



climate  
risk  
horizons

# white elephants

**new coal  
investments  
threaten  
tamil nadu's  
financial  
recovery**

OCTOBER 2021

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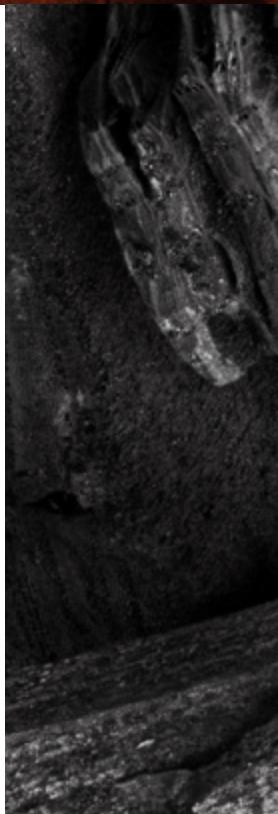
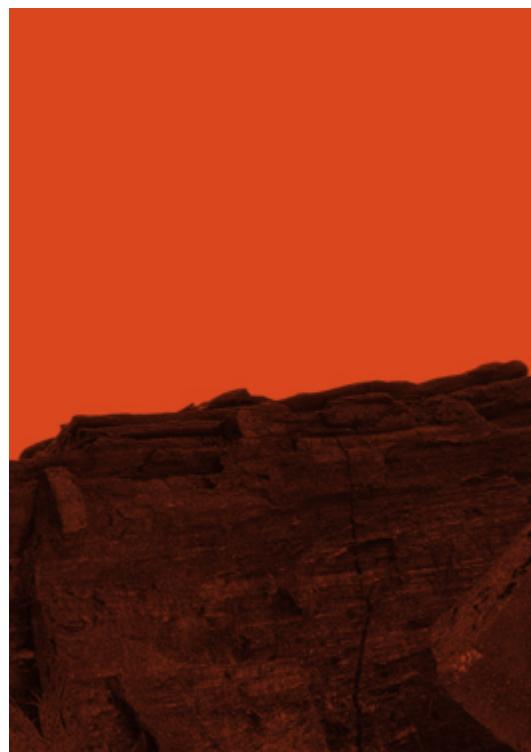
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# executive summary

Tamil Nadu's state finances are in the red, with the state's fiscal deficit growing to 3.26% of state GDP, and the combined debt of public sector units and the state itself reaching 36% of GSDP. The electricity sector is the prime contributor to the crisis: In FY 2021, 90% of outstanding government guarantees were related to the power sector. Public sector TANGEDCO & TANTRANSCO are significant contributors to the state's debt burden, with TANGEDCO's total debt standing at ₹1,34,119.94 cr. as of March 31, 2021<sup>1</sup> after recording a net loss of ₹32,553 cr. in FY 2021 alone. Interest cost is now TANGEDCO's biggest cost heading—over ₹11,000 cr. in FY 2021. A default by state public sector units will mean a further increase in the government's debt burden.

This analysis shows that ongoing expenditure to build two new coal plants in Tamil Nadu will worsen this financial situation significantly, to the tune of an additional ₹20,000 cr. of debt and ₹15–20,000 cr. between 2024 and 2030 by way of excess power purchase costs, while failing to meet the state's needs in terms of cheap, reliable power.



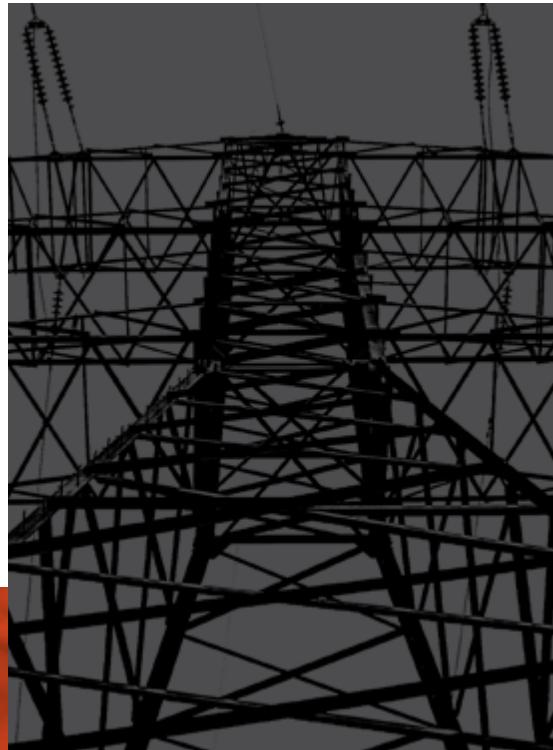
In March 2021, the National Green Tribunal ordered a stay on construction of the 1,600 MW Uppur Power Plant in Ramanathapuram.<sup>2</sup> The following month, in April 2021, the board of TANGEDCO decided to ‘shift’ the project to the Udangudi site, where construction on the 1,320 MW Stage I Udangudi Power Plant is underway. In effect, TANGEDCO intends for Uppur’s 2x800 MW units to now be shifted as Stage II for a total of 2,920 MW at Udangudi.<sup>3</sup>

## Tamil Nadu's finances will be worsened significantly by ongoing construction of new, expensive coal units at Udangudi that will not be cost competitive

Both the Uppur and Udangudi projects were first proposed over a decade ago, when Tamil Nadu faced a power deficit, coal power was the cheapest source of new electricity and India was embarking on a massive coal power plant construction boom. The energy sector and the economics underpinning it have undergone significant changes in the last five years, with renewable energy and, more recently, RE combined with storage now providing cheaper electricity than can be expected from most—perhaps all—new coal plants currently under construction.

1. [www.tnbudget.tn.gov.in/tnweb\\_files/white\\_paper\\_2021\\_english.pdf](http://www.tnbudget.tn.gov.in/tnweb_files/white_paper_2021_english.pdf)
2. [www.timesofindia.indiatimes.com/city/chennai/ngt-stops-1600mw-uppur-power-project/article-show/81557576.cms](http://www.timesofindia.indiatimes.com/city/chennai/ngt-stops-1600mw-uppur-power-project/article-show/81557576.cms)
3. [www.dtnext.in/News/Tamil-Nadu/2021/05/01/010207/1291328/Tangedco-to-shift-Uppur-project-to-Udangudi-over-legal-vpf#:~:text=Faced%20with%20continuous%20legal%20hurdles,like%20the%20National%20Green%20Tribunal](http://www.dtnext.in/News/Tamil-Nadu/2021/05/01/010207/1291328/Tangedco-to-shift-Uppur-project-to-Udangudi-over-legal-vpf#:~:text=Faced%20with%20continuous%20legal%20hurdles,like%20the%20National%20Green%20Tribunal)

- <sup>6</sup> For that reason, these new coal projects will create considerable financial risk for TANGEDCO and by extension the state government and electricity consumers. Given the long gap between when these projects were first proposed and all the economic and technological changes in the power sector since, CRH conducted an analysis to ascertain if these coal units are still necessary, what their likely financial costs would be to stakeholders and whether cheaper, more suitable options exist.



## key findings

#1

The Udangudi Stage I and II (formerly Uppur) projects are surplus to Tamil Nadu's requirements for the next decade at least and will lie largely unutilised, while imposing a significant financial burden on the state by way of fixed costs and debt repayment.

#2

Construction of Udangudi Stages I (1320 MW) and II (1800 MW) will lock TANGEDCO into an annual fixed cost payment of nearly ₹5,000 cr., totalling approximately ₹29,000 cr. between 2024–2030, irrespective of plant utilisation levels. This will drive up the average cost of supply for all TANGEDCO customers and expose the state government to thousands of crores in additional debt and subsidies.

#3

Electricity from these units will be expensive, costing approximately ₹8.2 per kWh at a probable 55% Plant Load Factor (PLF). Even at a more unrealistic 75% PLF the tariff would still be over ₹6.7/kWh. (Tamil Nadu's coal fleet has an average PLF of 60% since 2018.) New renewable electricity is reliably available below ₹3/kWh, and RE with storage in Tamil Nadu is estimated at ₹4.97 in 2021, dropping to ₹3.4 by 2030.



#4

Substituting power supply from these thermal plants with a mix of renewable energy and battery storage will save the state between ₹15,000–₹20,000 cr. on power purchase costs alone from 2024–2030, depending on PLF levels. Even considering an ambitious 75% PLF for the new coal units, the savings would be ₹15,000 cr. over the same period. In other words, even if the state's power demand situation requires significant utilisation of Udangudi Stages I and II, it would be much cheaper to meet this demand from a mix of RE and storage.

#5

The total expenditure incurred on Udangudi Stages I and II is ₹6,155 cr. as of July 2021 which is less than the combined equity capital requirement of the two projects. Writing this off as a one-time regulatory asset would be preferable to continuing the projects at what will be a ballooning loss that will weigh down TANGEDCO and state finances, possibly into the 2030s.

## recommendations

Solutions to TANGEDCO's financial struggles involve hard decisions; the construction of 4 new coal units totalling 2,920 MW will worsen the discom's financial situation and undermine the state's long-term energy security.

The expenditure already incurred is often used as justification for following through on what are now outdated, uncompetitive projects. Rather than succumbing to the 'sunk cost fallacy', the financial interests of TANGEDCO and the state of Tamil Nadu would be better served by halting further construction and exploring alternative energy-related uses of the Udangudi site.

