MINUTES OF THE NINETEENTH MEETING OF FORUM OF REGULATORS (FOR)

VENUE : Jacaranda-II, India Habitat Centre,
Lodhi Road, New Delhi

DATE : 30th July 2010.

The meeting was chaired by Dr. Pramod Deo, Chairperson, CERC/FOR. The list of participants is at **Annexure-I**.

Agenda Item No.1: Confirmation of the Minutes of the 18th Meeting of "FOR" held on 18th June, 2010 at New Delhi.

The minutes of the 18th Meeting of FOR held at New Delhi and the Action Taken Report were perused. Secretary, FOR mentioned that a corrigendum to the minutes had been issued modifying the minutes relating to Agenda Item No.3 by adding that "Ceiling tariff as proposed may not apply in case of SEZ having exclusive licence in the SEZ area". Chairperson, PSERC recalled his intervention during discussions in the Agenda Item No.2 that the projections shown in the study regarding the likely capacity additions in State of Punjab were too much on higher side and these might not be feasible. Secretary, FOR said that as per the decision taken in the last meeting, FOR Secretariat has already requested Ministry of New and Renewable Energy to undertake an assessment of existing potential of RE resources in various states and also the likely capacity additions in next five years so as to arrive at more accurate all India picture.

The minutes were confirmed with the above observations.

After discussions on the Action Taken report, FOR approved setting up a working group for evolving a model regulation on open access to consumers after

taking into account the draft regulations framed by Uttarakhand ERC and other SERCs. The Working Group would be chaired by Chairperson, CERC and would have Chairperson, UERC; Chairperson, GERC; Chairperson, AERC; Shri K. Venugopal, Member, TNERC and Shri Satpal Singh Pall, Member, PSERC as its members. The Working Group would endeavour to finalize the draft of the model regulations within one month.

Regarding the list of key issues on which the relevant judicial pronouncements are to be compiled and updated by the FOR Secretariat, the SERCs were requested to send their inputs, if any, within one week.

Some members raised the difficulties being faced by the SERCs in getting their orders implemented even after imposition of penalty under section 142 of the Electricity Act. FOR Secretariat was asked to examine the legal issues involved. It was also suggested that the court ruling, if any, in this regard available with CERC may be shared with all the SERCs.

Agenda Item No.2: National Solar Mission (NSM) – Issues regarding connectivity and evacuation.

Shri Deepak Gupta, Secretary, Government of India, Ministry of New and Renewable Energy joined the meeting for interaction with the members of FOR on this agenda item. He appreciated the various initiatives taken by FOR for promotion of renewable sources including renewable energy certificate and the steps taken by CERC for grid integration of renewable in new IEGC, and also the waiver of transmission charges and losses for the solar power plants set up during phase-I of NSM for use of inter-state transmission system. He said that the capacity addition required for achieving the RPO set in National Action Plan on Climate Change required examination from the viewpoint of feasibility taking into account various policy and implementational aspects. He suggested a larger dialogue with the states and SERCs on issues relating to RPO level and the tariffs being given by

the SERCs for various renewable technologies. He also suggested setting up a working group for estimating the investments required for creating evacuation facilities in the areas where comparatively large renewable based capacities in clusters are expected to come up in next few years.

A presentation was made by FOR Secretariat to explain the agenda note. A copy of the presentation is **enclosed** at **Annexure-II**. Shri Ravinder, Chief Engineer, CEA explained the rationale behind the proposal of charging the transmission losses on cash basis. He explained that in case the STU was required to compensate the energy equivalent to losses in the State Transmission Systems, the same could be procured from outside the State and therefore the equivalent amount in cash could be charged as losses on solar power. He also said that the business as usual approach of levying losses in kind would not be appropriate for solar power in view of its very high cost of generation presently.

Chairperson, UERC was of the opinion that in case developer is required to make a transmission line upto the substation, developer needed to be compensated for the investment. Chairperson, PSERC said that renewables were being given a promotional tariff and therefore generally other charges should be levied in a similar manner for all sources of energy. Chairperson, RERC said that the principle of levying transmission charges and losses on incremental burden basis appeared to be acceptable in view of the promotional thrust being given to solar energy at national level. There was also a viewpoint that marginal principle cannot be extended to all the renewables otherwise state transmission utility may end up significantly cross-subsidizing the transmission of renewables.

After in-depth discussions, there was a consensus that the approach suggested in the agenda note should be followed only for the solar power plants being set up in phase-I of the NSM and accordingly the state transmission utilities should be compensated to the extent of incremental burden on their systems. The principle of charging transmission losses in cash on the lines suggested in the

agenda note was also agreed to for the solar power plants to be set up in phase-I of the NSM.

Agenda Item No. 3: Consideration of Draft Report of Study on "Implementation and Impact Analysis of Time of Day (TOD) Tariff in India'.

A presentation was made by M/s. PWC to explain the findings of the study, a copy of which is **enclosed** at **Annexure-III**. The presentation also incorporated some international experiences in the area of TOD tariffs. A note was also circulated by Chairperson, UERC which is **enclosed** at **Annexure-IV**.

