

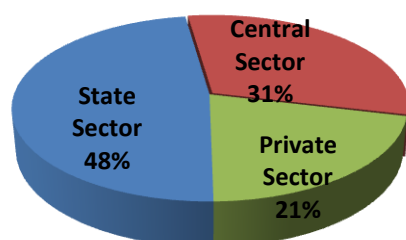
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## Power Shortages in India's Southern Region: Challenges for Growth

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The power industry is one of the largest and most important industries in India as it fulfils the energy requirements of various other industries. India has the world's fifth largest electricity generation capacity and it is the sixth largest energy consumer accounting for 3.4 per cent of global energy consumption. In India, power is generated by State utilities, Central utilities and private players. The share of installed capacity of power available with each of the three sectors can be seen in the pie-chart below:

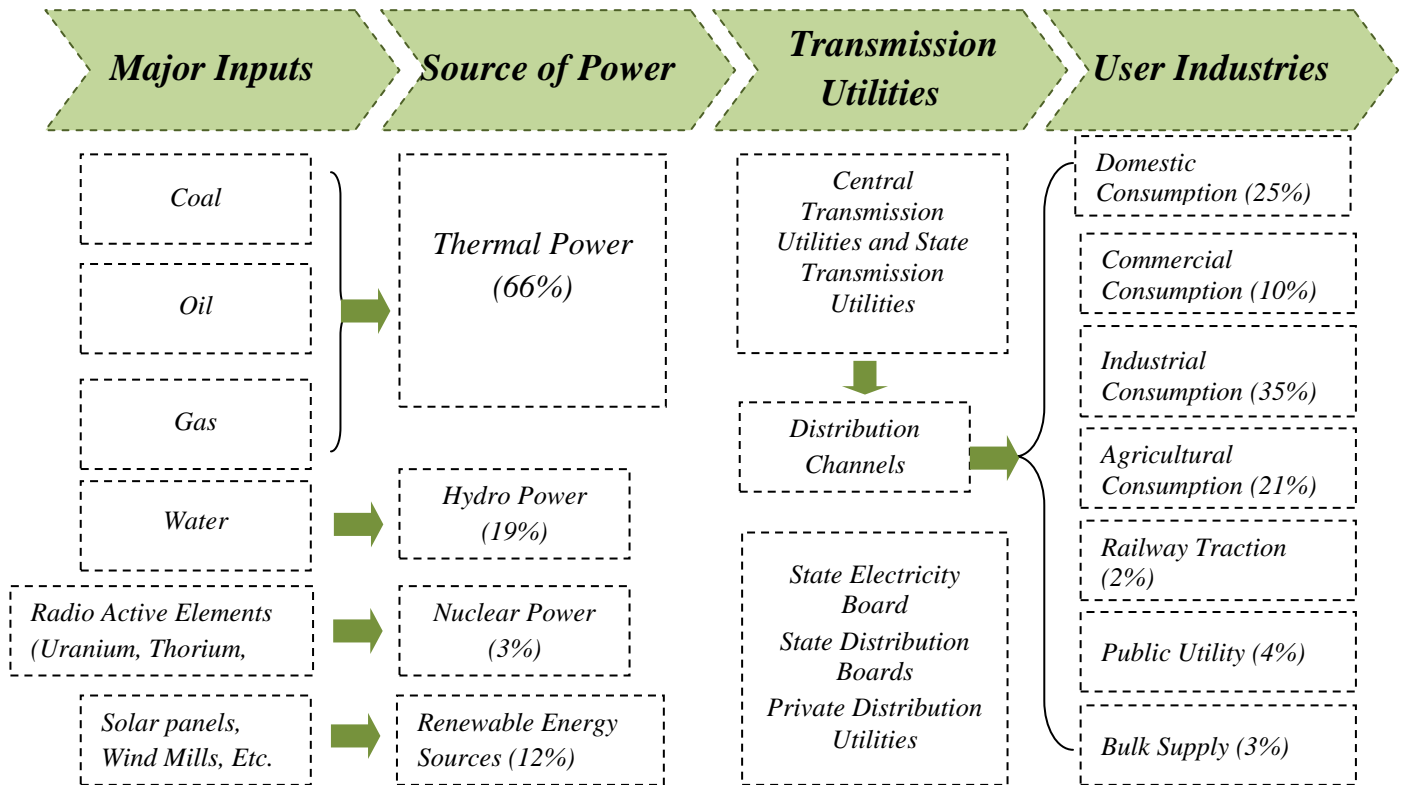
**Figure 1: Top Players in the Power Sector**



