## IMANI Report: Privatisation of the Electricity Company of Ghana Futuristically Useful. – Comparative Lessons from India and Uganda Suggest.

This study seeks to measure the success of reforms in electricity distribution for Ghana, Uganda and India and then extrapolate based on the findings, potential gains to Ghana from incorporating private participation into the distribution of electricity. The general assumption is that, the long term concession model that Ghana purports to adopt in the reform of electricity distribution has been applied by Uganda and India (Delhi). Therefore, the successes or otherwise of this reform strategy as observed in these countries may be similar to what Ghana may experience. The study is in three main parts;

1. Measuring the current success of reforms in electricity distribution for Ghana, Uganda and India
2. Analysis and discussion of findings
3. Recommendations and conclusion

# Measuring the Success of Reforms in Electricity Distribution

METHODOLOGY

The study adopts the framework and methodology developed by Jena & Andoh (2014)[1] for measuring the success of electricity sector reforms and modifies it to measure the success of reforms in the power distribution sector of Ghana, India and Uganda.

The methodology hinges on two general schools of thought concerning the measurement of successful power sector reforms namely the nearness of market structure to retail competition and the sustainability of reforms. According to the first school of thought, indicators of successful reforms should include improved efficiency of the sector, lower prices/tariffs and better quality of service[2]. The second school of thought posits that in measuring the success of power sector

[1]Jena & Andoh, 2014, *What are the key indicators of successful reforms? A comparative analysis of United Kingdom (UK) and Ghana.* Available at https://www.academia.edu/10473243/What_are_the_key_indicators_of_successful_reforms_A_comparative_analysis_of_United_Kingdom_UK_and_Ghana Accessed 20/06/2017

[2] Jamasb, T., 2004. Between the state and market: Electricity sector reform in developing countries. *Utilities Policies,* pp. 14-30.

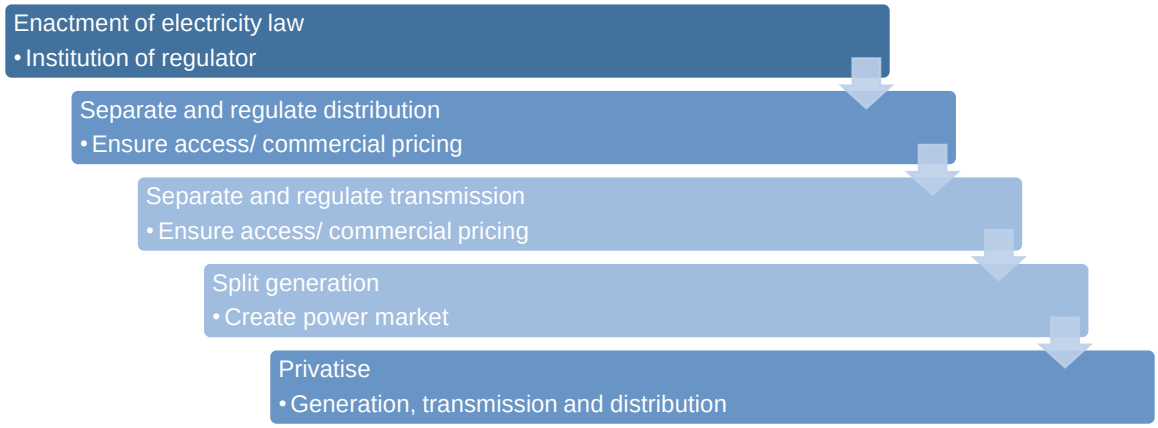
reforms, greater weightage must be given to supporting the reform process once begun to ensure sustainability[3].

Based on these schools of thought, Jena and Andoh (2014) identify indicators for measurement of successful electricity sector reforms as follows:

**Degree of Private Participation**: The theory that the funding of public expenditure through taxes leads to loss in social welfare because of the deadweight loss makes a strong case for private funding for investments in the electricity sector. It is also noted that, increases in private participation in the electricity sector, particularly electricity distribution is most likely to result in reduced system losses, lower prices, cost efficiency and improved revenue collection[4].

**Degree of adherence to the elements of reform**: The elements of reform as suggested by Newbery[5] is presented in the figure below

*Diagram 1: Elements of Reform*




Our focus here is not on the overall reform of the electricity sector in Ghana as this has already been initiated, but on reforms in distribution. Given the poor performance of the Electricity Company of Ghana (ECG), Ghana's main distribution utility (high system losses of about 30% of power purchased, low levels of revenue collection-60% of power sold, accumulation of debts among others), the general consensus is that reform in distribution is required. Through the Millennium Challenge Corporation's Ghana Power Compact, Ghana has opted for the incorporation of Private Sector Participation (PSP) into distribution as a means of improving the

[3] Benavides, J. M., 2003. *Can Reforms be Made Sustainable? Analysis and Design Considerations for the Electricity Sector,* Washington, D.C. : IFM Publications.
[4] Newbery, D., 2002. *Issues and options for restructuring electricity supply industries: DAE Working Paper WP 0210,* Cambridge: Department of Applied Economics, University of Cambridge.
[5] ibid

efficiency of electricity distribution. Key to reform in distribution, Jamasb (2004)[6] notes that the greater the number of distribution entities, the greater the competition and the greater the efficiency. Further, incentive regulation and third-party access work to improve the efficiency of distribution while the cost-plus method of tariff determination helps in the reduction of cross subsidies. This indicator will therefore measure the overall adherence to these elements.

**Degree of competition and market power**: In a properly functioning competitive market, it is assumed that there is the presence of more players which ensures efficiency, all other things equal. However in replicating this model in electricity business, it is useful to ensure that efficiencies generated through unbundling exceed economies of coordination enjoyed by the vertically integrated electricity sector before unbundling[7]. Further, the concentration of ownership gives rise to market power which could potentially erode efficiency therefore the smaller the market share of each player, the better for the realization of efficiency gains[8]. To foster competition, other key requirements are to open up access to transmission and distribution networks either through regulated or negotiated third party access and to ensure that rules for allocation of transmission charges, congestion pricing and arrangements for financing of transmission network are well laid out.

**Degree of marginal cost based tariff**: A key to efficiency in the electricity sector is that tariffs must reflect the true cost of power generation and must tend to marginal costs in the long run where there are no supernormal profits[9]. However in most developing countries, government offers generous subsidies to make electricity affordable which causes tariffs to deviate from marginal costs. The greater the degree of subsidies, the more difficult it is for reforms to work in the short term[10]. In view of this, reforms must target the removal of subsidies since welfare gains by those who benefit from removal of subsidy is usually greater than the welfare loss to consumers

[6] ibid@2
[7] Joskow, P. L., 2004. Electricity sector restructuring and competition: a transactions-cost perspective. In: E. Brousseau & J. Glachant, eds. *The economics of contracts.* Cambridge: Cambridge University Press, pp. 503-530.
[8] Jamasb, T., 2004. Between the state and market: Electricity sector reform in developing countries. *Utilities Policies,* pp. 14-30.
[9] Benavides, J. M., 2003. *Can Reforms be Made Sustainable? Analysis and Design Considerations for the Electricity Sector,* Washington, D.C. : IFM Publications.
[10] World Energy Council, 2004. *Energy Market Reform: Lessons Learned and Next Steps with Special Emphasis on the Energy Access Problems of Developing Countries,* London: World Energy Council.

who would have enjoyed subsidy[11] (Joskow, 2004). The ratio of actual tariff and marginal cost could be an important indicator for measuring reforms (Newbery, 2002).