# background

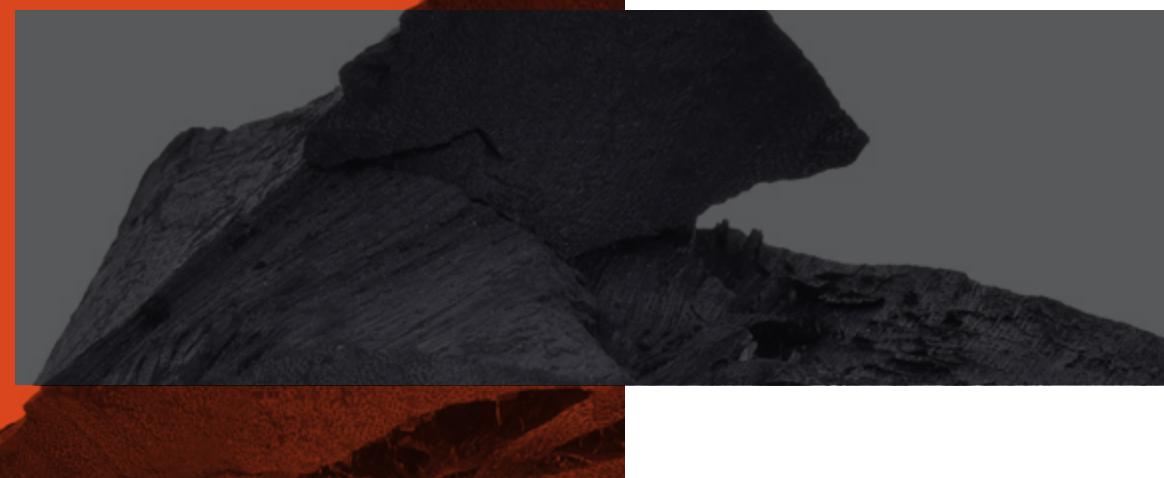
## New coal plants addressed power deficit but led to spiralling debt for the state

Tamil Nadu's government is prioritising shoring up the state's precarious finances and restoring fiscal health in order to maximise social and economic development. The state's fiscal deficit has grown to 3.26% of state GDP, and debt of public sector units and the state is 36% of GSDP. The electricity sector is the prime contributor to the state's high debt levels: In FY 2021, 90% of outstanding government guarantees were related to the power sector. Public sector TANGEDCO & TANTRANSCO are significant contributors, with TANGEDCO's total debt standing at ₹1,34,119.94 cr. as of March 31, 2021<sup>4</sup> after recording a net loss of ₹32,553 cr in FY 2021 alone.

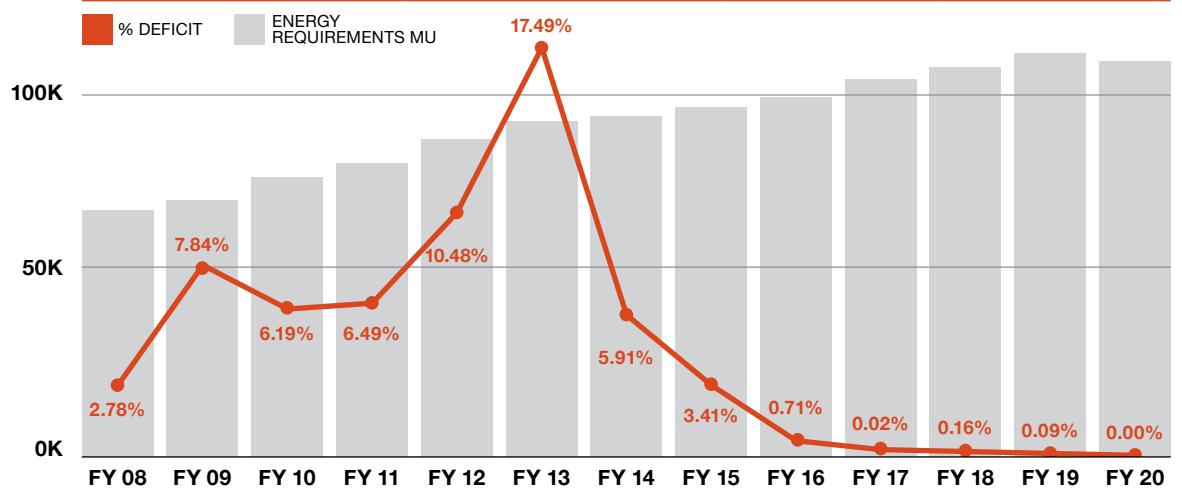
Within the last decade, Tamil Nadu has moved from a situation of power deficit to surplus. At the same time, state discom TANGEDCO has seen its losses increase significantly to the point where it sought and received a ₹30,000 cr. bailout package from the Centre in 2020.<sup>5</sup>



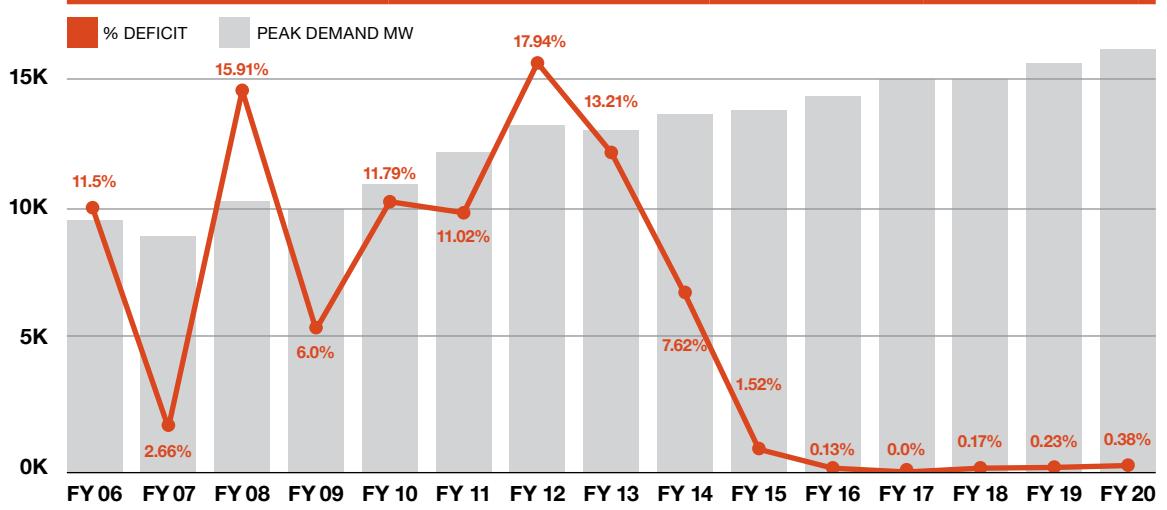
4. [www.tnbudget.tn.gov.in/tnweb\\_files/white\\_paper\\_2021\\_english.pdf](http://www.tnbudget.tn.gov.in/tnweb_files/white_paper_2021_english.pdf)
5. [www.energy.economictimes.indiatimes.com/news/power/discoms-liquidity-infusion-tamil-na-du-tops-states-with-rs-30000-crore-sanctioned-loan/79232831](http://www.energy.economictimes.indiatimes.com/news/power/discoms-liquidity-infusion-tamil-na-du-tops-states-with-rs-30000-crore-sanctioned-loan/79232831)



**FIGURE 1**  
**Energy demand in Tamil Nadu in GWh and deficit (%)**



**Peak demand in Tamil Nadu in MW and deficit (%)**



10

In the early 2010s Tamil Nadu had a significant electricity demand deficit which peaked at 17% around 2013 before reducing to less than 1% by 2016, mainly due to an increase in thermal generation capacity. Between 2012–2020, the state doubled its thermal capacity, adding 7.2 GW.<sup>6</sup> In addition to thermal plants within the state, capacity addition also came via contracts with Inter-State Generating Stations (ISGS) located in states such as Andhra Pradesh, Karnataka and Odisha.

While TANGEDCO has succeeded in addressing the power deficit situation, this has come at a price, as the average cost of supply rose, mainly due to high generation costs.



TABLE 1  
**Generation costs in September 2021 of Coal Power plants commissioned in TN since 2012<sup>7</sup>**

**COAL PLANTS COMMISSIONED IN TAMIL NADU SINCE 2012**

Plant	Promoter	Fixed cost (₹/kwh)	Variable cost	Total cost (₹/kwh)
New Neyveli TPS	NLC	1.88	2.20	4.08
NLC TPS II- Expansion	NLC	2.41	2.65	5.06
North Chennai TPS ST-II	TANGEDCO	5.88	2.88	8.76
Mettur TPS ST-III	TANGEDCO	4.36	3.57	7.93
Vallur TPS	NTPC	2.23	3.26	5.49
Mutiara TPS	COASTAL ENERGEN	1.46	4.50	5.96
Cuddalore TPS	IL&FS	0.1	4.5	4.60

6. [www.niti.gov.in/edm/#elecSupply](http://www.niti.gov.in/edm/#elecSupply)

7. [www.meritindia.in/state-data/tamil-nadu](http://www.meritindia.in/state-data/tamil-nadu)

TANGEDCO has not been able to resolve its financial woes despite the restructuring plan by the state government and participation in the UDAY scheme. In FY 2017–18 and FY 2018–19 TANGEDCO was the highest loss-making entity amongst all the discoms and integrated utilities in the country. TANGEDCO was given the lowest C grade (very low operational and financial performance capability) and ranked 40 out of 41 in the Ministry of Power's Ninth Annual Integrated Rating for State Power Distribution Utilities.<sup>8</sup>

- 8. [www.pfcindia.com/DocumentRepository/ckfinder/files/Govt\\_Initiatives/Annual\\_Integrated\\_Ratings\\_of\\_State\\_DISCOMs/9th%20Integrated%20Rating%20Booklet.pdf](http://www.pfcindia.com/DocumentRepository/ckfinder/files/Govt_Initiatives/Annual_Integrated_Ratings_of_State_DISCOMs/9th%20Integrated%20Rating%20Booklet.pdf)
- 9. [www.settn.energy/sites/default/files/2020-12/Presentation%20-%20TANGEDCO%20Financial.pdf](http://www.settn.energy/sites/default/files/2020-12/Presentation%20-%20TANGEDCO%20Financial.pdf)

