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Powering India: The Next-Generation Reforms in Power Distribution Sector

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Abstract

Indian power sector witnessed several reforms since 1991 and series of reforms after enactment of landmark legislation 'The Electricity Act, 2003'. Although these reforms have significantly contributed to the development of power sector, it has failed to achieve financial viability of the state power utilities. Sustained financial losses of DISCOMs remain a major threat to India's energy security and economic growth. This study determines the factors significantly contributing to the sustained losses of DISCOMs from the detailed literature survey. It also evaluates the impact of power sector reforms post 2003 by SWOT analysis. The study finds that state-run DISCOMs in India have become financially and commercially unviable and unsustainable. Huge commercial losses, un-targeted subsidies, irrational tariff, rampant theft, strong government intervention in tariff setting process have significantly contributed to the sustained financial losses. The paper prescribes the needed policy initiatives for the Next-Generation reforms in the distribution sector.

Keywords: Financial viability, power distribution companies, DISCOM, power sector reform, Aggregate Technical and Commercial (AT&C) Loss

INTRODUCTION

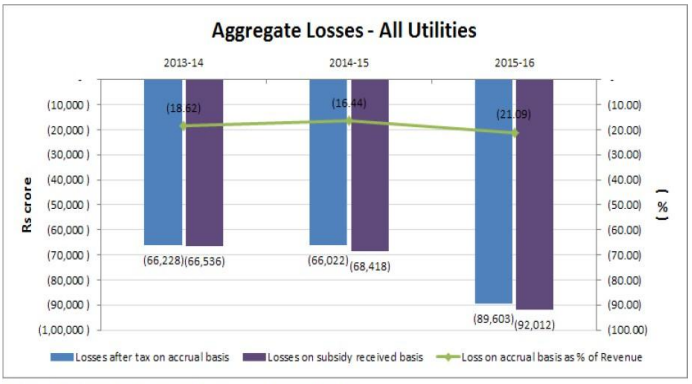
Indian power sector witnessed several reforms since 1991 and implementation of several reform schemes after enactment of landmark legislation 'The Electricity Act, 2003'[42]. Severe financial crisis in India during 1991 has led to many economic reforms including power sector since opening up of the economy[36]. Although these reform measures have significantly contributed for the development of power infrastructure and achievement of several reform parameters, it has not succeeded to achieve financial viability of state power utilities. A huge sustained loss of DISCOMs is a major threat to the sustainability of the power sector, India's energy security and country's economic growth.

Robust and sustainable power sector is the pre-requisite for socio economic development of any nation. Since, electricity is the concurrent subject in the constitution of India both central and state government has implemented several reform programs in power sector for its sustainable development [20]. However, despite implementation of several reforms in the sector, the state-run DISCOMs continued to make huge financial losses on sustainable basis and the business sustainability of the DISCOMs remains a major concern for the sectoral and economic growth[27]. The sustained financial losses of state-run DISCOMs have undermined the soundness of the Indian power sector [36].

Mounting financial losses of state power utilities

Despite implementation of several rounds of reforms in power sector during the past 14 years post enactment of EA-2003, the reform measures has not been successful in achieving the financial viability of the state power utilities[35]. The aggregate losses of all the state power utilities are mounting year-on-year basis and it has reached an alarming level. The aggregate losses of state power utilities for the FY 2015-16 on subsidy received basis increased to Rs.92,012 crore from Rs.68,418 crore in FY 2014-15[30] as shown in Figure-1. The losses on accrual basis as percentage of revenue received have increased to 21.09% of the total revenue for the FY 2015-16 from 16.44% in FY 2014-15 [30].

Figure-1



Source: PFC report on performance of state power utilities 2015-16

The sustained huge financial losses have eroded the net worth of the state-run DISCOMs and they became bankrupt, which has derailed the power sector reforms and heavily impacted the economic growth of the nation in a big way.

Unsustainable power distribution business

For sustainable development of power sector, the financial viability of the DISCOMs is of paramount importance. Achieving the financial viability is one of the primary objectives of the power sector reforms[34]. To achieve financial viability and sustainability of power distribution

business of the state-run DISCOMs, they have to operate its business on commercial principles to make profit.

However, despite several rounds of reforms, DISCOMs are unable to generate sufficient revenue to meet the cost incurred to supply the electricity resulting into huge revenue shortages and mounting accumulated losses[27]. The accumulated loss of all the state-owned power utilities for the FY 2015-16 has reached an alarming level of Rs.4,85,922 Crores, which is 4.28% of the GDP of India for the year 2015-16[30]. As per the PFC Report 2015-16, the total net worth of state power utilities selling power directly to the consumers for the FY 2015-16 stood at Rs.2,16,125 Crore (Negative)[30]. The DISCOMs have virtually become bankrupt. For the financial turnaround of the state power utilities, Government of India has granted major financial restructuring packages three times to bailout DISCOMs in 2003, 2012[10] and recently in 2015 through Ujjwal DISCOM Assurance Yojana (UDAY), a reform linked financial restructuring package for financial and operational turnaround of DISCOMs [42].

Research Objective

This research has been carried out to determine the factors significantly contributing to the sustained financial losses of the DISCOMs and to formulate the Next-Generation reform strategies to achieve the financial viability of the DISCOMs for the sustainable development of power sector.

Research Methodology:

This research has been carried out to determine factors significantly contributing to the sustained losses of DISCOMs by extensive review of most relevant literature. This paper also evaluates the impact of power sector reforms and achievement of various reform parameters post enactment of the Electricity Act, 2003 by SWOT (Strength, Weakness, Opportunity and Threats) analysis based on extensive literature survey on various reform programs implemented in Indian power sector and review of research papers.

Impact of power sector reforms post EA-2003: SWOT Analysis

A reform can be considered as sustainable, if it is politically acceptable, financially viable, economically efficient, socially desirable, environmentally benign, and is implementable as a project[34]. In this paper, a detailed SWOT analysis has been made to evaluate the impact of the power sector reforms carried out reform post EA-2003 and achievement of the financial viability parameters has been studied in detail based on detailed literature review.

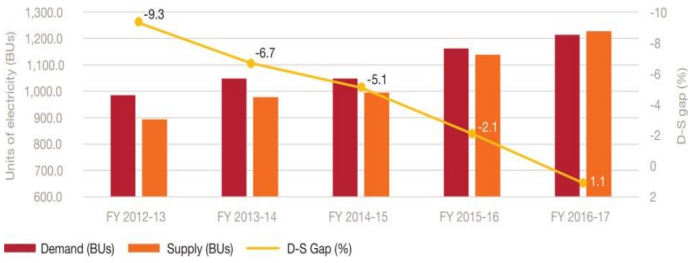
Strength

The power sector in India witnessed accelerated growth and the sector has successfully achieved many of the reform parameters post enactment of EA-2003. Some of the major achievements of reform parameters post EA 2003 are described below:

Demand-Supply gap bridged

With the sustained generation capacity addition programme, the sector has achieved an aggregate installed capacity of 3,30,000 MW (as on August 2017), which exceeds the country's power demand. The power shortages have virtually vanished. The demand-supply gap in the sector during past five years have drastically declined from negative gap of 9.3% to 1.1% between FY 2012–13 and FY 2015–16 as shown in Figure-2. This is one of the major milestone achievements in Indian power sector. The sector used to have as high as 18 per cent power shortage in the past. In the past 15 years period from 2002 and 2017, about 2,25,000 MW of power generation capacity was added, making an aggregate installed capacity of 330 GW. The energy demand of the country in August 2017 stood at 1,04,231 Million Units (MU), while the supply of energy stood at 1,03,571 MU[8]. Due to the consistent efforts on generation capacity addition, the sector is able to match the growing demand-supply gap despite innumerable challenges.

Figure-2



Source: CII (www.pwc.in)

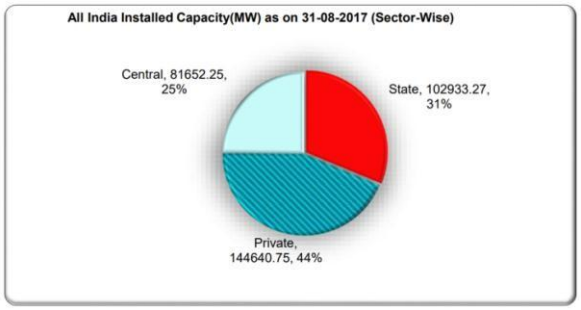
Power Supply in India

Increased private sector investment

To bridge the gap between the increasing demand and supply of electricity, Indian power sector was highly depends upon the private sector investments due to the need of huge capital, as the financial position of the state power utilities are weak. With De-licensing policy for adding power generating capacity (excluding hydro), the sector has successfully attracted the private sector investment and added sufficient generation capacity, which has helped to bridge the demand-supply gap. The sector has spinning reserve capacity today. The sector through proper policy intervention viz., Ultra Mega Power project (UMPP), International tariff-based competitive bidding etc., has helped to achieve fourfold increase in private sector investment with Independent Power Producers (IPP) share of 44% of installed capacity in 2017 as against just 11% in 2008[8] as shown in Figure-3. The Govt. of India and the states have pushed the reform agenda through proper policy measures and attracted the private sector investment

successfully with support of all the stakeholders including the political support despite several challenges.