**Degree of sustainability of reforms**: Bhattacharyya (2007)[12] develops a framework for measuring the sustainability of reforms. This framework hinges on political acceptability of the reform process, social desirability, ability to implement, being environmentally benign, economically efficient and financially viable.

**Degree of technical efficiency**: The focus here is to ascertain the efficiency of operating capital assets which have a direct impact on the costs of power generation and distribution. This can be done using parameters such as plant load factor, capacity factor, fuel efficiency, labour productivity and in the case of distribution the Pivotal Supply Index (PSI).

Framework

The methodology grafts these indicators into a framework that measures the success of reforms in the electricity sector. For the purposes of measuring the success of reforms in electricity distribution for Ghana, India and Uganda, this study modifies the Jena-B framework as follows:

*Table 1: Modified Jena-B Framework*

| Sl. No. | Indicator | Calculation methodology and remarks |
|---|---|---|
| **Degree of private participation – Maximum marks: 1** | | |
| **1** | Degree of private participation | **Formula**: (Distribution capacity owned by private sector/ total distribution capacity)<br>**Remarks**: This indicator will test the level of private sector participation in the distribution sector |
| **Degree of adherence to elements of reforms – Maximum marks: 4** | | |
| **1** | Existence of electricity sector (distribution) regulators | Yes ( 1 mark)<br>No (0 marks) |
| **2** | Multiple distributors or distribution franchisees | High (1 mark)<br>Moderate (2/3 marks)<br>Low (1/3 marks) |
| **3** | Regulated distribution business | Yes (1 mark)<br>No (0 marks) |
| **4** | Barriers for private distributor entry | High (1 mark)<br>Moderate (2/3 marks)<br>Low (1/3 marks) |
| **Degree of competition and market power – Maximum marks: 3** | | |

[11]Joskow, P. L., 2004. Electricity sector restructuring and competition: a transactions-cost perspective. In: E. Brousseau & J. Glachant, eds. *The economics of contracts.* Cambridge: Cambridge University Press, pp. 503-530.
[12] Bhattacharyya, S. C., 2007. Sustainability of power sector reform in India: what does recent experience suggest?. *Journal of Cleaner Production,* Volume 15, pp. 237-238.

| Sl. No. | Indicator | Calculation methodology and remarks |
|---|---|---|
| **1** | Ownership of 3 largest players in distribution | 1 – (Distribution capacity owned by three largest firm/total distribution capacity) |
| **2** | Rules for third party access have been laid out | Yes (1)<br>No (0) |
| **3** | Provisions of congestion pricing is available | Yes (1)<br>No (0) |
| **Degree of marginal cost based tariff – Maximum marks: 2** | | |
| **1** | Industrial tariff | **Formula**: If recent industrial tariff/ marginal cost is less than 1 then 1 mark should be allocated, otherwise indicator value is 1/( Recent industrial tariff/ marginal cost)<br>**Remarks**: Generally it is observed that industrial tariffs are greater than marginal cost. The formula brings the indicator within the range of 0 and 1. |
| **2** | Residential tariff | **Formula**: If (recent residential tariff/ marginal cost) is less than 1 then value of indicator is equal to the calculated value. Otherwise the indicator value is 1 mark.<br>**Remarks**: Generally it is observed that residential tariffs are less than marginal cost due to subsidies. The formula brings the indicator within the range of 0 and 1. |
| **Degree of sustainability of reforms – Maximum marks: 3** | | |
| **1** | Politically acceptable | This paper uses Worldwide Governance Indicators published by World Bank to measure political acceptability. The scores are calculated as (summation of all the six indicators/6[13]) |
| **2** | Government considered removal of subsidy in phased manner | High (1)<br>Medium (2/3)<br>Low (1/3) |
| **3** | Legal framework provides for implementation | Measured as average of government effectiveness, rule of law and regulatory quality as published by World Bank under World Governance Indicators |
| **Degree of technical efficiency – Maximum marks: 2** | | |
| **1** | Capacity Factor | Pivotal Supply Index (PSI)<br>PSI = I[Total consumption > $\Sigma i \neq x Ci$ ]<br>The above statement could be read as follows:<br>If total consumption (load) is greater than sum of the distribution capacities (C) of all entities (i) except the pivotal entity (x) than the statement inside the [ ] (brackets) in the formula is true. Therefore the integral value (I) of PSI is "1". If it is false, the integral value of PSI is '0' |
| **2** | Labour productivity | **Formula**: 1 – Labour force participation rate (as published by International Labour Organisation)<br>**Remarks**: Assumption; the lesser the labour force participation the greater the productivity[14] |

[13] World Bank Worldwide Governance Indicators. Available at http://info.worldbank.org/governance/wgi/index.aspx#reports Accessed 28/06/2017

[14] International Energy Agency, 2005. *Lessons Learnt from Liberalised Electricity Market,* Paris : Organisation For Economic Co-Operation And Development/ International Energy Agency.

The main assumptions of the framework are:

1. The indicators have equal weight. The World Bank adopted a similar approach in its studies[15].
2. It is assumed that each indicator has a maximum score of one (1) and minimum score of zero (0).
3. Indicators that are difficult to quantify are considered as high, moderate or low. A high indicator is given a mark of 1, moderate is given a mark of 2/3 and low indicator is given a mark of 1/3.
4. A colour coding technique is adopted where values up to 1/3 are coloured red, values from 1/3 up to 2/3 are coloured yellow and from 2/3 up to 1 are coloured green. Red represents an area of significant potential improvement, yellow represents an area of moderate potential improvement and green represents an area of low potential improvement for realising reform objectives.
5. All the scores are then added and divided by maximum possible score and multiplied by 100 to get the index value.
6. The paper considers a mean score of 50 as a relative measure of the success of reforms in electricity distribution.

The framework is populated for Ghana, India and Uganda as follows:

[15] Bacon, R., 1999. *A Scorecard for Energy Reform in Developing Countries,* Washington, D.C.: The World Bank Group.

| Sl. No. | Indicator | Ghana | Uganda | India | Sources/ Remarks |
|---|---|---|---|---|---|
| | Degree of private participation – Maximum marks: 1 | | | | |
| 1 | Degree of private participation | 0.00 | 0.5 | 0.00 | **Ghana**-No ownership of distribution assets/infrastructure by private companies<br>**Uganda**-Umeme owns 50% of distribution infrastructure[16]<br>**India**-Insignificant capacity is owned by the private sector for distribution |
| **Sub-total** | | **0** | **0.5** | **0** | |
| | Degree of adherence to elements of reforms – Maximum marks: 4 | | | | |
| 1 | Existence of electricity distribution regulators | 1.00 | 1.00 | 1.00 | **Ghana**-Public Utilities Regulatory Commission (PURC).<br>**Uganda**- Electricity Regulatory Authority (ERA)[17]<br>**India**- Electricity Act 2003 provides for setting up of regulators[18] |
| 2 | Multiple distributors or distribution franchisees | 0.00 | 0.30 | 0.60 | **Ghana**-one state owned distribution entity<br>**Uganda**-97% of distribution given on concession to private distribution entity-Umeme Limited<br>**India**- Private participation in distribution has been opened up but it is yet to see privatization of all distribution entities[19] |
| 3 | Regulated distribution business | 1.00 | | 1.00 | **Ghana**-Distribution is regulated by the PURC.<br>**Uganda**-Regulated by ERA |