| Top Players in the Power Sector |                |
|---------------------------------|----------------|
| NTPC                            | Public Sector  |
| NHPC                            |                |
| Power Grid Corporation          |                |
| Reliance Power                  | Private Sector |
| TATA Power                      |                |
| Adani Power                     |                |

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**Figure 2: The Power Sector Value Chain**



The continuing gap between demand and supply led the Planning Commission to adopt an ambitious target for power generation for the Eleventh Five Year Plan (2007-2012) of 78,000 MW of fresh generation capacity. This had to be scaled down, and only around 54,000 MW could be added in this period, and that too with a significant contribution from the private sector. The gap between availability and demand, in a growing economy, has increased. In the Southern Region, in particular, the gap has become even more, as this region has been growing faster than the rest of the economy.

The Southern Region now contributes 26 per cent of the country's GDP, with only 23 per cent of installed capacity (excluding renewable). The industrial sector contributes 80 per cent of revenue and accounts for 60 per cent of the Gross State Domestic Product. Energy consumption of the industrial and commercial sectors has been growing and the current power constraints have started affecting output from manufacturing as well as commercial sectors.

**This paper argues that neglect of the Southern Region in power generation and transmission facilities is affecting the region's growth potential.**

**Table 1: GDP and GSDP of Southern Region and India**

| GSDP in Rs. Crore           | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 |
|-----------------------------|---------|---------|---------|---------|---------|
| Andhra Pradesh              | 306645  | 327731  | 347344  | 381942  | 407949  |
| Karnataka                   | 228202  | 244421  | 257125  | 279932  | 297964  |
| Kerala                      | 154093  | 162659  | 177209  | 193383  | 208468  |
| Tamil Nadu                  | 305157  | 320085  | 350258  | 391372  | 428109  |
| Southern Region Total       | 994097  | 1054896 | 1131936 | 1246629 | 1342490 |
| All-India GDP(2004-05 base) | 3896636 | 4158676 | 4507637 | 4885954 | 5222027 |

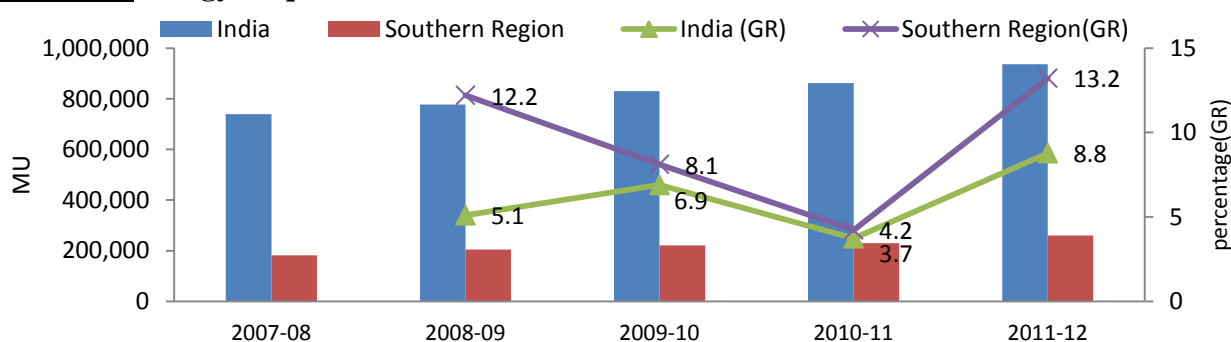
**Source:** Directorate of Economics & Statistics of Respective State Government (2004-2011) & Central Statistics Office