After discussions, FOR directed that the study report be finalized with the following additions/modifications:

a) The recommendations regarding peak and off peak time hours should be revised taking into account the effect of load shedding on the load curves.

b) The peak and off peak time hours should be differentiated for different seasonal scenarios taking into account local conditions.

c) TOD impact analysis should also be done for Reliance distribution area in Maharashtra and the same should be added in the report.

d) The methodology regarding data collection for validation and improvement in TOD tariffs should detail out the sampling procedure and also the need of monitoring the same consumer before and after the implementation of TOD tariff.

e) The facts regarding Uttarakhand be corrected as indicated by Chairperson, UERC during the discussions.

Agenda Item No. 4: Multiple/Parallel Licensees - Issues

After discussions, the FOR agreed on the following:

a) In Scenarios (i) & (ii) also there could be cases where the incumbent licensee has distribution network such as MES area in Mumbai and Reliance SEZ in Haryana. The tariff treatment in such cases needs to be on the line as suggested in Scenarios (iii) and (iv).

b) Recalling its earlier decision that individual SERCs could consider permitting retail tariffs in case of new SEZs on the principle of the tariffs for incumbent licensee being taken as ceiling, FOR agreed that SERCs may also consider laying down simplified reporting and scrutiny requirements for the SEZ licensees. This was considered necessary in view of the large number of SEZs approaching SERCs in some states for tariff approval.

c) It was also felt that imposing the tariffs of incumbent licensee as cap may act as entry barrier in some cases. Therefore, SERCs may have to resort to normal tariff determination in such cases.

d) Ministry of Power should be requested to review the rule regarding the area for a second distribution licensee for incorporating discretion to the SERCs for granting licences for a smaller area where the incumbent licensee has no distribution network after consultation with the State Government.

e) The issues involved in determination of ceiling tariff for cases covered under Scenarios (iii) and (iv) were discussed and it was felt that in view of the complexities involved, especially because of consumer mix, allocation of costs, treatment of subsidy etc., the dispensation of the tariff of the existing licensee as the ceiling tariff may not achieve the desired objective. The Act provides for ceiling tariff for retail sale in such cases. However, there is a need for a specific treatment for the transition period before the regulatory commissions move towards price/revenue cap regulation. It was agreed that a detailed study may be commissioned to examine the issue regarding ceiling tariff in cases covered under Scenarios (iii) and (iv). The study should suggest a transition path for movement from cost plus tariff regulation to price or revenue cap regulation, process of tariff determination during this transition phase, process of determination of wheeling charges and that of ceiling tariff for retail sale after the transition phase.

Agenda Item No. 5: Interaction with Chairperson, APTEL – issues raised during Roundtable convened by CERC on "Grid Management : Regulatory Challenges" on 12th May, 2010.

Hon'ble Justice M. Karpaga Vinayagam, Chairperson, APTEL, Shri Rakesh Nath, Member Technical, APTEL and Hon'ble Justice P.S. Datta, Member Judicial, APTEL joined the meeting for interaction with the members. In his address, Chairperson, APTEL emphasized the following:

a) While functioning as expert bodies, Electricity Regulatory Commissions also need to take a judicial approach in passing their orders.

b) In view of the provisions of sections 111(3), 111(4) and 121 of the Electricity Act, 2003, the SERCs must represent before the Appellate Tribunal for assisting it in proceedings in which their orders are under appeal. This becomes especially important in those cases where jurisdiction of the ERC has been challenged.

c) In accordance with the provisions of the Act, it must be ensured that tariff orders are issued within 120 days of the receipt of tariff application. In case of unavoidable delays, the reasons for the same should be recorded.

d) Citing a number of rulings of the Hon'ble Supreme Court, Chairperson, APTEL said that the policy directions given by the government cannot take away the discretion of statutory bodies like ERCs. For example, such directions cannot be given in individual matter of tariff determination, neither such directions can be against the provisions of the Act such as providing open access or timely issuing the tariff orders.

e) The ERCs should not hesitate in correcting factual errors in their orders at the stage of review before them. Under the Electricity Act, the Appellate Tribunal has wide powers for review of the orders and these needed to be utilized in appropriate cases.

f) The auditor's report can at best be guiding and should not be taken as binding by the ERCs. Therefore, ERCs should exercise prudence check on the accounts of the regulated entities.

g) Making of regulations should be taken seriously in order to maintain their sanctity as upheld recently by the Hon'ble Supreme Court.

h) The independent member to be nominated by the ERC in the consumer grievance redressal forums should also have judicial experience.

i) The powers given to the ERCs under section 142 could prove to be very effective if used judiciously. Summoning the concerned officers of the regulated entities should also be considered in order to get the orders/directions of the Commission implemented.

j) The ERCs should keep themselves up-to-date on the latest judicial pronouncements by subscribing the publications like Energy Law Journal.

Dr. Pramod Deo, Chairperson, CERC thanked the Chairperson and Members of the APTEL for their guidance and hoped that such interactions would help ERCs in discharging their functions more effectively.

The meeting ended with a vote of thanks to the Chair.

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/ ANNEXURE – I /

LIST OF PARTICIPANTS ATTENDED THE EIGHTEENTH MEETING

OF

FORUM OF REGULATORS (FOR)

HELD ON 18TH JUNE, 2010

AT INDIA HABITAT CENTRE, NEW DELHI.