[16] It is assumed that Umeme owns 50% of current distribution infrastructure in Uganda as it states in its 2016 annual report that its investments over an 11 year period have led to a doubling of physical distribution infrastructure. Umeme Annual Report 2016. Available at http://www.umeme.co.ug/assets/resources/UMEME_ANNUAL%20REPORT_2016.pdf Accessed 06/07/2017

[17] Electricity Regulatory Authority, Uganda http://www.era.or.ug/index.php/sector-overview/uganda-s-electricity-sector

[18] The Electricity Act 2003, India http://www.cercind.gov.in/Act-with-amendment.pdf

[19] Public Private Partnership (PPP) in Electricity Distribution: Case Studies of Delhi and Odisha. The Energy and Resources Institute, 2015 Available at http://www.teriin.org/eventdocs/files/TERI-GSEP-PPP-in-Electricity-Distribution_Case-Studies.pdf Accessed on 29/06/2017

| | | | | | |
|---|---|---|---|---|---|
| | | | 1.00 | | **India**-Regulatory authorities carved under the Electricity Act 2003 regulate distribution[20] |
| 4 | Barriers for private distributor entry | 0.00 | 0.3 | 0.6 | **Ghana**-No private participation, pronounced barriers to entry<br>**Uganda**-Moderate private participation<br>**India**-Barriers to entry exist though sector is still opening up[21],[22] |
| **Sub-total** | | **2.0** | **2.6** | **3.2** | |
| Degree of competition and market power – Maximum marks: 3 | | | | | |
| 1 | Ownership of 3 largest players in distribution | 0.00 | 0.00671 | 0.68 | **Ghana**-Data sourced from Ghana Electricity Wholesale Market Bulletin, Jan 2017[23]<br>**Uganda**-Data sourced from ERA<br>**India**-Supply situation as presented by the Central Electricity Authority (CEA)[24] |
| 2 | Rules for third party access (TPA) have been laid out | 1.00 | 1.00 | 1.00 | **Ghana**-TPA exists; see Strategic National Energy plan[25]<br>**Uganda**-TPA provided for in the Electricity Act 1999[26]<br>**India**-TPA exists through a regulation by Central Electricity Regulatory Commission (CERC)[27] |

[20] The Electricity Sector Act 2003, India http://www.cercind.gov.in/Act-with-amendment.pdf
[21] National Competition Policy and Economic Growth in India-Electricity Sector Study (October 2013). Available at http://www.cuts-ccier.org/compeg/pdf/Report-Electricity_Sector_Study.pdf Accessed 28/06/2017
[22] Chandra et al (September 2014), Power Generation and Supply Industry in India-An Economic Analysis of the Market Structure, Available at https://www.slideshare.net/shahudo/power-generation-and-supply-industry-in-india-an-economic-analysis-of-the-market-structure?from_action=save Accessed 28/06/2017
[23] Energy Commission, Ghana Wholesale Electricity Market Bulletin, January 2017
[24] Distribution capacity owned by three largest firms/total = 1- (capacity owned by the states of Maharashtra, Uttar Pradesh and Tamil Nadu/Total capacity) = 1- (demand by these states/total demand) = 1- 46966/145187 = 0.68. Ministry of Power, Central Electricity Authority, New Delhi (Jan 2017). http://www.cea.nic.in/reports/monthly/executivesummary/2017/exe_summary-01.pdf Accessed 29/06/2017
[25] Energy Commission Strategic National Energy Plan 2006-2020. Available at https://s3.amazonaws.com/ndpc-static/pubication/Strategic+National+Energy+Plan+2006-2020.pdf
[26] The Electricity Act 1999. Uganda. Available at http://www.era.or.ug/index.php/2013-12-14-14-58-04/laws-polices/laws Accessed 29/06/2017s
[27] Central Electricity Regulatory Commission New Delhi (Open Access in Inter-State Transmission). Available at http://www.cercind.gov.in/31012004/finalregulations-openaccess.pdf Accessed 29/06/2017

| | | | | | |
|---|---|---|---|---|---|
| 3 | Provisions of congestion pricing is available | 0.00 | 0.00 | 1.00 | **Ghana**-No congestion pricing<br>**Uganda**-No congestion pricing<br>**India**-Exists in power purchased on exchange[28] |
| **Sub-total** | | **1** | **1.00671** | **2.68** | |
| | Degree of marginal cost based tariff – Maximum marks: 2 | | | | |
| 1 | Industrial tariff | 0.21 | 0.17 | 1/1.08=0.93 | **Ghana**-Tariff calculations; ECG[29] Marginal Cost calculations[30]<br>**Uganda**-Tariff calculations[31], Marginal Cost calculations, ERA[32]<br>**India**-Calculations attached in annex[33] |
| 2 | Residential tariff | 1.00 | 1.00 | 0.6 | |
| Sub-total | | **1.21** | **1.17** | **1.53** | |
| | Degree of sustainability of reforms – Maximum marks: 3 | | | | |
| 1 | Politically acceptable | 0.55 | 0.31 | 0.46 | Based on the Worldwide Governance Index-Refer to Annex for calculations |
| 2 | Government considered removal of subsidy in phased manner | 0.0 | 0.6 | 0.6 | **Ghana**-No clear strategy on subsidy removal<br>**Uganda**-Gradual process of subsidy removal[34]<br>**India**-Government is trying to remove but subsidies still exist[35] |
| 3 | Legal framework provides for implementation | 0.53 | 0.42 | 0.51 | Refer to Annex for calculations |
| **Sub-total** | | **1.08** | **1.33** | **1.57** | |

[28] Indian Power Market, Journey so far and Way Forward (June 2014) Available at https://www.iexindia.com/Uploads/Reports/14_01_2015IEX_India_IPM_Report.pdf Accessed 29/06/2017
[29] Electricity Company of Ghana Reckoner 2017. Available at http://www.ecgonline.info/images/tariff/RECKONER-2017.pdf Accessed 04/07/2017
[30] Energy Commission, Ghana Wholesale Electricity Market Bulletin November-December 2016. Available at http://www.energycom.gov.gh/files/November-December%202016.pdf Accessed 05/07/2017
[31]Umeme, 2017. Available at http://www.umeme.co.ug/assets/resources/Tariff%20Adjustments/Tariff_Adjustment.pdf Accessed 29/06/2017
[32] Electricity Regulatory Authority; Statistics and Tariffs. Available at http://www.era.or.ug/index.php/statistics-tariffs/2013-11-27-16-54-30/distribution-statistics Accessed 29/06/2017
[33] Report on Road Map for Reduction in Cross Subsidy, PwC, April 2015. Available at http://www.forumofregulators.gov.in/Data/WhatsNew/Report.pdf Accessed 29/06/2017
[34] Energy Subsidy Reform in Sub-Saharan Africa: Experience and Lessons. IMF, 2013. Available ar https://www.imf.org/external/pubs/ft/dp/2013/afr1302.pdf Accessed 29/06/2017
[35] ibid@15

| | | | | | |
|---|---|---|---|---|---|
| | Degree of technical efficiency – Maximum marks: 2 | | | | |
| 1 | Capacity Factor (PSI) | 1.00 | 1.00 | 1.00 | **Ghana**-((18394.248Gwh)>(1244.09-870.86=373.227Gwh))[36]<br><br>**Uganda**-((1147258Mwh)>(2596612.75-2558167.5=38444.95Mwh)[37]<br><br>**India**-((145187)>(145187-19899))[38] |
| 2 | Labour productivity | 1-(77/100)=1-0.77=0.23 | 1-(85/100)=1-0.85=0.15 | 1-(54/100) = 1-0.54 = 0.46 | World Bank labor force participation data[39] |
| **Sub-total** | | **1.23** | **1.15** | **1.46** | |
| | Total – Maximum marks: 15 | | | | |
| Grand total of individual countries | | **6.52** | **7.76** | **10.44** | |
| **Jena-B Reform Index** | | **(6.52/15)*100=43..47** | **(7.76/15)*100=51.71** | **(10.44/15)*100=69.6** | |