**Table 2: Annual Electricity Consumption**

| Consumption in Million Units       | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 |
|------------------------------------|---------|---------|---------|---------|---------|
| India Energy Consumption           | 666149  | 690787  | 746704  | 788355  | 857537  |
| Southern Region Energy Consumption | 176001  | 188711  | 206459  | 217949  | 237395  |

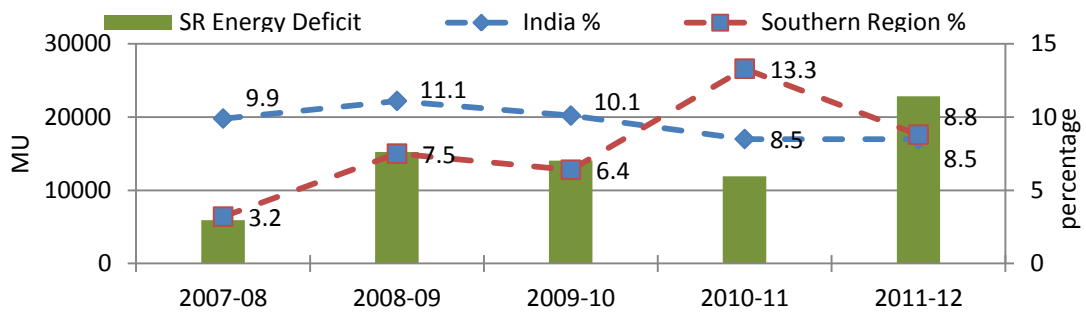
**Source:** Load Generation Balance Reports (2007 - 2012), Central Electricity Authority

The energy intensity of growth in Southern Region has been expanding faster than the all India requirements. This has led to a growing deficit in energy availability in the region. The energy deficit in million units has almost doubled in 2011-12, although some new generation capacity has been added.

**Figure 3: Energy Requirement vs. Growth**

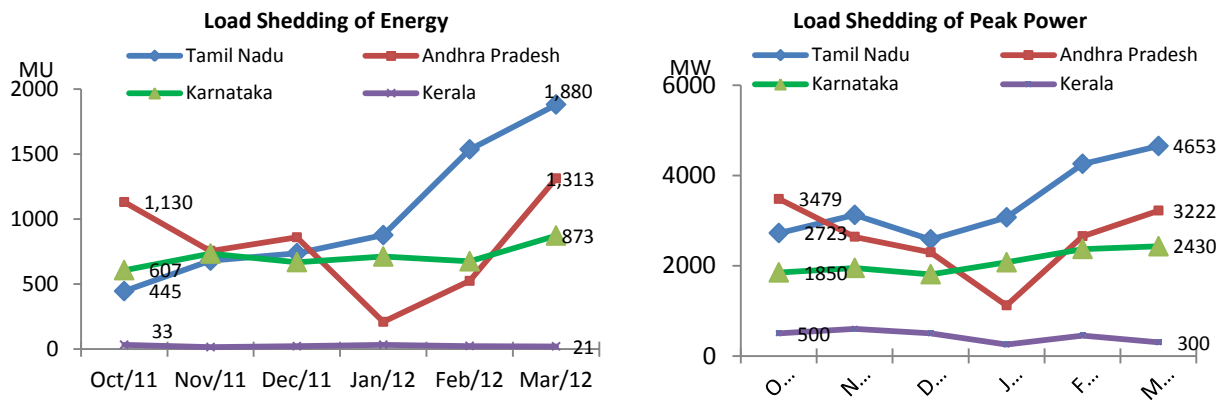
**Source:** Load Generation Balance Reports (2007 - 2012), Central Electricity Authority

