

# **Cheyyur UMPP:**

## **Financial Plan Will Make Electricity Unaffordable**



**Institute for Energy Economics  
and Financial Analysis**  
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# Executive Summary

In early January 2015 the Ministry of Power, Government of India (GoI) terminated the bid process for the proposed 4000 MW Ultra Mega Power Plant (UMPP) in Cheyyur, Tamil Nadu. The project is referred to as Plant Cheyyur in this report. The bid process was terminated because seven out of eight applicants, including Indian and international private power companies, pulled out of the competition citing unfavorable bidding rules and their inability to secure bank financing. According to published reports, the Ministry of Power has elected to rework the bid specifications and rebid the project in late 2015. Based on a detailed analysis of Plant Cheyyur's business assumptions, this paper concludes that the power plant will place an upward push on tariff rates. Additional reworking of the bid documents may make the project more attractive for investors, but will make it even more financially fraught for consumers and cash strapped utilities. Any new program design must either pass along greater costs to the residential, industrial and agricultural users or necessitate greater governmental costs (subsidies).

The ratepayer tariff required to build and operate a 4000 megawatt (MW) power plant using imported coal in Tamil Nadu would be rupees (Rs.) 4.9/kwh (unit) in the first year (2021) with a levelized price of Rs. 5.95 over the life of the plant. This figure does not include future, potentially significant environmental liabilities through lawsuits seeking compensation and reparation for damage to health, agriculture, fisheries and local hydrology. Neither does the figure incorporate cost overruns as a result of delays in land acquisition or due to on-the-ground resistance. However, even this conservative tariff is well outside the range of other approved UMPP and large coal plant projects. It is also likely to be higher than the average cost of electricity in Tamil Nadu when it becomes operational in 2020-2021.

The cost of the plant would place upward pressure on electricity prices in Tamil Nadu, a community already contending with an ailing utility and the problem of rising electricity costs. The important public policy goal to provide affordable electricity would be undermined by the approval of Plant Cheyyur.

Finally, the paper also demonstrates that current and planned grid and transmission improvements, competitive wind and solar prices, an existing pipeline of projects for Tamil Nadu and greater resource planning have decreased the need for Plant Cheyyur.

# Background

## Project Development

Plant Cheyyur is a 4000 MW proposed supercritical coal fired power station.<sup>1</sup> The planned location is in Cheyyur Taluk of Kancheepuram District in the State of Tamil Nadu (TN), India. The Rs. 24,200 crore (USD \$4 billion) plant and accompanying infrastructure is sponsored by a consortium of 17 distribution companies (discoms) that will underwrite the power plant. Of the 17 sponsoring discoms, 7 will receive power allocations from the Ministry of Power. Tamil Nadu will receive 1600 MW or 40% of the electricity from Plant Cheyyur. The lead utility for the project is Tamil Nadu Generation and Distribution Corporation Ltd (TANGEDCO).

The development phase of the project is part of a larger, nationwide program of the Government of India. The Ultra Mega Power Project (UMPP) is part of a large proposed expansion of the number and size of coal plants in India.<sup>2</sup> The planned development follows a Design Build, Finance, Operate and Transfer (DBFOT) model. Coastal Tamil Nadu Power Limited (CTNPL)<sup>3</sup> is a Special Purpose Vehicle and the authorized representative empowered to carry out a competitive process for the selection of the private company that will build and operate the plant. The details of the agreement are outlined in a Request for Qualifications (RFQ) issued by CTNPL, which sets forth some terms and cost information. The project plan called for the construction of the 4000 MW plant, the development of an ash pond, a captive port and related infrastructure such as a conveyor belt, railway siding and access roads, all within close proximity. The specific assessment of actual costs, however, was to be made by the companies that bid on Plant Cheyyur. During the development process CTNPL would hold 100% of the project equity and transfer it to the successful applicant.<sup>4</sup>

CTNPL and the discoms were to enter into a long term Purchase Power Agreement (PPA) with the successful bidder. CTNPL's role was to obtain key clearances such as Environmental and Coastal Regulation Zone clearances, and land for the project. However, land acquisition has commenced only for the power plant, ash pond and captive port. No work has begun on acquisition of land for critical components such as railway siding, coal conveyor corridor, ash pipeline and road access. With CTNPL in the lead role, the successful bidder would need to acquire other clearances, and lands for related facilities like railway siding, coal conveyor corridor and road access. In order to compete for the project, applicants must meet character and competency criteria described in the RFQ. Applicants are allowed to organize a

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<sup>1</sup> The facts discussed in this Background section are drawn largely from: CTNPL, *Request for Qualification for Power Purchase Agreement for Development and Operation of 4000 MW Cheyyur Ultra Mega Power Project*, RFQ No: 03/UM08?13?RfQ, September 26, 2013 ("RFQ").

<sup>2</sup> The UMPP is a project of Gol's Ministry of Power in association with the Central Electricity Authority (CEA) and the Power Finance Corporation (Pfc). The goal of the project is reduce the chronic electricity deficit in the country. The concept is to build large power plants (4000MW) in order to deploy more efficient super critical coal plant technology and take advantage of economies of scale. For a more detailed description of the program intent and structure see: <http://www.ijrte.org/attachments/File/v2i1/A0506032113.pdf>

<sup>3</sup> CTNPL is a wholly owned subsidiary of the Power Finance Corporation Ltd. The corporation was organized to undertake activities for obtaining clearances, approvals and linkages including the bid process and developer selection. The guidelines for the process are issued by the Ministry of Power, India.

<sup>4</sup> RFQ, Section 1.1.2, p. 2.

consortium of companies to meet the technical, financial and operational requirements of the project. The successful bidder (deemed the Concessionaire in project documents) is responsible to supply power to the discom consortium based upon the terms of the PPA.

The critical element of the PPA is the tariff, which will be absorbed by ratepayers and the state government in case it subsidizes power to end users. Prior to the termination of the bid process, applicants that were accepted in response to the RFQ were invited to submit a Request for Proposals (RFP). The RFP requires a revenue proposal (a bid) consisting of a fixed energy charge and fuel charge. The first year's tariff expressed as, Rs. /kwh rate sets the basis of the competition and comparison of the applicants. The bid process requires multiple private bids in order to establish a valid market and competitive price. The company with the lowest first year rate would be provided an opportunity to finalize a PPA to develop the project. The bid documents assume that Plant Cheyyur will use 12-14 million tons of imported coal annually. The initial bid process started in 2013. The plant was supposed be placed in commercial operation sometime in 2020 or 2021.

## Current Project Status

In May 2014, CTNPL announced that it had accepted seven proposals<sup>5</sup> from private companies in response to the RFQ for the Cheyyur plant. During the ensuing months, a group of the applicants wrote to CTNPL requesting changes to the RFQ in order to provide a more predictable operating environment. In December 2014, it was reported that CTNPL had received only one bid for the next phase of the program.<sup>6</sup> The sole bid from NTPC, a public sector enterprise, raised the potential of project cancellation or delay<sup>7</sup> because multiple bids from several companies are required to establish a true market price.