[36] Total peak load is 18394.248. Total distribution capacity without pivotal supplier (ECG) is 373.337 (=1244.09-870.863). This means that the statement within brackets is true. And hence PSI is 1. Data sourced from the Ghana Wholesale Electricity Market Bulletin, January 2017. Available at http://www.energycom.gov.gh/files/January%202017%20final.pdf Accessed 30/06/2017

[37] Total peak load is 1147258Mwh. Peak generation is used as proxy for total consumption/peak load. Total energy sales (distribution) used as proxy for total distribution capacity. Total distribution capacity without pivotal supplier (Umeme) is 38,444.95Mwh (2596612.75-2558167.80). This means that the statement within brackets is true. And hence PSI is 1. Generation and Distribution Statistics data sourced from the Electricity Regulatory Authority, Uganda

[38] Total peak load is 145187. Total distribution capacity without pivotal supplier (Maharashtra being the largest) is 125288 (=145187-19899). This means that the statement within brackets is true. And hence PSI is 1. Data presented in Annex

[39] http://data.worldbank.org/indicator/SL.TLF.CACT.ZS

## Interpretations & Discussions

The JB Reform Index as calculated for Ghana, Uganda and India indicates that overall, with a total score of 69.6, India has been more successful at reforms in the distribution of electricity than Uganda which scored a mark of 51.71 and Ghana which scored 43.47. Based on the assumption earlier made that a mean score of 50 on the JB Reform Index indicates relatively successful reform in electricity distribution we can say that, both Uganda and India have experienced some success/benefits from steps taken to reform electricity distribution and as such valuable lessons can be learnt from their processes of reform of electricity distribution.

It is useful to note that, as revealed by the framework, what sets Uganda and India apart and has resulted in successful reform in distribution for both countries is private participation as discussed below:

1. Degree of private participation: Infrastructure/Assets owned by the private sector

   *This indicator revealed that, significant improvement is required by Ghana in terms of private ownership, operation and maintenance of distribution infrastructure/assets.*

   To curb the problems of low operational efficiency, poor reliability, high transmission and distribution losses and poor financial & commercial performance, electricity distribution in Uganda was ceded on concession to Umeme, a private company, for 20 years. After 11 years, Umeme reports that it has cumulatively invested over US$500 million in electricity distribution infrastructure and succeeded in doubling the infrastructure[40]. This has improved electricity supply infrastructure in Uganda doubling the capacity from approximately 38.60MW in 2008 to 76.20MW in 2016.

   Although the overall private ownership of distribution in India requires improvement, Delhi stands out as a success story in electricity distribution. Private distribution improved electricity supply in Delhi of India whose electricity distribution was formerly highly inefficient and of poor quality. After restructuring of the sector, three privately owned companies, specifically Tata Power Delhi Distribution Limited (TPDDL) took over electricity

[40]Umeme Annual Report 2016

distribution via a 25 year Renew Operate and Transfer (ROT) concession and investment in infrastructure increased by approximately 350% between 2002 and 2016[41]. PwC reports that, within a 10-year period post privatization, capital expenditure by private distribution companies in Delhi amounted to more than USD$686 million[42].

The main thrust of the Millennium Challenge Corporation Power Compact for Ghana is to encourage private investments in the distribution of electricity with the view to improve efficiency of distribution[43]. New investment in capital assets is expected and this will be measured by the total value of new equipment installed in the distribution network as well as the actual investments in maintenance of the network. The ratio of actual maintenance expenditures to the dollar value of total distribution assets is expected to increase from the 2012 baseline of 0.98% to 2.5% within 5 years of the PSP coming into force which indicates the capital investment in infrastructure is expected to more than double with the introduction of PSP[44].

2. Degree of adherence to elements of reform

A. Multiple distributors or Distribution franchisees:

*The performance of the countries under study on this indicator reveals that Ghana requires significant improvement in the number of distributors of electricity.*

As measured by the indicator, the presence of multiple distributors, over 70 distribution companies in the case of India, has made overall electricity distribution more efficient. In Uganda, 97% of distribution is handled by Umeme, and the remaining 3% is handled by seven other distribution entities that chiefly supply power to rural areas in an effort to ensure access to electricity in the rural areas. Umeme reports that over the period 2010

[41]Tata Power Delhi; Excellence Journey 2016. Available at http://tatapower-ddl.com/showfile.aspx?this=143&f=ABOUT-US&s=Tata-Power-DDL-Innovation-Journey&t=Tata-Power-DDL-Excellence-Journey Accessed 07/07/2017

[42]A Privatized Power Sector; The Pain and the Glory. PwC 2014. Available at https://www.pwc.com/ng/en/assets/pdf/pwc-a-privatized-power-sector-the-pain-and-the-glory.pdf Accessed 13/07/2017

[43] Millennium Challenge Compact between The United States of America Acting through the Millennium Challenge Corporation and the Republic of Ghana. Available at http://www.mida.gov.gh/pages/view/MCA_CompactII-0.pdf/43 Accessed May 2017

[44]ibid

to 2016, energy losses have decreased from 30% to 19%, customer growth increased from 14.2% to 19.8%, revenue growth from 9.5% to 13.0% and revenue collections rate from 93% to 98.4%. This paints a picture of marked improvements in overall distribution efficiency.

Electricity distribution in Ghana stands to benefit from efficiency gains if distribution is opened up to more private entities.

B. Barriers for private distributor entry:

*This indicator reveals that Ghana requires significant improvement in opening up entry for private distributors.*

Indian and Ugandan policy makers have consistently removed the barriers for private sector participation in the sector to increase competition. For instance, India adopted the separation of wire business (a natural monopoly) from the supply of electricity (competitive element); it developed a model Public Partnership Framework and as well as distribution franchisee models and invested in the development of the capacity of regulators in the oversight of distribution activities.

Elimination of barriers for private distributor entry has the attendant effect of engendering competitive efficiency. Ghana needs to work towards progressively removing the existing barriers to entry for private distributors in electricity distribution, for instance through the adoption of a private partnership framework in distribution, to benefit from improved competitive efficiency.

3. Degree of competition and market power:

A. Market power:

*Ghana performed poorly on this indicator and requires significant improvement.*

It has been noted that concentration of ownership gives rise to market power which has the potential to erode efficiency gains to be derived from introducing competition and

presents the opportunity to impact and manipulate tariffs. The situation is exacerbated when this ownership of the distribution market is wholly placed under a single company such as ECG. As proceeds from Jamasb (2004) that the smaller the market share of each player the better the efficiency, it is in the interest of the country that ECG be broken into smaller companies in order to introduce competition which would result in increased operational efficiencies. Further, by splitting the company into smaller units, the market power of ECG would be significantly reduced and hence the power to impact & manipulate tariff will be reduced. This will help in reducing the pass-through of unacceptable operational inefficiencies to consumers as high tariffs. Private participation may further be introduced into the divided entities formed out of ECG.