S. No.	NAME	ERC
01.	Dr. Pramod Deo Chairperson	CERC – in Chair.
02.	Shri B.K. Halder Chairperson	BERC
03.	Shri Manoj Dey Chairperson	CSERC
04.	Dr. P.K. Mishra Chairperson	GERC
05.	Shri Bhaskar Chatterjee Chairperson	HERC
06.	Shri S. Maria Desalphine Chairperson	J&KSERC
07.	Shri Mukhtiar Singh Chairperson	JSERC
08.	Dr. V.K. Garg Chairperson	JERC for Goa & all UTs except Delhi
09.	Shri M.R. Sreenivasa Murthy Chairperson	KERC
10.	Shri K.J. Mathew Chairperson	KSERC
11.	Shri V.P. Raja Chairperson	MERC
12.	Shri P.J. Bazeley Chairperson	MSERC
13.	Shri S.I. Longkumer Chairperson	NERC
14.	Shri Jai Singh Gill Chairperson	PSERC
15.	Shri D.C. Samant Chairperson	RERC
16.	Shri Rajesh Awasthi Chairperson	UPERC

17.	Shri V.J. Talwar Chairperson	UERC
18.	Shri Prasad Ranjan Ray Chairperson	WBERC
19.	Shri C.S. Sharma Member	MPERC
20.	Shri Alok Kumar Secretary	CERC
21.	Shri Sushanta K. Chatterjee Deputy Chief (Regulatory Affairs)	CERC
SPECIAL INVITEES		
22.	Hon'ble Sh. Justice M. Karpaga Vinayagam Chairperson	APTEL
23.	Shri Rakesh Nath Technical Member	APTEL
24.	Hon'ble Sh. Justice P.S. Datta Judicial Member	APTEL
25.	Shri Deepak Gupta Secretary	MNRE
26.	Ms. Gauri Singh Joint Secretary	MNRE
27.	Shri Ravinder Chief Engineer (SP & PA)	CEA
28.	Shri A.K. Goyal CEO	NVVNL

NATIONAL SOLAR MISSION (NSM) - ISSUES REGARDING CONNECTIVITY AND EVACUATION

8/6/2010

Central Electricity Regulatory Commission

Jawaharlal Nehru National Solar Mission (JNNSM)

- Target (grid connected)
  - 20 GW by 2022
  - Phase I (upto 2013) – 1 GW
    - Bundling of solar power with power from the unallocated quota from NTPC coal based stations

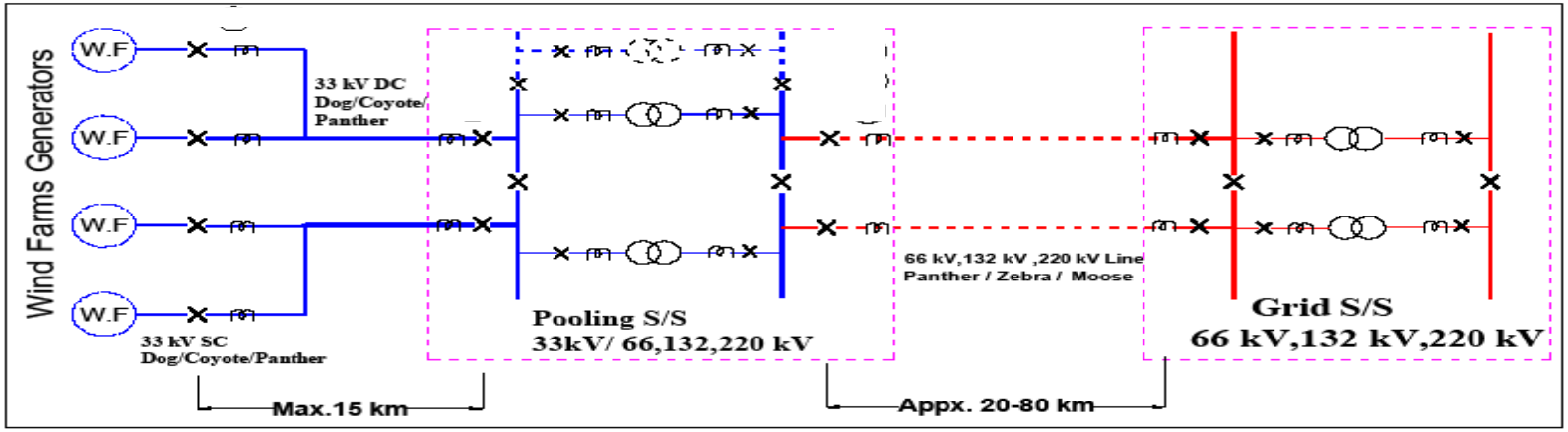
Guideline for selection of solar power project: Connectivity with the Grid

- Interconnection with the State Transmission Utility (STU) at the voltage level of 33 kV or above
  - not the distribution substation
- STU's responsibility of constructing the transmission line from power plant upto nearest STU substation

Grid Connectivity: Existing practices

- Responsibility of Developer for evacuation arrangement upto inter connection point