Figure-3



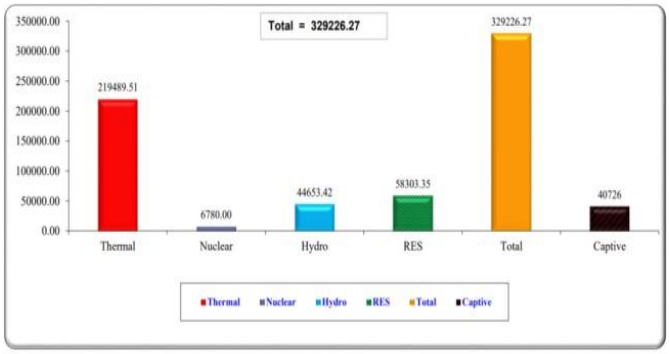
Souce: CEA, Ministry of power Report, Aug' 2017

Share of private investors in installed generation capacity

Renewable Capacity addition

Post EA-2003, the power sector witnessed an unprecedented capacity addition in Renewable Energy (RE) space and the sector is in transition to the future low-carbon regime. The share of Renewable Energy Sources (RES) in the total capacity has increased to 58,303 MW in December 2016 with a share of 17.7% in the generation mix as shown in Figure-4[8]. The net capacity addition through RES is 11,000 MW as against 10,300 MW through conventional sources. This Green energy capacity addition has helped to decrease the dependency of fossil fuels and increased the India's energy security. Govt. of India (GoI) has planned to add 1,75,000 MW RE generation capacity by 2022[24]. This would help the sector to achieve energy security.

Figure-4



Note: Captive Generation is not included in the total. Renewable Energy Sources (RES) as on 31.12.2016
Souce: CEA, Ministry of Power Report, August, 2017

Installed capacity as on 31.08.2017

Achievement of power parity

The sector has achieved the grid parity (matching the cost of generation of power from renewable energy sources with the conventional sources) in 2017 well ahead of the plan of 2022. Over a period of six to seven years, Government of India through various reform measures and interventions has successfully reduced the cost of renewable power from Rs.17/- per kW-Hr in 2012 to Rs.2.44 per kW-Hr. Now, the renewable power is available at lower price than the conventional power. This is one of the major milestone achievements in the power sector reform and would go a long way for India to have energy security and self-sufficiency in power.

Many reform measures have been taken by the Govt. of India to increase the renewable energy capacity addition by attracting private investors through various sops viz., capital subsidies for RE capacity addition, accelerated depreciation benefits, generation based incentives, tax benefits, import duty concessions etc. and through policy interventions like Renewable Power Purchase Obligation (RPO), trading of Renewable Energy Certificate (REC) in energy exchange, concessional interest rate, tariff based competitive bidding, Perform Achieve and Trade (PAT) Scheme of Ministry of New and Renewable Energy Sources (MNRE).

Drastic decrease in capital cost

The sector witnessed substantial reduction in capital cost for addition RE capacity. Technological advancement, increased capacity addition in RE space, decrease in the price of Solar Photovoltaic (SPV) cells, development in international market, and increase in competition has been the major drivers for the reduction of capital cost. The capital cost for installation of 1 MW solar capacity has been drastically reduced from Rs.17 crore per MW in 2012 to Rs.4.5 to 5 crore per MW in 2017.

Lowest cost of wind and solar power

The sector witnessed a drastic decrease in procurement of power from renewable sources during the year 2017 with all-time low price discovery of Rs.2.44 per kW-Hr for solar and Rs.3.46 per kW-Hr for wind, which has been made possible because of competition in the sector, which is one of the prime objectives of the reform. The recent initiative by the Solar Energy Corporation (SECI) made it possible to procure the wind power with all-time lowest price discovery in wind space. This would lead to transition from the past Feed-in Tariff regime.

Increased rating

The World Bank's rating on 'Ease of Getting Electricity' Index rose to 26 in 2017 from 99 in 2009.

Robust National Grid

The development of a robust national grid by integrating all the regional grids has made it possible to transmit power from any part of the country to any other parts and exchange of power with other countries. 'One Nation, One Grid, One Frequency' has been made possible now. There has been substantial reduction in traffic congestion in power transmission. The integrated operation of national power

systems have been facilitated by separating system operation from the Power Grid Corporation of India Ltd (PGCIL) and entrusting this responsibility to another independent organization.

Strengthening of transmission lines

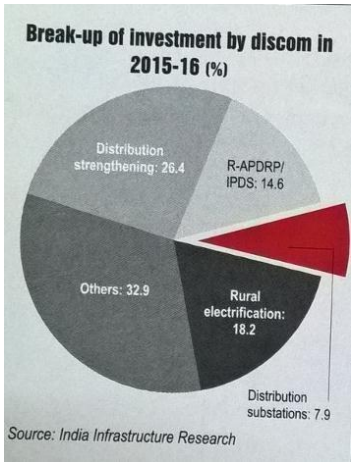
The sector has witnessed strengthening of transmission corridors. A major High Voltage Direct Current (HVDC) Transmission corridor linking Chamba-kurukshetra was added for North-West, and 765 kV Wardha-Nizamabad line was added, which facilitates transmission of cheaper power to southern and northern regions besides reducing the congestion in transmission of power. Owing to this, the day-ahead market volume loss has drastically reduced to 1% during the FY 2017-18 as against 4% during the FY 2016-17.

Strengthening of distribution infrastructure:

Govt. of India has implemented several reform programs in the distribution sector viz., Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), Accelerated Power Development and Reform Program (APDRP), Restructured APDRP (R-APDRP), Deen Dayal Upadyay Gram Jyoti Yojana (DDUGJY), Integrated Power Development Scheme (IPDS), Decentralized Distributed Generation (DDG), Power for All etc[20]. The share of investment in strengthening distribution system in DISCOMs is mentioned in Figure-5.

These reform programs have significantly contributed for the substantial improvement and capacity addition in power infrastructure, strengthened the power distribution system both in urban and rural areas and helped to reduce Transmission and Distribution (T&D) losses and significantly reduced the Aggregate Technical & Commercial (AT&C) losses from 26% to 21%[4][6]. But, still the present AT&C loss level is very high. Ministry of power has targeted to achieve the AT&C Loss to 15%. The huge AT&C loss is one of primary reasons for the huge financial losses of the DISCOMs[16][27][43].

Fgure-5

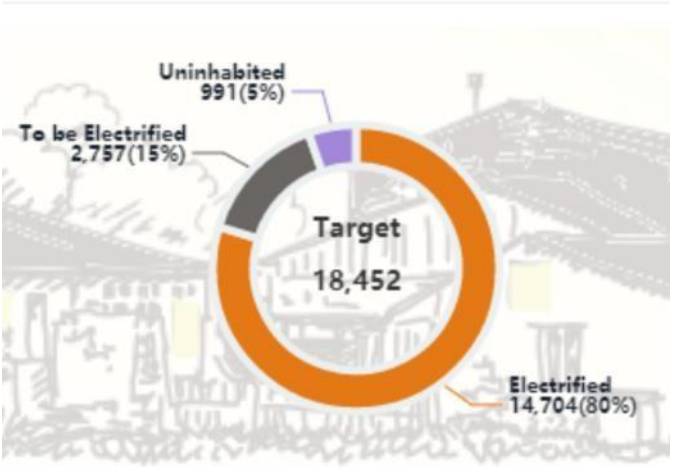


DISCOM's investment in distribution sector in 2015-16

Increased access through Rural Electrification:

With the consistent efforts on rural electrification drive, 99.5% of the villages in India (appearing in census list) have been electrified through Deen Dayal Upadyay Gram Jyoti Yojana (DDUGJY), a flagship scheme of the Govt. of India with total fund outlay of Rs.75,893 crore with Central Govt. capital subsidy of Rs.63,027 crore[20]. Rural Electrification Corporation is the nodal agency for the Scheme. As per census 2011, India has 5,97,464 inhibited villages as on 1.4.2015. Out of which, 18,452 census villages were reported as Un-Electrified Villages (UEVs). Out of 18,452 UEVs, electrification of 80% UEVs have been achieved, 5% is uninhibited villages and balance 15% is slated to be electrified by December 2017 to achieve 100% electrification of villages[20]. (Figure-6).

Figure- 6



Source: www.garv.gov.in GARV APPs of REC

Achievements in electrification of rural villages [33]

Universal Household electrification

Universal access to electrification by providing 'Power for All' is one of the main reform agenda under the EA-2003. As on September 2017, the sector has significant progress in achievement of household electrification, as 77% of households in the country have got electricity as compared to 44% in 2001 as per census 2001[20]. To achieve universal household electrification (100% electrification of households) and to ensure last mile connectivity, Govt. of India in September 25, 2017 has launched a new scheme viz., Pradhan Mantri Sahaj Bijili Har Ghar Yojana (SAUBHAGYA) with REC as the nodal agency to electrify 300 lakhs balance households in the country (250 lakhs in urban and 50 lakhs in rural areas) with scheme cost of Rs.16,320 crore, including Government support of Rs.12,320 crore. [Source: Ministry of Power Office Memorandum for SAUBHAGYA Scheme dated 20.10.2017].

Short-term power trading

Trading of power through energy exchange is one of the objectives of power sector reforms enshrined in the EA-2003 by increasing competition. Power sector witnessed possibilities of short-term power trading by establishing two power exchanges viz., Indian Energy Exchange and Power Exchange India Ltd. With adequate generating capacity, increased coal production, insignificant power shortage, the short-term power prices are traded at prices as low as Rs.2.80 per kW-hr.

Financial & operational turnaround through UDAY

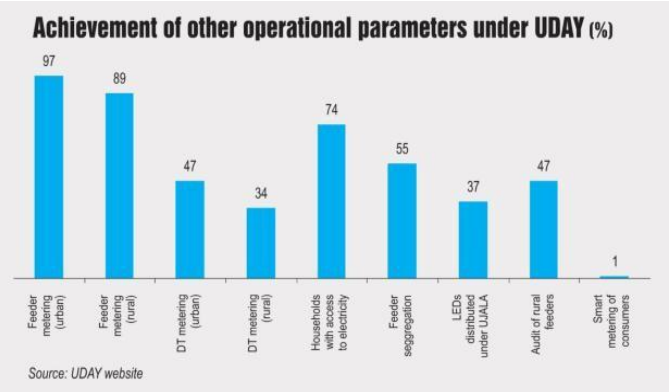
In order to improve the financial viability of the state-run DISCOMs, Government of India in 2015 has successfully launched a novel reform linked restructuring scheme viz., "Ujwal DISCOM Assurance Yojana" (UDAY), to financial turnaround of the ailing DISCOMs, which has helped to drastically reduce the interest costs and improved the DISCOM's liquidity and has been a life saver.