B. Competition and market based pricing:

*Ghana performed poorly on this indicator and requires significant improvement.*

India has introduced congestion pricing in power sold through the energy exchange and further, the regulators consider the impact of congestion while fixing tariff. This allowance for congestion pricing acts as an indicator for attracting private investment into the distribution sector. Drawing from this example, it will be useful for ECG to work towards the provision of congestion pricing to continue to attract private sector investment in long run.

4. Degree of marginal of marginal cost based tariff:

*Significant improvement is required by Ghana in terms of the extent to which tariffs tend to marginal cost in the long run.*

The indicator reveals that, industrial tariffs for Ghana currently at Ghs1.92/kwh (for consuming 10000 units[45]) are higher than marginal costs Ghs0.40/kwh revealing the effect of subsidization for residential electricity. This works adversely against the efficiency of distribution. A progressive removal of electricity subsidies as part of the privatization process will help improve efficiency of supply of electricity. The high industrial tariff results

[45] ibid@29

affects the costs of locally produced goods as compared to imported goods given the high cost of their production due to higher industrial tariffs. This discourages local private sector investments in the industrial and manufacturing sectors of Ghana and leads to reliance on imports. This further results in low employment rates in the industrial sector in the long run. A move towards marginal cost pricing for the industrial sector which is expected with the introduction of PSP would greatly serve to alleviate such adverse effects.

Even though tariffs may not necessarily decrease with the introduction of PSP, there will be a trade off in efficiency gains and there are reports which indicate the willingness of Ghanaians to pay higher tariffs once they are guaranteed quality service delivery[46]. Domestic tariffs after reform of electricity distribution in Uganda increased by 61.72% between 2010 and 2016[47] (whereas industrial tariffs increased at an increasing rate of 81.72%[48] within the same period).

5. Degree of sustainability of reforms:

*Ghana requires moderate improvement in the area of sustainability of reforms in electricity distribution whereas India has experienced more sustainable electricity distribution reform.*

Political support is required for the sustainability of reforms in distribution in Ghana, especially consensus on the progressive removal of subsidies where Ghana requires significant improvement. Strong political will is needed for the sustainability of reforms in electricity distribution.

[46]Twerefou, D.K. (2014) Willingness to Pay for Improved Electricity Supply in Ghana. Modern Economy, 5, 489-498. http://dx.doi.org/10.4236/me.2014.55046
[47]Electricity Regulatory Authority, Uganda. Available at http://www.era.or.ug/index.php/statistics-tariffs/tariffs/distribution-tariffs/2014-10-14-10-24-55?resetfilters=0&clearordering=0&clearfilters=0 Accessed 14/07/2017
[48]Electricity Regulatory Authority, Uganda. Available at http://www.era.or.ug/index.php/statistics-tariffs/tariffs/distribution-tariffs/commercial-tariff?resetfilters=0&clearordering=0&clearfilters=0 Accessed 14/07/2017

6. Degree of Technical Efficiency:

*Overall, Ghana requires significant improvement in technical efficiency especially with the productivity of labor*

The International Energy Agency reports in its study[49] a clear decreasing trend in the work force of some OECD countries under study upon the liberalization of the electricity sector. The reform of electricity distribution in Delhi further confirms this finding. According to Tata Power Delhi Distribution Limited (TPDDL) reports[50], the number of employees decreased from 5,600 prior to reform to 3,512 by March 2016. During this same period, remarkable improvements were experienced in reduction of technical and commercial losses (from 53.1% in 2002 to 8.8% in 2016), system reliability (70% in 2002 to 99.68% in 2016), revenues generated (increased by 496% between 2002 and 2016) as well as consumer satisfaction index.

Ghana may increase labor productivity by continuous capacity building via training and skills development. India offers online courses (https://indiaskills.nsdcindia.org/) for skills development along with certifications for its people interested in employment in the electricity distribution sector. Regulated private sector institutions may be set-up for skills development courses in Ghana to reach out to its citizens either through online courses or through training centers across Ghana including for courses in electricity distribution.

[49] International Energy Agency, 2005. *Lessons Learnt from Liberalised Electricity Market,* Paris: Organisation For Economic Co-Operation And Development/ International Energy Agency.
[50] ibid@2

## Recommendations & Conclusions

This study sought to measure the success of reforms in electricity distribution for Ghana, Uganda and India and to extrapolate based on the findings the perceived successes and benefits that may accrue to Ghana in the pursuit of privatization of electricity distribution.

It finds that India has been most successful in reforming electricity distribution and both India and Uganda have enjoyed efficiency gains from introducing private participation into distribution. Given that the intended PSP for Ghana takes a similar form as that adopted in Uganda and India (Delhi), the study extrapolates that Ghana stands to enjoy chiefly efficiency gains proceeding from increased capital investments in electricity distribution, reduction in energy losses (technical and commercial) and system reliability, revenue growth, improvements in revenue collection rate, and improvements in labor productivity.

The study makes the following recommendations:

1. To improve electricity access to rural areas, it may be useful to further open up distribution to private sector players able and willing to supply electricity to rural areas

2. To improve distribution efficiency, tariffs must tend to marginal costs. The government must critically consider the formulation and implementation of a strategic plan to progressively remove subsidies to foster efficiency in electricity distribution

3. One of the things that greatly facilitated the turnaround of the electricity distribution sector in Delhi was the governmental support the private companies enjoyed including:
    - A five year transitional period where government provided data and ensured appropriate market conditions
    - Capping of the serviceable liabilities transferred from the predecessor utility (Delhi Vidyut Board, DVB) to the private companies such that the private companies started business with a clean balance sheet
    - The extension of a 14-year, 14% (with 4 years' moratorium on interest and principal repayment) loan to each private company
    - A government guaranteed return on equity of 16% for the private party so that the private companies were able to preclude tariff shocks during the transition period

The government of Ghana may consider lending such support to the PSP process

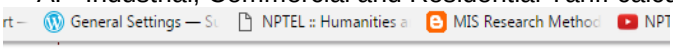
4. It is interesting to note that in the reform of electricity distribution in Delhi, a tri-partite agreement involving the Government, the predecessor utility (DVB) and the Workers' Union ensured that;
    - No employee of the predecessor utility will be retrenched on account of being declared redundant or on account of restructuring
    - All existing employees will be absorbed by the successor companies
    - The terms and conditions of service upon transfer to the private entities to succeed the predecessor utility (DVB) will be guaranteed to continue without change and warranted modification will only be undertaken after negotiations and settlement with recognized unions and associations without reduction to existing benefits.

    To assuage the fears of the employees of the Electricity Company of Ghana and thereby create buy in for the introduction of PSP into electricity distribution, the government of Ghana may consider structuring a similar agreement. It may also consider establishing a program for continuous capacity development for the workers of ECG.

