Unbundling and Deregulating Electric Power in Tamil Nadu, India

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I. Executive Summary

The key issues facing the Power Sector in Tamil Nadu are the inefficiencies at the generation and distribution stages represented by low Plant Load Factors and high Transmission and Distribution Losses, respectively. The losses in these areas are in themselves driving the State Electricity Board into the red. Correspondingly, reform targeted at precisely these areas would in itself make the provision of Electric Power in the state profitable without tariff reform.

Unbundling combined with deregulation has been very successful in significantly improving the efficiency of the power sector in those countries that have done it. The primary advantage of this method is that by deregulating to open competition, the industry functions at much higher levels of efficiency. This is particularly important in a developing country like India with severe demands on its capital. Efficiency gains in the power sector result in lower prices for consumers and, because electricity is a core input to all sectors, significant gains for the economy as a whole.

The process would involve breaking up the Tamil Nadu Electricity Board (TNEB) and developing competitive markets in generation and power sales.

(i) **GENERATORS:** TNEB would divide its generating assets into independent firms and sell them off separately. These firms would then sell their power into a wholesale power market. The entry point for new generators would then not be the signing of a power purchase agreement with TNEB, but a perception that power prices would remain higher than the cost of generation.

(ii) **MARKETERS:** Marketers would trade in the wholesale power market and sell electricity to final consumers. Since marketers would compete with one another for power sales, they would offer packages tailor made for the individual needs of consumers. They would also compete for purchasing power from generators and offer them contracts that fulfilled their specific needs. In other words, the marketers would make the wholesale market a full fledged liquid commodity market with spot, forward and option trading.

(iii) **DEFAULT SUPPLIERS AND AGRICULTURAL MARKETERS:** The default supplier is a special case of marketer: a consumer is automatically signed up with it until another is chosen. Equally important, it is the marketer of last resort facility – stepping in if one’s selected provider fails for any reason. As agricultural consumers do not have to pay for power currently, and will continue to receive subsidized power into the foreseeable future (the tariff rate being below a wholesale rate), the agricultural
The marketer will be the default supplier. The default supplier status for different regions of the state would be auctioned for a period of five years. The rates would be fixed prior to auctioning by the state electric regulator and then increase at the retail price index. For providing the service, potential default suppliers would bid against each other on a positive or negative basis, i.e. the amount of money they would pay to TNEB or expect to receive from it for providing this service in a designated region.

(iv) **DISTRIBUTORS**: TNEB would sell its distribution assets either to a single entity or as multiple firms based on the regions served. Distributors would handle the distribution of power and the billing and collection of dues. They would collect these revenues as the agent of TNEB. Their own charges would be based on the power distributed, the number of consumers and performance indicators like number of new consumers added and reduction of distribution losses. This charge would be set by the Regulator.

(v) **THE NEW SEB**: TNEB would retain the Transmission role ensuring the reliability of the grid. It would also levy a transmission fee (called a wire charge) based on the type of final user – as a means of continuing the cross-subsidization driven tariff scheme currently in place. In order to do this effectively, TNEB would have to settle the market financially. Another task it would accomplish would be the transfers through concession fees from the different service providers to each other. TNEB would also provide the interface between this market and Central Government Generators like NTPC and consumers, and other states’ SEBs. These activities would effectively make TNEB the market maker to this market: making two way quotes and providing a base liquidity. In order to accomplish these tasks, it is worth considering a strategic partner for TNEB.

The tremendous advantage of this model is its flexibility to further reform. To remove the cross-subsidy, one only has to remove the segregated wire charge. As reforms continue in other states and they deregulate as well, TNEB can stop being an intermediary in transactions with players in those states, and allow them direct access to this market.

As one can see this process is both highly desirable and achievable. Tamil Nadu could receive the efficiency gains from this critical sector with multipliers across the entire economy. These tremendous gains would of course be possible without having to remove the cross subsidy from agriculture.
II. Introduction

ISSUE

Tamil Nadu Electricity Board (TNEB), like most State Electricity Boards in India, is facing a problem of continuing losses. This is in part due to the absence of a power tariff on agricultural users, and also due to the high transmission and distribution losses and low plant load factors. Other inefficiencies are also high from the fact that management faces no competitive pressures currently. If one takes these factors into consideration, current tariff levels will support adequate profitability without any increase in average tariffs. (Though a rationalization of the tariff structure does also need to be done.)

A secondary issue would be that a full unbundling with the development of a wholesale market in power would allow for power generating companies to sell directly into the market and not to the SEB. In other words, TNEB would not have to enter into Power Purchase Agreements and seek counter guarantees in the future.

