



POWER TRADING IN INDIA: WHAT IS STOPPING THE NEEDED GROWTH?

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ABSTRACT

Power trading is a solution to reduce power deficiency and also to encourage investment in the sector. While power trading allows for arbitrage opportunities across regions due to supply and demand diversity, state level efforts will be needed to ease open access process to strengthen the power trading market. Power trading will give rise to competitive energy market which in turn will drive efficiency improvement across the power market value chain. In India, it currently has a minimal share of less than 3% in total power generation and there are number of reasons for that. This paper reviews necessity of power trading in India and also highlights the issues which are responsible for this slow growth of power trading so that necessary actions can be taken.

Index Terms: Power Trading, Electricity Act 2003, Transmission Congestion, and Cross Subsidy etc.

1. INTRODUCTION

In the Electricity Act, 2003 (EA, 2003), the Government of India (GoI) decided to provide "Power to All" by 2012 but still more than 50% of population does not have access to electricity. Today, in India total installed power generating capacity is around 250 GW. As of 2011, India's per capita power consumption is nearly 700 KWh which is well below relative to other countries like China (3300 KWh), Japan (7,800 KWh) and U.S. (13,000 KWh). There are number of reasons for relatively slow growth of Indian power sector. Some are listed here:

- Insufficient power generation capacity
- Scarcity of fuel
- Financial sickness of distribution utility
- High AT&C losses of distribution utility
- Lack of transmission capacity
- Political intervention in power sector
- Absence of competition

Govt. has taken many steps to rejuvenate power sector through policies and acts like Mega Power Policy, Regulatory Act 1998, Electricity Act 2003, and Tariff Policy. Apart from these, many other schemes like APDRP, RGGVY, and Feeder Separation have also been started to strengthen the power system. These schemes led to some improvements but still a lot of work has yet to be done to make the sector viable.

Competition is an important aspect to bring efficiency in any sector and it has largely been absent in Indian Power sector. In Electricity Act, 2003, open access policy was enacted to bring competition in power sector. As per act, Open Access is "Non-discriminatory provision for the use

of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the Appropriate Commission". Through this policy, power sector is now open for numbers of players to invest in all areas like generation, transmission and distribution. Open access has also given strength to power trading, which was not developed before the Electricity Act, 2003. Under this, any person can sell electricity to any other person or industry and buy electricity from any distribution utility or directly from any generator.

2. WHY DO WE NEED POWER TRADING?

Geographically, India's power grid is divided into five regions which are Northern, Eastern, North Eastern, Western, and Southern. All the states and territories in India fall in either of these regions. Each region has different supply and demand dynamics; load profiles, load growth, generating capacity, resource potential etc. It has been observed that some regions remain in surplus in a given season/hour, while other regions remain in deficit in the same season/hour, and so these two regions can well be balanced via power trading.

Northern, Southern and Western regions are highly populated and industrialized, and so they have high electricity requirement throughout the year. Specially in summer, when demand reaches to its highest levels, it's very difficult to match the total requirement. At the same time, in summer, there is surplus power in North Eastern states as they have lesser power requirement because of hilly terrain where temperature remains relatively low. These regions have large number of hydro power plants and in summer, generation from these power plants



increases because of good amount of water flow in rivers. Eastern region has generally been in surplus due of large number of coal plants and relatively lower industrial load. This surplus power can be supplied to other power deficit regions.

Southern region has huge capacity of wind power which is highly intermittent. There are instances where wind plants are generating electricity when it is not needed and vice-versa.

State / Region	Energy				Peak			
	Requirement	Availability	Surplus(+)/ Deficit (-)		Demand	Met	Surplus(+)/ Deficit (-)	
	(MTU)	(MTU)	(MTU) (%)		(MW)	(MW)	(MW) (%)	
Northern	328,944	318,837	-10,107 -3.1		47,570	46,899	-671 -1.4	
Western	288,062	289,029	967 0.3		45,980	52,652	6,672 14.5	
Southern	298,180	260,366	-37,814 -12.7		41,677	32,423	-9,254 -22.2	
Eastern	118,663	114,677	-3,986 -3.4		17,608	17,782	174 1.0	
North-Eastern	14,823	12,248	-2,575 -17.4		2,543	2,215	-327 -12.9	
All India	1,048,672	995,157	-53,515 -5.1		147,815	144,788	-3,027 -2.0	

Chart -1 Anticipated All India Power Supply Position for the Year 2014-15

Above table shows that there are some regions like Northern, Southern and North Eastern which probably would be in deficit position and regions like Western & Eastern in surplus position. This surplus power can be supplied to deficit regions through power trading to reduce overall deficit of the country.

Power trading also helps in maintaining grid frequency by reduction of demand supply gap of electricity. Maintaining grid frequency is very important for grid management. Current grid frequency band is 49.7 – 50.2 Hz. If demand supply gap increases, frequency also goes up and down.