**Figure 4: Growth in Energy Deficits**



**Source:** Load Generation Balance Reports (2007 - 2012), Central Electricity Authority

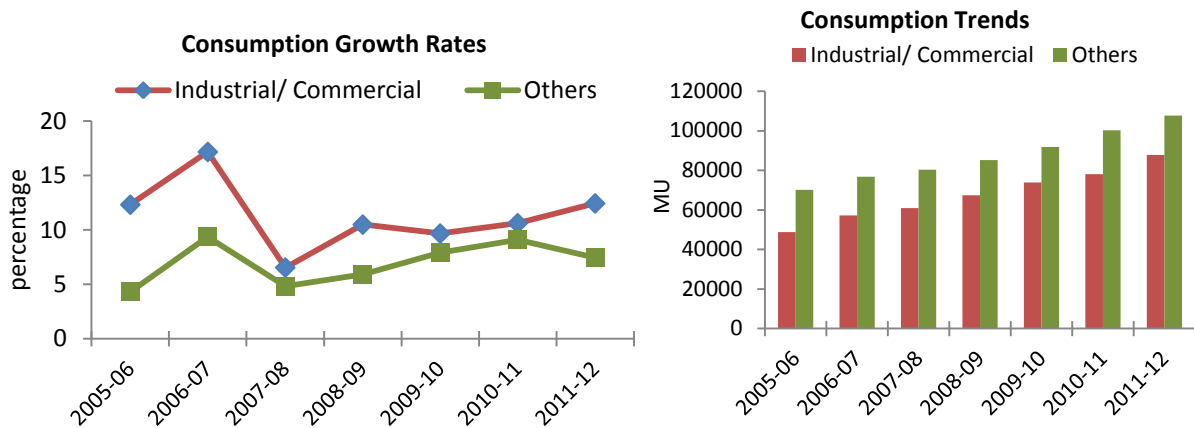
**Figure 5: Load Shedding Trends in the Southern Region**



**Source:** Monthly Report on Power Cuts to Industries, Central Electricity Authority, accessed on May 12, 2012

It may be seen that Tamil Nadu has been affected the most, with a sharp energy load shedding after January 2012. The pattern of consumption growth trends indicates increasing industrial and commercial activity in the region.

**Figure 6: Energy Consumption in the Southern Region**

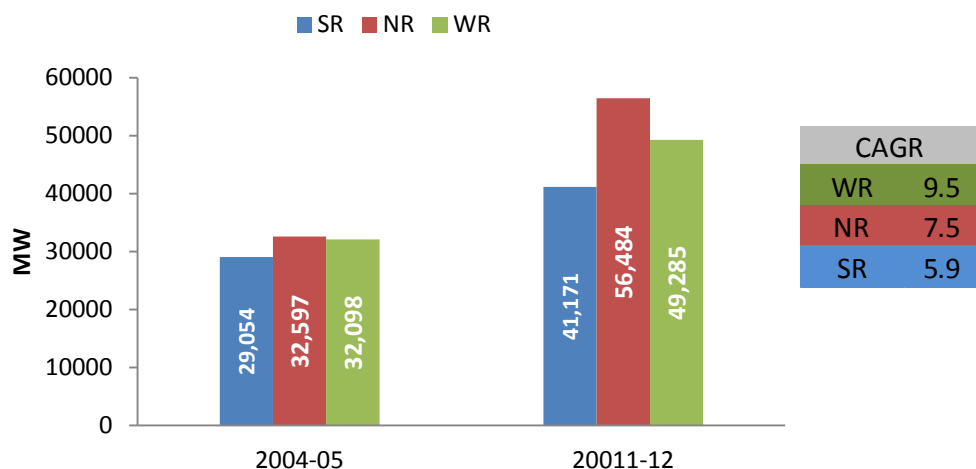


**Source:** Annual Revenue Requirement & Retail Supply Tariff (2005-2012), various State Electricity Regulatory Commissions.

Even in terms of installed capacity, growth in the western and northern regions has been far greater than the Southern Region. This has led to a situation where shortages have increased—the Southern Region is growing faster, and yet the generation capacities have been lagging behind, thus exacerbating the shortages.

The installed capacity (conventional source) of the Western Region grew at a CAGR (compounded annual growth rate) of over 9.5 per cent since 2004-05 and for the Northern Region it grew at 7.5 per cent, however in the Southern Region only a 5.9 per cent growth was witnessed during the same period.