**FIGURE 2  
TANGEDCO losses since FY 2015 (INR CR.)<sup>9</sup>**

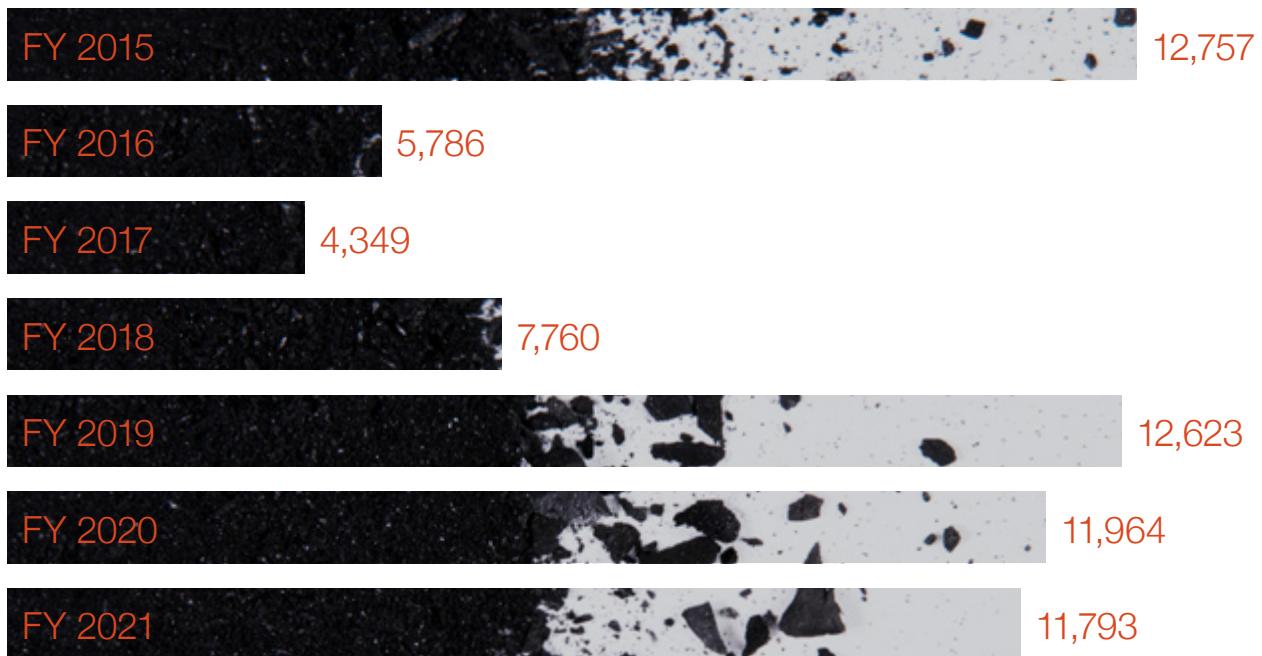
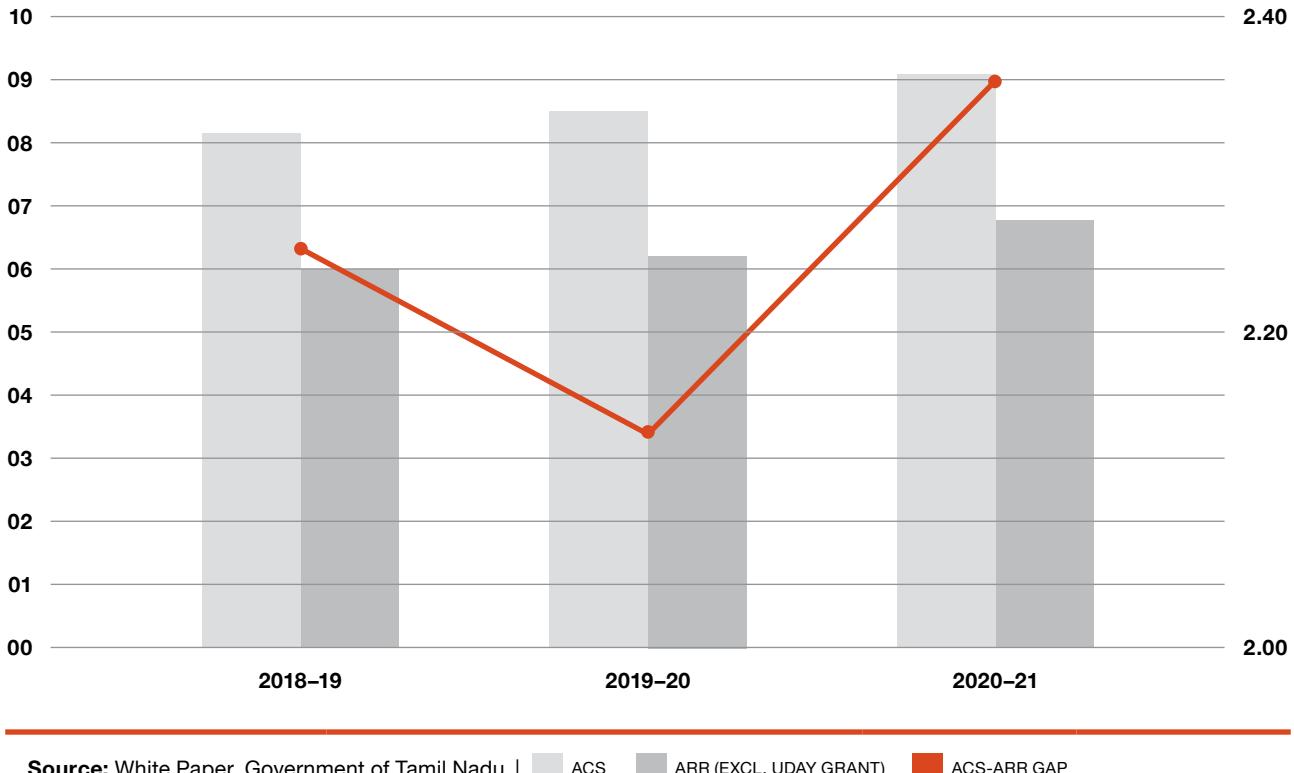


FIGURE 3  
**TANGEDCO average cost of supply and average revenue requirement (₹/kWh)**



The primary reasons for TANGEDCO'S financial under-performance are under-recovery of charges from domestic and agriculture consumers due to infrequent tariff revisions, despite the high and escalating cost of power purchase and generation. The cost of power generation in TN is high because the state remains dependent on coal power plants, which source their fuel either from distant states via rail or via seaborne imports, significantly increasing the landed cost of coal. The difference between average cost of supply and sverage rate of realisation has now grown to ₹2.36/kWh in FY 2021.<sup>10</sup>

Even as new coal capacity was being added within the state, growth in electricity demand began to lag behind projections. The 19<sup>th</sup> Electricity Power Survey (EPS) forecast, which guides capacity planning, assumed a CAGR of 5.2%<sup>11</sup> for Tami Nadu between 2015 and 2020, whereas actual CAGR for the period was 2.8%.<sup>12</sup>

- 10. White Paper on Finances of Government of Tamil Nadu, August 2021. [www.tnbudget.tn.gov.in/tnweb\\_files/white\\_paper\\_2021\\_english.pdf](http://www.tnbudget.tn.gov.in/tnweb_files/white_paper_2021_english.pdf)
- 11. [www.tangedco.gov.in/linkpdf/pet3\(301219\).pdf](http://www.tangedco.gov.in/linkpdf/pet3(301219).pdf)
- 12. [www.niti.gov.in/edm/#elecSupply](http://www.niti.gov.in/edm/#elecSupply)

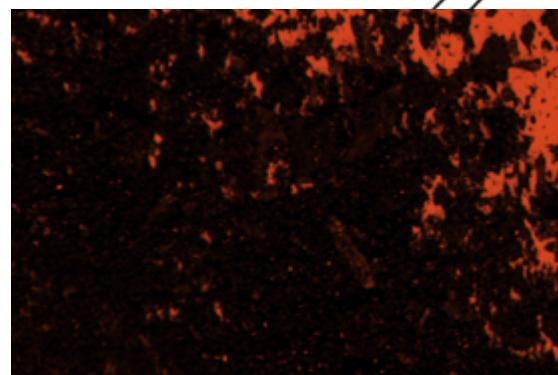
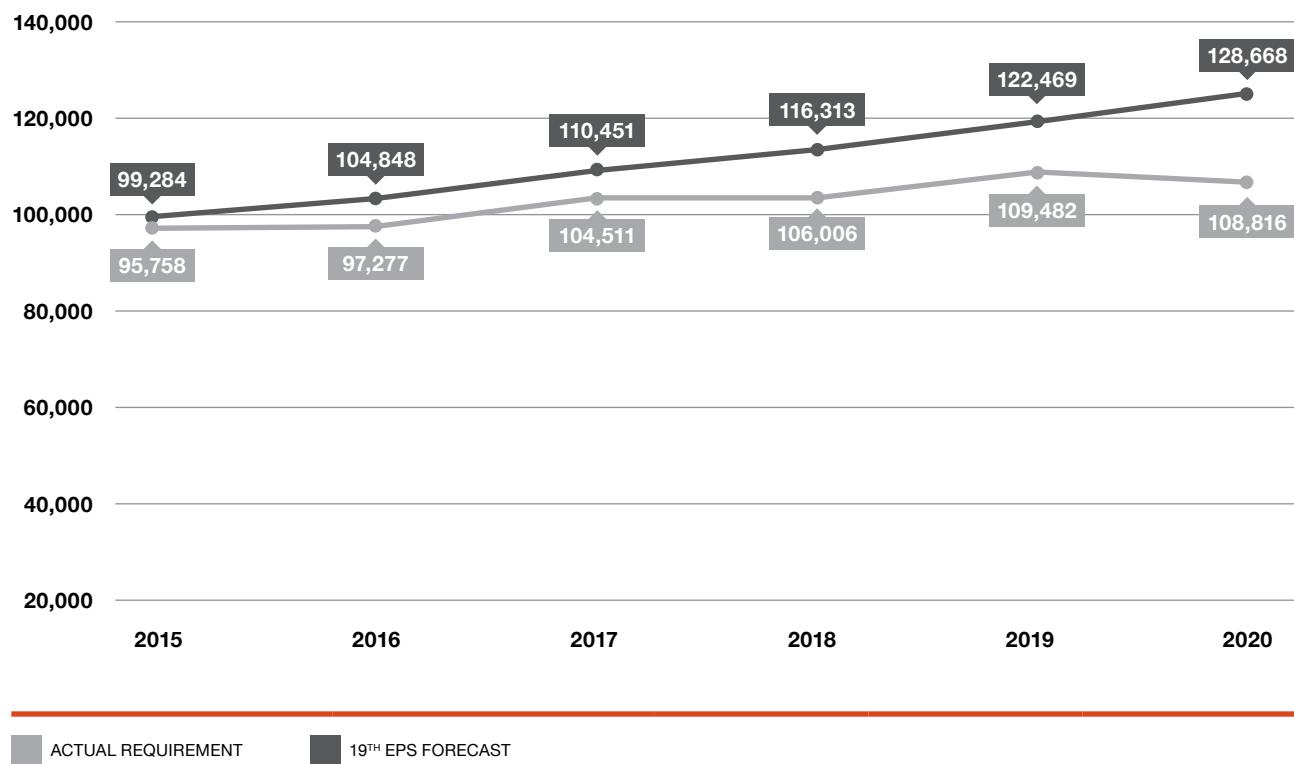


FIGURE 4  
Actual electricity demand in TN lags projections



As a result, Tamil Nadu went from being a power deficit to a ‘power surplus’ state in terms of in-state generation capacity. Some point to the state’s purchases of power on the exchange to argue that Tamil Nadu is still in a power deficit. However, these purchases are invariably due to outages on the part of in-state plants, not due to a lack of installed capacity. Moreover, exchange purchases are usually (though not always) cheaper than in-state generation.