One of the most important advantages of power trading is promoting competition and bringing in efficiency in the entire power sector. Using open access, now any person or generator can purchase or sell power to anyone. Now consumers have choice to select their power supplier in case of dissatisfaction from the current utility's supply. This will force utilities to bring efficiency in the system and to improve their services to satisfy customers. Customers can use transmission and distribution system after payment of appropriate charges.

Presently in India total short term electricity market which covers contract for less than one year, is near 11 percent which includes power transaction through unscheduled interchange (UI) as well. In countries like

Norway, Sweden, Finland & Denmark, short term power market is more than 75% of the total consumption of electricity in these countries. With analysis of other western countries power market, it can be stated that after more than 10 years of enactment of the Electricity Act, India still could not achieve a satisfactory position in power trading.

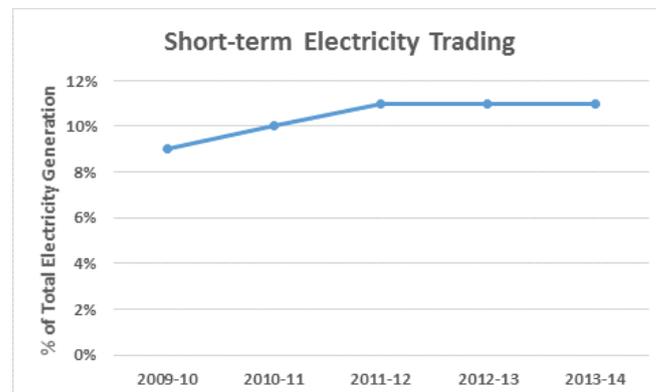


Chart -2 Short-term Transaction of Electricity

Last five years of short-term electricity transaction data suggest that growth of short term market has been very slow. In-fact in the last three years, growth remain stagnant. There are various hurdles in growth of short term power market or power trading. Some of those reasons are discussed below:

1. Scarcity of Fuel
2. Insufficient Transmission Capacity
3. Financial sickness of distribution utilities
4. Cross Subsidy Regime
5. Slow growth of renewable energy
6. Wide grid frequency band
7. Lack of technology usage in power sector

Scarcity of Fuel: In the last year 2013, plant load factor (PLF), a measure of capacity utilization, has dropped to level of 65.6% for coal based power plants from 75% in 2010, whereas demand continues to rise. Not only coal based, but also gas based power plant's capacity utilization has also been dropped. This is mainly due to the acute coal supply shortages faced by almost all of thermal power plants across the country. Because of this fuel shortage, power plants don't have excess capacity to sell power in short term market as they first need to fulfill the capacity obligation under the long term power purchase agreements. Natural gas is an option for MPPs but in view of current situation of gas price and its availability, it is also becoming a non-feasible solution. Power generation from costly imported coal/gas is very difficult to sell in this short term power market. Fuel scarcity is also affecting new investment in generation sector as investors have fear of facing same situation in future also.

Insufficient Transmission Capacity: Insufficient transmission capacity is a major bottleneck in the



progress of not only power trading, but the sector as a whole. According to a power transmission report, in the last five year, power generation capacity has grown by 50%, whereas transmission capacity has increased by about 30%. According to the norms, transmission corridors are booked firstly for long term power purchase agreement and then rest capacity can be booked for power trading in short term power market. Since there is already insufficient transmission capacity, most customers in short term market don't get enough excess capacity to supply power. There are regions with surplus power but they don't have enough power evacuation capacity. In India, investment in transmission & distribution has not been as focused as it has been in generation. As of 2013, total installed generation capacity of country is around 250GW whereas total inter-regional transmission capacity is only 37 GW.

Consider that, on day 6 Aug 2014, market clearing volume (this is electricity volume cleared on equilibrium price which is obtained by bidding of power from many buyers and sellers) was 93,308 MWh but due to transmission congestion, final clearing volume was 82,534 MWh. Very clearly, it can be stated that due to insufficient transmission capacity, more than 10,000 MWh could not be sold in to the market. This situation is likely to persist. This is the loss for both the power generators as well as the consumers.

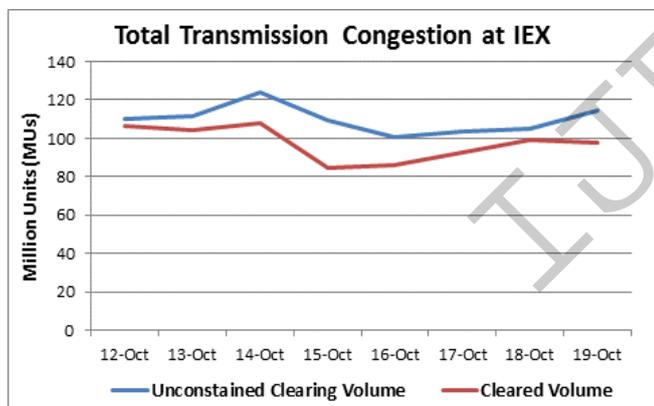


CHART 3- Impact of transmission congestion on Market Clearing Volume at IEX

In above chart, there is market clearing volume data for 8 days (from 12 Oct 2014 to 19 Oct 2014) at Indian Energy Exchange (India's most preferred electricity trading platform). There are two parameters, Unconstrained Clearing Volume and Cleared Volume which represents volume before checking transmission corridor availability and after that respectively. It is clearly shown in the chart that cleared volume is reduced because of transmission congestion. In these 8 days, there was demand and supply was also available but because of transmission congestion 400,000 units could not be supplied.