In addition, because the only bid came from a public sector unit, the withdrawal of all seven private companies from the bidding indicates concerns with the business assumptions of the project.<sup>8</sup> According to published reports, the applicants accepted under the RFQ withdrew from the next phase because they could not obtain financing for the project. According to these reports, the applicants were concerned about bank financing, coal price volatility, ownership rules and requirements related to the long term disposal of the plant after the agreements ended.<sup>9</sup>

The project had been designed to be competitively bid. Absent additional bidders, there was no viable private market or reliable price to design, build and operate the proposed plant. CTNPL officials announced in January 2015 that the bid process was terminated.<sup>10</sup> The plan going forward is to redesign the business assumptions of the plan to restart the bid process for

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<sup>5</sup> <http://www.newindianexpress.com/business/news/Finally-Cheyyur-Odisha-Ultra-Power-Projects-Get-Bidders/2014/05/10/article2215708.ece>

<sup>6</sup> [http://www.business-standard.com/article/companies/ntpc-the-only-bidder-for-tamil-nadu-umpp-114122300366\\_1.html](http://www.business-standard.com/article/companies/ntpc-the-only-bidder-for-tamil-nadu-umpp-114122300366_1.html)

<sup>7</sup> [http://www.business-standard.com/article/companies/ntpc-the-only-bidder-for-tamil-nadu-umpp-114122300366\\_1.html](http://www.business-standard.com/article/companies/ntpc-the-only-bidder-for-tamil-nadu-umpp-114122300366_1.html) and <http://timesofindia.indiatimes.com/business/india-business/Pvt-cos-wont-bid-for-UMPPs-till-norms-change/articleshow/45644892.cms>

<sup>8</sup> <http://www.businessworld.in/news/business/energy-and-power/power-play-1/1812027/page-1.html>

<sup>9</sup> <http://www.mydigitalfc.com/news/stalled-umpps-get-lifeline-071>

<sup>10</sup> <http://www.kseboa.org/~kseboa/news/centre-aborts-cheyyur-and-bedabahal-umpp-bids-to-avoid-public-sector-08013623.html>

the plant.<sup>11</sup> Meanwhile, a court order in a case alleging illegalities and fraud in the Environmental Clearance process bars CTNPL from awarding any bid pending a judgement in the case.

## Status of other UMPP projects

To date, the public-private partnership model designed to move UMPP projects has been less than successful. Four projects have been awarded. All have filed for tariff increases, and have also had additional environmental and operational problems. The status of these projects is as follows:

1. Reliance Power – Sasan UMPP is operating five of eight planned units. Financial analysts and the company have not offered an initial determination as to the project's profitability.<sup>12</sup> Electricity consumers are also now facing significant rate increases due to some of the broader market factors discussed later in this report. The role of Sasan in providing a source of affordable electricity and a hedge against large increases is uncertain.<sup>13</sup> The project has experienced considerable controversy and is now the subject of an US ExIm Bank Inspector General investigation.<sup>14</sup>
2. The Tata Mundra project at Gujarat is operating five of its seven plants. The project developer went to court to have the original tariffs overturned.<sup>15</sup> A recent Supreme Court decision denied the company's appeal to raise the tariffs and pass along costs to the consumer. In the original UMPP agreement these costs were to be borne by the owner developer as part of the contracted tariff.<sup>16</sup> The project was the subject of a 2013 International Finance Corporation audit that found the process for plant approval was flawed environmentally and failed to include people most affected by the project. A follow-up monitoring report has found that project sponsors have failed to comply with the 2013 audit recommendations.
3. The Krishnapatnam UMPP project is on hold due to disagreement over increasing tariff costs above what was originally agreed.
4. Reliance Power has withdrawn from the Tilaiya UMPP in Jharkhand citing delays in land acquisition. The state government has said that the real reason is tariff concerns.<sup>17</sup> The company had earlier filed for rate relief.<sup>18</sup>

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<sup>11</sup> [http://www.business-standard.com/article/specials/horror-and-its-layers-114060601215\\_1.html](http://www.business-standard.com/article/specials/horror-and-its-layers-114060601215_1.html)

<sup>12</sup> [http://www.business-standard.com/article/companies/sasan-s-ability-to-boost-reliance-power-s-profitability-is-yet-to-be-tested-114112000795\\_1.html](http://www.business-standard.com/article/companies/sasan-s-ability-to-boost-reliance-power-s-profitability-is-yet-to-be-tested-114112000795_1.html)

<sup>13</sup> <http://www.hindustantimes.com/india-news/bhopal/citizens-fret-over-proposed-power-tariff-hike-in-mp/article1-1299709.aspx>

<sup>14</sup> <http://www.bna.com/exim-bank-inspector-b17179897269/>

<sup>15</sup> [http://www.business-standard.com/article/economy-policy/govt-staring-at-empty-power-sector-pipeline-in-13th-plan-period-114122600016\\_1.htm](http://www.business-standard.com/article/economy-policy/govt-staring-at-empty-power-sector-pipeline-in-13th-plan-period-114122600016_1.htm)

<sup>16</sup> <http://indianexpress.com/article/business/companies/supreme-court-pulls-up-tata-power-adani-power-says-firms-cant-seek-higher-tariff/2/>

<sup>17</sup> <http://timesofindia.indiatimes.com/india/Jharkhand-blows-lid-off-corporate-conspiracy-ready-to-go-ahead-with-Tilaiya-UMPP/articleshow/47095012.cms>

<sup>18</sup> <http://www.thehindubusinessline.com/companies/reliance-power-seeks-higher-tariff-for-tilaiya-umpp/article5220813.ece>

# Finance Model

The Institute for Energy Economics and Financial Analysis (IEEFA.org) commissioned Equitorials, an Indian energy-focused financial analysis firm in Mumbai to evaluate the question of what wholesale electricity price would be required to justify the construction of Plant Cheyyur. The modeling in this paper relies upon relevant data provided in the RFQ and is supplemented with governmental and market sources.

The purpose of providing a financial model of the Cheyyur plant is to bring together in one place as much relevant financial information as possible to further public discussion. The model would also benefit from greater disclosure by the private and public sector of their financial assumptions regarding the plant. The estimates contained herein are our best professional judgments of the plant and its current financial status. Further discussion and analysis by project stakeholders with direct interests will assist with a more complete understanding of the costs and benefits of the project.

## A. Tariff

The development design tendered by CTNPL would require a levelized tariff on the wholesale price of electricity from Plant Cheyyur of Rs. 5.95. Fuel costs, debt service and taxes drive the largest portions of the cost structure of the plant. Annual costs for the plant will rise through the first fifteen years of the plant with the tariff rate rising from Rs. 4.9/kwh in 2021 to Rs. 8.3/kwh by 2036.

## B. Recent Tariff Activity

The range of tariff levels for new plants is Rs. 1.15 to 3.7/kwh for four UMPP projects and several additional power generation projects. The examples include:

1. Reliance was also awarded development rights on the UMPP Tilaiya plant with a tariff bid of Rs. 1.15/kwh.<sup>19</sup>
2. Reliance Power has signed a PPA at Rs. 3.70/kwh with UP Discoms and Rs. 2.50/kwh with MP Discoms for the Chitrangi Thermal Power Plant.
3. Reliance Power's 3,960MW Sasan UMPP with a mine pit head location signed a Rs. 1.20 per unit PPA<sup>20</sup> with this project being progressively commissioned over 2013/14.<sup>21</sup>

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<sup>19</sup> <http://www.pfcindia.com/Content/UltraMegaPower.aspx>