THE US MODEL

The US developed its power system partly through private utilities and partly through public ones. There are numerous utilities across the country that are divided into 3 grids: East, West and Texas. The combined generating capacity of the US is approximately eight hundred thousand megawatts and it distributed over 3 trillion-kilowatt hours (source: Electric Power Annual 1997, US Department of Energy).

Starting in 1992, the US started to deregulate its power markets. The Federal Government developed a system where utilities could buy and sell power between them. Now states are unbundling the services provided by utilities – breaking them up into generating companies, marketers who trade in power and sell it to consumers, distribution companies that run local distribution networks and independent service operators that run the transmission lines. The end result is that customers will be able to choose their power marketer and a pricing package suitable for them. The primary advantage of this model is that it allows generating companies and marketers to be deregulated – and have market driven efficiencies.
METHODOLOGY

It has been the experience in Western Countries that private regulated firms while avoiding the gross inefficiencies common in state owned corporations are not near the efficiency levels achievable when companies freely compete. Since these companies sit at the center of the economy, efficiency losses lead to higher prices and lower economic growth across all sectors. Thus states’ have tried to deregulate portions of infrastructure providers so that one can get to those levels. In areas where a natural monopoly does exist, other methods of regulation have been attempted – like “RPI-X.” This method fixes the permissible price increases to the increase in the retail price index less an efficiency factor labeled X. The firm is thus forced to reduce prices in real terms for a fixed period, after which X is reset. By allowing firms to retain any additional profits from efficiency gains beyond those controlled in X, the regulator gives the firms the incentive to achieve even greater efficiencies. The experience in the UK with this was not wholly successful. Across different infrastructure, firms were able to extract efficiency gains which were far in excess of those imagined possible. Their increased profitability became a political liability to the government. This experience has only fueled the desire to deregulate rather than find better ways to regulate.

CURRENT SCENARIO

TNEB is setting up a regulator in line with the Common National Minimum Action Plan for Power, 1996 and the Electricity Regulatory Commissions Act, 1998. Additionally, it has retained Ernst and Young to prepare a detailed recommendation to the state on reforming the power sector.

This report gives a broad unbundling and deregulation plan for Tamil Nadu, using the development of the regulator and the existing assets and skill set of TNEB.

III. The Players and their Roles

GOAL

Developing on the experience of other countries, and particularly the US model (its size and intricacies making it in many ways the most applicable to India), as well as Tamil Nadu’s own issues driven by the large cross subsidization from industry and other consumers to agriculture, the following structure was developed. The intention was to conceive of a
system which had the fewest portions that needed to be regulated, and that would have a large number of players so that one would get healthy competition. The agricultural tariff is currently absent, so that the system was developed to accommodate this as well as changes that might occur to it in the future.

THE MARKET

As one can see from the figures, the physical path of electricity stays the same. The difference in the sales path is that default suppliers and marketers would now purchase power from the market hosted by the SEB and sell it to individual customers.

Generators would generate electricity and then sell it in a wholesale market. They would be ‘merchant’ providers, i.e. they would sell at whatever was the current price, rather than at a pre-fixed level. Similarly, the volumes they produced would also depend on their marginal costs and the prevailing market price. Generators would not have the advantage of a take-or-pay agreement.
Depending on those prices generators would be free to chose whether to produce power or not. Prevailing prices would be at the marginal cost of the plant with the lowest cost necessary to fulfill the quantity demanded. Generators with the lowest marginal costs would have the highest profitability.

Black outs and higher wholesale electricity prices would attract investment. And unlike in the current environment when the generator is subject to high political risk with continuous contesting of the Power Purchase Agreement, this would not be true. The lower risk here would translate to lower prices.

MARKETERS

Marketers would be the purchasers of power in the wholesale market. They would then sell it to the final consumers. Given the high cross-subsidization it would be necessary to have three different kinds of marketers, each of which would attract a different transmission cost from the SEB. In order to allow for a healthy market to develop, forward and option transactions would have to be netted in the spot market and the transmission cost paid then. Being deregulated, a potential producer would not need to receive a license from TNEB, the State Government or the Regulator – it would make the decision on purely business considerations.

The structure as envisioned would continue the single bill, rather than one divided into each of the constituent parts. This rate would be offered by the marketer.

As meter technology in the state would not allow for power consumption to be monitored on an individual customer basis in real time, it would not be possible for each consumer to be choose a marketer – such selection would have to be made on a group basis. Over time, with more advanced systems each consumer will indeed be able to pick the marketer of his/her choice.