***This report was authored by IMANI's Barbara Maame Esi Andoh and draws inspiration from a study tour report of India and Uganda by IMANI's Maud Martei in 2014. For interviews, please call Barbara Andoh on 0302 972 939 or 0554 309 966.***

# ANNEX

A. Industrial, Commercial and Residential Tariff calculation for 22 states in India:




### 4.2.1. Category wise analysis of cross subsidies

Based on the review of tariff orders of all the states, 4 broad consumer categori agricultural, commercial and industrial which when combined account for 80 discoms. It can be observed that generally agricultural and domestic categori and industrial categories. We have done a further analysis of these 4 broad cate

**Table 4 ACoS coverage comparison for broad consumer categories o**

| State[6] | FY | ABR Domestic | Agri-cultural | Industr-ial | Comm-ercial | ACoS | Domestic |
|---|---|---|---|---|---|---|---|
| **North** | | | | | | | |
| Jammu & Kashmir | FY15 | 2.13 | 2.57 | 3.87 | 3.54 | 5.69 | 37% |
| Himachal Pradesh | FY15 | 4.10 | 5.11 | 5.50 | 5.62 | 5.22 | 82% |
| Uttarakhand | FY15 | 3.06 | 1.19 | 4.54 | 4.80 | 4.16 | 74% |
| Punjab | FY15 | 5.60 | 4.71 | 6.76 | 6.82 | 5.88 | 95% |
| Delhi | FY15 | 5.44 | 3.15 | 9.02 | 9.98 | 7.38 | 74% |
| Rajasthan | FY14 | 5.49 | 4.14 | 6.03 | 7.05 | 5.97 | 92% |
| Uttar Pradesh | FY15 | 3.87 | 2.45 | 7.28 | 6.55 | 6.11 | 63% |
| **West** | | | | | | | |
| Gujarat | FY15 | 3.69 | 1.32 | 5.57 | 4.10 | 5.27 | 70% |
| Goa | FY15 | 1.93 | 1.88 | 4.34 | 3.78 | 3.78 | 51% |
| Maharashtra | FY13 | 4.89 | 2.41 | 7.50 | 10.28 | 5.56 | 88% |
| Madhya Pradesh | FY15 | 4.87 | 3.75 | 6.02 | 6.59 | 4.84 | 101% |
| Chhattisgarh | FY15 | 2.99 | 2.54 | 5.42 | 6.27 | 4.40 | 68% |
| **East** | | | | | | | |
| Jharkhand | FY13 | 2.36 | 0.74 | 6.33 | 5.95 | 5.69 | 41% |
| Bihar | FY15 | 4.50 | 5.96 | 6.39 | 6.95 | 6.46 | 70% |
| Meghalaya | FY15 | 4.16 | 2.98 | 6.03 | 6.33 | 5.38 | 77% |
| Arunachal Pradesh | FY15 | 4.00 | - | 3.77 | 5.00 | 13.26 | 30% |
| Assam | FY14 | 5.41 | 5.61 | 6.02 | 7.06 | 6.01 | 90% |
| Manipur | FY15 | 3.82 | 2.70 | 3.76 | 4.66 | 6.36 | 60% |
| Nagaland | FY15 | 4.05 | 2.70 | 4.55 | 5.73 | 6.76 | 60% |
| Mizoram | FY15 | 3.26 | 2.10 | 6.22 | 4.83 | 9.02 | 36% |
| **South** | | | | | | | |
| Tamil Nadu | FY14 | 3.46 | 2.62 | 6.83 | 7.78 | 5.24 | 66% |
| Andhra Pradesh | FY14 | 4.59 | 2.69 | 6.83 | 8.90 | 5.25 | 87% |
| Kerala | FY15 | 3.76 | 2.47 | 6.09 | 9.21 | 5.28 | 71% |

*Source: PwC analysis*

| | Domestic | Agricultural | Industrial | Commercial |
|---|---|---|---|---|
| State 1 | 37.00 | 45.00 | 68.00 | 62.00 |
| State 2 | 74.00 | 29.00 | 109.00 | 115.00 |
| State 3 | 95.00 | 80.00 | 105.00 | 116.00 |
| State 4 | 74.00 | 43.00 | 122.00 | 135.00 |
| State 5 | 92.00 | 69.00 | 101.00 | 118.00 |
| State 6 | 63.00 | 40.00 | 119.00 | 107.00 |
| State 7 | 70.00 | 25.00 | 106.00 | 78.00 |
| State 8 | 51.00 | 50.00 | 115.00 | 100.00 |
| State 9 | 88.00 | 43.00 | 135.00 | 185.00 |
| State 10 | 101.00 | 78.00 | 124.00 | 136.00 |
| State 11 | 68.00 | 58.00 | 123.00 | 143.00 |
| State 12 | 41.00 | 13.00 | 111.00 | 105.00 |
| State 13 | 70.00 | 92.00 | 99.00 | 107.00 |
| State 14 | 77.00 | 55.00 | 112.00 | 118.00 |
| State 15 | 30.00 | | 28.00 | 38.00 |
| State 16 | 90.00 | 93.00 | 100.00 | 117.00 |
| State 17 | 60.00 | 42.00 | 59.00 | 73.00 |
| State 18 | 60.00 | 40.00 | 67.00 | 85.00 |
| State 19 | 36.00 | 23.00 | 69.00 | 54.00 |
| State 20 | 66.00 | 50.00 | 130.00 | 148.00 |
| State 21 | 87.00 | 51.00 | 130.00 | 169.00 |
| State 22 | 71.00 | 47.00 | 115.00 | 174.00 |
| | | | | |
| Average | 59.70 | | 107.50 | |
| % of marginal cost | | 0.60 | | 1.08 |

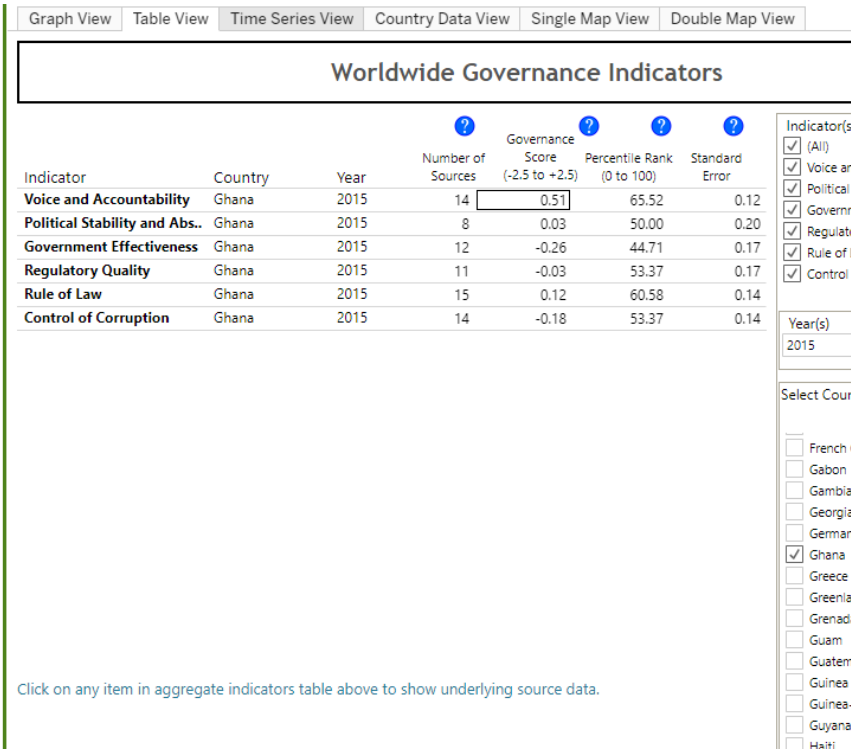
PwC reports marginal cost as the Average Cost of Supply (ACoS) and Industrial tariff as the Average Billing Rate (ABR). The ratio of Tariff to Marginal Cost (Tariff/Marginal Cost) is called the ACoS Coverage expressed in percentages. Therefore as per the formula for calculating this indicator, if the ACoS coverage is greater than 1, then the tariff is calculated as 1/ACoS coverage. If the ACoS Coverage is less than one, then the indicator value is equal to 1. (Industrial tariffs are not subsidized thus usually higher than MC thus the need to bring it closer to marginal cost by deducting ACoS coverage value from 1)

For the domestic tariff, the formula is the reverse of the industrial tariff calculation (because domestic tariffs are subsidized therefore the need to bring it closer to marginal cost).