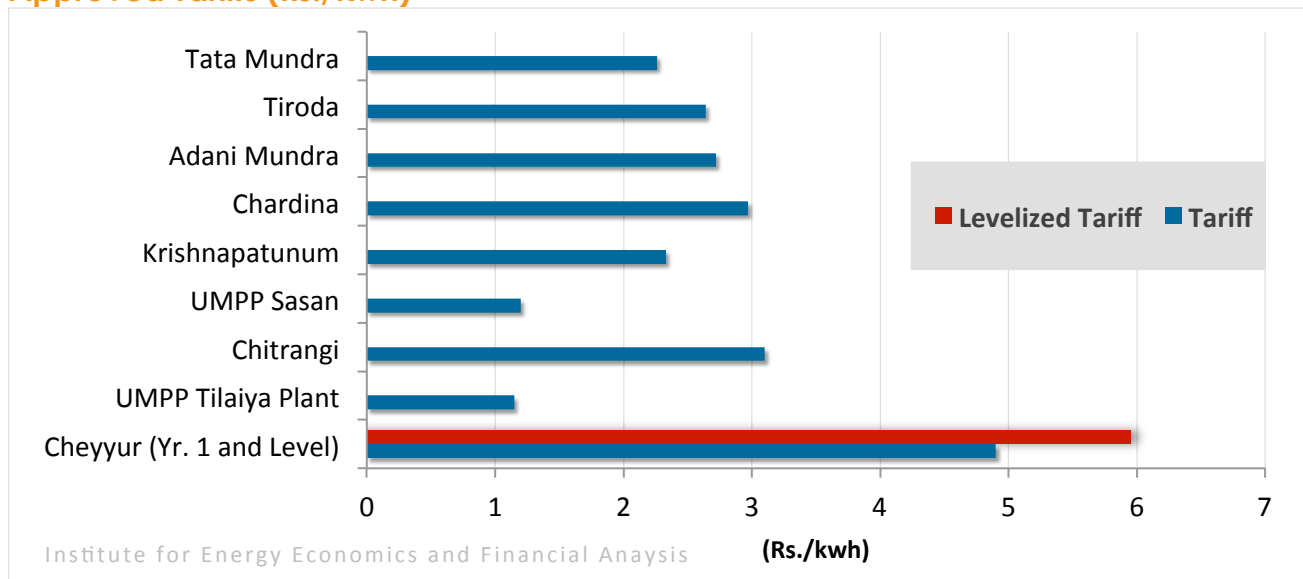
<sup>20</sup> <http://www.pfcindia.com/Content/UltraMegaPower.aspx>

<sup>21</sup> [http://articles.economictimes.indiatimes.com/2012-08-20/news/33287754\\_1\\_coal-blocks-coal-mines-chitrangi-project](http://articles.economictimes.indiatimes.com/2012-08-20/news/33287754_1_coal-blocks-coal-mines-chitrangi-project)[http://www.reliancepower.co.in/business\\_areas/power\\_projects/coal\\_based\\_projects/sasan.htm](http://www.reliancepower.co.in/business_areas/power_projects/coal_based_projects/sasan.htm)

4. Reliance Power has signed a PPA at Rs. 2.33/kwh for its 3,960MW Krishnapatunam UMPP.<sup>22</sup> The company suspended work at the project in 2011 stating that the fuel supply benchmark prices made the project unviable and lenders were unwilling to fund the plant.
5. Abhijeet Group has signed a PPA at long term fixed rates of Rs. 2.60-3.50/kwh for its 540 MW Chandwa Thermal Power Plant and another 33 year PPA at the initial rate of Rs 2.97 for its 272MW Mihan Thermal Power Plant.<sup>23</sup>
6. East Coast Energy Pvt Ltd has signed a PPA with AP Discoms at Rs. 2.97/kwh for its 2x 1320 MW Kakrapalli Thermal Power Plant. <sup>24</sup>
7. Adani Power's Mundra coal-fired plant had two PPAs with Gujarat – one at Rs. 2.35 /kwh for 1,000 MW power supply, and one for Rs. 2.89/unit for 1,000 MW plus two PPAs for Rs. 2.94/unit with two Haryana utilities for total capacity of 1,424 MW, with supply due to commence progressively over 2010-2013.
8. Adani Power's 1,320 MW Tiroda coal-fired power plant signed a PPA for Rs. 2.64/unit commencing Aug'2012.
9. Tata Power's 4,000 MW power plant at Mundra has signed agreements for Rs. 2.26/unit for 25 years. <sup>25</sup>

Recent tariff levels for these projects, if applied to the Plant Cheyyur project, would be insufficient to cover the revenue requirements and costs.

**Figure 1: Estimated Tariff Required of Plant Cheyyur compared to Eight Recently Approved Tariffs (Rs./kwh)**



<sup>22</sup> <http://www.thehindubusinessline.com/companies/article3012494.ece>

<sup>23</sup> <http://www.financialexpress.com/article/fe-columnist/record-cafe-pm-must-debate-power-tariff-hike-at-niti-aayog-says-pramod-deo-central-electricity-regulatory-commission/60003/>

<sup>24</sup> <http://www.thehindubusinessline.com/companies/east-coast-energy-to-set-up-1320-mw-plant-insrikakulam/article4438718.ece>

<sup>25</sup> <http://www.livemint.com/Industry/PegcwBtlLxHhBm5gbVyN5H/CERC-bails-out-Tata-Power-states-may-challengeorder.html>



## C. Tariff Policy

The Government of India views tariff policy as a politically sensitive matter.<sup>26</sup> The rationalization of tariffs is a priority in the Twelfth Five Year Plan (2012-2017). The policy issues on tariffs extend beyond the issue of coal-fired generation. Low tariffs are anti-inflationary, foster economic development and reflect the underlying income and growth rates for India's residential, small businesses and industrial, agricultural and commercial sectors. Low tariffs, however, impede investment in capital-intensive plants.<sup>27</sup> The energy sector as currently organized in India generally faces structural deficits, and the inability to bring recurring revenues into alignment with recurring expenses. To close the deficit between the costs of power generation and distribution and revenues from low tariffs, the Government of India makes significant annual public outlays (subsidies).<sup>28</sup> These outlays decrease, but have not eliminated, the annual deficits of the discoms. The outlays, however, compound India's account deficit, weakening its credit standing and currency.

Many private power generation companies doing business in India face significant financial pressures. As shown below, the largest generation companies are highly leveraged. Low tariffs impair the ability of these companies to create viable financial strategies to continue providing electricity in India. Plant Cheyyur, like the other UMPP plants, would require these companies to take on even greater levels of debt at a time they cannot afford to do so.<sup>29</sup> A new set of business assumptions that improves the project for private power companies is very likely to pass new cost burdens onto consumers or transfer risk and financial liabilities to TANGEDCO. The utility faces mounting debt and deficit problems that Plant Cheyyur is likely to compound.<sup>30</sup>

**Figure 2: Indian Private Power Companies: Equity/Debt and Recent Profit/Loss**

Indian Private Power Companies	Equity Market Capital (RS Bn)	Net Debt Rs Bn 3/15 Consensus	2012/13 Profit(Loss) RsBn	2013/14 Profit(Loss) RsBn	Capital US\$bn	Debt US\$bn
Tata Power Company	225	316	-0.9	-2.6	3.6	5.0
GVK Power and Infrastructure	19	200	-3.4	-3.7	0.3	3.2
Adani Power	121	389	-23.0	-2.9	1.9	6.2
Lanco Infratech	19	354	-10.7	-22.7	0.3	5.7

<sup>26</sup> Government of India, Planning Commission, *Twelfth Five Year Plan 2012-2017, Volume II*, September 2013.

<sup>27</sup> *Ibid*, p. 134 and 138

<sup>28</sup> *Ibid*, p. 140

<sup>29</sup> *The UMPP Saga: To have or not to have*, December 2013

<sup>30</sup> <http://www.thehindu.com/news/national/tamil-nadu/how-badly-is-tneb-doing/article6711866.ece>



## D. Modeling the Cheyyur Plant: Technical Assumptions

The revenue requirements for Plant Cheyyur were derived by applying a series of financial assumptions to a power plant finance model. The critical assumptions are as follows:

### Power Assumptions

Figure 3 details the key power and energy assumptions for Plant Cheyyur. The plant has a capacity of 4000MW. The projected cost for the plant is Rs242bn<sup>31</sup> (U.S. \$4.0bn). The RFQ assumed the plant would be running by 2021. The plant life has an estimated useful life of 40 years and is expected to run at an 80% Plant Load Factor (PLF, average availability rate).<sup>32</sup> An assumed 7% of power generated is consumed onsite in the process (a 7% auxiliary consumption rate).