**Figure 7: Installed Capacity (Conventional sources)**



**Source:** Installed Capacity (In Mw) Of Power Utilities in the States/UT (2005-2012), Central Electricity Authority

Even more serious is the lack of transmission capacity in the Southern Region. The growth of transmission in the Southern Region in the last decade has been much smaller than in the other regions (see map) thus constraining the flow of power into and out of this region. There is thus a mismatch between the growth of availability of power in the northern and western regions and the ability to use this power in the Southern Region, where there are severe shortages and bottlenecks. During the 11th Plan, the inter-regional transmission capacity between the Southern Region and the rest of the country increased by 500 MW, where as capacity between other regions such as the Western and the Northern Region increased by over 8,500 MW during the same period.

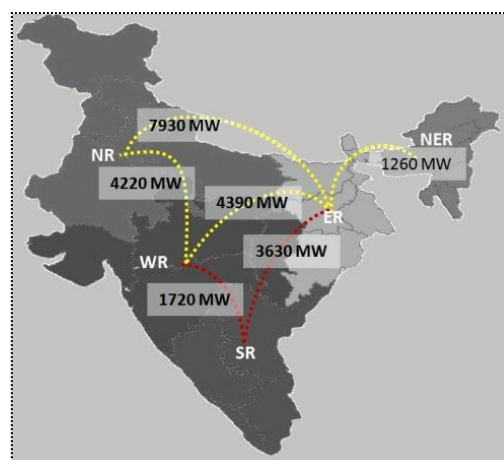
Congestion in the SR grid occurred almost daily between June 2010 and Aug 2011 with congestion touching 25 per cent for most months and over 50 per cent congestion for four months. Rs 573 crore additional congestion charges were paid by southern consumers for purchasing power from the exchanges. As a result of this congestion, the South was unable to draw enough power from the exchanges.

**Table 3: Growth in Inter-regional Transmission Capacity**

| In MW       | End of 10th Plan | as on 2009-10 | as on 30 <sup>th</sup> Dec 2011 |
|-------------|------------------|---------------|---------------------------------|
| ER-SR       | 3130             | 3630          | 3630                            |
| ER-NR       | 3430             | 6330          | 7930                            |
| ER-WR       | 1790             | 2990          | 4390                            |
| ER-NER      | 1260             | 1260          | 1260                            |
| NR-WR       | 2120             | 4220          | 4220                            |
| WR-SR       | 1720             | 1720          | 1720                            |
| India Total | 13450            | 20150         | 23150                           |

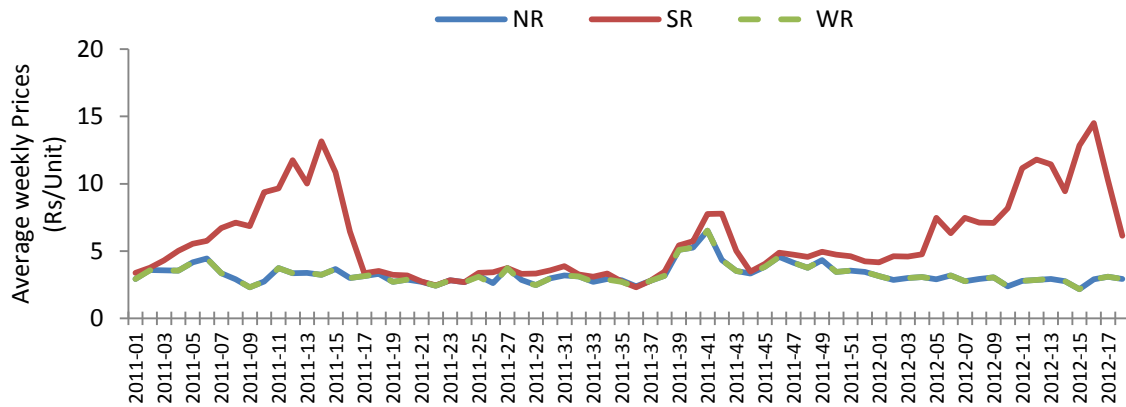
**Source:** Draft National Electricity Plan (Volume II – Transmission) Feb- 2012, Ministry of Power, Central Electricity Authority

**Figure 8: Inter-Regional Transmission Capacity**



The clear evidence of this mismatch has been in the price of exchange traded power in the Southern Region. These prices have been ruling at several multiples of the rates in the rest of the country.