The scheme aimed at achieving the financial and operational turnaround of state-run power distribution companies. Twenty six states and one Union Territory have joined the scheme. Sixteen states and one Union Territory have signed Memorandum of Undertaking (MoU) with the Ministry of Power (MoP) for financial and operational turnaround of DISCOMs. Ten states and Union Territory of Puducherry (UT) have signed MoUs for operational turnaround. Of the total DISCOM debt of Rs.4,30,000 crore as on September 30, 2015, Rs.2,75,000 crore has been covered for financial turnaround of DISCOMs under the ambit of UDAY. Of this, states and DISCOMs have issued bonds about Rs.2,40,000 crore [42][43][44]. Under the scheme, the unsustainable debt of DISCOMs in the books of Banks and Financial Institutions has been replaced with high quality state government loans or bonds, which are guaranteed by the concerned state Govt., resulted in sharp decline in DISCOMs interest costs. During nine months of 2016-17, the DISCOMs have achieved an estimated savings in interest cost of Rs.1,20,000 crore. The scheme is making steady progress in achieving operational parameters [44].

Improvement in operational performance

The UDAY Scheme is linked with achievement of reform parameters by DISCOMs viz., reduction of AT&C losses as per the trajectory, reducing the gap between ACS-ARR gap, feeder metering, distribution transformer metering, Feeder segregation, installation of SMART meters, rural feeder audit distribution of LED bulbs under Unnat Jyoti by Affordable LEDs for All (UJALA) etc[42]. Since the launch of the scheme, there has been substantial progress in achievement of various operational parameters as shown in Figure-7. The key of achieving financial turnaround is dependent on a major reduction in AT&C losses and closing the gap between the ACS and ARR by aligning the tariff with the cost of supply.

Figure-7



Source: UDAY [44][45]

Achievement of operational performance

Governance through digital initiatives

The sector witnessed various digital initiatives, as various reform parameters are being displayed showing the latest status transparently through various Mobile and desktop based Applications (APPs) by the Ministry of Power viz., GARV App for rural electrification, '24x7 Power For All', Vidyut PRAVAH for electricity price availability and highlights, and DEEP for discovery of efficient electricity price etc. Many of the reform parameters viz., status of village and household electrification, demand and supply of power, power purchase price are transparently and timely displayed, which has improved the governance a lot. There has been a major shift in timely display of important parameters, as in the earlier times, when sources of information were hard to obtain by the stake holders.

WEAKNESSES

Mounting revenue shortages makes distribution business unviable

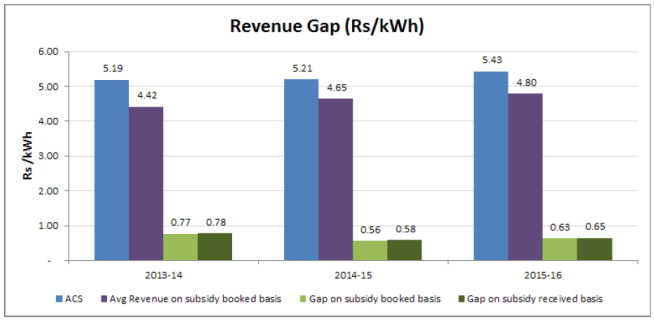
Despite implementation of several reform programs and reform initiatives in the power sector post 2003, the DISCOMs continued to make burgeoning losses on sustainable basis primarily due to the huge negative gap between Average Revenue Realized (ARR) and Average Cost of Supply (ACS). As per PFC report for the FY 2015-16, the ARR without subsidy stood at Rs.4.23 per kW-Hr, while the ACS stood at Rs.5.43 per kW-Hr and there is a straight revenue gap of Rs.1.20 per kW-Hr without subsidy[30]. DISCOMs are highly subsidy dependent from states. Out of the total 7,89,512 Million Units (MU) energy sold during FY 2015-16, DISCOMs have made a straight loss of Rs.94,741 crore[30]. This is a straight financial loss arising only out of selling electricity lower than its cost price. As per PFC report for the FY 2015-16, DISCOMs are able to recover only 77.86% of its cost and it has made a huge aggregate loss of Rs.1,21,001 crore without subsidy. There has been an increase in aggregate of Rs.15,987 crore as compared the aggregate losses of Rs.1,05,014 crore during the FY 2014-15[30]. This sustained

huge revenue shortages for the DISCOMs make its power distribution business financially and commercially unviable and unsustainable.

Gap between ARR and ACS

The gap between the Average Revenue Realized (ARR) and the Average Cost of Supply (ACS) has been the primary reason for the sustained losses of DISCOMs. As per PFC report, the ARR on revenue realized basis for the FY 2015-16 stood at Rs.4.80 per kW-Hr and the ACS is Rs.5.43 per kW-Hr, leaving a huge gap of Rs.0.65 per kW-Hr even after the receipt of subsidies, significantly contributing to huge commercial losses of DISCOMs as shown in Figure-8[30].

Figure-8

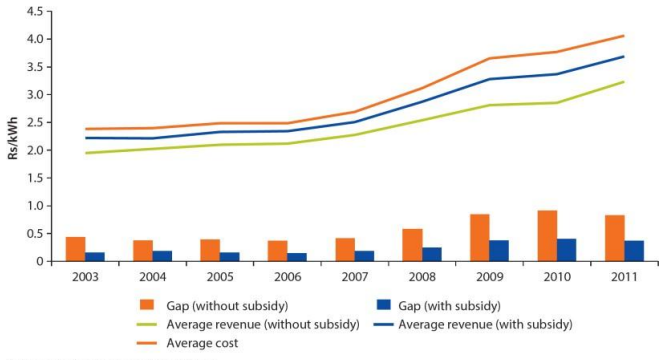


Source: PFC report on performance of state power utilities 2015-16

The primary reason for the increase in ACS was due to increase in power purchase cost. The major reasons for decrease in revenue realization are primarily due to underpricing and adoption of non-cost reflective tariff by DISCOMs, leading to negative gap between ARR and ACS, which has resulted into burgeoning revenue shortages and mounting financial losses [27]

The percentage of the cost recovery through tariff for the period from 2003 to 2011 stood between 76 to 85 per cent and the average recovery percentage was 82 per cent as shown in Figure-9

Figure-9

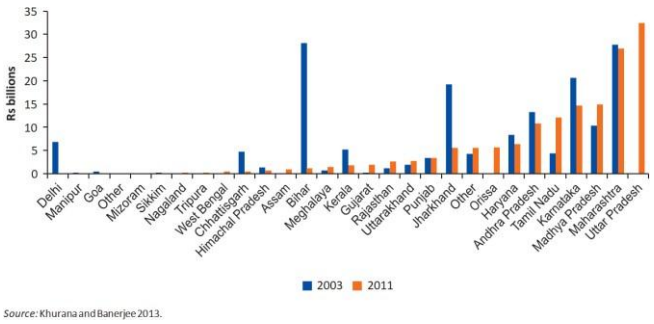


Source: India Power Sector Review Database.

ARR ACS Gap

The widening gap between ARR and ACS and the resultant the huge financial losses are also due to lower billing and collection efficiency. As per the World Bank study report, Uttar Pradesh, Maharashtra, Madhya Pradesh, Karnataka and Tamil Nadu has incurred huge financial losses due to lower billing and collection efficiency [27] as shown in Figure 10.

Figure-10



Source: Khurana and Banerjee 2013.

Losses due to lower revenue collection

Decline in Negative gap in APR and ACS

After implementation of UDAY, there has been substantial reduction in interest cost of the DISCOMs, which has led to the substantial reduction in ACS and the operational performance parameters has shown improvement. Overall, tariff revisions have led to a reduction in the ACS-ARR gap, from Rs 0.61 per unit in March 2016 to Rs.0.49 per unit in December 2016[30]. Twelve DISCOMs have reported an improvement in their ARR-ACS gap reduction during the first three quarters of 2016-17 as compared to the previous year. Periodical and timely tariff revision is paramount need to contain the huge revenue shortages due to the negative gap between ACR and ACS [27].

Financial and commercial unsustainability

The state power utilities are not operating on commercial principles and are incurring huge commercial losses, which led to mounting revenue shortages. DISCOMs are unable to sustain its power distribution business without government subsidies. DISCOMs are highly dependent for operational subsidy from state government and huge capital subsidy from the central government. Even though the central and state governments has taken many reform initiatives to develop infrastructure and to reduce technical losses, much less reforms has been done to reduce the huge commercial losses, which makes the power distribution business financially and commercially unviable and unsustainable.

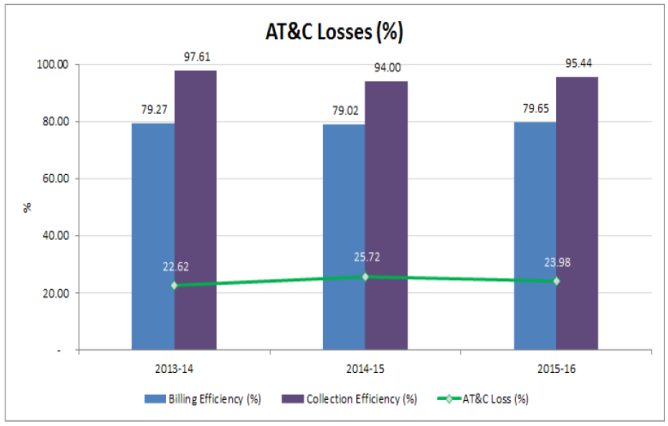
High AT&C loss

One of the primary reasons for the sustained financial losses of the state power utilities is due to the high Aggregate Technical and Commercial losses (AT&C losses), which comprises of (i) Technical losses and (ii) Commercial losses.