**Figure 3: Key Power Plant Assumptions**

Power Plant Life (Years)	40
Power Plant Capacity (MW)	4,000
Plant Load Factor (PLF,%)	80%
Project Cost (Rs. Bn)	242
Cost per MW (Rs. Mn)	60
Cost per MW (US\$Mn)	1.0
First Full Year Commercial Operation	2021
Auxiliary Consumption	7.0

Figure 4 details the key finance assumptions for the project. The project finance assumes 70% of the capital costs<sup>33</sup> can be borrowed at a cost of 12.5% per annum for 10 years duration. This presumes a 30% equity finance share and that a regulated return available on equity is 15.5%,<sup>34</sup> after tax charged at 33%. Depreciation is presumed to be taken straight line at 5.3% per year, an allowable life of 19 years relative to the likely effective operating life of 40.

**Figure 4: Key Power Plant Financing Assumptions**

Equity Funding	30%
Debt Funding	70%
Indian Corporate Tax Rate	33%
Equity Guaranteed Rate of Return	15.5%
Interest Cost (%)	12.5%
Depreciation rate (%)	5.3%

<sup>31</sup> RFQ, p.2.

<sup>32</sup> India's average PLF to-date is around 67%, rising to 2011-12 at 75% and then 2012-13 at 70%. For more information please refer: <http://www.ntpc.co.in/images/content/investors/AnalystMeet2013.pdf>

<sup>33</sup> Other financing scenarios with higher debt to equity ratios (80:20, 90:10) would increase the size of the interest payment and place further upward pressure on the tariff or subsidy required to maintain financial viability.

<sup>34</sup> <http://www.motilaloswal.com/site/rreports/HTML/634539218015182898/index.htm> (Tata Mundra achieved a 15% return while its expectation was 24%).

Figure 5 details the key coal import cost assumptions employing the coal specifications supplied in the Request for Qualifications. The heat rate of the coal-fired power plant is assumed to be 2129Kcal/kWh, while the coal has a calorific value of 5000Kcal NAR. A free-on-board 2021 price of \$65 per ton rises to \$77 when shipping costs of US \$12.00 per ton are included.<sup>35</sup> (The model assumes a 1.5% annual nominal U.S.-dollar thermal coal price escalation. The model uses a 62 Rupee per U.S.-dollar exchange rate. The model assumes a 2% rate on 10-year U.S. government bonds versus 8% for India.)

**Figure 5: Key Coal Import Assumptions**

Heat Rate (Kcal/kwh)	2129
Calorific Value Imported Coal (Kcal/kg.)	5000
FOB Coal Cost (US\$/t) - 2021	65
Richards Bay Port to India (US\$/t)	12
Initial Exchange Rate (Rs/US\$)	62
Fuel Cost Escalation	1.5% pa

## Project Cost Assumptions

The RFQ identifies the current project cost assumption of Rs. 24200 crore. The initial project cost assumption for Plant Cheyyur was Rs. 20000 crore.<sup>36</sup> The rising price for the project has been attributed to project delays.<sup>37</sup> Given the type and level of risks facing the project, there is a strong chance that further delays are likely. Further delays and cost increases will raise the price and place additional upward pressure on the tariff levels required for the project to attain profitability

## E. Observations on the Model

There are four substantive observations that can be made based upon the financial model used in this report.

### 1. Overall Project Viability

The revenue requirements of the Cheyyur plant far exceed the typical tariff levels granted to developers of Ultra Mega Power Projects and other large power plant projects. As proposed, Plant Cheyyur is not a financially viable proposition.<sup>38</sup> Plant Cheyyur would require tariff levels

<sup>35</sup> The model assumes a coal price based on a composite of South African API 4, the Newcastle benchmark and several Indonesian products. The initial RFQ assumes the API 4 model but it is equally likely that over the course of time coal will be sourced from a variety of places. The model assumes the 2015 price of coal of \$59.3 per ton.

<sup>36</sup> When UMPP's were originally designed in the Eleventh Five Year Plan the assumed cost for a 4000 MW plant was Rs16000. See: <http://www.ijrte.org/attachments/File/v2i1/A0506032113.pdf>

<sup>37</sup> <http://www.thehindu.com/news/national/tamil-nadu/delay-in-cheyyur-plant-execution-leads-to-cost-overrun/article5667796.ece?ref=relatedNews>

<sup>38</sup> The successful applicant is unlikely to obtain traditional investment from the private markets. Any applicant will therefore be relying on the subsidized financing models available through the State of India and other International Financial Institutions.

between two and five times the typical level of existing plants. The plant will either place prohibitively intense upward pressure on the rates charged to residential, commercial and industrial customers in Tamil Nadu or require substantial subsidies. On the cost side of the equation, the combination of the high price of imported coal and significant debt levels create a cost structure that limits the potential of any cost-reduction strategies as the project becomes operational and efficiencies are achieved. Debt is usually a fixed cost, and imported coal prices are driven by volatility in the global thermal markets.

Plant Cheyyur's financial structure is weak. It is also increasingly clear that efforts by the Government of India to encourage public-private partnerships have created a dilemma for many private companies. These companies have participated in the various governmental infrastructure plans, like the UMPP. The companies agreed to take on balance sheet indebtedness. The companies have agreed to take on other financial risks inherent in the development process in India. Many projects have failed to move forward.<sup>39</sup> This has left many companies with stranded or stressed assets after significant capital expenditures. The recent decision by private sector firms to abandon Plant Cheyyur suggests these companies are no longer willing to absorb this level of risk.

Although the Power Ministry has expressed its desire to create new bidding rules for Plant Cheyyur, it is apparent that for the project to work an unacceptably high tariff would be required.

## 2. Upward Pressure on Rates

Tamil Nadu has recently raised its electricity rates between 15% and 30%.<sup>40</sup> This upward rate pressure is taking place as the country is experiencing growth rates that are improving but still off the optimum pace identified by the Government of India.<sup>41</sup> India's labor markets are weak.<sup>42</sup> In such an environment, the middle class grows more slowly. In addition, personal income<sup>43</sup> and business profitability are likely to lag the growth in electricity cost increases. Absent growth in these two areas, an upward price pressure of electricity undermines the gains for household budgets<sup>44</sup> and business profitability from an environment with lower inflation.<sup>45</sup> These factors then drive demand for public subsidies, exacerbating public deficits, inflation and currency concerns.

## 3. Imported Coal

The Government of India has expressed the need to improve the development of its own coal reserves and reduce dependency on coal imports.<sup>46</sup> Domestic coal is far less expensive than

<sup>39</sup> [http://finmin.nic.in/reports/mid\\_year\\_rev.asp](http://finmin.nic.in/reports/mid_year_rev.asp). For a recent discussion of the problem see, paragraph 1.38, p.13.

<sup>40</sup> <http://www.thehindu.com/news/national/tamil-nadu/tangedco-to-hike-tariff-power-cuts-back/article6439380.ece>

<sup>41</sup> [http://finmin.nic.in/reports/mid\\_year\\_rev.asp](http://finmin.nic.in/reports/mid_year_rev.asp), p.13.

<sup>42</sup> Capital Economics, *India Chart Book*, December 18, 2014, p. 4.