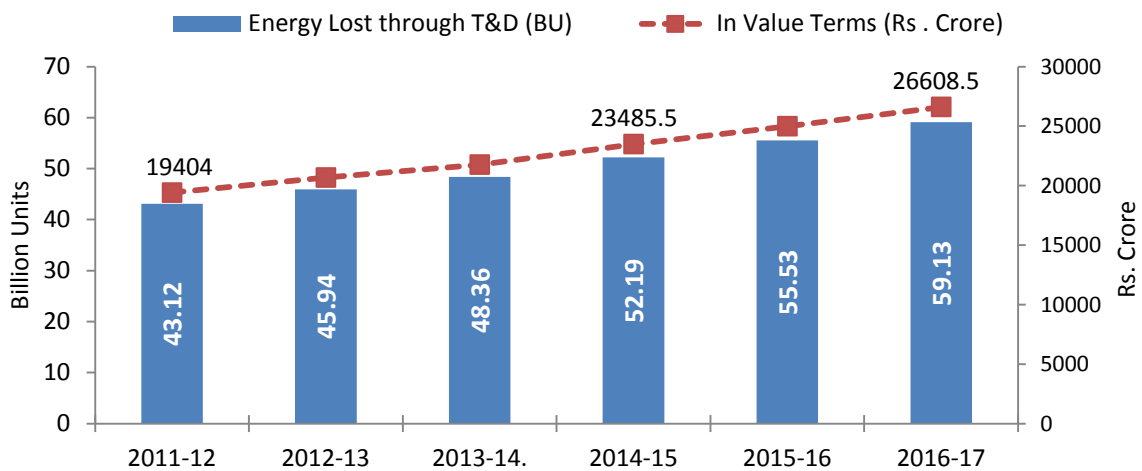
**Figure 9: Exchange Traded Power (2011-12)**



**Source:** Indian Energy Exchange, Average Weekly Prices, Accessed 12 May 2012. <http://www.iexindia.com/Reports/AreaPrice.aspx>

It is clear that there are serious constraints to availability and distribution of power in the Southern Region that needs to be addressed through short term as well as long term measures. A common feature among the four states of the Southern grid (Tamil Nadu, Andhra, Karnataka and Kerala) is the substantial losses in transmission and distribution. The energy lost through T&D losses in the Southern Region is equivalent to the annual consumption of Madhya Pradesh and in terms of value is just above the expenditure requirement of all distribution utilities in Karnataka. In 2011-12, 43.12 billion units of energy were lost owing to T&D losses. A one per cent reduction in T&D losses in the Southern Region can result in 2.13 billion units of energy saving annually.

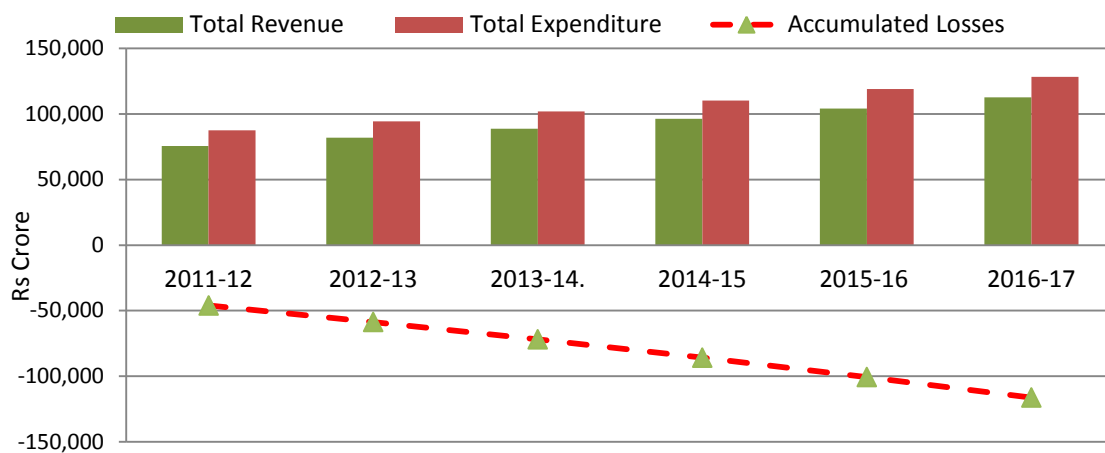
**Figure 10: Expected Losses due to T&D**