As a result of the surplus capacity, Tamil Nadu’s coal and lignite fleet has been running at below 60% PLF since FY 2018. In 2020, the Covid-19 pandemic further impacted operations of businesses and industries because of which energy consumption in Tamil Nadu registered a marginal decline compared to 2019. The actual requirement of 108,816 MW in 2020 was 5.8% lower than CEA’s estimated



<sup>14</sup> demand requirement for the state.<sup>13</sup> Given the durability of the pandemic and its resulting economic impacts, strong and sustained growth in electricity demand from 2019 levels is unlikely in 2021 either.

There are additional factors that could cause a further deviation from power demand growth projections over the next decade, such as greater energy efficiency measures and sales migration by large commercial and industrial users away from TANGEDCO.

## New coal capacity has raised power costs; TANGEDCO continues to build new thermal projects, incurring debt that will need to be paid off into the 2030s

Sales migration in particular could cause significant deviations from projected demand growth. Commercial and industrial consumers cross subsidise agricultural and domestic consumers by paying more than the average cost of supply. But in recent years, C&I consumers have started to move to open access consumption, enabled by surplus generation capacity and the availability of lower cost alternatives, including renewables. As a result, there are fewer large consumers to bear the cross subsidy charges, leading to a mutually reinforcing cycle, as remaining C&I consumers risk suffering even higher cross subsidy surcharges levied on a dwindling base, worsening their cost profile. Adding more expensive generation capacity, as TANGEDCO is currently doing, will further increase the utility's power purchase costs and incentivise sales migration.

13. [www.nrpc.gov.in/wp-content/uploads/2020/05/LGBR-Report-2020-21.pdf](http://www.nrpc.gov.in/wp-content/uploads/2020/05/LGBR-Report-2020-21.pdf)

Despite the role that new coal capacity has played in raising average power costs, and despite the obvious mismatch between capacity and actual demand, the state continues to build new thermal power projects, incurring debt that will need to be paid off over the coming decade and into the next.

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**TABLE 2  
Under construction coal power plants in Tamil Nadu**

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**THERMAL CAPACITY UNDER CONSTRUCTION**

Sl. No.	Project	Capacity (MW)	Progress*
1	North Chennai Thermal Power Station Stage III	800	75%
2	Ennore SEZ Thermal Power Project	1320	55%
3	Udangudi Stage I Thermal Power Project	1320	24%
4	Uppur/Udangudi Stage II Thermal Power Project	1600	18%
5	Tuticorin TPP	525	95%

\*Based on % expenditure incurred of total projected expenditure as reported by CEA

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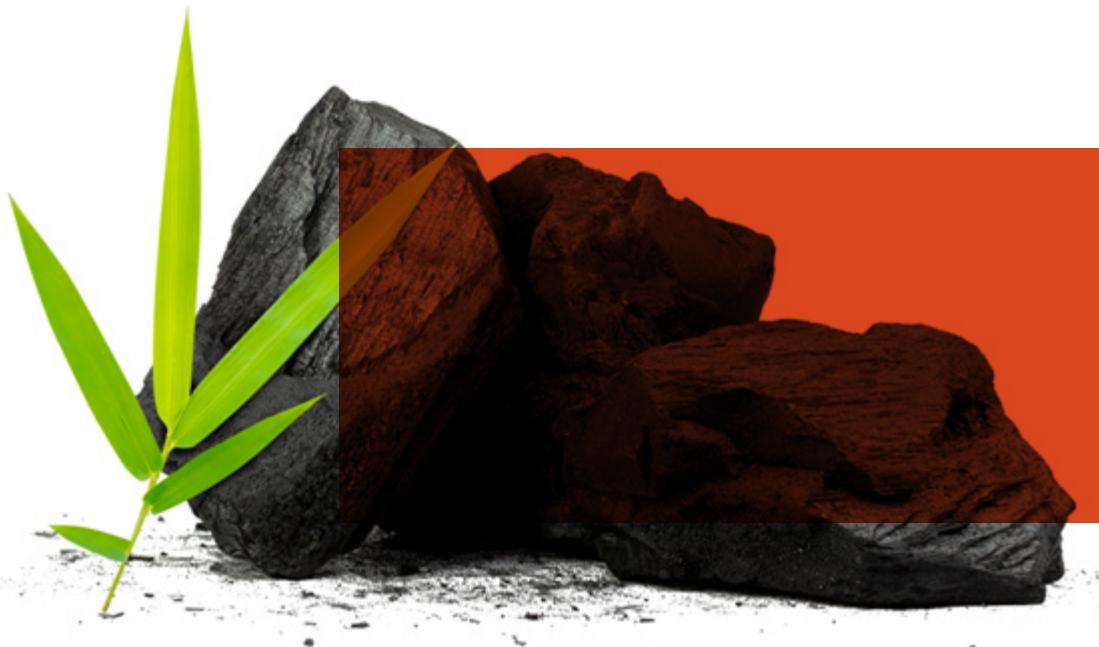
**TABLE 3  
Non-coal power projects under construction**

Sl. No.	Project	Capacity (MW)	Commissioning date
1	Kundah Pumped Storage Hydroelectric Project	500	2022–23
2	Kollimalai Hydro Electric Project	20	2021–22



A total of 5,040 MW of coal power capacity is under construction in Tamil Nadu along with 520 MW of hydro and pumped hydro projects. The coal capacity under construction is about one-third of existing thermal capacity and more than TANGEDCO's existing generation capacity.

Neyveli New Unit 2 (500 MW) was commissioned in 2021; five more plants are currently under construction. North Chennai, Ennore SEZ and Tuticorin are in advanced stages of construction and will add 2,645 MW to existing conventional capacity, while Udangudi Stage I and Uppur/Udangudi Stage II are in early stages of construction.



Despite having sufficient in-state nameplate capacity, Tamil Nadu depends on power purchases from outside the state to meet demand, due in large part to frequent outages of thermal units in the state. Inter-state purchases are not a bad thing, as the energy exchanges and bilateral purchases are frequently a cheaper source of electricity compared to many plants located within Tamil Nadu. In fact, the position that Tamil Nadu should install sufficient generation capacity to be independent of inter-state purchases must be questioned not just in terms of economic efficiency but also because it ignores the fact that most of the state's power generation is dependent on coal transported from distant states such as Odisha, and as such prone to disruptions due to heavy rainfall events, transport bottlenecks, payment disputes with Coal India etc.

Tamil Nadu has seen a large expansion of thermal capacity between 2010 and 2020. More recently, the state has also emerged as a leader in renewable energy with the highest installed RE capacity within the country, growing from 9,629 MW in 2015 to 17,009 MW IN 2021.<sup>14</sup> This renewable capacity is not taken into account while estimating energy availability, even though RE accounts for close to 23% of Tamil Nadu's total generation,<sup>15</sup> despite limitations such as intermittency.

RE's main disadvantage compared to thermal generation has been its intermittency and lack of 'dispatchability'. Falling battery prices over the last decade have now brought the energy transition to an inflection point with RE+battery storage now cost competitive with thermal generation. Storage makes RE dispatchable, negating thermal's erstwhile advantage. Storage enables RE to meet peak demand and respond to variations in demand in a much more flexible manner than thermal generation, as baseload thermal plants are bound by constraints such as ramp rates, minimum technical load and start-up time, whereas batteries can provide instant power.

The current model of power procurement by TANGEDCO revolves around contracting baseload conventional capacity (predominantly coal) to meet the anticipated peak demand. With increasing RE deployment on the back of lower costs and preferential must-run status, building baseload thermal capacity mainly serves to increase power purchase costs through fixed charges that have to be paid irrespective of utilisation levels.



14. [www.tangedco.gov.in/linkpdf/Data%20card2019-20.pdf](http://www.tangedco.gov.in/linkpdf/Data%20card2019-20.pdf)

15. [www.settn.energy/sites/default/files/2021-02/Estimating%20Energy%20Storage%20Requirements%20for%20TN.pdf](http://www.settn.energy/sites/default/files/2021-02/Estimating%20Energy%20Storage%20Requirements%20for%20TN.pdf)

- For the RE-dominant grid of the future, flexibility in generation and dispatch will be prized. Coal power is not designed for flexible operation; battery storage is perfectly flexible.

Renewable energy curtailment has been an ongoing issue for RE-rich states like Tamil Nadu, generally attributed to grid balancing requirements, transmission congestion and limited flexibility of conventional capacity. There is a reluctance to back down thermal generation to accommodate RE as the fixed charges are payable even if a plant is backed down. As a result, despite its must run status, RE is often backed down when demand is low and conventional capacity cannot be curtailed further.

The average curtailment of wind power in Tamil Nadu in 2019 was 3.52 hours a day, up from 1.87 hours in 2018.<sup>16</sup> Increasing transmission and storage capacities will help to minimise curtailment and extract value for generators.



New renewable energy is now the cheapest source of additional electricity. Even when combined with battery storage, these tariffs are still cheaper than new coal capacity. JMK research and analytics estimated an RE+storage tariff of ₹4.97 for Tamil Nadu in 2021, dropping to ₹3.4 in 2030. A national-level analysis by LBNL has estimated solar PV + storage at ₹3.3 in 2025.<sup>17</sup> CRH's analysis uses the more conservative JMK projection.

Against this background of surplus firm capacity, TANGEDCO and the state government's dire financial situation and the availability of new, cheaper electricity options, the Udangudi Stage I (2x660 MW) and Stage II (2x800 MW, formerly Uppur) projects must be examined rationally.

16. [www.cdn.cseindia.org/attachments/0.95400900\\_1592893817\\_1factsheet-re.pdf](http://www.cdn.cseindia.org/attachments/0.95400900_1592893817_1factsheet-re.pdf)

17. [www.eta-publications.lbl.gov/sites/default/files/lbnl-2001314.pdf](http://www.eta-publications.lbl.gov/sites/default/files/lbnl-2001314.pdf)



The priority for TANGEDCO and the state government is to rein in power purchase and supply costs on the one hand, while seeking socially just ways to reduce or pay for subsidy burdens. This analysis shows that the construction of the additional 2920 MW at Udangudi will have the opposite effect—raising overall power purchase costs significantly and increasing the state’s subsidy burden.