<sup>43</sup> The Ministry of Finances recent midyear economic report notes a sharp drop in the wages of rural employees, see: [http://finmin.nic.in/reports/mid\\_year\\_rev.asp](http://finmin.nic.in/reports/mid_year_rev.asp), p.13

<sup>44</sup> The GoI India notes that although Tamil Nadu is considered a "rich state" it also has some of the poorest areas in India. [http://planningcommission.gov.in/plans/planrel/12thplan/pdf/12fyp\\_vol1.pdf](http://planningcommission.gov.in/plans/planrel/12thplan/pdf/12fyp_vol1.pdf), p. 312-313

<sup>45</sup> Capital Economics, *India Inflation Monitor*, January 9, 2015.

<sup>46</sup> <http://in.reuters.com/article/2014/11/12/india-coal-imports-idINKCN0IW0FJ20141112>

imported coal.<sup>47</sup> However, due to an inability of India's leading domestic coal supplier, Coal India, to achieve its production goals, the government is compelled to develop projects that rely upon imported coal.<sup>48</sup> Official estimates show a rise in the use of imported coal to India this year.<sup>49</sup>

Even with the currently low price of global thermal coal, its price places upward pressure on the cost structure and tariff requirements at Plant Cheyyur. Coal constitutes 55% of the annual expense for the plant. Global coal markets are in a state of oversupply and are likely to continue in this manner for the foreseeable future.<sup>50</sup> Some increases in coal prices are expected as current prices prove financially unsustainable for global coal producers. If the global markets could sustain current coal prices in the \$65 per ton range delivered), the price would still be more than twice as high as Coal India's price of \$25 per ton.<sup>51</sup> In addition, this analysis does not include likely increases to coal costs that will occur as India and the world adopt more stringent carbon policies. The residents and businesses of Tamil Nadu must bear this higher cost and future volatility in the global thermal markets.

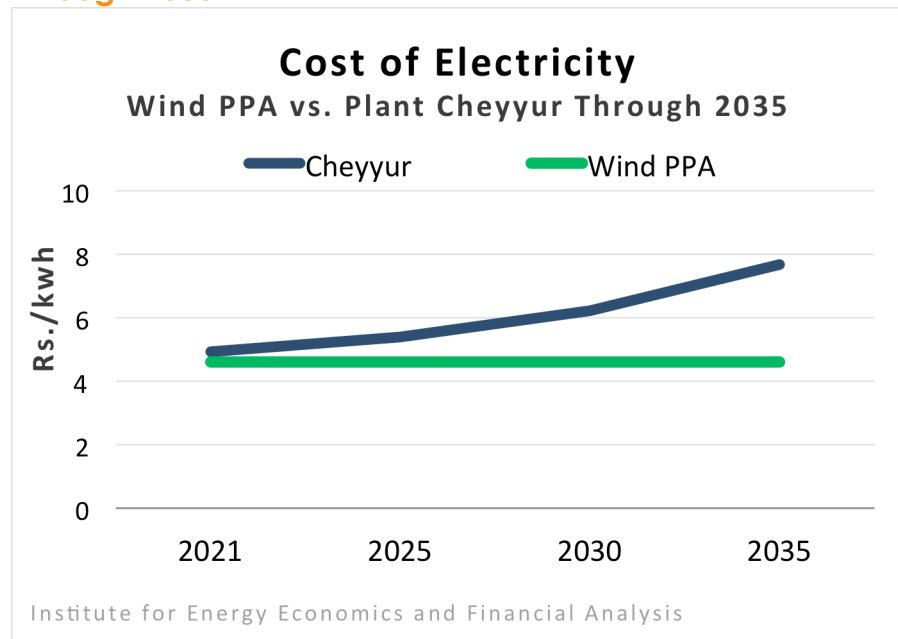
#### 4. Wind and Solar Costs are Substantially Lower than Plant Cheyyur's Costs

A key difference between coal fired power generation and that from renewable energy is the issue of inflation. Equitorials' financial modeling shows an annual increase in the cost of electricity of 1.5%.

The standard terms of Indian solar and wind PPAs is a fixed price contract with zero inflation escalation over the 25-year life.

To illustrate the impact of inflation of electricity costs over time, we contrast the expected cost of Plant Cheyyur coal-fired power generation of Rs. 4.9 in 2021,

**Figure 6: Cost of Electricity: Wind PPA versus Plant Cheyyur Through 2035**



<sup>47</sup> <http://timesofindia.indiatimes.com/india/Govt-looks-at-price-reforms-for-coal/articleshow/37661147.cms>

<sup>48</sup> IEEFA has explored the issue of the financial stresses in India created by more imports. See: <http://www.ieefa.org/briefing-note-india-power-prices/> and <http://www.ieefa.org/report-coal-india-running-on-empty/>

<sup>49</sup> <http://profit.ndtv.com/news/industries/article-indias-coal-import-up-18-per-cent-at-171-mt-in-2013-14-389261>

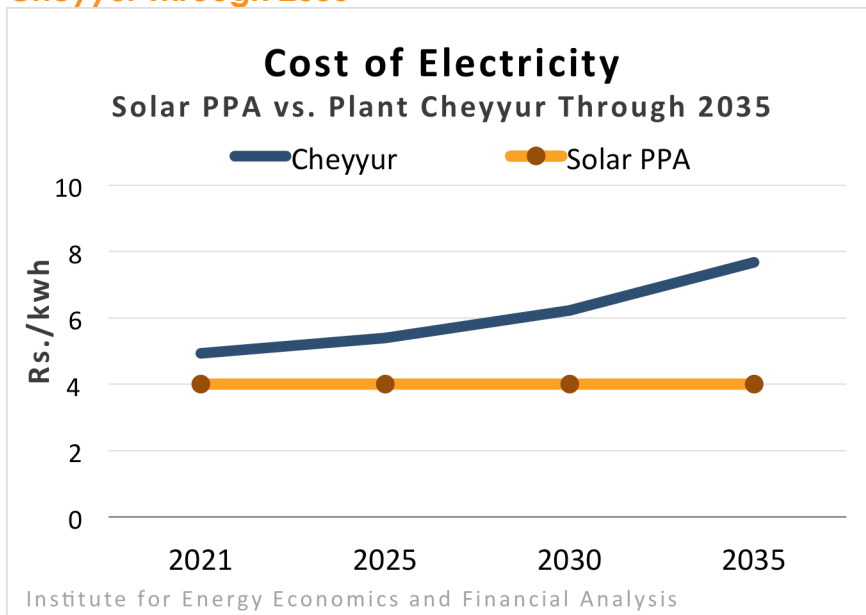
<sup>50</sup> For a more complete discussion of global coal markets see: <http://www.carbontracker.org/report/carbon-supply-cost-curves-evaluating-financial-risk-to-coal-capital-expenditures/>

<sup>51</sup> [http://content.icidirect.com/mailimages/IDirect\\_CoalIndia\\_Q4\\_FY14.pdf](http://content.icidirect.com/mailimages/IDirect_CoalIndia_Q4_FY14.pdf)

rising to Rs. 5.40 by 2025, Rs. 6.23 by 2030 and Rs. 7.67/kWh by 2035. By contrast, wind commissioned in 2015 would be flat throughout at Rs. 4.60/kWh, meaning electricity costs would be 6.7%, 14.8%, 26% and 40% cheaper than electricity from Plant Cheyyur in 2021, 2025, 2030 and 2035 respectively.