DEFAULT SUPPLIERS

Default suppliers are the marketers of last resort. Customers are automatically enrolled with a default supplier until they chose another marketer. The default supplier would offer a standard rate for each category of consumer. While it would be possible for other consumers to choose another marketer, agriculture would be committed to its default supplier as there would be no payment made by it. Thus, the default supplier would also serve as the agricultural marketer for its area.
Also, in the event that a marketer fails, the default supplier would be forced to step in and serve the former’s customers. However, for these consumers the standard offer rate would only be applicable after a month to allow the default supplier to make arrangements to cover that additional load. In that interim period, those customers would be charged on a cost plus basis.

Both the standard rates and the cost plus calculation would be initially stated by the regulator prior to an auction round and have a standard escalation clause based on the retail price index. To continue to force efficiency gains and keep prices down, the default supplier status would be auctioned every five years.

■ DISTRIBUTORS

Distributors handle the entire client interface. They would be responsible for the distribution network: TNEB would transmit power to the distributor in bulk and then the latter would be responsible for the physical movement of power to the individual consumer. They would also handle meter checks and billing. This would continue to be a regulated service. There would not be a distribution charge on the bill – a single charge for power would appear – as the distribution payment would be made from the pool managed by the SEB. Each distributor would be assigned a portion of the pool depending on the power distributed, number of customers and their performance vis-à-vis standard indicators.

■ THE NEW SEB

The SEB would now have sold off its generation and distribution businesses. On the physical side of the business, it would now be a transmission company – transmitting power from the generators to the individual distribution companies.

It would also domicile the power exchange market: unlike the current system, generators and marketers would be trading in power on a constant basis. In order to do this they would need an electronic exchange. Since the SEB would already be handling the physical side of transaction through transmission, it makes the most sense for it to handle the financial side as well. The SEB would also participate in the market by selling Tamil Nadu’s share of power from the Central Government Generators. Additionally when needed, it could purchase power for sale to other SEBs, or it could purchase power from other SEBs for sale on this market.

Its wire charges, i.e. charges to marketers for transmitting power through its system, would form the basis of the cross subsidization from industrial users to the rest of the market. It
would also manage the pool of charges: it’s wire charges, the flow from the negative and positive bids by the default suppliers, payments from the sale of its generation and distribution assets, and concession fees to the distribution companies.

IV. Generators

CREATING THE FIRMS

For a market to be efficient, one needs to have several buyers and sellers. Thus, having a large number of generators is important. On the flip side, the greater the number of generating companies, the greater the loss of efficiencies from scale – particularly in fuel procurement. The SEB will have to incorporate its generating assets into firms and sell them off with the requirement that they cannot be merged without the SEB’s consent. (This would protect against a significant portion of the generating assets in the State being merged as a means of increasing revenues, yet leaves open the possibility for reinterpretation in the future in the event that similar policy is implemented in other states and a change in transmission technology allows for generating assets in other states setting a nationally cleared price.) The pooling of these assets into firms would be based on the type and location of assets.

AUCTIONING PROCESS

Since the assets would be sold outright, a simple public tender system would be appropriate. The issue that one would have to encounter would be whether TNEB should offer a sales aid finance, i.e. asking for a down payment plus a fixed payment every year over a long term period (ten to twenty years). This has two benefits:

(i) it would increase the selling price of the generating equipment (as long duration debt is not available), and

(ii) it would allow for TNEB to receive money when it was needed in the pool and not in a single bullet up front (this would protect against the funds being misused early on and then the state being unable to make up the gap in the pool.)

The primary disadvantage would be that TNEB and the State Government by extension would then take on the business risk of the generator. However, the safety gained from delaying payment till it was closer to when it would be needed would outweigh this additional business risk. Given the absence of an applicable discount rate in India, the government would have to set fixed proportions for payments over the life of debt, i.e. if the state government chose to offer a 15 year finance facility for a generator it could require a
down payment of 25% and an additional 2.5% payable semi-annually. Since the proportion of payments would be fixed, the tendered amounts could then be easily evaluated in absolute terms without the need to determine a discount rate.

V. Marketers

■ IMPORTANCE

The number of marketers and their effectiveness drives the entire unbundling process. If marketers can not reach customers and offer them alternative rates, the default suppliers will not face competitive pressure and be efficient. The state should therefore carefully consider the requirements placed on these institutions.