Many research reports and Government documents confirms the fact that while the technical losses arises mainly in transmission and distribution of powers through electric system, the huge commercial losses occurs primarily due to the irrational tariff structure resulting into negative gap between the ARR and ACS, lower billing and collection efficiency. Lower billing efficiencies are primarily due to un-billing, un-metering, incorrect billing, huge subsidies, rampant theft etc. Lower collection efficiency is due to inefficiencies in billing and collection of revenues [16][20][21][27][30] [33][35][36][42][46].

As per the PFC report, the AT&C losses for the FY 2015-16 stood at 23.98%. The billing efficiency of the state power utilities for the FY 2015-16 stood at 79.65% as shown in Figure-11 i.e. 20.35% of the energy is not billed. The collection efficiency for the FY 2015-16 is 95.44% [30].

Figure-11



Source: PFC report on performance of state power utilities 2015-16

AT&C loss reduction

Post EA-2003, with substantial capital support from the central government, states have implemented several reform schemes to strengthen the power infrastructure, reduce the AT&C losses and to increase the access to electrification viz., Rajiv Gandhi Grameen Vidyuti Karan Yojana (RGGVY) and Deen Dayal Grameen Jyoti Yojana (DDUGJY), De-centralized Distributed Generation (DDG) for electrification of villages located in remote and far away from grid, Accelerated Power Development Reform Program (APDRP) and Restructured APDRP (R-APDRP), Integrated Power Development Scheme (IPDS) for electricity system strengthening and AT&C loss reduction in urban areas, 'Power for All' to achieve supply of quality power round the clock throughout the year, Ujawal Assurance Yojna (UDAY) for the financial and operational turnaround of financially weak DISCOMs [20][46].

As per the agreement entered into by DISCOMs with the Ministry of Power, the AT&C loss reduction trajectory has been agreed to reduce to 15% by 2019 [43]. Initiatives are being taken reduce AT&C losses through segregation of feeders, replacement of faulty meters and installation of smart meters. While there has been an improvement in some states, the achievement so far has been short of the targets set under UDAY scheme[45]. Overall, AT&C losses stood at 19.27 per cent as of May 31, 2017 compared to 23.98 per cent as on March 31, 2016[30]. The states participated in UDAY scheme establish that DISCOMs in the states are recovering the cost incurred in selling electricity to achieve the improvement in billing efficiency and collection efficiency and decrease in AT&C losses as per the trajectory[27][43][44].

All these reform schemes and measures have significantly contributed for the development of power infrastructure across the country and successfully brought the private sector investment in the sector and competition was built in the system. However, despite implementation of several rounds of reforms during the past 14 years post enactment of EA-2003, Indian power sector has not been successful in achieving financial viability. As power being the driver of the economy for any nation, the power sector operating in an unviable manner is a major concern for the development of power sector and overall economic growth.

Rationalized tariff: Need of the hour

One of the primary objectives of the reform as enshrined in the EA-2003 is to match the tariff with the cost. But in reality after 14 years of reforms since 2003, this objective has not been achieved. Even when the Average Cost of Supply (ACS) increases, ARR has not increased substantially and huge commercial losses have not been decreased. This is primarily due to irrational tariff, non-revision of tariff timely by the states, huge subsidies, inefficiencies in billing and collection of bills.

Mounting NPAs

NPAs of Power sector

The state-owned power utilities are unable to service its loans and defaulted due to the sustained financial losses and the loan account become NPAs in the Banks books. The growing NPAs poses a major risks to the Banking sector besides it has affected the capital adequacy ratio and the net worth of the Banks and Financial Institutions [27].

As per Reserve Bank of India (RBI) report as on September 15, 2017, the gross NPAs of the Banks and Financial Institutions (FI) has reached an alarming level of Rs.12,29,104 crore. As per ICICI report 2017, out of the total lending by Banks and FIs, about 40% of the lending are in risk watch list. The gross NPAs of Public Sector Bank and Scheduled Commercial Banks stood at 12.12%, which is posing a major threat to the Banking and Financial sector.

About 30,000 MW of commissioned thermal power plants are stranded due to lack of power demand. As per CEA Report August 2017, the power plant capacity is utilized only 54.61% of the total installed capacity. The sub-optimal utilization of power generation and distribution capacities causes huge losses to the state power utilities. As per RBI report as on September 15, 2016, out of the total lending to industries, 19.6% of loans

amounting to Rs.5,25,393 crore has been lent to Indian Power sector.

Huge Debt level

Huge debt level of the state power utilities with sustained losses are the two significant contributors for the unviability of the DISCOMs and remains as major concerns for the sectoral development and the very survival of the DISCOMs and it is affecting the banking system in a big way[16][27][36]. As per PFC report, the total outstanding debt of state power utilities selling directly to customers increased to Rs.4.22 lakh crore on March 31, 2016 from Rs.4.03 lakh crore as on March 31, 2015[30].

Other weak financial parameters

As per PFC report, the Return on Capital Employed (RoCE) for 37 state power utilities is negative. The Debt Equity Ratio (DER) of 35 state power utilities are negative. Return on Net worth (RoNW) of 56 state power utilities are negative[30]. The weak financial position due to the sustained loses has reduced the DISCOM's risk rating, which has reduced its ability to raise loans at competitive rates.

Operational inefficiencies & Weak Management

The continued huge negative gap between the ARR and ACS, negative net worth, inability to control the leakages and contain the huge commercial losses due to low billing and collection efficiencies shows the operational inefficiencies and weak management.

Unwillingness of customers to pay affordable price:

In India, electricity has been made as an instrument of political patronage. Politicians are ensuring that the electricity is supplied to favored voting groups at a highly subsidized price to win in the election[16]. Over the period of time, agricultural consumers and some segments of domestic consumers who are enjoying the benefit of subsidies irrespective of their economic status are not willing to discontinue the great offer given to them by politicians. Unwillingness to pay the affordable price for the electricity has been one of the significant factors contributing to the huge commercial losses due to high subsidies [7][27].

Patronage based relationship of politicians:

The patronage based relationship between politicians and certain segments of power consumers in exchange for their political gain led to the higher demand for the subsidy and are simply stolen with little fear of penalties[36]. Political parties deliberately interfere to fix flat electricity price and huge losses are occurring on un-billing[7]. Due to such patronage based relationship between politicians and power consumers, certain segments of consumers are not willing to pay the affordable price for the electricity [36]. This trend is growing year after year and remains a major impediment to achieve financial sustainability.

It requires strong political will and political support to implement reform to rationalize subsidies as it has to go only to the targeted customers and should be limited to some quantity. In this context, Gujarat has been successful in convincing the agricultural consumers to pay the affordable price by providing reliable power to them. That means consumers may willing to pay affordable tariff for the reliability [36].

OPPORTUNITIES

Opportunity for cheaper short-term power procurement:

The present environment with sufficient installed power generation capacity, the decline in the price of renewable energy and increased competition in the market would make the short-term power purchase option more attractive than the long-term purchase of power through 25 years Power Purchase Agreement (PPA). In December, 2016, the Ministry of Power amended the revised guidelines for procurement of short-term power from one day to one year (issued in March 2016) to provide greater clarity on the e-reverse bidding auction system (e-RA).

Solar Energy Corporation of India (SECI) has successfully concluded the first e-RA for 1,000 MW in February 2017. Ministry of Power has released an order for waiver of charges for inter-state transmission of power and losses of electricity generated from solar and wind energy projects in line with the revised National Tariff Policy, 2016 to promote power generation using Renewable Energy Sources (RES). The reform initiatives have made it possible to procure power at competitive rate, which has resulted in savings in the overall cost of power and would pave the way for reduction of Aggregate Technical & Commercial (AT&C) losses. The cost of power purchased could be passed on to consumers.

Economic growth

There are innumerable opportunities available in the power sector for the economic growth. The Indian power sector and the DISCOM should make use of the business opportunity available in the environment due to the excess installed capacity, availability of cheaper green power in system and reap the benefit in a big way by optimal utilization of all the generation capacities to drive the economy. This would resolve the issue of stranded assets of about 30,000 MW and the huge unused generation capacity immediately which stood as a national waste. The power demand is not picking up since the DISCOMs weak financial position, liquidity constraints, its long-term PPA with high cost power procurement does not permit it to purchase short-term power available at cheaper cost. We have to create the demand by optimal pricing of electricity dynamically. This could create employment and help to kick start the economy.

Move towards dynamic price regime

In order to operate the power system efficiently, DISCOMs have to operate it on commercial principle and not in the traditional way. It should recover all its cost and also should make sufficient profit in order to sustain in its power distribution business. The complicated and complex factors associated with fixing rational tariff and to reduce the gap between ARR and ACS could be resolved by deriving the solution by out of box thinking.

Indian power sector today has excess power generation capacity and it has not been optimally utilized. As per CEA report, the capacity utilization of the present generation capacity as on July 2017 is only 54.61%[8]. If capacity utilization of existing capacity is increased to say 75 -80%, the cost of electricity will come down drastically and the electricity will be available at cheaper price, which could be sold to industries at cheaper rate. For this we have to move to *'dynamic pricing regime'* from the *'static fixed price regime'*. The dynamic pricing system for electricity based on optimal utilization of existing capacity including highly seasonal renewable energy, the system could be able to operate most efficiently and economically and profitably. To achieve this, we have to shift to Time-of-the day metering. Indian power sector has to implement SMART meters and AMR meters on priority, which would monitor, control also disconnect the consumers remotely and would pave the way for improving collection efficiency and to monitor the theft and inefficiencies in the system.