For solar commissioned in 2018 would be flat at Rs4.00/kWh, electricity costs would be 18.9%, 25.9%, 35.8% and 47.9% cheaper than that produced from Plant Cheyyur in 2021, 2025, 2030 and 2035 respectively. The deflationary impact of renewable energy is significantly underestimated.<sup>52</sup>

**Figure 7: Cost of Electricity Solar PPA Versus Plant Cheyyur Through 2035**



## 5. Trends in Power and Peak Demand and TN Pipeline of new generation

### Tamil Nadu: Power Position

Based upon the most recent available data,<sup>53</sup> the actual performance of TN's electricity system has demonstrated considerable improvement over the last several years. On two critical measures – availability of energy supply versus demand and the level of peak demand met – TN has gone from being a driver of power and peak deficits<sup>54</sup> in the southern region and India to being a leader in the nation's overall improvement. TN's progress on these measures parallels but surpasses electric grid performance gains across the southern region and for India as a whole.<sup>55</sup>

- The power deficit in 2012 for TN was 17%. By 2014 TN's deficit was 3%. The power deficit measures the difference between TN's power requirement and power availability.

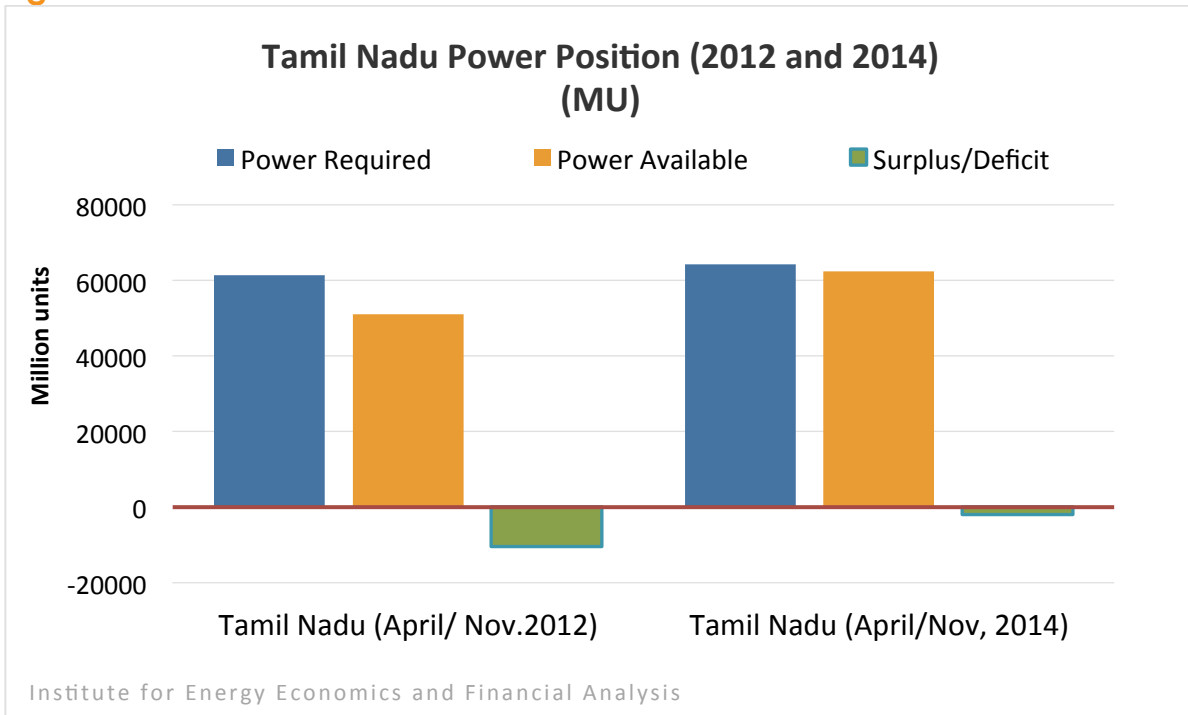
<sup>52</sup> <http://ieefa.org/briefing-note-india-power-prices/>

<sup>53</sup> [http://www.cea.nic.in/reports/monthly/executive\\_rep/nov14.pdf](http://www.cea.nic.in/reports/monthly/executive_rep/nov14.pdf),

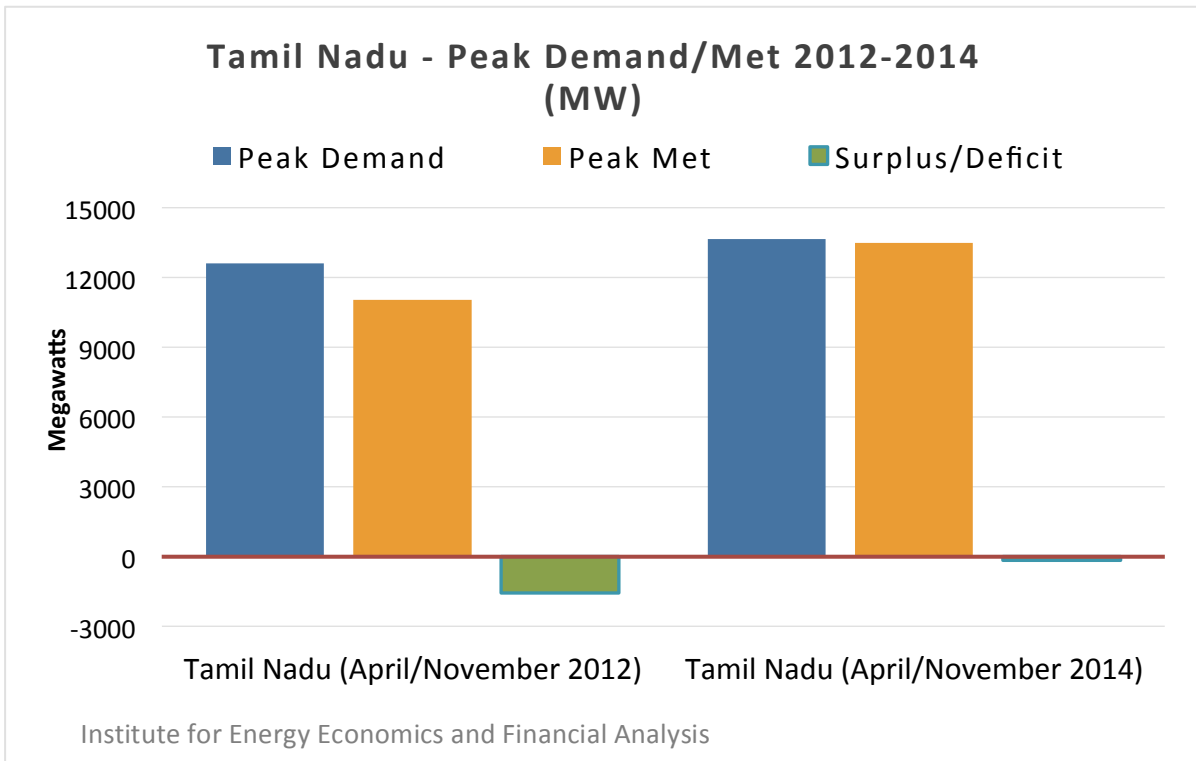
<sup>54</sup> [http://www.cea.nic.in/reports/monthly/executive\\_rep/nov14.pdf](http://www.cea.nic.in/reports/monthly/executive_rep/nov14.pdf), *Power Supply Position and Peak Demand*, p. 23-24. For 2012 data see CEA executive reports for November and December 2012. For 2012 Power Position see the December 2012 executive report, Table 19: Actual Power Supply (April 2012 to November 2012.)