■ DEFAULT SUPPLIERS

The default suppliers in a region can also be ordinary marketers in other regions. They will have a strong local market to help their forays into other regions. For this reason, each default supplier should have different promoters and the merger of any two default suppliers should only be with the regulators consent.

■ EQUITY CAPITAL

High promoters equity requirements will keep potential entrants out. It is often argued that this keeps fraudulent and unstable companies out. It also prevents the creation of start ups that might be very successful in the future. Since the amount of equity a marketer requires depends on its scale of operations and financial structure, this should be regulated by the financial system rather than explicitly stated in regulations. The financial system would also be in a better position to evaluate the quality of management.

■ COMMUNITY MARKETERS

In the US, Massachusetts in its unbundling promoted the idea that municipalities could set up their own marketer. Since power marketing involves taking positions in derivatives and commodity trading, there is a real financial risk to municipal governments from this activity. However, other solutions like a non-profit or cooperative marketer would provide much the same effect, without the risk to local governments. These would function like a mutual fund passing gains and losses to electric consumers for a fixed management fee.
VI. Default Suppliers and Agricultural Marketers

AUCHIONING PROCESS

As each supply area will have a different customer mix, it will have a different revenue stream. For instance, some regions will be largely agricultural and others, like Madras, will be largely retail and industrial consumers. Since default suppliers will not have to pay the segregated wire charge, this variation will directly effect their profitability. Those default suppliers with a high proportion of agricultural consumers might not generate enough revenues to cover the cost of electricity. While others with higher industrial consumption would be very profitable. Thus when the default supplier status for the latter are auctioned, there will be positive bids, while for the former one will have negative bids, i.e. the prospective default supplier will expect to receive money annually for the service it provides.

This situation is analogous to that of the rail companies in the privatization of British Rail. Since some of the collections of routes were unprofitable in either the short, medium and/or long term, prospective firms were allowed to bid on what they would want to receive or pay the government in each year over the life of the concession period. In the British case, an appropriate discount rate was determinable over a long period and that was used to evaluate bids.

In this case, one can have a simpler auction system where the prospective concessionaires bid the constant amount that they would be willing to pay or receive from the government in order to be the default supplier for a particular region. This is preferable for two reasons: it avoids the issue of selecting a discount rate, and given that it is a shorter term contract such a structure is indeed possible. This amount would necessarily have to be adjusted for inflation (see below).

It is important to note that the payment and receipt of these funds will by the distributors in the name of TNEB.

ADJUSTING TARIFFS, CONCESSION RATES FOR INFLATION, NOT EFFICIENCY

The default supplier is inherently exposed to the market price for electricity in the State. In the event that prices are in excess of their anticipated levels the default supplier will bear the cost. In order to protect the default supplier from inflation driven price risk, one would need to allow for a standard escalation clause. If one did not do this, the amounts that default
suppliers would be willing to make would decrease to a greater level than the cost of it (as their risk averse nature would make them weight the occurrence of the worst cases of inflation).

Since this service would only be contracted for five years before it was auctioned again and there would be a payment from the default supplier to the electricity board annually, the only way that profits could be extracted would be through efficiency gains. Hence, there would be no reason to reduce the inflation protection by an efficiency indicator. Indeed the concession payment from or to the electricity board, would be the most efficient form of obtaining that efficiency driver, as it would be set in an auction. The payment would represent expected efficiency gains which would be passed back to the electricity board, any additional profitability would have to come from efficiencies that were not expected.

**WHY PRIVATIZE**

One of the central inefficiencies facing the power system in Tamil Nadu, as with elsewhere in India, is the high Transmission and Distribution losses. These losses can be largely assigned to pilferage at the distribution level. Even though privatization to a regulated service will not in itself lead to efficiency, it will reduce pilferage to negligible levels. Further, if the distribution company is paid in the number of connections as well as power distributed, it will have an incentive to increase distribution at a much higher rate than the TNEB has achieved. Additionally, because payment will be made by TNEB to the boards and from individual customers, they will not have a disincentive to expanding free or uneconomic expansion of the service in rural areas.

**SINGLE OR MULTIPLE**

There is no clear reason why a state should break up the distribution service into multiple companies. Having different companies in reasonably similar conditions would make it easier for the regulator to monitor costs and compare performance leading to higher efficiencies. Multiple companies would also have less political leverage on the government than a single one. However, one would need to justify these arguments against the loss of economies of scale. In Tamil Nadu’s case, such a decision would have to be made after more detailed analysis.