•States: Maharashtra, Rajasthan, Tamil Nadu

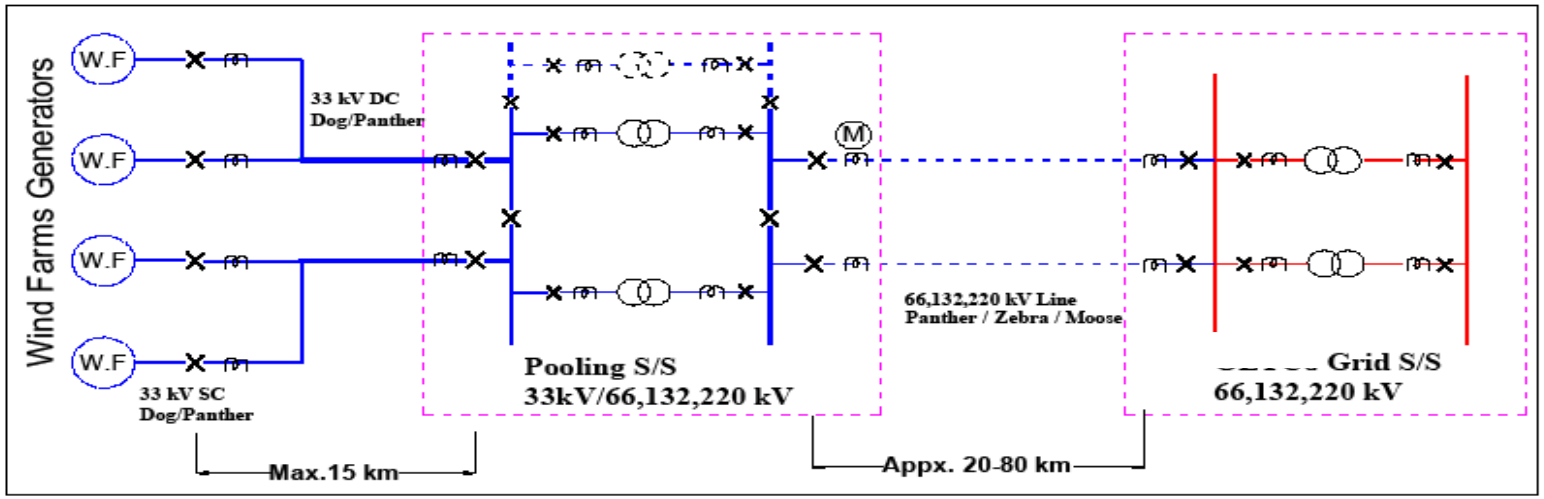


Work under Wind farm Developer's scope

Work under STU's scope

Grid Connectivity: Existing practices

- In cases where evacuation line from interconnection point to STU s/s is build by developer, cost incurred on this line is added to the generation cost
  - States Gujarat, Karnataka, Madhya Pradesh, Andhra Pradesh



Work under Wind farm Developer's scope

Work under STU's scope

CERC RE Tariff Regulation 2009

- Generation Tariff to project developer based on cost upto interconnection point

"Inter-connection Point" *shall mean the interface point of renewable energy generating facility with the transmission system or distribution system, as the case may be:*

(a) in relation to wind energy projects and Solar Photovoltaic Projects, inter-connection point ***shall be line isolator on outgoing feeder on HV side of the pooling sub-station****;……"*

Solar project developer shall be responsible for necessary infrastructure facilities upto the inter-connection point beyond which it will be responsibility of the STU to create necessary infrastructure

Challenges: Evacuation and Charges

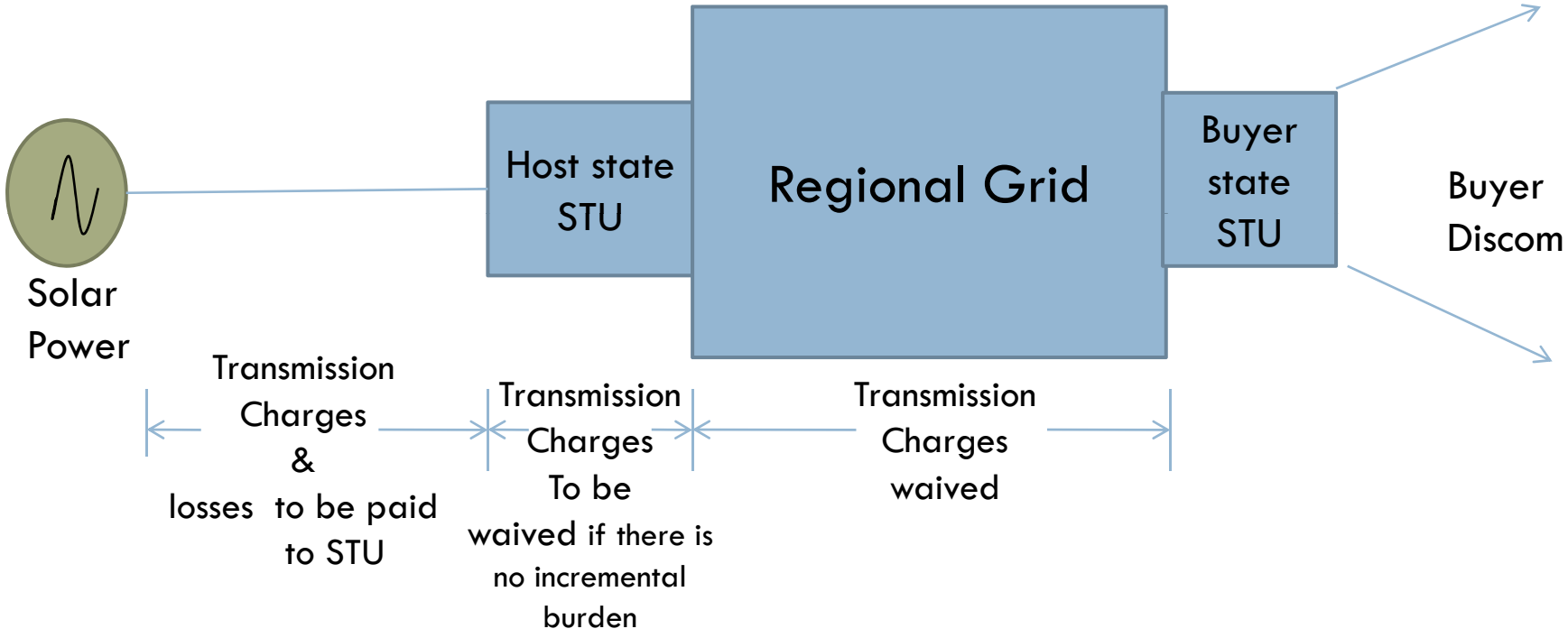
- Pancacking of charges of states and regional grid make high cost solar power costlier
  - CERC has waived Inter-State Transmission Charges and losses for the projects to be commissioned in Phase – for solar projects
  - Expectation from SERCs – reasonable treatment based on assessment of incremental burden if any.