All industrial and commercial consumers shall install smart meters without much delay which is affordable for them and also for DISCOMs as compared to the huge numbers of domestic and agriculture consumers. We should move to a system of changing price once in a month or a week and over a period of time daily, as in the case in pricing of petrol. The pricing should be based on the demand and supply, availability of cheaper power, excess generation capacity besides the cost, availability of renewable power etc. This move would help to achieve optimum utilization of generation capacity across fuel mix, across seasons and even day and night. This would improve the efficiency of operating the system in a big way.

The key players viz., DISCOMs, state power regulators and the state has to act on commercial principles and not in the business as usual in the traditional bureaucratic way with inordinate delay in determining prices, which takes a year and causing big regulatory assets and huge losses to DISCOMs and the exchequer. An efficient power pricing system should be designed, which should respond to market quickly and should be market-driven. By utilizing the profit earned out of the above way, the sector shall implement 'Time of the day pricing' across all customers.

Time of the day metering

The need to shift to *Time of the day metering* in the short-term is of paramount importance to bring the sector back on track and to contain the huge financial losses of DISCOMs. This would also smoothen the load curve and ensure efficient and optimal utilisation of both generation and distribution capacity.

Business opportunities at the bottom of the pyramid

With the advent of fast changing technologies in the renewable energy sector, competition in the energy pricing, availability of cheaper solar power, favorable international market and the proposed 1,75,000 MW additional RE capacity by the Govt. by 2022, possibility of connecting the off-grid solar & renewable to the grid, there are great business opportunities to create market at the bottom of the pyramid as advocated by C.L Prahalad in his book 'The fortune at the bottom of the pyramid eradicating poverty through profits', which would lead to socio-economic development.

In the near future, there is a tremendous possibility of many of the power consumers to become the power suppliers with various capacities of very small to medium solar renewable capacity by installing cheaper off-grid solar PV based power plants at their roof and idle lands and the lower price discovery due to economies of scale. This is no wonder, as the power sector in the past seven to eight years has witnessed drastic slash in cost of generation of solar power from Rs.17.00 per kW-Hr to Rs.2.44 per kW-Hr. The cheaper renewable power gives a great opportunity for storage of the electricity in battery during peak hours or during its availability and uses the same whenever required or un available. About twenty percent share of renewable energy based plants and the unutilized generation capacity of fossil based plants needs to be optimally utilized, which led to drastic reduction in cost of supply. Government of India is also making policy initiatives to have more electric operated cars, which would also create additional demand besides controlling pollution. The reduction in electricity price and the cost of storage system would go a long-way in creating additional demand due to cheaper price, which would pave the way for significantly increasing the per capita power consumption from 1,075 kW-Hr in 2015-16, leading to leap jump in socio-economic growth.

THREATS:

Sustained financial losses: A major threat to sustainability

Sustained financial losses of the state-run DISCOMs remain as one of the major threats to sustainability of the Indian power sector and India's energy security[27]. World Bank has warned that the sustained losses of DISCOMs have reached a point that has been termed *'India's subprime crisis'* [16]. Figure-12 shows sustained loss making trend of state-power utilities for the period from 2010 to 2015.

Figure-12

Sustained financial losses of state power utilities

Deteriorated financial performance

As per PFC report, the accumulated loss of all the state-owned power utilities for FY 2015-16 has increased to Rs.4,85,922 Crores from Rs.4,07,271 crore during FY 2014-15[30]. The Aggregate losses of the state-owned DISCOMs without subsidy has increased to Rs.1,47,298 crore in FY 2015-16 from Rs.1,14,007 crore in FY 2014-15[30]. The summary of financials of all state power utilities in India is mentioned at Table-1.

Table-1

Summary for All Utilities in State Power Sector

		2013-14	2014-15	2015-16
Profit/ (Loss) after tax on accrual basis	Rs Crore	(66,228)	(66,022)	(89,603)
Profit/(Loss) on accrual basis as % of Revenue	*%*	*(18.62)*	*(16.44)*	*(21.09)*
Profit/ (Loss) on subsidy received basis	Rs Crore	(66,536)	(68,418)	(92,012)
Profit/(Loss) on subsidy received basis as % of Revenue	*%*	*(18.70)*	*(17.04)*	*(21.65)*
Net Worth	Rs Crore	(92,820)	(1,17,534)	(63,154)
Accumulated Losses as per Balance Sheet	Rs Crore	(3,42,439)	(4,07,271)	(4,85,922)
Total Outstanding Loans	Rs Crore	5,88,046	6,70,708	7,26,721
State Government Loans	Rs Crore	43,948	57,137	1,31,568
State Govt. Loans as a % of Total Loans	%	7.47	8.52	18.10

Source: PFC report on performance of state power utilities 2015-16

Negative net worth

Sustained financial losses and the mounting debt have deteriorated the credit worthiness of the state-run DISCOMs [27].

Barring few DISCOMs, the net worth of most of the state owned DISCOMs have been eroded, with the highest erosion of net worth reported in DISCOMs of six states during the FY-2015-16 viz., Rajasthan, Tamil Nadu, Uttar Pradesh, Madhya Pradesh, Andhra Pradesh and Telangana (In the order from highest to lowest). As per the PFC Report 2015-16, the aggregate net worth of state power utilities selling power directly to the consumers for the FY 2015-16 is negative and stood at Rs.2,16,125 Crore (Negative). The aggregate negative net worth of state power utilities in six states for the FY 2015-16 stood at Rs.2,05,783 crore[30]. 95% comes from six poor performing states as shown in Table-2.

Table-2

(Rs Crore)

DISCOMs in the State	Net worth	Accumulated losses
Rajasthan	(71,669)	(92,652)
Tamil Nadu	(46,299)	(63,162)
Uttar Pradesh	(29,571)	(69,848)
Madhya Pradesh	(28,973)	(35,602)
Andhra Pradesh	(13,850)	(14,484)
Telangana	(15,421)	(16,520)
Total	**(2,05,783)**	**(2,92,268)**

(Source: PFC report-2015-16)[30]

Net worth & accumulated financial losses of DISCOMs of six states in FY 2015-16

Mounting Accumulated losses

The accumulated loss of all the state-owned power utilities selling power directly to consumers for the FY 2015-16 stood at Rs.4,13,933 crore[30], out of which, 70.6% of such huge accumulated losses came from DISCOMs of six states viz., Rajasthan, Tamil Nadu, Uttar Pradesh, Madhya Pradesh, Telangana and Andhra Pradesh (in the order from highest to lowest) as mentioned in Table-2.

Top five loss making states

The aggregate financial losses of all the state power utilities on subsidy received basis for the FY 2015-16 stood at Rs.92,012 crore, out of which Rs.73,077 crore i.e. 74.9% of the total losses comes from five top loss making states viz., Maharashtra, Uttar Pradesh, Rajasthan, Tamil Nadu and Madhya Pradesh, as detailed in Table-3 below:

Table-3

(Rs. Crore)

DISCOMs in State	Losses (subsidy received basis)
Maharashtra	28,029
Uttar Pradesh	21,486
Rajasthan	12,120
Tamil Nadu	6,050
Madhya Pradesh	5,392
Total	**73,077**

(Source: PFC report-2015-16) [30]

Top five DISCOMs losses on subsidy received basis

Leaking DISCOM's coffer: A major threat to India's energy security

The sustained financial losses to the tune of one 90,000 crore per annum and huge accumulated losses of the DISCOM are the major threats to sustainability of the Indian power sector and India's energy security, which has made the DISCOMs virtually bankrupt and it has derailed the past power sector reforms. Despite several rounds of financial restructuring by the central government, the huge loss making trend on sustainable basis continues and there is no or very little improvement and the DISCOMs' coffer is leaking. This is one of the serious threats to the India's energy security. Further, achieving the financial viability of the power sector become far from reality. Unless the leakage is plugged on war-footing basis, the trend would further impact the industrial and economic development heavily.

The electricity is in the concurrent list in the constitution of India. Both central and state exercise their power in reforming the sector. As per constitution, it is the responsibility of the states to distribute and supply power to customers[20]. Achieving financial sustainability of DISCOM's business is one of the primary objectives of the reforms. However, it is seen that rarely states have taken the sustainability interest of the power sector in the states as it continues to make huge losses through inefficient operation and wastage, leaving the least to the future generations.

Untargeted subsidies

Poor subsidy policies of states

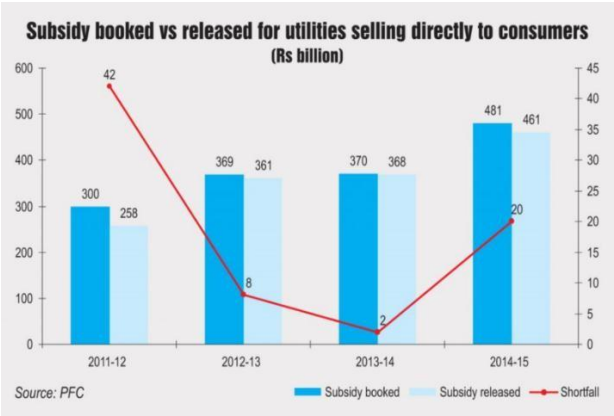
One of the major threats for the Indian power sector is the huge un-targeted subsidies. DISCOMs are selling electricity to agricultural consumers and certain section of domestic power consumers at highly subsidized prices lower than its cost. Few states like Tamil Nadu have policy of supplying electricity at free of cost to agriculture consumers. In most of the states, electricity supplied to agricultural consumers is not metered even if energy meters have been provided. Further, minimal fixed charges have been charged irrespective of the power consumed and there is inequity across power consumption levels and categories of consumers[27]. This has led to the large-scale leakage and wastage of the rare commodities of both power and water due to its inefficient usage.