For Uganda cost of energy purchased by the distribution companies is used as a proxy for marginal cost of supply and for Ghana, it is assumed that cost of power generation is equal to the marginal cost of supply or the ACoS.

B. POLITICALLY ACCEPTABLE: Using the Worldwide Governance Indicators of the World Bank:

**Ghana**

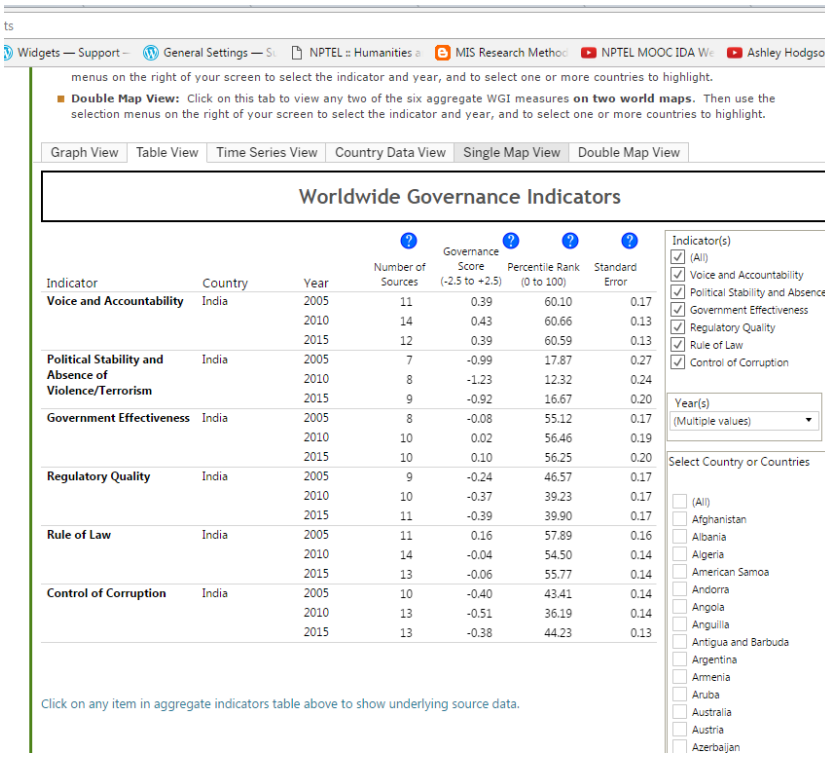



| | **2015** |
|---|---|
| Voice and accountability | 65.52 |
| Political stability and absence of violence/terrorism | 50.00 |
| Government effectiveness | 44.71 |
| Regulatory quality | 53.37 |
| Rule of law | 60.58 |
| Control of corruption | 53.37 |
| Average = sum/6 | 54.59 |
| Average/100 | 0.55 |

Legal Framework Provides for Implementation:

| | |
|---|---|
| Government effectiveness | 44.71 |
| Regulatory quality | 53.37 |
| Rule of law | 60.58 |
| Average | 52.89 |
| **Average/100** | **0.53** |

**India**

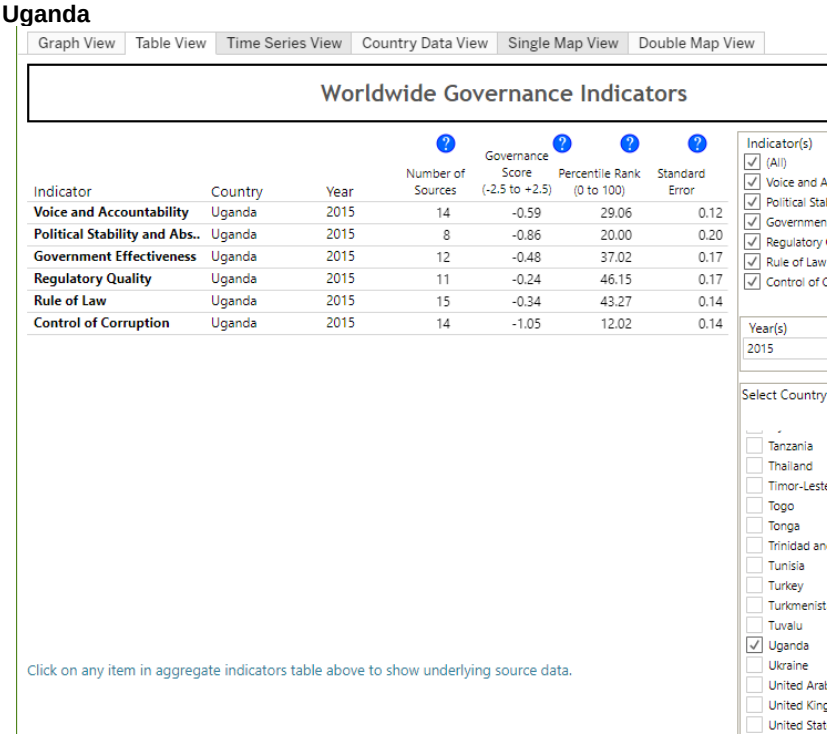



| | 2015 |
|---|---|
| Voice and accountability | 60.59 |
| Political stability and absence of violence/terrorism | 16.67 |
| Government effectiveness | 56.25 |
| Regulatory quality | 39.9 |
| Rule of law | 55.77 |
| Control of corruption | 44.23 |
| Average = sum/6 | 45.57 |
| Average/100 | 0.46 |

Legal Framework Provides for Implementation:

| | |
|---|---|
| Government effectiveness | 56.25 |
| Regulatory quality | 39.9 |
| Rule of law | 55.77 |
| Average | 50.64 |
| Average/100 | 0.5064 |

**Uganda**




| | 2015 |
|---|---|
| Voice and accountability | 29.06 |
| Political stability and absence of violence/terrorism | 20.00 |
| Government effectiveness | 37.02 |
| Regulatory quality | 46.15 |
| Rule of law | 43.27 |
| Control of corruption | 12.02 |
| Average = sum/6 | 31.25 |
| Average/100 | 0.31 |

Legal Framework Provides for Implementation:

| | |
|---|---|
| Government effectiveness | 37.02 |
| Regulatory quality | 46.15 |
| Rule of law | 43.27 |
| Average | 42.15 |
| **Average/100** | **0.42** |