**Source:** High Level Panel of Financial Position of Distribution Utilities, Dec- 2012, Planning Commission of India

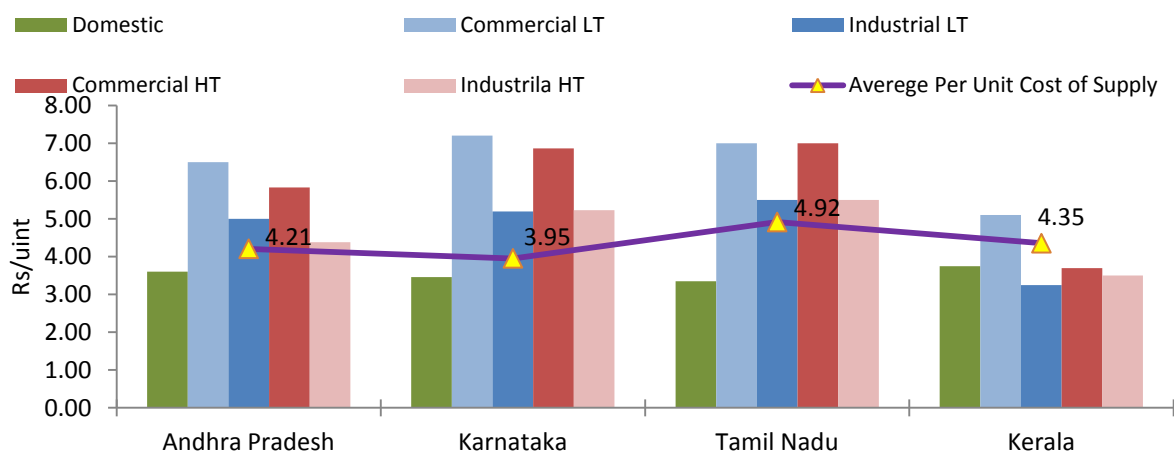
The financial health of the power utilities is also poor (see graph below). In the Southern Region, accumulated losses as on 2011-12, exceeded Rs 46,000 crore, and almost all the utilities are financially unviable. Due to the high financial losses faced by most utilities, they are unable to purchase power in times of deficit, leading to power cuts. The accumulated losses are about one per cent of the national GDP and are estimated to grow to over Rs. 1.16 lakh crore by the end of the 12th Plan. Owing to such high losses, utilities have increased the tariff on power, which is above the cost to serve.

**Figure 11: Financials of Utilities in the Southern Region**



**Source:** High Level Panel of Financial Position of Distribution Utilities, Dec- 2012, Planning Commission of India

**Figure 12: Per Unit Revenue Realised vs. Average Cost to Serve**



**Source:** Annual Revenue Requirement & Retail Supply Tariff (2012-13), High Level Panel of Financial Position of Distribution Utilities, Planning Commission of India

It is evident that the high level of subsidies would continue to stress the financials of the power utilities.



## **Conclusion**

There are opportunities to address these infirmities, both in the short term as well as the medium term. Among the alternatives to cut down T&D losses would be the introduction of demand side measures to manage peak loads and to introduce a franchise model for collection and billing. Tariff reforms could consider time of day tariffs for all consumers, and perhaps adopt the Gujarat model of separate feeders for free power and metered power. There is also an opportunity for taking public lighting off the grid in smaller towns by encouraging decentralised and distributed generation through hybrid sources of energy through solar and wind. Plant load efficiencies could be incentivised through higher tariff purchases.

In the medium term, apart from focusing on fresh generation capacity, there could be an emphasis on reducing congestion in the transmission grid. Investment in improving transmission appears to be among the most urgent priorities for the Southern Region.

Given the growth potential of the Southern Region, and the constraints to growth that is seen as being due to inadequate power supply, there is need for urgency to address both short term as well as long term measures.

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