All agricultural customers are given subsidy irrespective of whether they are poor or rich. Similarly, in Tamil Nadu as per the present domestic tariff in 2017, all domestic customers are given 100 units of electricity free for each billing period irrespective of their economic status.

As per PFC report, the subsidy booked for the power utilities has increased from Rs.37,000 crore in FY 2013-14 to Rs.48,100 crore in the FY 2014-15. The subsidy received during the FY 2014-15 is only Rs.46,100 crore and there is a short fall in receipt of subsidy of Rs.20,000 crore from states as mentioned in Figure-13 [30].

While several reform initiatives have been implemented to strengthen the infrastructure to reduce the technical losses, least has been done to contain the huge commercial losses due to the untargeted subsidies [27]. As per PFC report, the aggregate billing efficiency of state-owned DISCOMs for the FY is 2015-16 is 79.65%[30]. i.e. 20.35% of total energy received has not been billed, which leads to drain the DISCOM's coffer.

Figure-13



Huge subsidy leakage in agriculture

Selling electrical energy at highly subsidized rate to agricultural consumers and certain section of domestic consumers lead to the huge financial losses of the DISCOMs. As per PFC report 2016, out of the total 7.89 Billion Units (BU) of energy sold during the FY 2015-16, the share of energy sold to agriculture and domestic consumers stood at 22.43% and 27.8% respectively[30]. Out of 22.43% of total energy sold to agriculture, the revenue received from the agricultural consumers is only 7.74%. i.e. roughly revenue is received just about 35% of the total energy sold to agriculture. About 65% of the total energy sold to agriculture goes as subsidy. Similarly, out of 27.8% of the total energy sold to domestic consumers, the revenue received from domestic consumers are only 23.28%[30]. Thus, about 17% of the total energy sold to domestic consumers is subsidized. To make up these huge losses arising out of subsidies in selling electricity to agricultural and domestic consumers were highly cross subsidized and sold at an exorbitant price to industrial and commercial consumers, which has affected the industrial and overall economic growth in a big way.

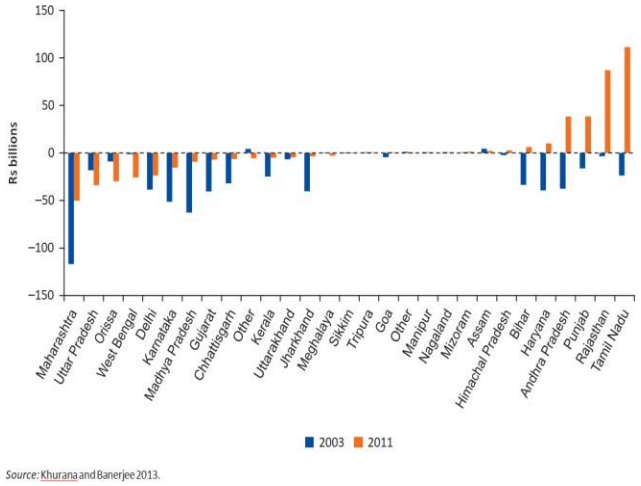
Poor subsidy policies working against the sustainability interest

As per World Bank study report, in most of the states in India, the average tariff charged is below its cost price and there is a huge untargeted subsidy and most of the subsidies are not reaching poor or those who are in Below Poverty Line (BPL)[27]. Huge financial losses have occurred due to the high level of untargeted subsidies in states viz., Tamil Nadu, Rajasthan, Punjab and Andhra Pradesh as shown in Figure-14. About 93% of domestic power consumers receive more in subsidies than they pay in cross-subsidies. 25% domestic consumers are not receiving subsidy since they do not have access to electricity and huge subsidies are leaking to the power consumers, who are Above Poverty Line (APL)[27].

Huge un-targeted subsidies have resulted into huge energy leakage and wastage besides wasting the rare water sources. The policies like 'Free Power' without passing the benefit of subsidy to the targeted customers has led to the huge financial losses in Tamil Nadu. Similarly in Tamil Nadu as per the present tariff for 2017, all domestic consumers irrespective of their economic status will get first 100 units of electricity free. These poor policies are against the sustainability interest of the state and the power sector as a whole. Such irrational tariff policy with huge un-targeted subsidies are the major reasons for the huge sustained losses of the TANGEDCO in Tamil Nadu.

As per PFC report, the accumulated loss of TANGEDCO for the FY 2015-16 stood at Rs.63,162 crore, holding the third highest accumulated losses amongst all the states (First being Rajasthan with an accumulated loss of Rs.92,652 Crore; and Uttar Pradesh: Rs.69,848 crore)[30]. DISCOMs hands are tied and political dictation dominates in fixing the price for electricity at highly subsidized prices, resulting into huge loss to the exchequer. Many research reports and special committee appointed by the Government of India for financial turnaround of state power utilities viz., Abraham Committee[4] and V.K.Shunglu committee [35] have confirmed the strong influence of the state government in determining the price and selling electricity at a highly subsidized price. It is seen that the state government involvement in managing the affairs of DISCOM has led to the sustained losses of DISCOMs.

Figure-14



Source: Khurana and Banerjee 2013.

Losses due to subsidies

Unless 100% of the energy supplied is measured, it cannot be possible to control the wastage. Un-targeted subsidies and passing blanket subsidies should be abandoned. There is a dire need to have a strong policy intervention to rationalize the subsidies and manage to control huge energy leakage and wastage. It requires a political will and strong support. But, it has to be done any way considering the sustainability interest of the power sector, overall economic growth and the threats to the India's energy security.

Subsidy dependencies of DISCOMs:

The state-run DISCOMs are highly depends upon on operational subsidy from states and capital subsidy from the central government[27]. It is evident that the state-run DISCOMs are not working on commercial principle, which has led to its huge financial losses. States are also confident that the central government will continue to support by giving financial restructuring package and huge capital support.

The increasing trend of subsidies is a major worry and it weakens the sectoral development besides the state-run DISCOMs have become bankrupt. Many researches on subsidies and sustainability of power sector in India have been carried out. Pradip Chattopadhyay (2002) concluded that the policy of cross- subsidy may have gone overboard in India. This study finds that huge subsidies to un-targeted consumers resulted in huge financial losses and wastage of energy and inefficient usage of energy and huge leakage. Further, these subsidies are given

often for the political reasons to lure the voting banks by the politicians than the use of energy efficiently for economic development. Section 65 of the EA-2003 provides that the state government should release the subsidy payment in advance to the DISCOMs for the following financial years. It is evident that the states are not paying 100% subsidies and also not paying the subsidies in advance as per EA-2003 and many of the times, DISCOMs receives subsidy belatedly, resulted into huge losses [27].

Strong political intervention

Distancing of state government from the state power regulators in tariff setting process has been enshrined in the reform legislations viz., the Electricity Act, 2003 and National Tariff Policy. However, despite several rounds of reforms, the power sector has witnessed that this is far from reality[7]. The reports of the high level committee appointed by the Government of India viz., Abraham Committee[4] and V.K.Shunglu committee[35] for financial turnaround of state power utilities confirm that there is a strong political intervention of the state government in determining the tariff and tariff setting process by the regulators.

The distancing of state government from tariff setting process is a hard reality. The reform to date has so far failed to restore credit worthiness of the power utilities, reduce political interference in sector management through creation of proper regulatory system [34].

The power sector in India witnessed the unacceptability of the power sector reform by political parties especially in setting cost-reflective tariff by reducing the cross subsidies. In order to please voters for their personal gain, politicians comes out with poor policies like free electricity to agriculture sector and certain section of domestic consumers, non-metering of agriculture consumers, charging fixed charges based on Horse Power capacity of the pump irrespective of consumption etc., waiver of outstanding electricity dues, waiver of loans etc., which are against the reform policies.

The research study on power sector reforms in Maharashtra by Nand P. Totare and Shabhu Pandit (2010) concludes that subsidized power to certain consumers and billing based on fixed HP ratings of pumps are major setbacks to the reform process. Brian Min and Miriam Golden in their detailed research theme paper (2013) concluded that the political parties in India deliberately redirect electricity to flat rates and unbilled users in a context of chronically inadequate supply[7]. This opportunistic behavior of Indian politicians and their intervention in selling power at highly subsidized power to agricultural and certain segments of domestic customers irrespective of their economic status is on increasing trend. This is one of the major threats to achieve financial sustainability of the state-run DISCOMs.

Unviable business model of DISCOMs

Financial viability implies that the power sector runs on commercial principles and is able to cater to its financial needs without the Govt. support. It is evident that the state-owned DISCOMs are not operating its power distribution business on commercial principles and are making huge financial losses on sustainable basis. DISCOMs are heavily subsidy dependent from both and central government[34]. Sustained financial losses, huge commercial losses arising out of revenue shortages due to the big gap between ARR and ACS, inefficiencies in billing and collection, huge subsidies have been the biggest challenges to achieve the financial viability [27]. The power distribution business of the state-owned DISCOMs become financially and commercially unviable and unsustainable and its present business model failed to create value for self, its customers and the society at large[46].

Irrational tariff structure

Weak tariff structure

One of the prime objectives of the power sector reform is to set the cost reflective tariff taking the interest of financial viability of DISCOMs, power sector development and protecting all the power consumers. It is seen that the tariff charged to agricultural and certain section of domestic consumers are sub-optimally low, which has led to uneconomic usage and wastage of electricity since the subsidies are not targeted properly. The tariff charged to industrial and commercial consumers are at higher in order to cross subsidize the high subsidy given to agricultural and some segment of domestic consumers. The higher tariff charged to industries has heavily impacted the industrial development and overall economic growth. Further, industrial consumers are being penalized for high power consumption rather than being incentivized.