Impact on Host STU

- Power generated would most likely be absorbed locally and
  - Replace the distant generation
  - Lead to reduction in import from the inter-state transmission system and consequently
    - Reduction in transmission losses
- Impact on Host STU
  - Investment to be incurred by STU to lay transmission lines from the remotely located solar plants to the nearest sub-station
  - There would be transmission losses in such radial links
- Possible Solution:

STU to be compensated for the transmission charges and losses for the radial portion

Possible Solution: Open Access Charges



Compensation to the host STU Demand charge & Usage charge

- Demand Charge in Rs./MW/Day
  - Entire fixed cost likely to be incurred by the STU for creating facility to evacuate solar generation
    - RoE
    - Depreciation
    - Interest on Loan
    - Interest on Working Capital
    - O&M Expenses
- Usage Charge :Losses in the radial feeder, from Solar Power Sub-station to the nearest STU's grid sub-station
  - To be paid in cash at the weighted average cost of purchase

Losses in the upstream side of the STU network would normally be negative because solar power generation would be consumed locally

Treatment to Scheduling

- MW Injection schedule at the point of:
  - Generation
  - Grid interconnection
  - STU- ISTS interface of the host state

And

- MW Drawal schedule at the point of:
  - ISTS –STU interface of the buying state

would be the same

Since losses are proposed to be paid in cash to host STU, buyer State will get same quantum of power generated at solar power plant

Assumption: Technical Parameters

Parameters	Voltage	kV	33	33	66	132
Type of circuit			S/C	D/C	D/C	D/C
Type of conductor			Dog	Dog	Dog	Panther
Typical injection		MW	7.5	12	22	60
Typical Line length		kM	15	15	30	70
Cost of D/C Transmission line	Rs.	Lacs/kM	12	24	35	40
Total Cost of Transmission Line		Rs. Lacs	180	360	1050	2800
Cost of one/two Bays at STU S/S		Rs. Lacs	25	50	170	250
Total Project Cost		Rs. Lacs	205	410	1220	3050

Assumption: Financial Parameters

Debt : Equity ratio	70-30
Interest Rate	10%
Loan tenure	10 years
Project Life	25 years
Base Return on Equity (ROE)	15.50%
ROE (after grossing up with MAT)	19.36%
ROE (after grossing up with Corporate Tax)	23.48%
MAT	19.931%
Corporate Tax	33.99%
Depreciation Rate = 90% /25	3.60%
Working Capital Interest Rate	11.75%
O&M : Tr. Line: % of capital cost	1.00%
O&M: S/S Bay: % of capital cost	2.50%
Escalation	5.00%
Discount Rate: WACC	13.55%

Levellised Demand Charge

Transmission Voltage	Rs. / MW /Day of contracted injected capacity
33 kV S/C	1116
33 kV D/C	1395
66kV D/C	2269
132kV D/C	2062

CALCULATIONS OF LINE LOSSES FOR POWER EVACUATION FROM THE SOLAR POWER PLANT TO STU GRID SUB-STATION

Voltage Level KV		33	33	66	132
Typical Line Loading MW		7.5	12	22	60
Conductor Size		Dog	Dog	Dog	Panther
No. of Circuit		S/C	D/C	D/C	D/C
Typical length of line kM		15	15	30	70
Line Current IL at pf=1.0, IL = Iph, in each circuit Amp		131	105	96	131
Unit Resistance	Ohm/Phase/kM	0.287	0.287	0.287	0.1622
Total losses for the D/C line	MW	0.22	0.28	0.48	1.17
Percentage Loss	%	2.97%	2.37%	2.17%	1.96%
Losses for Transmitting 1 kWh	kWh	0.030	0.024	0.022	0.020
Price of losses for transmitting 1 kWh at APPC Rs.3.00/kWh	Paisa per kWh	8.90	7.12	6.52	5.87
Levellisedf losses of transmissing 1 kWh	Paisa/ kWh	12.63	10.11	9.26	8.33