<sup>55</sup> Recent announcements by the Ministry of Energy of \$50 billion in transmission and distribution improvements should result in additional efficiency and resources to manage the power load in Tamil Nadu. <http://in.reuters.com/article/2014/11/06/india-energy-investment-idINKBN0IQ0AK20141106>

**Figure 8: Tamil Nadu Power Position**



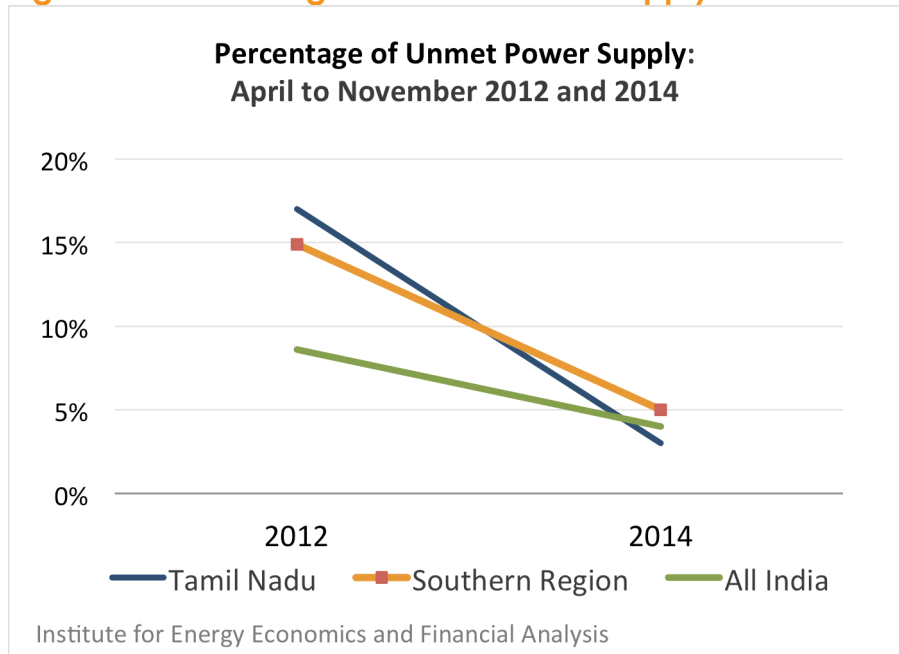
**Figure 9: Tamil Nadu - Peak Demand/Met 2012-2014 (MW)**



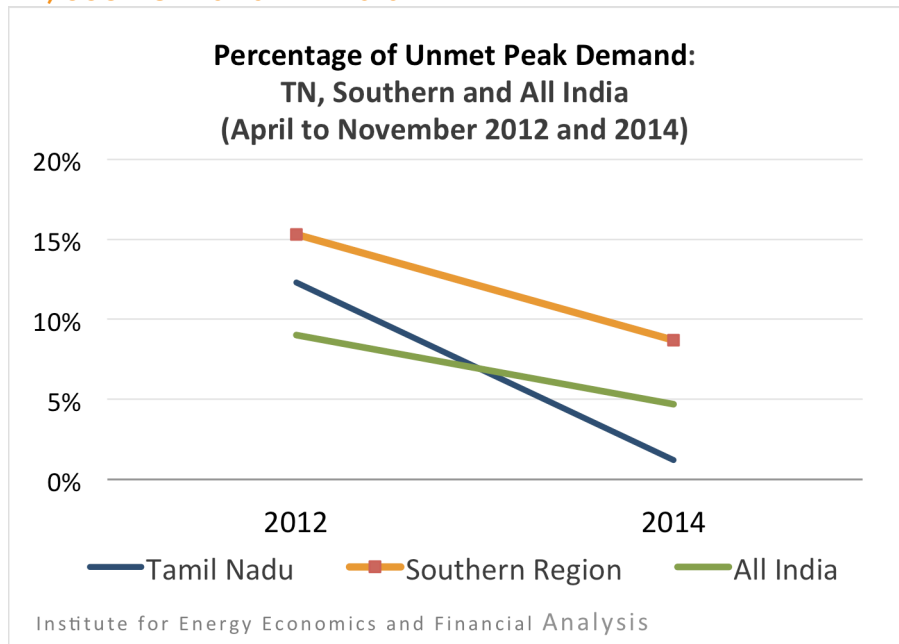
The peak demand deficit in 2012 was 12.8%. By 2014 the state's peak deficit was 1.2%. The peak deficit measures the difference between peak demand and the amount of power used and available to meet the demand. In both areas TN has moved from being a laggard to being a leader. TN's energy deficit declined more deeply and more rapidly than the southern region and India as a whole.

The improvements within TN, across the region and nation exceeded expectations.<sup>56</sup> The underlying cause of the decrease in both peak and power deficits flowed from higher plant loads and the impact of increased demand side management initiatives.<sup>57</sup> Despite these region wide improvements TN has established broader planning initiatives to make additional progress in this area.<sup>58</sup> TN achievements during this period were especially pronounced. The state was able to decrease its peak and power deficits considerably in its most recent year to year comparisons. TN also had some of the largest deviations from the Central Electricity Authority's estimated energy and

**Figure 10: Percentage of Unmet Power Supply**



**Figure 11: Percentage of Unmet Peak Demand: TN, Southern and All India**



<sup>56</sup> [http://www.cea.nic.in/reports/yearly/lgbr\\_report.pdf](http://www.cea.nic.in/reports/yearly/lgbr_report.pdf), see page 6. (LGBR 2014-2015)

<sup>57</sup> Ibid, p. 6.

<sup>58</sup> <http://www.thehindubusinessline.com/opinion/power-is-not-just-a-supply-side-problem/article6567983.ece>



power assumptions for 2013-2014. TN's actual peak demand needs were lower than anticipated by the CEA and its ability to meet demand exceeded CEA estimates. Similarly, the CEA overestimated power requirements and underestimated power availability.<sup>59</sup>

## Pipeline Projects

Despite this progress, TN, still experiences significant deficits on both the energy supply and peak demand fronts.<sup>60</sup> The current pipeline of projects in TN anticipates 13,000MW of new generation between 2014 and 2024, without the addition of 1600MW allocation from Plant Cheyyur to Tamil Nadu. These projects will not all be built as development and other concerns force cancellations. Other projects may also be substituted over time.

**Figure 12: Upcoming Power Projects in Tamil Nadu**

Name of Project	Capacity (MW)	Commissioning
Ennore thermal power station	660	Nov-17
Ennore special economic zone	1320	Dec-17
Udangudi Thermal power project	1320	Dec-17
North Chennai thermal power project	800	Dec-18
Uppur thermal power project	1600	Dec-18
Ennore thermal power station	660	Dec-18
TNEB-NTPC KV 500 MW at Vallur	500	Aug-14
TNEB - NLC JV 1000 MW at Tuticorin	1000	Nov-14
Udangudi expansion project	1320	Report prepared
Tuticorin thermal power project	1320	Report Prepared
Kundah pumped storage hep	500	2019-2020
Sillahalla pumped storage	2000	2023-2024
<b>Total</b>	<b>13,000</b>	

Currently TN has 21,192 MW of capacity of which 8,973MW is coal-fired generation. The state leads India in currently installed renewable energy resources.<sup>61</sup> An additional 13,000 MW of power generation is planned for Tamil Nadu through 2024. Recently the World Resource Institute<sup>62</sup> published a series of papers on energy planning. Its paper on integrated resource planning highlights the need to improve planning tools as economic development choices become more complex as growth occurs. As noted above, TN's type and level of economic and energy expansion has resulted in lower than expected demand and higher resource availability. Improved IRP planning will ensure that: 1) progress made in measuring demand side management is improved; 2) greater attention is paid to the integration of demand dynamics and power generation choices, and, 3) better data can be made available to measure the impact of rate changes on TN household budgets and the relative profitability of small and large businesses.

<sup>59</sup> See LGBR 2014-2015, p. 20 and 21.

<sup>60</sup> <http://tnerc.tn.nic.in/download/Tariff%20Petition/2013/Tariff%20Petition%2013-14.pdf>, p. 5.