If the tariff is rationalized, the high power consuming industrial consumers may not need the open access. Due to the sustained capacity addition, the power sector has achieved sufficient installed capacity to meet the present demand. Further, it has huge unutilized capacity. At this juncture, discouraging the higher power consumption by charging higher tariff to industries and limiting the demand is not a prudent tariff policy. Huge revenue shortages by selling the electricity at sub-optimally lower prices to certain segments of consumers, not revising the tariff timely in consonance with the cost remain the major challenges to achieve the financial sustainability of state-run DISCOMs.

Further, in the present tariff structure, there are number of tariff slabs and number of categories within each slab, which leads to inefficiency in collection and complexity in understating the tariff structure. The present tariff structure has not created value to DISCOMs, its customers and the states. Rationalizing the tariff structure is of paramount importance to achieve financial viability, power and industrial sector development and to contain the huge financial losses of DISCOMs.

Weak regulatory system

Subservient regulators

The EA-2003 have provided wide-range of powers to the SERC to play its regulatory role that includes setting tariff that would reflect the cost of supply and promoting competition in the sector. To play their role effectively, the regulators needs to be insulated from the political interference. But in reality, the distancing of regulator from politicians is not happening and the regulators are subservient to the state government [16].

One of the major weaknesses of the Indian power sector is that state power regulators are subservient to the state governments and they are unable to perform the regulatory role independently, efficiently and effectively without political interference even though they have the quasi-judicial powers. In almost all the states, there have been strong political interference in setting price for electricity and is one of the major reasons for the revenue shortages. Retired state government and DISCOM officials and retired bureaucrats are posted as Chairman and members of the State Electricity Regulatory Commission (SERC) and Joint Electricity Regulatory Commission (JERC) and are subservient to states and they have failed to set the cost reflective tariff, which is one of the primary objectives of the reforms as enshrined in EA-2003 [16].

Regulatory delays

It is evident that inordinate delay in filing tariff petition by DISCOMs, tariff determination process by the state regulators, truing-up process and adoption of tariff by DISCOMs has caused huge regulatory assets in the book of DISCOMs resulting into huge losses to DISCOMs.

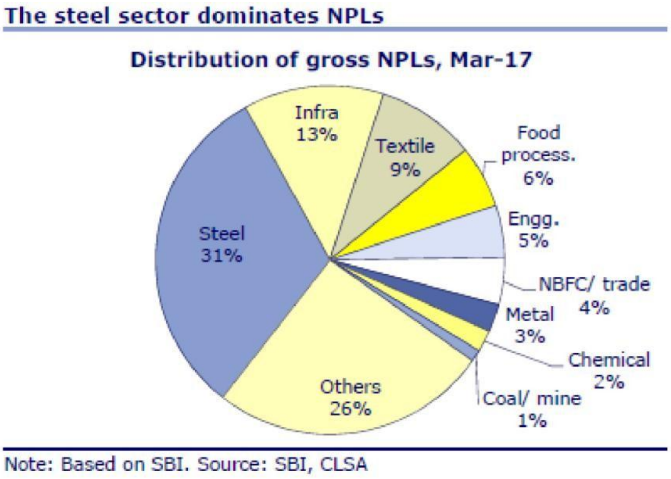
Higher industrial and commercial tariff: A major threat to economic development:

As per PFC report, the consumer category-wise revenue (in Rs. per kW-Hr), the tariff charged to industrial and commercial consumers are higher than that of the agricultural and domestic consumers[30]. As per PFC report 2016, out of total energy sold during the FY 2015-16, 22.37% of the energy was sold to industrial consumers. Due to the sub-optimally higher selling price to industries, the share of total revenue generated from the sale to industrial consumers stood at 32.85% [30]. That is about 47% higher than the average cost. The domestic tariffs are by far the lowest in all the states and Industrial and commercial tariff went as high as Rs. 8 per kW-Hr [27].

Selling electricity to industries and commercial consumers at higher prices is one of the main reasons for negative industrial growth and has impacted the overall economic growth and also has made many industrial business as unviable and unsustainable. The huge losses in the steel sector have a linkage with its large share of electricity as one of the main input cost. It is to note that 60% of the total cost of steel is the cost of electricity.

As on March 2017, the highest Non Performing Loan Assets (NPA) with a share of 31% is with steel sector (Figure-15). When electricity is sold at exorbitantly high tariff by cross subsidizing the agricultural and domestic consumers, the menace of industrial deceleration and burgeoning NPAs would endanger the economic development of nation.

Figure-15



The steel business become unviable and contributes to lakhs of crore of NPAs today. As per RBI report, the total gross NPAs as on September 15, 2017, the gross NPAs of the Banks and Financial Institution of Rs.12.29 lakh crore, the gross NPAs of steel sector contributes to about Rs.3,80,000 crore. One of the primary reasons for this menace is higher industrial tariff and the country and the banking system is feeling the pain of the higher industrial tariff.

It has been found that large number of textile spinning mills from Coimbatore (South India's Manchester) have been shifted from the state of Tamil Nadu to Telangana due to the sub-optimally high industrial tariff being charged by TANGEDCO, which has led to the industrial deceleration in Tamil Nadu besides making spinning mills business unviable in the state.

While development of any country is measured by its per capita consumption of electric power, limiting the nations' progress by increasing the power tariff will not be a good policy for the developing country like India. And that too, when the sector has the excess power generation capacity with under utilisation of its existing power generating capacity (The average PLF is only 54.61% for the FY 2015-16)[8]. It is to mention that country's economic growth during the first quarter of the FY-2016-17 come down to 5.7%, which is lowest in the past 3 years.

Due to the higher commercial tariff charged, many of the malls and other commercial establishments closed down in the recent past in India. Optimal tariff to industries and commercial consumers would address the issue immediately and would definitely pave the way for economic development and sustainable business operation of the state power utilities generation, transmission and distribution at large. The menace of charging higher tariff should discontinue and the tariff structure needs a revamp and tariff rationalization is need of the hour.

FINDINGS

From the detailed SWOT analysis on the impact of power sector reforms post enactment of the landmark legislation EA-2003, this study finds that:

(i) Several reforms have been carried out post EA-2003 by both state and central government. Although, these reforms have significantly contributed for development of power infrastructure and achievement of several reform parameters, it has not succeeded to achieve financial viability of the state power utilities, which is one of the main reform goal. The state power utilities are unable to sustain its business without the government subsidy support. It poses a major threat to the sustainability of the power sector, India's energy security and overall economic development.

(ii) The achievement of cost-reflective tariff, one of the reform objectives is far from reality. The present irrational tariff structure has been significantly contributing for huge financial losses of the state-run DISCOMs. There is a dire need to rationalize the present tariff structure to achieve financial viability of state-run DISCOMs.

(iii) The present business model being adopted by the DISCOMs is financially and commercially unviable and unsustainable. DISCOMs are running its business in a unviable business model, as state-run DISCOMs are making huge losses on sustainable basis with huge revenue shortage due to the negative gap between the Aggregate Revenue Realized (ARR) and the Average Cost of Supply (ACS) making its business commercially and financially unviable and unsustainable [46].

(iv) Un-targeted subsidies to agricultural and certain section of domestic power consumers are causing huge losses to DISCOMs. There has been strong political intervention in fixing the price with sub-optimally lower prices with huge subsidies to agricultural and certain section of domestic power consumers. DISCOMs are highly subsidy dependent from state and central government.

(v) The state government and politicians are directly and indirectly involving in the regulatory process and the state power regulators are unable to perform their role effectively and efficiently by distancing the state government and politicians.

(vi) Higher tariff are being charged to industrial and commercial consumers in order to cross subsidize agricultural and domestic consumers, which has decelerated the industrial development and is hampering the overall economic development of India.

(vii) Achievement of grid parity, sufficient installed capacity, lowest ever price discovery of solar and wind based Renewable power, completion and the favorable domestic and in international conditions made it possible to procure short-term and medium power at cheaper price.

(viii) Increasing trend of opportunistic behavior of the politicians insisting to sell power at sub-optimally lower prices with huge untargeted subsidies has been the biggest challenges to achieve the financial viability and sustainability of the power sector. The patronage based relationship between politicians and certain segments of consumers has been a major driver for subsidy and the electricity has been made as an instrument of political patronage.

(ix) Less reforms have been done to contain the huge commercial losses, rationalizing subsidies. Huge commercial losses, un- targeted subsidies to agricultural and certain section of domestic consumers, irrational tariff, rampant theft, energy leakages, strong government and political intervention in tariff setting process have significantly contributed for huge financial losses of DISCOMs and poses a major hindrance to achieve financial unviability of DISCOMs[5][6][16][34].

(x) The past reform to privatize the DISCOM business have not made a great success, as the private players viz., Reliance power, Tata Power, Torrent Power although recued the AT&C losses significantly, their motive is profit, as their intention is to increase tariff rather than to decrease the tariff and passing on the benefit to the customers, which is the prime objectives of the reforms. Total privatization is again led to creation of several private monopolies in the sector. This is against the overall interest of the nation at large and would not protect the interest of the consumers. Hence, Government should not blindly follow and go-ahead with bifurcating wire and supply business, as has been implemented in several countries as is being advocated by international funding agencies like World Bank. Unbundling of integrated State Electricity Board into generation, transmission and distribution companies as advocated by World Bank has not yielded the benefit of achieving the financial viability of DISCOMs and the sustainability of the state power utilities as was expected. Hence, the business model for the state power utilities working successfully in one country may not be successful in India, as the Indian power sector has already witnessed such experiences.