Levellised Usage Charge

Transmission Voltage	Paisa / kWh of actually injected (metered) energy
33 kV S/C	12.63
33 kV D/C	10.11
66 kV D/C	9.26
132 kV D/C	8.33

Thank You

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Demand Charge in Paise per unit at 21 % CUF

Transmission Voltage	Rs. / MW /Day of contracted injected capacity	Demand Charge per unit at 21% PLF Paisa /kWh	Usage Charges Paisa /kWh	Total Charges Paisa /kWh
33 kV S/C	1116	22.14	12.63	34.77
33 kV D/C	1395	27.68	10.11	37.79
66kV D/C	2269	45.02	9.26	54.28
132kV D/C	2062	40.91	8.33	49.24

Implementation & Impact Analysis of Time of Day (TOD) tariff in India

Forum of Regulators

July 2010

PRICEWATERHOUSECOOPERS

Agenda

- Introduction
- Review of TOD implementation in different states
- Impact analysis of TOD tariff in 5 selected states
- Framework for cost-benefit analysis
- International experience
- Recommendations

Section 1
Introduction

Introduction

- Objective of the assignment: To prepare a comprehensive report detailing implementation of TOD tariff in the country, along with its impact analysis.

TOD Tariff: Legislative framework for implementation

- Various legislative and legal frameworks in the country promote introduction of time differentiated tariff as an important DSM tool

– Electricity Act, Section 62(3)	*"The Appropriate Commission... may differentiate according to the consumer's load factor, power factor, voltage, total consumption of electricity during any specified period or the time at which the supply is required."*
– National Tariff Policy, Clause 8.4	*"Two-part tariffs featuring separate fixed and variable charges and Time differentiated tariff shall be introduced on priority for large consumers… within one year. This would also help in flattening the peak and implementing various energy conservation measures."*
– FOR Working Group Report on "Metering Issues"	*"Time of the day metering is important while propagating and implementing Demand Side Management (DSM) and achieving energy efficiency."*

Section 2
Review of TOD implementation in different states

Status of TOD implementation in different states

- Most State Electricity Regulatory Commissions (SERCs) have implemented TOD tariffs, generally for large industrial and commercial consumers

S. No.	State	TOD implemented	S. No.	State	TOD implemented
1	Assam	Yes	14	Uttarakhand	Yes
2	Bihar	Yes	15	Uttar Pradesh	Yes
3	Chhattisgarh	Yes	16	West Bengal	Yes
4	Gujarat	Yes	17	Andhra Pradesh	**
5	Himachal Pradesh	Yes	18	Delhi	*
6	Jharkhand	Yes	19	Haryana	*
7	Karnataka	Yes	20	Jammu & Kashmir	-
8	Kerala	Yes	21	Punjab	*
9	Madhya Pradesh	Yes	22	Rajasthan	-
10	Maharashtra	Yes	23	Manipur	-
11	Orissa	Yes	24	Meghalaya	-
12	Tamil Nadu	Yes	25	Arunachal Pradesh	-
13	Tripura	Yes			

* TOD tariff not introduced, but certain other charges levied for the purpose of demand management *TOD Tariffs in different states*

** Notified recently

State specific observations (1/4)

- Initiation: TOD tariff has been mentioned right from the first Tariff Order in:
  - MP, Chhattisgarh, Gujarat, West Bengal, Assam and Tamil Nadu
- Information availability: States have specified TOD tariffs (for HT Industrial and commercial consumers to begin with) but lack of load profiling data remains
  - Impacted implementation, rationalization and design of TOD tariffs for other consumer categories
- Tariff regulation in West Bengal has provisions for time based tariff for supply of power from generation plants

State specific observations (2/4)

- Applicability:
  - TOD tariff is compulsory for HT and EHT consumers in states like Maharashtra, WB, HP, MP, Gujarat, Uttarakhand, UP, Kerala, TN, Tripura
  - TOD tariff is compulsory in states like Uttarakhand, Maharashtra, WB for LT consumers (non-residential/ commercial/ industry) and MV consumers (commercial/ industry) above a certain threshold load
  - In Tripura TOD tariff is compulsory for LT consumers having a 3-ph connection with a connected load of 3kW and above, subject to availability of TOD meters

State specific observations (3/4)

- Time period: Peak hours, Off-Peak hours and Normal hours vary from state to state.
  - TOD tariff is compulsory for HT and EHT consumers in states like Maharashtra, WB, HP, MP, Gujarat, Uttarakhand, UP, Kerala, TN, Tripura
  - Uttarakhand and HP have different time periods for summers and winters
  - WB has specified different time periods for different consumer categories. Tariff specified for a consumer category varies according to season (summer, monsoon and winters)
  - Gujarat: Only peak hour charges applicable (for HTP consumers)
  - Karnataka: Symmetric peak hour and off-peak hour energy charges/ rebates, whereas most states have asymmetric peak hour and off-peak hour energy charges/rebates

State specific observations (4/4)

- Other features
  - Punjab and Haryana have specified PLEC which is used as a tool for controlling demand during peak hours.
  - HP has specified PLVC charges along with PLEC charges
  - Orissa: Flat concession to consumers opting for TOD metering & billing

Section 3
Impact analysis of TOD tariff in 5 selected states

Framework of impact analysis (1/2)

