market but also for the rest of the world.

Do you think more private sector participation can help improve the situation? How can the government encourage corporates to provide large-scale solutions?

Installation of power plants requires huge investments. Participation of private sector will definitely make this investment proposal more

competitive and ultimately benefit the consumers.

From the government side, sustainable energy policies backed up by financial support, is required to promote the participation of private sector.

State Electricity Boards are the main customers of private players in the power sector. To boost the morale of private players, economically-viable, timely and assured payment from state utilities to these private players is a must.

What kind of innovation and technology can contribute in overcoming the situation? In line with this, what would be the strategy and vision of Toshiba in the coming years? As per Toshiba management's vision, we are working towards contributing to a better human life by providing solutions to the key problems that human society faces. We call this as "lifenology", which means the technology life requires.

Toshiba Corporation has put the focus on India and has planned India to be the strategic hub for power solutions to the rest of the world. This is a huge step and big support for us. TJPS is already in the process of providing engineering and product supply to Toshiba Corporation projects in South East Asia. Toshiba envisions that widening the areas of service towards complete solutions would enable us to utilise our overall expertise better and lead to supplying higher quality products at much economical rates for the society. Though our customers are actually the power companies and IPPs, we always think about contributing to the life of Indian people with enough electricity and we are working towards it.

OVER 50 YEARS WITH INDIAN POWER SECTOR

Toshiba has been an integral part of India's power sector for decades. The demand for power in India continues to increase leading to the need for higher capacity turbine and generators, which is one of Toshiba's core expertise. Toshiba continues to contribute to the development of India's power sector for more than 50 years. In India, Toshiba plays a vital role in supplying technology to the Hydro and Thermal power sectors.

For hydro-electric power generation in India, Toshiba started with the supply of facilities for Umiam 1 in 1965 and so far has supplied 21 turbines amounting to 2.6 GW and 31 generators amounting to 4.1 GVA. Some of the landmark hydro

power projects of Toshiba are Purulia pumped hydro for West Bengal State Electricity Distribution Company and Teesta 5 for NHPC. The company delivers small to large hydro power systems and micro hydro equipment of remarkable design and efficiency.

Toshiba is making continuous efforts in research and development of technology, including the advanced work of producing high performance turbines and generators. Apart from other kinds of hydro turbines, Toshiba designs, manufactures and supplies Francis type Pump Turbine that vary in usage from high head to low head that are constant or variable in speed, according to the needs of various locations. During



unstable power fluctuation power supply, Toshiba recommends variable/adjustable speed generator which instantaneously adjusts the active and reactive power and compensates the

power fluctuation. Toshiba's thermal power business in India began in 1990. Toshiba delivered 500MW steam turbine generator to Anpara Thermal Power Station in Uttar

Pradesh and was recognised for its long-term continuous run, efficiency and reliability. In 2012, India's first 800MW-class supercritical turbines and generators, all the five units which

were supplied by Toshiba, entered commercial operation at Tata Power Company's Mundra power station. The Mundra power plant is the biggest power project at a single location in India.

Toshiba JSW Power Systems Private Limited (TJPS) (former Toshiba JSW Turbine and Generator Pvt. Ltd.) was established in 2008 with 75% stake by Toshiba. Toshiba, which

THE DEMAND FOR POWER IN INDIA CONTINUES TO INCREASE LEADING TO THE NEED FOR HIGH-END POWER TURBINE & GENERATORS, WHICH IS ONE OF TOSHIBA'S CORE EXPERTISE

has the technology for advanced ultra-super critical turbines, has entered into a comprehensive technology transfer with Toshiba JSW in India. TJPS is now one of very few

companies in India that can produce super critical steam turbine generators.

TJPS offers turnkey solutions for the entire power plant on Engineering, Manufacturing, Procurement, Construction and Services (EMPCS) basis. Recently, TJPS has been awarded an EPC contract for the supply of steam turbines and generators island package for NTPC's Darlipali Thermal Power Project stage 1.

Toshiba's vision for this business is not only limited to Indian market. Going ahead, Toshiba intends to position TJPS as a base for exports to Southeast Asia, the Middle East and Africa where a number of large-scale projects are being planned. The idea is to develop TJPS as a key element within the framework of an expanding global business and thus contribute to the development of India's economy.