Are these much-delayed legacy projects still justified in the current circumstances and in light of rational projections for the coming decades? Do they represent the best use of scarce financial resources to meet Tamil Nadu’s legitimate demands for economic growth and social empowerment?

## **The construction of 2,920 MW of coal capacity at Udangudi will raise overall power purchase costs and increase the state’s subsidy burden**



# results

#1

## Financial risk

If built, these projects will place a significant financial risk on TANGEDCO and Tamil Nadu in the coming decade, irrespective of plant utilisation, with fixed costs alone amounting to Rs. 29,000 crores between 2024–2030.

#2

## Lock-in of expensive power

The power produced from these projects will be expensive, ranging between ₹6.7–8.2/kWh depending on utilisation levels—far above the costs of renewable energy even when combined with battery storage.

#3

## No demand justification

Tamil Nadu's power demand situation in 2021 and for the coming decade does not justify the addition of 2,920 MW of fresh coal capacity.

#4

## Cheaper options exist

Based on current and projected costs, a combination of renewable energy and battery storage is the least cost option for the state to meet energy demand growth. Pursuing such a strategy will save the state between ₹15–20,000 cr. between 2024 and 2030 in terms of power purchase costs alone.



#1

# financial risk of udangudi stage I and II

21

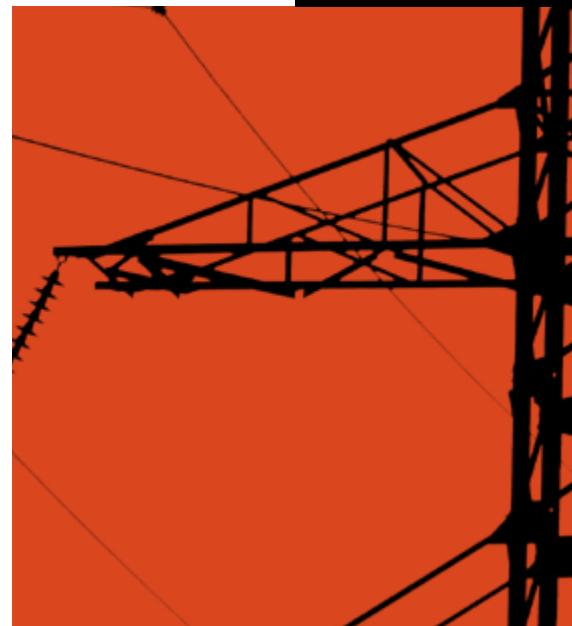
Per current data, the Udangudi Stage I and II (formerly Uppur) project will require an investment of about ₹27,000 cr. At a 70:30 debt equity ratio, that amounts to over ₹20,000 cr. of additional debt on the books of the state, in addition to ₹8,500 cr. of equity investment. Given the long delays in the project's execution, exacerbated by the necessity of shifting Uppur and delays due to the pandemic, further cost escalations are possible.

## These projects will place a fixed cost burden of ₹29,000 cr. on TANGEDCO consumers between 2024–2030 alone

There is no information in the public domain as to the likely cost of electricity generated by the Udangudi Stage I and II plants. A discussion of projected tariffs as well as fixed costs payable is essential to have a full picture of the costs vs benefits of the project, and determine its financial desirability and necessity for the state. Based on available project costs, interest rates and the operating costs of similar coal plants in Tamil Nadu, Climate Risk Horizons has estimated the cost of electricity from these projects.

**Fixed cost burden:** Assuming Stage I is completed by 2024 and Stage II by 2027, these projects will place a significant financial risk on TANGEDCO and Tamil Nadu, irrespective of plant utilisation, with fixed costs alone amounting to ₹29,000 cr. between 2024–2030.

- 22** The fixed costs payable for these units will be in the range of ₹4,700 cr. annually for the first 5–7 years after commissioning at least. These charges are due irrespective of utilisation levels and will need to be met either by additional subsidies from the state government or higher tariffs paid by consumers. TANGEDCO's board has proposed to shift Uppur TPP (2X800 MW) to Udangudi site as Udangudi Stage II due to issues related to land acquisition and the NGT order. The total expenditure of ₹2,298 cr. on Uppur as of July 2021 is likely to be a sunk cost and it is unclear if these costs will be added to capital expenditure on Udangudi Stage II. We have assumed this is written off and not included in the capital cost for Stage II and hence not recoverable. If it were to be added to the capex for the shifted Stage II it would imply higher fixed costs and a higher tariff.



Construction contracts for BTG, BOP and sea water package have been suspended and new tenders for the same may come with price escalations. The projects were running behind schedule and the pandemic has posed further challenges to timely completion which may cause planned expenditure to overshoot earlier estimates. For all these reasons, our estimates probably err on the downside.

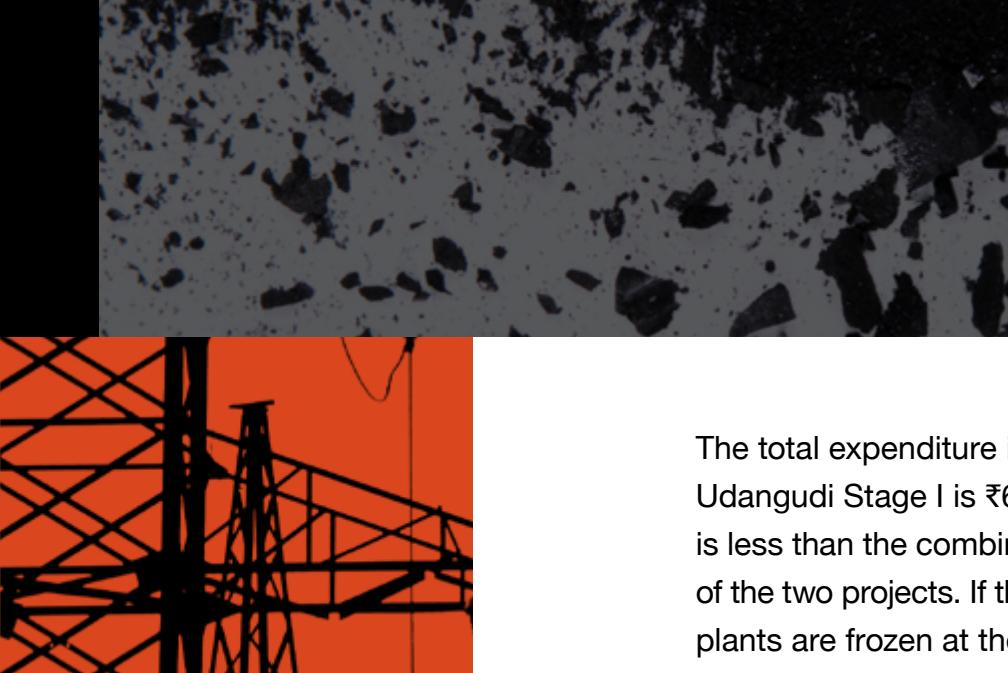
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TABLE 4  
**Capital expenditure on Udangudi Stage I and Stage II**

Plant	Project expenditure	Debt	Equity
Udangudi Stage I	12,778	8,945	3,833
Udangudi Stage II*	15,849	11,094	4,755
<b>Total</b>	<b>28,627</b>	<b>20,039</b>	<b>8,588</b>

\*Total expenditure for Udangudi Stage II is based on per MW capital expenditure of Udangudi Stage I. Estimate for Udangudi Stage II is higher than the previous estimate for Uppur as the EPC contracts for Uppur tendered in 2017 have been suspended and new tenders will reflect inflationary cost escalation, assumed at 2% p.a. This total also excludes expenditure of ₹2298 cr. already incurred on Uppur. This amount can either be written off or added to the capital expenditure of Udangudi Stage II.

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The total expenditure incurred on Uppur and Udangudi Stage I is ₹6,155 cr. as of July 2021 which is less than the combined equity capital requirement of the two projects. If the expenditure on these power plants are frozen at the current levels, the equity capital alone can absorb the expenditure incurred till date and TANGEDCO can avoid taking on additional debt of more than ₹20,000 cr.

TABLE 5

**Projected fixed costs**

Assuming Udangudi Stage I commissioned in 2024 and Stage II in 2027

PROJECTED FIXED COSTS <b>Udangudi Stage I (660 X 2) MW</b>	PROJECTED FIXED COSTS <b>Udangudi Stage II (800 X 2) MW</b>
<b>Project expenditure</b> ₹12,778 cr.	<b>Project expenditure</b> ₹15,849 cr.
<b>Project equity = project expenditure x 30%</b> ₹3,833 cr.	<b>Project equity = project expenditure x 30%</b> ₹4,755 cr.
<b>(1) ROE = project equity x 15.5%</b> ₹594 cr.	<b>(1) ROE = project equity x 15.5%</b> ₹737 cr.
<b>Project debt</b> ₹8,945 cr.	<b>Project debt</b> ₹11,094 cr.
<b>(2) Interest on loan = project debt x 12%</b> ₹1,073 cr.	<b>(2) Interest on loan = project debt x 12%</b> ₹1,331 cr.
<b>Working capital = project expenditure x 10%</b> ₹1,278 cr.	<b>Working capital = project expenditure x 10%</b> ₹1,585 cr.
<b>(3) Interest on WC @12%</b> ₹153 cr.	<b>(3) Interest on WC @12%</b> ₹190 cr.
<b>(4) Depreciation = (plant + PCT + coal jetty) x 4%</b> ₹359 cr.	<b>(4) Depreciation = (plant + PCT + coal jetty) x 4%</b> ₹463 cr.
<b>Normative O&amp;M cost = ₹22 lakh/MW</b>	<b>Normative O&amp;M cost = ₹23.1 lakh/MW</b>
<b>(5) O&amp;M cost</b> ₹290 cr.	<b>(5) O&amp;M cost</b> ₹370 cr.
<b>Fixed cost (1+2+3+4+5)   ₹2,470 cr.</b>	<b>Fixed cost (1+2+3+4+5)   ₹3,091 cr.</b>

TABLE 6  
Fixed costs projection for years 2024–2030 (figures in crores)