## C. CAPACITY FACTOR CALCULATIONS:

**India**

## अवधि (संशोधित) / Peak Demand and Peak Met (Revised)

आँकड़े मेगा वाट नेट / Figures in MW net

| राज्य/State<br>प्रणाली / System<br>क्षेत्र / Region | दिसंबर,2016 / December,2016 | | | | अप्रैल,2016 - दिसंबर,2016/ April,2016 to December,2016 | | | |
|---|---|---|---|---|---|---|---|---|
| | अधिकतम मांग<br>Peak Demand<br>( MW ) | अधिकतम उपलब्धि<br>Peak Met<br>( MW ) | अधिशेष / कमी (-)<br>Surplus / Deficit (-)<br>( MW ) | ( % ) | अधिकतम मांग<br>Peak Demand<br>( MW ) | अधिकतम उपलब्धि<br>Peak Met<br>( MW ) | अधिशेष / कमी (-)<br>Surplus / Deficit (-)<br>( MW ) | ( % ) |
| चंडीगढ़/ Chandigarh | 218 | 218 | 0 | 0.0 | 361 | 361 | 0 | 0.0 |
| दिल्ली / Delhi | 3,857 | 3,857 | 0 | 0.0 | 6,342 | 6,261 | -81 | -1.3 |
| हरियाणा / Haryana | 6,561 | 6,561 | 0 | 0.0 | 9,262 | 9,262 | 0 | 0.0 |
| हिमाचल प्रदेश / Himachal Pradesh | 1,408 | 1,408 | 0 | 0.0 | 1,410 | 1,410 | 0 | 0.0 |
| जम्मू कश्मीर / Jammu & Kashmir | 2,591 | 2,073 | -518 | -20.0 | 2,591 | 2,102 | -489 | -18.9 |
| पंजाब / Punjab | 6,266 | 6,266 | 0 | 0.0 | 11,408 | 11,408 | 0 | 0.0 |
| राजस्थान / Rajasthan | 10,613 | 10,113 | -500 | -4.7 | 10,613 | 10,113 | -500 | -4.7 |
| उत्तर प्रदेश / Uttar Pradesh | 13,748 | 13,673 | -75 | -0.5 | 17,183 | 15,501 | -1,682 | -9.8 |
| उत्तराखंड / Uttarakhand | 1,857 | 1,857 | 0 | 0.0 | 2,020 | 1,972 | -48 | -2.4 |
| **उत्तरी क्षेत्र / Northern Region** | **45,782** | **44,389** | **-1,393** | **-3.0** | **53,372** | **52,612** | **-760** | **-1.4** |
| छत्तीसगढ़ / Chhattisgarh | 3,502 | 3,500 | -3 | -0.1 | 3,875 | 3,851 | -25 | -0.6 |
| गुजरात / Gujarat | 12,920 | 12,883 | -37 | -0.3 | 14,724 | 14,708 | -16 | -0.1 |
| मध्य प्रदेश / Madhya Pradesh | 11,512 | 11,501 | -11 | -0.1 | 11,512 | 11,501 | -11 | -0.1 |
| महाराष्ट्र / Maharashtra | 19,899 | 19,835 | -64 | -0.3 | 20,499 | 20,462 | -37 | -0.2 |
| दमन और दिउ / Daman & Diu | 296 | 296 | 0 | 0.0 | 327 | 327 | 0 | 0.0 |
| दादर व नगर हवेली / Dadra & Nagar Haveli | 721 | 721 | 0 | 0.0 | 784 | 784 | 0 | 0.0 |
| गोवा / Goa | 462 | 411 | -51 | -11.0 | 531 | 531 | 0 | 0.0 |
| **पश्चिमी क्षेत्र / Western Region** | **47,837** | **47,463** | **-374** | **-0.8** | **47,837** | **47,463** | **-374** | **-0.8** |
| आन्ध्र प्रदेश / Andhra Pradesh | 7,141 | 7,117 | -24 | -0.3 | 7,969 | 7,965 | -4 | -0.1 |
| तेलंगाना / Telangana | 7,848 | 7,831 | -17 | -0.2 | 8,284 | 8,284 | 0 | 0.0 |
| कर्नाटक / Karnataka | 9,344 | 9,331 | -13 | -0.1 | 10,061 | 9,871 | -191 | -1.9 |
| केरल / Kerala | 3,624 | 3,526 | -98 | -2.7 | 4,132 | 3,996 | -135 | -3.3 |
| तमिल नाडु / Tamil Nadu | 13,319 | 13,316 | -3 | 0.0 | 14,823 | 14,823 | 0 | 0.0 |
| पुडुचेरी / Puducherry | 327 | 326 | 0 | -0.1 | 371 | 368 | -3 | -0.7 |
| लक्ष-द्वीप / Lakshadweep # | 8 | 8 | 0 | 0 | 8 | 8 | 0 | 0 |
| **दक्षिणी क्षेत्र / Southern Region** | **38,542** | **38,528** | **-14** | **0.0** | **42,052** | **41,610** | **-442** | **-1.1** |
| बिहार / Bihar | 3,729 | 3,534 | -195 | -5.2 | 3,883 | 3,759 | -125 | -3.2 |
| दामोदर घाटी निगम / DVC | 2,507 | 2,507 | 0 | 0.0 | 2,686 | 2,686 | 0 | 0.0 |
| झारखण्ड / Jharkhand | 1,194 | 1,194 | 0 | 0.0 | 1,498 | 1,498 | 0 | 0.0 |
| ओडिशा/ Odisha | 3,837 | 3,837 | 0 | 0.0 | 4,012 | 4,012 | 0 | 0.0 |
| पश्चिम बंगाल / West Bengal | 6,210 | 6,207 | -3 | 0.0 | 7,931 | 7,886 | -45 | -0.6 |
| सिक्किम / Sikkim | 91 | 91 | 0 | 0.0 | 112 | 112 | 0 | 0.0 |
| अंडमान-निकोबार/ Andaman- Nicobar # | 40 | 32 | -8 | -20 | 40 | 32 | -8 | -20 |
| **पूर्वी क्षेत्र/ Eastern Region** | **16,973** | **16,782** | **-191** | **-1.1** | **18,790** | **18,596** | **-194** | **-1.0** |
| अरुणाचल प्रदेश / Arunachal Pradesh | 131 | 129 | -2 | -1.5 | 148 | 140 | -8 | -5.4 |
| असम / Assam | 1388 | 1,388 | 0 | 0.0 | 1,673 | 1,633 | -40 | -2.4 |
| मणिपुर / Manipur | 161 | 157 | -4 | -2.5 | 161 | 157 | -4 | -2.5 |
| मेघालय / Meghalaya | 309 | 309 | 0 | 0.0 | 312 | 312 | 0 | 0.0 |
| मिज़ोरम / Mizoram | 97 | 96 | -1 | -1.0 | 97 | 96 | -1 | -1.0 |
| नागालैंड / Nagaland | 127 | 127 | 0 | 0.0 | 130 | 130 | 0 | 0.0 |
| त्रिपुरा / Tripura | 230 | 230 | 0 | 0.0 | 284 | 284 | 0 | 0.0 |
| **उत्तर-पूर्वी क्षेत्र / North-Eastern Region** | **2,245** | **2,223** | **-22** | **-1.0** | **2,487** | **2,475** | **-12** | **-0.5** |
| **सम्पूर्ण भारत / All India** | **145,187** | **144,392** | **-795** | **-0.5** | **159,542** | **156,934** | **-2,608** | **-1.6** |

# Lakshadweep and Andaman & Nicobar Islands are stand- alone systems, power supply position of these,does not form part of regional requirement and availability