**SOCIAL REQUIREMENTS**

A private firm will always act in a profit-maximizing manner. If the firm does not have clearly stated requirements for its activities particularly in the area of the growth and
development of the system, it would not function in the public interest. For this reason, it is important that this matter is carefully considered and dealt with before the distribution companies are sold. For each distribution area, analyses would have to be made based on future economic growth in the region and its effect on demography and demand.

- **REVENUES**

US States that have unbundled have chosen to clearly show the customer that the service has been separated into constituent parts, each of which has a separate line in the bill. However, because of the complications arising from the steep cross subsidization, it would be better not to have an explicit charge for distribution. The revenues for the distribution company could be calculated on a performance basis, i.e. being a product of number of customers and power distributed as well as annual expansion of the network, quality of the billing process and collection of receivables, reduction of transmission and distribution losses, and inflation. As the distribution company would be collecting the customers receipts, it would have possession of the revenues of the entire electric system. It would then keep its share as determined by its performance formula and then pass on the rest to the pool managed by the TNEB.

- **AUCTIONING PROCESS**

As TNEB would be selling off its distribution assets as regulated on-going businesses, a simple auction would be possible. As with generating companies a long-term financing package would be the best method. (Please see the generators section above for further details.)

**VII. The New SEB**

- **TRANSMISSION RESPONSIBILITY AND WIRE CHARGES**

The SEB would have sold off its generation and distribution businesses, and now only retain the transmission responsibility on the physical side. In order to retain the sharp cross subsidization, it would have to impose segregated tariffs (called wire or transmission charges) on marketers, i.e. marketers would have to pay different rates depending on who they would be selling that power too. Power for industrial use would have the highest transmission charges, while that for agricultural use would not attract one.
It is worth noting that since default suppliers will not be paying the wire charge, it would be implicitly stated in their concession bids. Thus the rates for these charges would necessarily have to be fixed at the same time as the concessions were auctioned. Any increase or decrease in these charges will not increase or decrease revenues from these tariffs, it would only change consumer prices and effect default suppliers’ profitability.

FINANCIAL CLEARING AGENT

To The Market

TNEB would be setting the physical, i.e. electron side, of the market by its very nature of being the transmission system for the state. It would hence make the most sense for it to also settle the financial side, i.e. being the settler for the spot, future and option markets in power.

In the US, California has chosen not to combine these two settling services. In order to protect the electricity service in the event that they are settled differently, the physical settler (the independent service operator) is allowed to override the financial market and decide which generators should be operating, and at what level.

In the case of Tamil Nadu, it is particularly important that TNEB also has the financial settling responsibility, as it will be levying a segregated wire charge. If it does not know who the counterparty is, it will not be able to level an appropriate charge.

To The Pool

TNEB will be receiving and paying charges to generators, default suppliers, marketers and distributors. It will have to monitor these payments and make sure that all funds are received and paid out. If there is any short fall it will have to cover it, and surpluses it would keep for possible use in the future.

MARKET MAKER

TNEB being an SEB would also be the primary connection between Tamil Nadu’s Electric System and the rest of the country. It could purchase power from generators and sell it outside the state, or it could purchase power from other SEB’s and sell it to marketers and default suppliers. This would provide liquidity to the market and some price stability.

On an on-going basis, it would be purchasing power from the Central Government’s generators – NTPC, NHPC, NPB – for sale to marketers, default suppliers and Central consumers – primarily the Railways.
NEED FOR A PARTNER

As one can see, the unbundling process will result in a reduction in TNEB’s physical duties, but a considerable increase in its financial capabilities. It would hence be useful for the state to bring an international utility with strong financial skills or a finance company – like a Financial Institution, as a strategic partner.

VIII. Flexibility for Further Reform

The unbundling proposal has been set up to easily accommodate further reforms. The most important reform would be the rationalization of the tariff structure, which would be accomplished by changing to a single wire charge from the segregated one. If other states decided to adopt this structure then TNEB could allow for direct sales across state lines and cease to be an intermediary.

IX. Conclusion

Unbundling power at the State level is both highly desirable and achievable. It would provide dramatically higher efficiency levels leading to lower costs and profitability. Perhaps more importantly, it would result in higher growth and development of this economically critical sector.

By deregulating portions of electric services, one can get dramatically higher efficiency levels. This will be combined with the privatization under regulation for other parts of the service., which would make the entire service profitable.

The unbundling process can also be used to increase generating capacity and distribution. Higher wholesale prices and blackouts would signal to new investors the potential in this area. Distribution gains through performance remuneration will increase the availability of power in the state, which in turn would drive economic development.