**UDANGUDI STAGE I (660 X 2) MW**

ROE	2024	2025	2026	2027	2028	2029	2030
	594	594	594	594	594	594	594
Interest on loan	2024	2025	2026	2027	2028	2029	2030
	1,073	1,024	975	926	877	827	778
Interest on WC	2024	2025	2026	2027	2028	2029	2030
	153	153	153	153	153	153	153
Depreciation	2024	2025	2026	2027	2028	2029	2030
	359	359	359	359	359	359	359
O&M cost	2024	2025	2026	2027	2028	2029	2030
	290	305	320	336	353	371	389
TOTAL	2024	2025	2026	2027	2028	2029	2030
	2,470	2,435	2,401	2,368	2,336	2,304	2,274



## UDANGUDI STAGE II (800 X 2) MW

25

ROE	2024	2025	2026	2027	2028	2029	2030
				737	737	737	737
Interest on loan	2024	2025	2026	2027	2028	2029	2030
				1,331	1,270	1,209	1,148
Interest on WC	2024	2025	2026	2027	2028	2029	2030
				190	190	190	190
Depreciation	2024	2025	2026	2027	2028	2029	2030
				463	463	463	463
O&M cost	2024	2025	2026	2027	2028	2029	2030
				370	388	407	428
TOTAL	2024	2025	2026	2027	2028	2029	2030
				3,091	3,048	3,006	2,966

### TOTAL FIXED COST UDANGUDI STAGE I & II

2024	2025	2026	2027	2028	2029	2030
2,470	2,435	2,401	5,459	5,384	5,311	5,239

The fixed cost of these units will add a minimum of ₹28,700 cr. to the utility's power purchase costs between 2024–2030 irrespective of utilisation rates.



# #2

## lock-in of expensive power

CRH analysis based on publicly available project expenditure details shows that the likely starting tariffs from these units in Year 1 (2024 for Stage I and 2027 for Stage II) will range between ₹6.77 and ₹8.2/kWh depending on utilisation levels. This is a significant premium over other electricity sources available to the state.

Variable costs increase at lower utilization because of increase in station heat rate and auxiliary consumption. Based on the likely fixed and variable costs, we can estimate a range of likely tariffs, at low utilisation (55% PLF) and high utilisation (75% PLF) levels. For reference, Tamil Nadu's current coal fleet has had PLFs below 60% since 2018.

TABLE 7  
**Variable costs**

VARIABLE COSTS <b>Udangudi in 2024 at 55% PLF</b>	VARIABLE COSTS <b>Udangudi in 2024 at 75% PLF</b>
<b>Station heat rate (kcal/kWh)</b> 2,450	<b>Station heat rate (kcal/kWh)</b> 2,300
<b>GCV of oil (kcal/kg)</b> 10,300	<b>GCV of oil (kcal/kg)</b> 10,300
<b>Specific oil cosumption (ml/kWh)</b> 1.47	<b>Specific oil cosumption (ml/kWh)</b> 1.47
<b>Heat contribution of oil (kcal/kWh)</b> 15	<b>Heat contribution of oil (kcal/kWh)</b> 15
<b>Average GCV of coal (kcal/kg)</b> 3,440	<b>Average GCV of coal (kcal/kg)</b> 3,440
<b>Heat contribution of coal (kcal/kWh)</b> 2,435	<b>Heat contribution of coal (kcal/kWh)</b> 2,285
<b>Cost of oil (₹/kl)</b> 38,000	<b>Cost of oil (₹/kl)</b> 38,000
<b>(1) Specific oil cost (₹/kwh)</b> 0.06	<b>(1) Specific oil cost (₹/kwh)</b> 0.06
<b>Specific coal consumption (kg/kWh)</b> 0.71	<b>Specific coal consumption (kg/kWh)</b> 0.66
<b>Average cost of coal (₹/mt)</b> 4,270	<b>Average cost of coal (₹/mt)</b> 4,270
<b>(2) Specific coal cost (₹/kWh)</b> 3.02	<b>(2) Specific coal cost (₹/kWh)</b> 2.84
<b>(3) Variable cost PCT (₹/kWh)</b> 0.20	<b>(3) Variable cost PCT (₹/kWh)</b> 0.20
<b>Variable cost (1 + 2 + 3) (₹/kWh)</b> 3.28	<b>Variable cost (1 + 2 + 3) (₹/kWh)</b> 3.09
<b>Auxilary consumption</b> 8.25%	<b>Auxilary consumption</b> 8.25%
<b>PCT auxilary consumption</b> 1.40%	<b>PCT auxilary consumption</b> 1.40%
<b>Total auxiliary consumption</b> 9.65%	<b>Total auxiliary consumption</b> 9.65%
<b>Variable cost at bus bar (₹/kWh)</b> 3.63	<b>Variable cost at bus bar (₹/kWh)</b> 3.42

TABLE 8  
**Availability (MU) from Udangudi State I and II**

Plant	55% PLF	75% PLF
<b>Udangudi Stage I</b>	5,406	7,372
<b>Udangudi Stage II</b>	6,552	8,935

TABLE 9 <b>FIXED COST AT 55 PLF (₹/KWH)</b>	2024	2025	2026	2027	2028	2029	2030
Udangudi Stage I	4.57	4.51	4.44	4.38	4.32	4.26	4.21
Udangudi Stage II	-	-	-	4.72	4.65	4.59	4.53
FIXED COST AT 75 PLF (₹/KWH)	2024	2025	2026	2027	2028	2029	2030
Udangudi Stage I	3.35	3.30	3.26	3.21	3.17	3.13	3.08
Udangudi Stage II	-	-	-	3.46	3.41	3.36	3.32

**Total fixed costs decline annually as interest expense decreases with loan repayment**

TABLE 10 <b>VARIABLE COSTS/KWH</b>	2024	2025	2026	2027	2028	2029	2030
Variable cost at 55% PLF bus bar: Udangudi Stage I & II (₹/kWh)	3.63	3.70	3.78	3.85	3.93	4.01	4.09
Variable cost at 75% PLF bus bar: Udangudi Stage I & II (₹/kWh)	3.42	3.49	3.56	3.63	3.70	3.78	3.85

**2% annual inflation factor for coal price and freight charges**

TABLE 11 <b>Total cost at 55% PLF (₹/kWh)</b>	2024	2025	2026	2027	2028	2029	2030
Tariff: Udangudi Stage I	8.20	8.21	8.22	8.23	8.25	8.27	8.29
Tariff: Udangudi Stage II				8.57	8.58	8.60	8.61
	2024	2025	2026	2027	2028	2029	2030
Total cost at 75% PLF (₹/kwh)	2024	2025	2026	2027	2028	2029	2030
Tariff: Udangudi Stage I	6.77	6.79	6.82	6.84	6.87	6.90	6.94
Tariff: Udangudi Stage II				7.09	7.11	7.14	7.17

Effective per unit cost of generation is higher at lower utilisation rates as fixed costs have to be paid irrespective of utilisation. Due to low demand, low position in merit order due to high variable costs and the must run status of renewable energy, the effective cost of generation from Udangudi Stage I and II will probably be closer to estimates at 55% PLF than 75% PLF. However, even at the unlikely 75% PLF level, these tariffs are substantially over-priced compared to other sources.



#3

## tamil nadu does not need new coal power

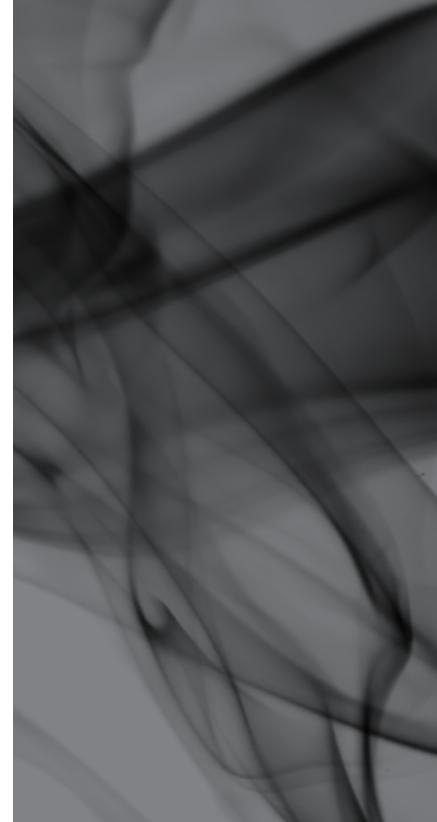
Tamil Nadu's thermal fleet has remained significantly under utilised over the past three years but TANGEDCO has procured additional power through short term contracts to meet peak periods. This phenomenon highlights the redundancy of baseload thermal plants in an energy system transitioning towards renewables. Tamil Nadu gets close to one fourth of its electricity from renewable sources, with thermal capacity operating at lower PLF because renewables have 'must run' status. As the share of renewables increases, the utilisation rate of thermal capacity will continue to decline.

Tamil Nadu's operational thermal capacity is 14,366 MW.<sup>18</sup> Other than Uppur/Udangudi, the coal plants currently under construction will add another 2,971 MW. If units older than 25 years are retired in the next few years as would be financially prudent, TN's coal capacity will be approximately 14,187 MW in 2030.

TABLE 12  
**TN thermal capacity in 2030**

<b>Current thermal capacity</b>	<b>14,366 MW</b>
(+) Neyveli New TPS*	326 MW
(+) North Chennai TPS	800 MW
(+) Tuticorin TPP	525 MW
(+) Ennore SCTPP	1,320 MW
(-) Old unit retirement	3,150 MW
<b>Total thermal capacity in 2030</b>	<b>14,187 MW</b>

\*Tamil Nadu's 65% share of 500 MW unit



There is a further 3,039 MW of non thermal capacity already under-construction and an additional 2,000 MW of pumped hydro planned.<sup>19</sup>

TABLE 13  
**Non-thermal capacity planned or under construction**

<b>Non-thermal capacity addition</b>	<b>Type</b>	<b>Capacity</b>
Kollimalai Hydro	Hydro	20
Bhavini Kalpakkam	Nuclear	167
Kundah Pumped Storage HEP	Pumped hydro	500
Silahalla Pumped Storage HEP	Pumped hydro	2000
KKNPP Units 3–6 (state's share)	Nuclear	2352
<b>Total</b>		<b>5,039 MW</b>

19. [www.tangedco.gov.in/linkpdf/pet3\(301219\).pdf](http://www.tangedco.gov.in/linkpdf/pet3(301219).pdf)  
[www.timesofindia.indiatimes.com/city/madurai/construction-of-kknpp-units-5-6-to-be-gin-today/articleshow/83935336.cms](http://www.timesofindia.indiatimes.com/city/madurai/construction-of-kknpp-units-5-6-to-be-gin-today/articleshow/83935336.cms)

The key argument in favour of new coal has been that it is indispensable to meeting peak loads during evening/night hours when there is no solar generation. However, with the advent of cost-competitive grid-scale battery storage, this argument is being challenged.