<sup>61</sup> <http://www.tangedco.gov.in/nces-main.php>

<sup>62</sup> [http://www.wri.org/sites/default/files/wri\\_10questions\\_integrated\\_resources\\_planning.pdf](http://www.wri.org/sites/default/files/wri_10questions_integrated_resources_planning.pdf)

# Considerations for the New UMPP Bid Documents

The cancellation of the last round of bids exposed several financial defects in the UMPP model. These defects will need to be addressed if the next round of bidding is to attract private company participation and banking interest. Private companies are clearly unwilling to carry operating deficits for the plants on their books for an indeterminate period. To address each defect requires the government to absorb risks that were originally borne by the private sector. In financial terms this means either a significantly higher tariff (more expensive electricity) or a revised financial structure that includes more and deeper government subsidization.

The prospective owner of Plant Cheyyur, like the owners of the other UMPP's identified in this paper, benefits from the resources provided by the Government of India and the states to assemble the site and secure environmental permits.<sup>63</sup> These upfront development costs are absorbed by the government as an inducement to the private developer. They are a subsidy. Thus, the costs of planning and costs caused by the inherent delays in the process are not charged to the balance sheets of private companies, but are absorbed by the government. This component of the subsidy for Plant Cheyyur is likely to increase under the next round of bidding.

In order to avoid further public expense (subsidies) for Plant Cheyyur, the government would have to grant a tariff to the prospective owner that is considerably higher than those granted to other UMPP developers/owners. As mentioned above, the power costs from Plant Cheyyur will be at levelized rate of Rs. 5.95/kwh over the life of the project but will rise each year based on inflation and volatility of imported coal prices. The residents and businesses of TN have recently faced price increases for the current system. Adding this plant to the portfolio would place upward pressure on prices for the system as a whole. The initial costs to the electricity system are considerable. Over the long haul, the prices will be sensitive to coal price volatility. The recent decision of India's Supreme Court on the Tata Mundra UMPP case<sup>64</sup> is also likely to complicate any resolution of the tariff matter. Under the current UMPP program design the size of the tariff has been limited. In a scenario where TANGEDCO and the Government of India embrace deeper subsidization there are three likely financial concessions that may appear in the revised bid solicitation.

First, during the bid solicitation period several companies raised the issue that the project would remain in state ownership after the contract period.<sup>65</sup> This impaired the ability of companies to secure commercial financing for the project.<sup>66</sup> A concession here would be an agreement now by the GOI and Tamil Nadu to transfer some or all of the plant's value to the owner. How the Government resolves the differences between the two business models (long-term state ownership versus long term transfer) will determine how much risk the developer/owner bears and how much TANGEDCO and the public must bear.

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<sup>63</sup> [http://www.business-standard.com/article/companies/nptc-the-only-bidder-for-tamil-nadu-umpp-114122300366\\_1.html](http://www.business-standard.com/article/companies/nptc-the-only-bidder-for-tamil-nadu-umpp-114122300366_1.html)

<sup>64</sup> <http://indianexpress.com/article/business/companies/supreme-court-pulls-up-tata-power-adani-power-says-firms-cant-seek-higher-tariff/2/>

<sup>65</sup> <http://www.deccanchronicle.com/150303/nation-current-affairs/article/mode-execution-changed-tamil-nadu-generation-and-distribution>

<sup>66</sup> <http://archive.financialexpress.com/news/adani-sterlite-gmr-jindal-power-pull-out-of-umpp-bidding-process/1298838>

Second, the plant will be fueled by coal that is imported. Global prices are typically volatile. A major area of contention in the original bid documents was the ability of owner/developers to pass along coal price fluctuations onto consumers.<sup>67</sup> It is likely that the coal will be imported from Indonesia, but South Africa and Australia may also be possible sources for the coal. Currently, coal prices are at a historic low. Even if the price of seaborne thermal coal is reduced considerably, it will still be more expensive than the domestic coal currently produced by Coal India.<sup>68</sup> Rising imports creates an undesirable element to India's trade balance and greater pressure to increase the tariff.

Third, India's 2015 budget included an initiative to create five new UMPPs. The plan is to induce 1 trillion rupees of new investment in this area.<sup>69</sup> The redesign of the UMPP is likely to contain some new financing measures as the use of the tariff alone is unviable.<sup>70</sup> Whether the source of this capital is from the public or private sector, or some combination, is unspecified but is likely to become clearer as the government makes public its plans.<sup>71</sup> It is questionable whether the Government of India would want to absorb significant levels of new debt for risky coal plant development given that its current debt levels represent years of fiscal discipline. Most of the major companies in the Indian economy are currently facing heavy debt burdens.<sup>72</sup>

## Conclusion

The levelized tariff required to build and operate Plant Cheyyur is Rs. 5.95 /kwh. Under current tariff policy and practice, the plant is not financially viable. In addition, the cost structure is based on factors (imported coal costs and debt service) outside the control of potential plant operators. The combined financial risks have resulted in a pullout of private-sector participation in the plant. The recognition by the Power Ministry of the flaws in the original project design is a step in the right direction. Plant Cheyyur is unlikely to be a viable, affordable power plant under any circumstances. As lead promoter, Tamil Nadu may have to bear the risk of additional fiscal costs for the plant.

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<sup>67</sup> <http://timesofindia.indiatimes.com/business/india-business/Pvt-cos-wont-bid-for-UMPPs-till-norms-change/articleshow/45644892.cms>

<sup>68</sup> <https://www.pwc.in/assets/pdfs/industries/power-mining/icc-coal-report.pdf>

<sup>69</sup> <http://profit.ndtv.com/budget/panel-suggestions-on-fresh-bidding-norms-for-umpp-by-march-end-745070>

<sup>70</sup> <http://www.financialexpress.com/article/fe-columnist/record-cafe-pm-must-debate-power-tariff-hike-at-niti-aayog-says-pramod-deo-central-electricity-regulatory-commission/60003/>

<sup>71</sup> According to the International Monetary Fund India's Debt to GDP ratio is considered in the reasonable range in the middle 60% ratio.

[https://books.google.com/books?id=WIDnBwAAQBAJ&pg=PA58&lpg=PA58&dq=india%27s+public+debt+2015&source=bl&ots=2qJInscdhj&sig=GY6-](https://books.google.com/books?id=WIDnBwAAQBAJ&pg=PA58&lpg=PA58&dq=india%27s+public+debt+2015&source=bl&ots=2qJInscdhj&sig=GY6-McgY2gcY_dJNWsWJ28zolk4&hl=en&sa=X&ei=u7c0Vfn3EcOoNonPgagB&ved=0CFEQ6AEwBw#v=onepage&q=india's%20public%20debt%202015&f=false)

[McgY2gcY\\_dJNWsWJ28zolk4&hl=en&sa=X&ei=u7c0Vfn3EcOoNonPgagB&ved=0CFEQ6AEwBw#v=onepage&q=india's%20public%20debt%202015&f=false](https://books.google.com/books?id=WIDnBwAAQBAJ&pg=PA58&lpg=PA58&dq=india%27s+public+debt+2015&source=bl&ots=2qJInscdhj&sig=GY6-McgY2gcY_dJNWsWJ28zolk4&hl=en&sa=X&ei=u7c0Vfn3EcOoNonPgagB&ved=0CFEQ6AEwBw#v=onepage&q=india's%20public%20debt%202015&f=false), p. 58. In 2014 the ratio was 67.72%, within the reasonable range.

<sup>72</sup> <http://economictimes.indiatimes.com/news/economy/indicators/india-inc-is-still-weighed-down-by-huge-debt-says-crisil/articleshow/46827712.cms>

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