Financial Sickness of Distribution Utilities: Because of high AT&C losses, lower tariff and subsidy, majority of the distribution utilities across the country are facing severe financial crunch. These cash starved utilities don't have money to purchase power for their consumers. In place of purchasing power from short term market, they prefer load shedding in supply areas as there are no stringent norms enforcing reliable power supply. This situation also led to a reduction in PLF of power plants. Govt. is trying to revamp the situation by giving a bailout package of Rs. 2 trillion to distribution utilities. But there are challenges for utilities as stated above- like reduction of losses, cost based tariff and minimizing the subsidy. Without overcoming from these challenges, bailout package would be just a short term solution, not a permanent measure. Power trading, where buyers have to do prepayment for electricity, is not preferred by these cash crunched utilities.

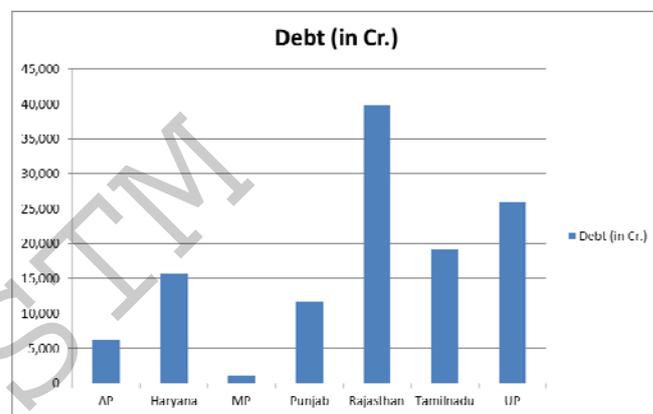


CHART 4 - Total Debt on State's Electricity Boards

Cross Subsidy Regime: In distribution tariff structure, industrial & commercial consumers have to pay extra charges as cross subsidy to supply power to agricultural consumers at lower tariff than average cost of power supply. If an industrial or commercial consumer applies for open access, first he has to pay to generator from whom he is taking power, Transmission Company for using the transmission infrastructure, Distribution Company for using the distribution network, and cross subsidy surcharge. It increases the overall cost of power for the open access consumer. This scenario discourages such consumers for levied open access. According to the National Tariff Policy, 2006 cross subsidy surcharge and other surcharge to be levied from consumers who are permitted open access should not be so onerous that it eliminates competition in the power sector. But still in any state, cross subsidy charges have not come down.

Slow Growth of Renewable Energy: Renewable energy in total country's energy mix has increased from nearly 8% in 2008 to 12% in 2013, but still it is still very less compare to other western countries like Germany and Canada where its proportion in total electricity consumption is more than 50%. As the share of



Renewable energy gains more share in generation mix, short term power market would be helpful to maintain grid reliability by better scheduling these intermittent resources.

Renewable energy (RE) sources which not only help the environment, but also a good option to fill the short gaps in demand and supply. Lot of initiatives has been taken by govt. like incentivizing the sector, JNN Solar Mission to attract investment in RE, but still a long way to go to achieve the required growth.

Wide Grid Frequency Band: According to present grid - discipline norms, frequency band gap is 49.7 – 50.2 Hz to maintain grid discipline. If frequency goes beyond this range (either less than 49.7 or more than 50.2) responsible generator or discom will have to pay a penalty. At the time of peak demand, most of the cash starved utilities prefer draw more power from the grid than scheduled, instead of purchasing power from the short term market. This is due to the fact that while buying power from the short term market, utilities will have to pay upfront before drawing the power, whereas UI is better option for these utilities as they don't have to pay it upfront.

Lack of Technology Usage in power sector: Technological advancement through IT, Automation, GIS/SCADA, and Smart Grid can play a dominant role in improvement of the Indian power sector. So far technology has touched only few segment of this sector like in distribution billing and ERP software, and that is also in few places of the country. Implementation of technology will help in doing more accurate forecasting of demand and supply, faster communication between utility and consumer, and control on the T&D network to get quick response. Through smart metering which will enable two way flow of communication, Time of Day or real time pricing can be implemented for Demand Side Management (DSM). It will boost intra-day or short term market. Some steps have been taken such as RAPDRP, Smart Grid task force and forum to make a framework to implement technology in power sector.

3. CONCLUSION

We have discussed many obstacles for power trading in India. Obstacles like fuel scarcity, insufficient transmission capacity and financial sickness of distribution utilities are the major bottleneck for power trading growth. Govt. of India is taking steps to overcome from some of the obstacles and for rest still they have to take initiatives. Political intervention which is major reason of high cross subsidy also should get rid of from the power sector. As, in starting of this paper, we have discussed advantages of power trading, it is important for the govt. to remove all these obstacles

sooner than later to improve the sector and achieve last mile connectivity.

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