In FY 2021, peak demand was observed during daytime unlike previous years. It is too early to say if this trend will continue, as some have projected. If it does, it is safe to say that solar will play an ever increasing role in meeting daytime peaks. If peak demand occurs in the evenings, as has been the historical trend in India, then ‘dispatchable’ sources (thermal/nuclear/pumped hydro/battery storage) are required.

Tamil Nadu’s peak demand grew at less than 3.5% CAGR between FY 2015–FY 2020.<sup>20</sup> The highest peak demand of 17,121 MW was observed around noon on April 10, 2021.<sup>21</sup> Under an aggressive electricity demand scenario with 5% year-on-year growth over this decade, peak demand in FY 2030 will be 25,296 MW. In all likelihood, the state will not see such a high peak demand growth rate for the next decade. However, even if it does, is building new coal the most efficient way to meet this demand?

Table 14 shows the likely electricity mix at non-daytime peak periods for Tamil Nadu in 2030, assuming that non-coal capacity targets laid out by the state are met and that wind capacity grows in line with estimates put forward by NREL/TANGEDCO for economically feasible wind capacity.<sup>22</sup> The contribution of wind to meeting peaks is not nil. TANGEDCO assumptions of wind’s contribution to peak availability works out to a very conservative 5%. NREL’s assumptions are higher at 8%. The total capacity available during non-daytime peaks (when solar’s direct

20. [www.niti.gov.in/edm/#elecSupply](http://www.niti.gov.in/edm/#elecSupply)  
[www.tnrc.gov.in/Orders/files/CO-MPNo37%20050220211517.pdf](http://www.tnrc.gov.in/Orders/files/CO-MPNo37%20050220211517.pdf)

21. [www.dtnext.in/News/TopNews/2021/04/12002305/1287028/In-a-first-TNs-peak-power-demand-crosses-17000-MW.vpf](http://www.dtnext.in/News/TopNews/2021/04/12002305/1287028/In-a-first-TNs-peak-power-demand-crosses-17000-MW.vpf)

22. [www.nrel.gov/docs/fy21osti/78266.pdf](http://www.nrel.gov/docs/fy21osti/78266.pdf)



contribution is nil) will be approximately 18,000 MW—about 8,000 MW short of peak demand under a 5% growth scenario. Thus, even the addition of the 2920 MW Udangudi Stage I and II would not meet this peak demand, despite posing a large financial burden on the state.

A more cost-effective and reliable alternative is to ensure that Tamil Nadu progressively installs up to 8 GW of 4-hour battery storage co-located with solar/wind by 2030. This will ensure that peak demand can be met more flexibly, with greater reliability and at a lower cost than through the addition of long gestation, capital intensive coal projects. Due to the smaller gestation period of battery storage investments, this option also minimises the risk inherent with long-gestation projects such as coal power plants, allowing annual or biennial investments to adjust to actual demand growth or lack of it, as the case may be. If, as seems likely, peak demand will grow at less than 5%, it is easier for planners and market forces to adjust by building or postponing RE+storage projects that take 12–24 months to come on stream, rather than coal power plants that take 5–6 years from commencement to commissioning.

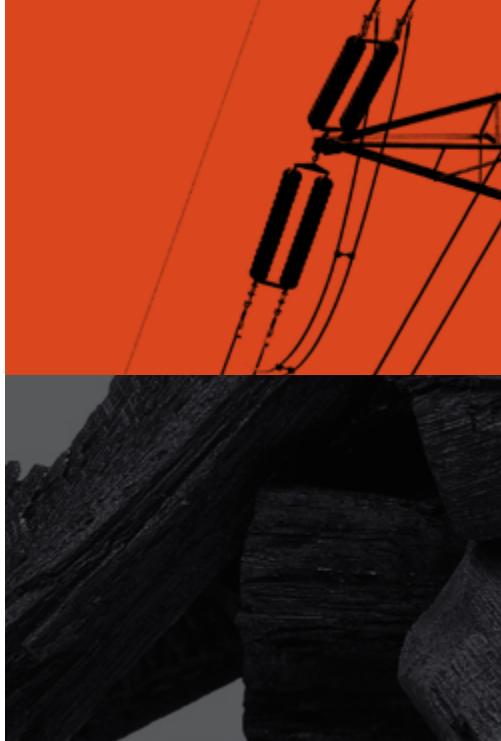
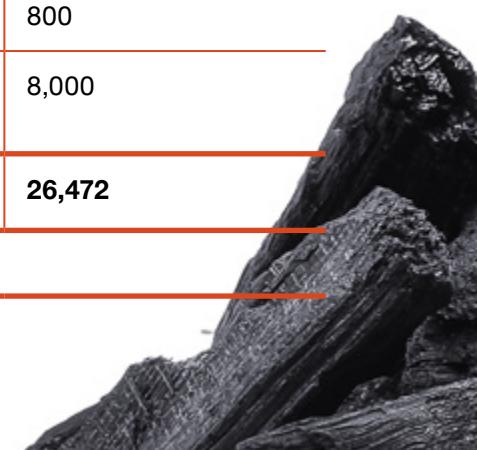


TABLE 14  
**TN installed capacity and evening peak availability in 2030**

Source	Capacity (MW)	Peak availability (%)	Available capacity (MW) during peaks
Thermal	14,187	85%	12,059
Nuclear	4,105	70%	2,874
Hydro	2,198	45%	989
Pumped Storage	2,500	70%	1,750
Wind*	16,000	5%	800
New storage (1 MW/4 MWH)	8,000	100%	8,000
<b>TOTAL</b>	<b>46,427</b>		<b>26,472</b>

\*NREL/TANGEDCO estimates 20-23 GW of capacity is economically feasible by 2030.



# #4

## cheaper power options for tamil nadu

TANGEDCO has multiple options to procure power to meet increased demand for electricity. Renewable energy tariffs have fallen to an extent that they are now lower than the variable cost of generation of almost the entire thermal capacity located within the state.

The cost of RE+ battery storage (4 hour) is already at par or cheaper than state run thermal capacity. As the share of RE grows in the energy mix, without adequate transmission and storage, renewable energy curtailment will increase. Battery prices are expected to decline further over the coming decade: the LCOE of RE+storage is expected to be ₹3.4/kWh by 2030, which will be comparable to the estimated ₹3.41/kWh variable cost alone of the thermal plants currently under construction.

New coastal thermal plants are the most expensive option for new capacity addition as cost of generation will be higher due to Pollution Control Technology implementation and coal transportation costs. Moreover, with low utilisation rates, the effective cost of generation increases as the fixed costs has to be paid. Procuring power from short/medium contracts or the power exchange is cheaper and better suited for meeting seasonal peak demand.

TABLE 15  
**Cost of power procurement options for Tamil Nadu**

<b>Power procurement options for TANGEDCO</b>	<b>Tariff/LCOE (₹/kWh)</b>
Solar <sup>23</sup>	₹2.8
Wind <sup>24</sup>	₹2.9
Solar and wind+storage <sup>25</sup>	₹4.97
RTC-MTOA/STOA*	₹3.3–4.0
TANGEDCO's thermal plants <sup>26</sup>	₹6.0–8.0

\*Round the clock—medium/short-term open access

Rather than incurring significant financial risk and burden through the 2,920 MW at Udangudi, Tamil Nadu can meet its electricity needs through a combination of RE+storage, with the energy exchanges and short term contracts serving as backup in case of need.

JMK Research and analytics recent study “The case of proving Battery Storage Viability in Tamil Nadu” and CRH calculations show that LCOE of RE with 4 hours of battery storage will be ₹5.85/kWh in 2024 when Udangudi Stage I is likely to commence operation and ₹4.4/kwh in 2027 when Udangudi Stage II is likely to commence operation. This compares favourably with the likely starting tariffs from the coal power plants of ₹8.2 and ₹8.5/kWh respectively, with a per kWh saving of ₹2.35 to ₹4.17 respectively from Year 1, growing annually due to the probable cost escalations inherent in coal’s supply chain.

- 23. [www.eqmagpro.com/tangedco-to-buy-500mw-solar-power-for-25-years-to-meet-clean-energy-quo](http://www.eqmagpro.com/tangedco-to-buy-500mw-solar-power-for-25-years-to-meet-clean-energy-quo)
- 24. [www.mercomindia.com/tamil-nadu-ap-proves-tariff-wind-projects](http://www.mercomindia.com/tamil-nadu-ap-proves-tariff-wind-projects)
- 25. [www.jmkresearch.com/renewable-sector-published-reports/case-for-proving-battery-storage-viability-for-tamil-nadu/#:~:text=The%20research%20further%20highlighted%20that,hrs%20per%20day%20in%202018](http://www.jmkresearch.com/renewable-sector-published-reports/case-for-proving-battery-storage-viability-for-tamil-nadu/#:~:text=The%20research%20further%20highlighted%20that,hrs%20per%20day%20in%202018)
- 26. [www.eqmagpro.com/wp-content/uploads/2020/06/TANGEDCO-MPNo12of2020-.pdf](http://www.eqmagpro.com/wp-content/uploads/2020/06/TANGEDCO-MPNo12of2020-.pdf)

Investing in RE+storage instead of continuing construction of the Udangudi units will reduce power purchase costs for the state. Savings from substituting the power supply from these thermal plants with RE+storage will add up to approximately ₹20,000 cr. and ₹15,000 cr. at 55% PLF and 75% PLF respectively. Crucially, this is just for the period 2024–2030. When considering the 25-year lifetime of the

coal projects, the savings from RE+storage rather than power procurement from Udangudi would be higher by a factor of 4 or 5.