Policy prescriptions for the Next Generation reforms:

To address many issues in power sector, sustained financial losses and to manage the distribution system efficiently, a third generation reform is needed in the power distribution sector [1]. Based on the detailed study on the impact of power sector reforms and the country's past experience, it has been found that complicated and complex factors has been significantly contributing to huge financial losses of the state-run DISCOMs on sustainable basis. The unsustainable business of DISCOMs remain a major hindrance to achieve financial viability of the power distribution business of DISCOMs despite implementation of several reforms in Indian power sector. Based on the findings from the study, in order to achieve financial and commercial viability for the sustainable development of the power sector, the following policy interventions are prescribed:

Rationalized tariff Structure: Need of the hour

There is a dire need to rationalize the present tariff structure to achieve financial viability of state-run DISCOMs and the sustainability of the power sector. The rationalized tariff design should ensure that (i) The tariff should reflect the cost (ii) cross subsidies should not be more or less than 20 percent of the aggregate cost of supply to any consumers. (iii) It should respond with time and seasons to flatten the load curve (iv) encourage higher consumption for optimal utilization of generation capacities of both conventional and non-conventional (v) it has a simple structure with not more than three to four categories for better efficiency, transparency and to have better control on operation of DISCOMs (vi) ensure financial viability of DISCOMs and economic development (vii) It should be price sensitive to market price for optimal utilization of generation capacity and to have lower cost of power (viii) The subsidies should flow only to the targeted consumers to avert large-scale leakage and wastage.

Direct Transfer of Subsidy to targeted consumers

Direct Transfer of Subsidy to Targeted beneficiaries (DTSTB)

The present energy pricing system with huge subsidy has significantly contributed to the sustained financial losses of state-run DISCOMs and to its unsustainable business. In order to achieve the objective of self-sustainable power sector, to contain the burgeoning financial losses for the development of power sector and the overall economic development, we should build and implement a sound system to directly transfer the subsidies to the targeted beneficiaries by streamlining subsidies.

DTSTB system design should ensure that:

i. No blanket subsidy is given to any power consumer sectors without metering. The subsidy should go only to the targeted consumers based on the socio-economic status and the need.
ii. Free electricity should be limited to some pre-decided units only for the targeted customers.
iii. Each unit of the electricity consumed by every consumer should be billed. In the bill, eligible subsidized quantity of the units shall be deducted and the consumers have to pay the balance units.
iv. The state government has to pay the subsidy to DISCOM in advance before passing the benefit of subsidy.
v. All consumers shall needs to be metered and the billing has to be based on actual power consumed only.
vi. Charging of fixed tariff based on the Horse Power / KW of the motor of the pump set for agriculture consumers should be discontinued. Instead pre-decided quantity of power should only be allowed as subsidy after billing for 100% power consumed.
vii. Paying the 100% bill by consumer and getting the reimbursement subsequently from DISCOM/state is not a good policy, as reimbursement may not be done timely and transparently.
viii. Billing, collection and transfer of subsidies to all the consumers under DTSTB scheme shall be commercialized and private agencies shall be appointed transparently by tendering process for each district/division to increase the billing and collection efficiency. DISCOMs have to just monitor and manage billing and collection and transfer of benefits mechanism.

Market-driven dynamic pricing regime

Indian power sector should move towards *'Dynamic Pricing Regime'* in order to reap the benefits of optimal utilisation of capacity, price elasticity of demand and flattening of load curve. The way forward is to installation of smart meters, AMR metering and implementation of Time-of-the day metering.

Institutional reform of the state regulator

The direct and indirect interference by the state with the state power regulator in fixing the electricity price stood as a major hindrance in performing the role of the state regulator efficiently and effectively in true spirit as enshrined in EA-2003 and reform agenda, resulting into inordinate delay and inefficiency in tariff determination and setting a rationalized tariff. In order to distance the state and politicians in the regulatory process and to avert the subservient role being played by the state power regulator to the state government and in the larger interest to achieve financial viability of the state-run DISCOMs, there is a dire need to overhaul the existing regulatory structure. Creation of a strong institutional mechanism for the State Electricity Regulatory Commission (SERC) and Joint Electricity Regulatory Commission (JERC) is of paramount importance.

To achieve this, (1) Indian power sector should build a sound and strong institutional structure for the state power regulators like Union Public Service Commission (UPSC) with quasi-judicial power. It should have an independent, dynamic and broad-based full time board, having its members appointed in regular cadre (Not retired) with one chairman as head of the Commission (2) one state government nominee director (part-time. However & she/he should not be made as the Chairman) (3) A Specialized team comprising of at least six board level members (on regular appointment) one each from each specializations viz., (i) Power, (ii) Finance & Accounts (iii) Costs &Tariff (iv) Legal (v) Economist (vi) HR, Administration & Public Relations with dynamic serving officers from Indian Civil service (IAS), Indian Engineering Service (IES) & Indian Legal Service (ILS) shall needed to be appointed for the position of Chairman and also for Members in Technical, Finance, Costing and Legal domain. They should be in the age group between 30 and 55 and the maximum age limit should be 60 for all the board level position. No appointment / extension of service beyond the age 60 should be permitted.

(ii) Qualified, dynamic, result oriented and experienced professionals shall needs to be appointed to work on full time basis to function as board level members viz., Engineers for Technical, Charted Accountants for Finance & Accounts, Cost Accountant for Cost & Tariff, Legal professionals for Legal, Economist for economy domain and HR & Administration professionals for their specialization. The Chairman of the SERC/JERC should be a serving IAS /IES /ILS officer. For the other 6 Board level positions if IAS / IES and ILS officers are considered for posting, they should have the qualifications and experience in the respective specialized areas viz., Engineering, Finance, Costing, Legal and Economist respectively.

(iii) No retired bureaucrats and officers retired from local states/DISCOMs shall be allowed to function as Chairman, Directors/Members of the SERC. Further, members at the board level position shall not be posted on deputation from the local state government / state DISCOMs.

(iv) The cost of running the institutions shall have to be borne by the Central Government and the regulator should not depend from the state as prevailing now.

Conclusion & contribution to theory and literature

The factors significantly contributing to the huge sustained losses of the state-run DISCOMs in India have been ascertained. The impact of the past reform measures in power sector post enactment of the landmark legislation, the Electricity Act, 2003 is analyzed by SWOT analysis. The study finds that although the power sector reforms have achieved several reform parameters, it has not succeeded in achieving the financial sustainability, which is one of the primary objectives of the reforms. Fewer reforms have been done in the past to contain the huge commercial losses and to reduce cross subsidy and subsidies, which has led to huge losses. The huge financial losses of state-run DISCOMs and irrational power tariff structure has heavily impacted the development of power and other sectors of economy and the overall economic growth in a big way. High commercial losses, irrational tariff structure, huge subsidy to agricultural customers and certain segments of domestic consumers without proper subsidy policies with a strong political and state government intervention with DISCOMs and the state power regulators has been significantly contributing to the sustained financial losses of DISCOMs.

The business model of the state power utilities in India are largely constrained by what regulations allow them to do [30]. Several reviewed paper acknowledges the fact that the sustained financial losses are plagued by untenable and irrational tariff structure not reflecting the cost of power and is based on subsidies built in with strong political influence and the electricity has been made as an instrument of political patronage.

The present business model being adopted by the state-run DISCOMs is unviable and unsustainable, as DISCOMs are making huge losses on sustainable basis. The power distribution business of the state-run DISCOMs become financially and commercially unviable and unsustainable[46]. To achieve financial viability and for the sustainable power sector development, policy prescription in the form of Government interventions are prescribed.

The next generation reform should focus more on generating more revenue and by containing huge commercial losses. Rationalization of present tariff structure, direct transfer of subsidies to targeted beneficiaries and a major institutional reform to revamp of the existing structure of the state power regulator and to create a strong institutional mechanism for effective and efficient function of the regulator without political intervention.

Based on the reform experience in Indian power sector, the business models needs to be developed and should be tailored to suit the Indian conditions. The business model of the state-run DISCOMs needs to be re-designed for to achieve its business, which would lead to the sustainability of the Indian power sector considering financial, political, social, and environmental environment, the feasibility of implementation and acceptability by the major stakeholders in Indian conditions. Bluntly following the business model working in other parts of the world may not work in India.

The needed policy interventions by the Government to formulate strategies for the next generation reforms in distribution sector has been suggested. This paper would be of immense value to the policy planning bodies in India 'NITI Aayog', Ministry of Power, Government of India, central and state governments for successful planning and implementation of the Next Generation distribution reforms in power sector in India.

Abbreviations:

ACS	: Average Cost of Supply
APDRP	: Accelerated Power Development and Reform Programme
ARR	: Average Revenue Realized
AT&C loss	: Aggregate Technical & Commercial loss
CEA	: Central Electricity Authority
CERC	: Central Electricity Regulatory Commission
DDG	: Decentralized Distributed Generation
DISCOM	: Power Distribution Company
DDUGJY	: Deen Dayal Upadyay Gram Jyoti Yojana
EA Act	: The Electricity Act, 2003
FI	: Financial Institution
FRP	: Financial Restructuring Plan
GDP	: Gross Domestic Product
GoI	: Government of India
MNRE	: Ministry of New and Renewable Energy Sources
MoP	: Ministry of Power
MW	: Mega Watt (1,000 kW)
MU	Million Units 1,000,000 kW-Hr
NEF	: National Electricity Fund
NPA	: Non-Performing Asset
PAT	: Perform Achieve and Trade

PFC : Power Finance Corporation Ltd
PPA Power Purchase Agreement
PGCIL : Power Grid Corporation of India Ltd
R-APDRP : Restructured Accelerated Power Development and Reform Programme
RES : Renewable Energy Sources
REC : Rural Electrification Corporation Ltd
RGGVY : Rajiv Gandhi Grameen Vidyutikaran Yojana
RBI : Reserve Bank of India
SAUBHAGYA : Pradhan Mantri Sahaj Bijili Har Ghar Yojana
SERC : State Electricity Regulatory Commission
SECI : Solar Energy Corporation of India
SEB : State Electricity Board
SERC : State Electricity Regulatory Commission
TANGEDCO : Tamil Nadu Generation and Distribution Company Ltd
TNEB : Tamil Nadu Electricity Board
T&D : Transmission and Distribution
UDAY : Ujwal DISCOM Assurance Yojana

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