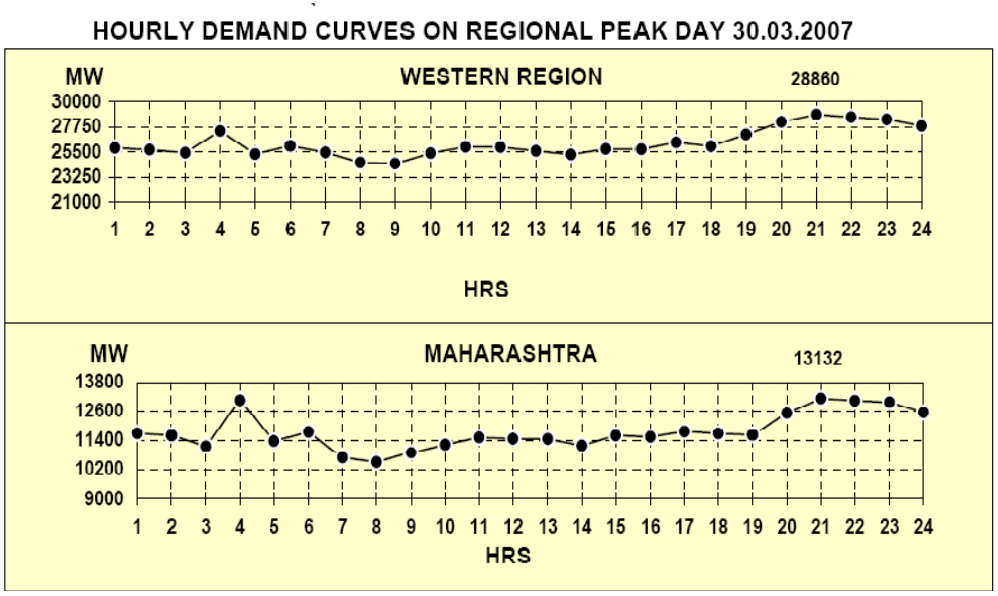
- Establish relationship between load factor and ratio of peak to average tariff levels over a period of time
- Identification of five states in consultation with the FOR Secretariat: Maharashtra, West Bengal, Assam, Karnataka, Uttar Pradesh
- Formats prepared for seeking information:
  - System peak and energy shortages after introduction of TOD tariff;
  - Impact of load shifting and demand-side management at consumer category level after introduction of TOD tariff; and
  - Cost of TOD metering

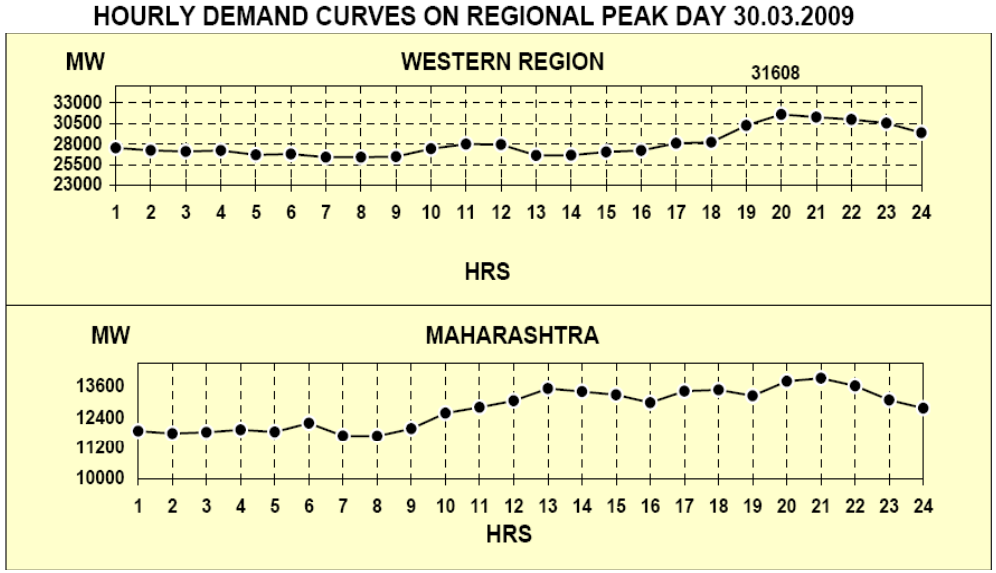
Framework of impact analysis (2/2)

- Standardisation of Utility wise peak tariff and average tariff
  - Stage 1
    - > Peak tariff: In case of more than 2 time bands within a day, the peak tariff has been averaged over time for each consumer category;
    - > Average tariff: Peak, off peak and normal tariffs are averaged over time for each consumer category
  - Stage 2: To find the ratio between peaks to average tariff for each utility, values arrived for each consumer category is averaged
- System load factor
  - For calculating the system load factor, the average demand (in MW) and peak demand (in MW) have been taken

Impact analysis of TOD Tariffs: Maharashtra Uttar Pradesh Assam West Bengal Karnataka

- Peak Tariff: NT+80p(Morning); NT+110p(Evening), XX; Off Peak Tariff: NT-85p
- Over the period FY07 to FY09, there has been change in load profile of the state vis-à-vis regional grid profile in the time slot 1000-1800 hrs