TABLE 16

**Savings from substitution of power from Udangudi with RE+storage**

<b>RE+storage substitution per unit saving at 55% PLF (₹/kWh)</b>	2024	2025	2026	2027	2028	2029	2030
Udangudi Stage I	2.35	2.36	2.37	2.38	2.40	2.42	2.44
Udangudi Stage II				4.17	4.18	4.20	4.21
<b>RE+storage substitution per unit saving at 75% PLF (₹/kWh)</b>	2024	2025	2026	2027	2028	2029	2030
Udangudi Stage I	0.92	0.94	0.97	0.99	1.02	1.05	1.09
Udangudi Stage II				2.69	2.71	2.74	2.77
<b>RE+storage substitution total savings at 55% PLF (INR CR.)</b>	2024	2025	2026	2027	2028	2029	2030
Udangudi Stage I	1,270	1,275	1,281	1,288	1,298	1,308	1,321
Udangudi Stage II				2,732	2,740	2,749	2,761
<b>Total savings at 55% PLF</b>	<b>1,270</b>	<b>1,275</b>	<b>1,281</b>	<b>4,020</b>	<b>4,037</b>	<b>4,058</b>	<b>4,082</b>
<b>RE+storage substitution total savings at 75% PLF (INR CR.)</b>	2024	2025	2026	2027	2028	2029	2030
Udangudi Stage I	679	695	712	731	752	775	800
Udangudi Stage II				2,402	2,424	2,449	2,476
<b>Total savings at 75% PLF</b>	<b>679</b>	<b>695</b>	<b>712</b>	<b>3,133</b>	<b>3,177</b>	<b>3,224</b>	<b>3,276</b>

# discussion

## **will cancelling uppur and udangudi waste the ₹6,000 cr. already spent?**

The Udangudi and Uppur projects were proposed at a time when there was a clear power deficit in Tamil Nadu and new coal capacity was the cheapest and most reliable option to bridge that deficit. However, by the time the projects broke ground in 2016/2017, circumstances had begun to change. Today the momentum and markets have moved decisively in favour of renewable energy and battery storage. The tough question before the government and people of Tamil Nadu is whether to adapt to changed circumstances or stay the course, even at considerable cost to consumers and the state's finances.

Over ₹6,155 cr. has already been spent on Uppur and Udangudi. This is a large sum, but it is less than 22% of the total projected expenditure on these projects.



Completing these projects will mean spending at least another ₹22–24,000 cr. Is this expenditure justified?

Power from a combination of RE and storage will not only be more flexible but also significantly cheaper—yielding a saving of at least ₹15,000, and possibly as much as ₹20,000 cr., by 2030 alone. Even at the lower end, the savings will be more than double the amount invested till date. Moreover, the generation cost gap between these plants and RE+storage will only widen over the years with increases in the price of coal, rail freight charges and regulatory oversight.

Continuing with construction of Uppur and Udangudi on the basis of the ₹6,000 cr. already invested will be a perfect example of the ‘sunk cost fallacy’—where additional investments are made out of an effort to justify expenses already incurred. Succumbing to this will actually cost TANGEDCO and the state government much more in the long run.

# implications for the government of tamil nadu

Replacing Udangudi Stage I and II (formerly Uppur) with less expensive RE+battery storage will yield several benefits for the state of Tamil Nadu:

**1 >>**

## Lower subsidies

The state government provides subsidies for agricultural and domestic users. With higher generation/supply costs, the subsidy burden increases. Lowering power purchase costs by relying on RE and battery storage will in effect lower subsidy payouts by reducing the gap between average cost of supply and average revenue realised.

## Lower debt

TANGEDCO can avoid debt of ₹20,000 cr. by cancelling Uppur and Udangudi as the expenditure incurred till date is lower than required equity investment. By procuring round the clock power via RE with storage from aggregators or IPP's, TANGEDCO can avoid or reduce significantly the debt burden the debt burden involved in building its own generation capacity, while utilising competitive bidding to reduce tariffs.

**< 2**

**3 >>**

## Lower government guarantees

Higher government guarantees lead to lower credit rating and costlier borrowings for the state. Due to TANGEDCO's poor financial performance, lenders are seeking government guarantees for new debt.<sup>27</sup> A significant addition to government guarantees can be avoided by cancelling Uppur and Udangudi and procuring RTC renewable power from aggregators and IPP's through competitive bidding.

27. [www.timesofindia.indiatimes.com/city/chennai/tamil-nadu-tanged-co-funders-want-guarantee-for-investments/articleshow/73831819.cms](http://www.timesofindia.indiatimes.com/city/chennai/tamil-nadu-tanged-co-funders-want-guarantee-for-investments/articleshow/73831819.cms)

# conclusion

Reducing Tamil Nadu's unsustainable debt burden is an urgent priority for the state, as is boosting economic growth and employment. Continuing to invest thousands of crores on the Udangudi coal projects will undermine both objectives by 1) increasing TN's debt burden directly through increased borrowing; 2) increase TN's debt indirectly by raising the cost of electricity and thus the subsidy burden on the state and 3) locking the state in to higher priced electricity, undermining economic development and social progress.

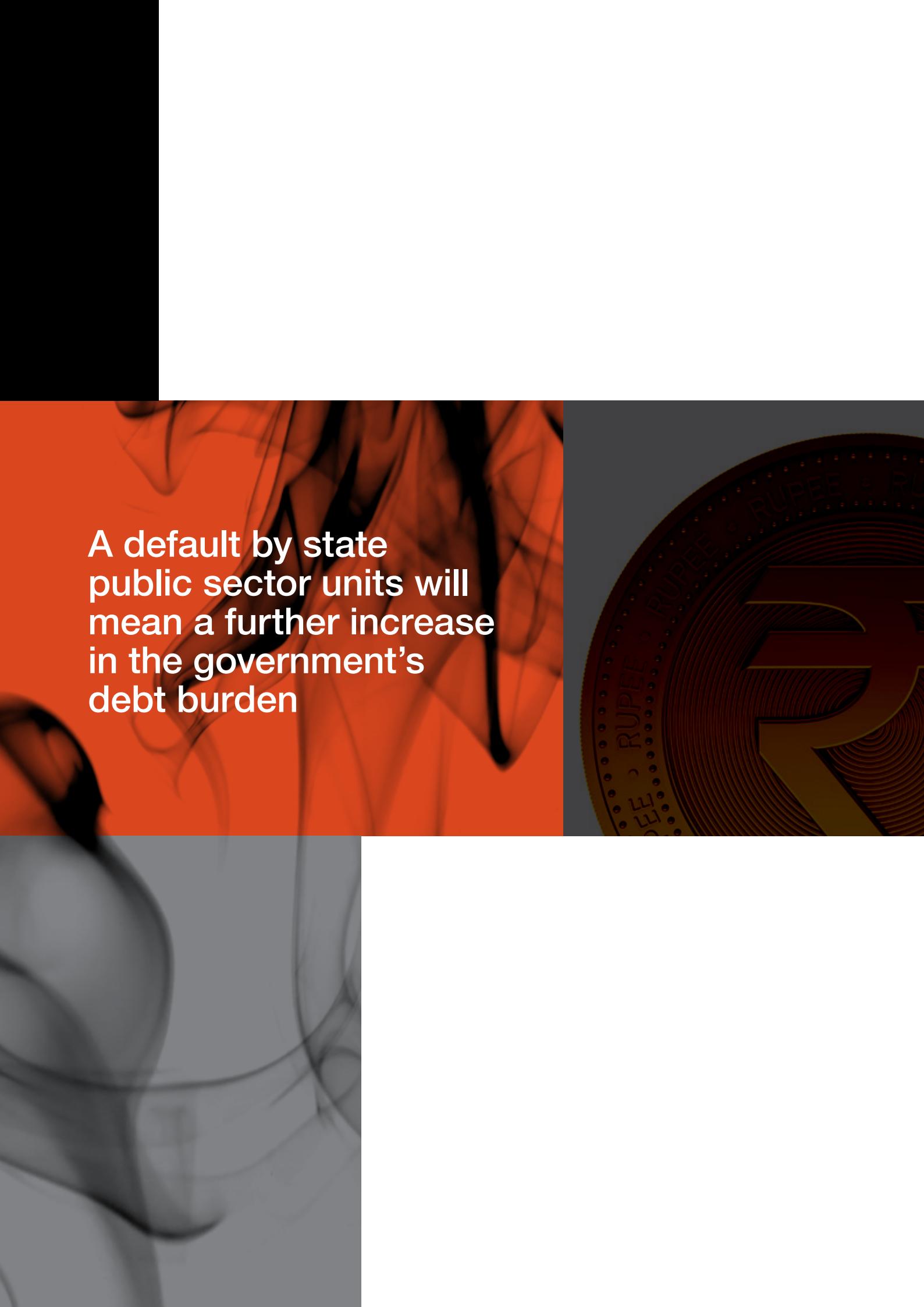
New coal based generation is not required because of a combination of factors, including lower than projected demand, the inability of inflexible thermal plants to adapt to a grid with changing demand and supply patterns, falling price of renewable energy, increasing competitiveness of energy storage, greater grid integration at the regional and national-level and a long-term move towards national-level market based economic dispatch.



Persisting with the construction of Udangudi Stage I and II will result in:

- Long term lock-in of expensive power leading to an escalation in the overall cost of supply
- If tariffs are raised to meet this cost escalation, consumers will have to bear higher electricity bills
- If tariffs are kept unchanged, the gap between cost of supply and revenue raised will grow further, leading to further losses for TANGEDCO
- Because the state has outstanding guarantees for TANGEDCO's debt, the state's credit rating and cost of finance will also be impacted

These projects will have a negative impact on the state's financial health. ₹6,155 cr. has already been spent on them, but courageous, rational decision-making requires pulling the plug on both the Udangudi Stage I and Uppur/Udangudi Stage II projects as this will save the state ₹29,000 cr. by way of fixed cost payments and at least ₹15,000 cr. in terms of reduced power purchase costs between 2024 and 2030.



**A default by state  
public sector units will  
mean a further increase  
in the government's  
debt burden**

# climate risk horizons

Climate Risk Horizons' (CRH) work highlights the systemic risks that disruptive climate change poses to investors, lenders and infrastructure investments. Through a data-driven, research-oriented approach that incorporates a holistic understanding of climate policy, energy infrastructure and regulatory processes, CRH provides advice on risk management strategies to minimise stranded, non-performing assets and economic disruption in the face of climate change.

Learn more about our work at [www.climateriskhorizons.com](http://www.climateriskhorizons.com)

## white elephants

**new coal investments threaten tamil nadu's financial recovery**



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