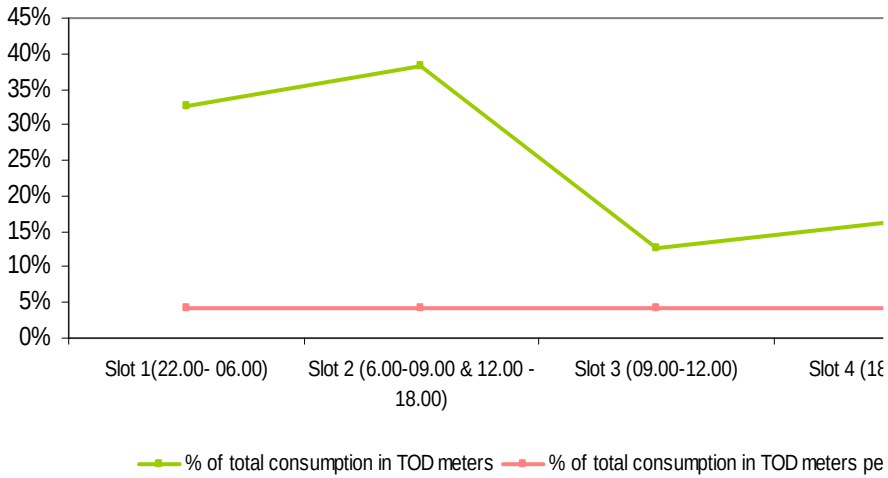


Source: WRPC Annual Report

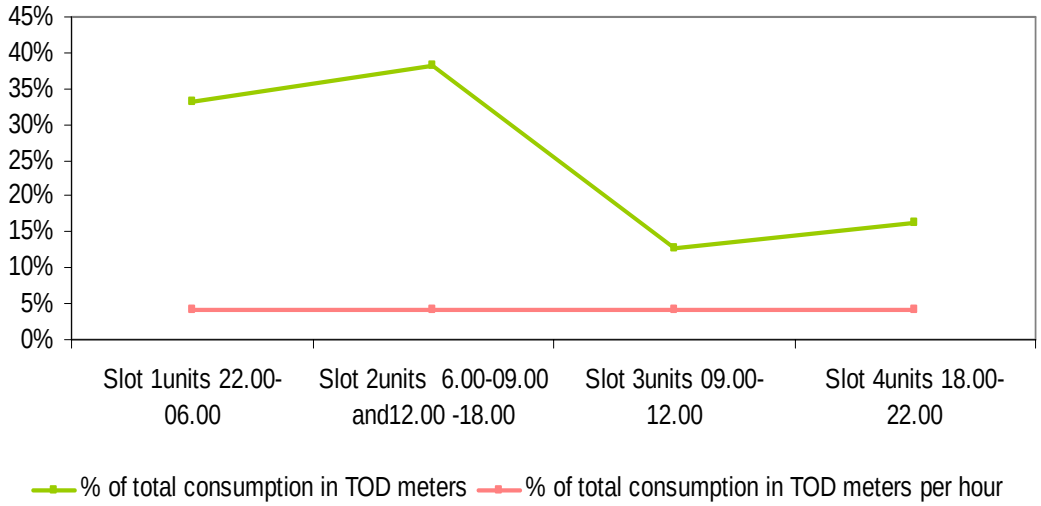
Impact analysis of TOD Tariffs: Maharashtra Uttar Pradesh Assam West Bengal Karnataka

- MSEDCL information
  - Consumption pattern across time slots in FY07 similar to that in FY06
  - TOD consumption across various time slots is identical
    - > load shedding may be responsible for flattening the curve

Consumption recorded in TOD meters (FY06)



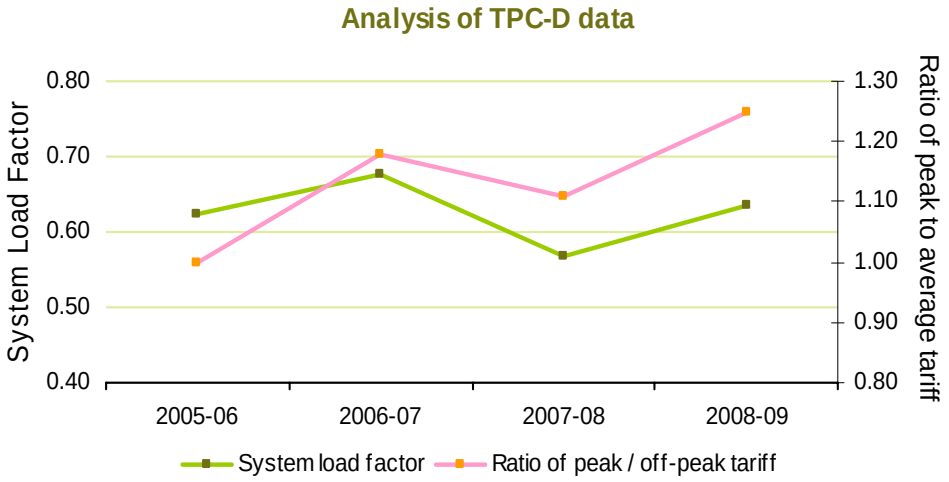
Consumption recorded in TOD meters (FY07)



Impact analysis of TOD Tariffs: Maharashtra Uttar Pradesh Assam West Bengal Karnataka

- TPC-D information:
  - Optional TOD tariff introduced in Oct 2006. System load factor in FY07 showed improvement over FY06.
  - In FY08, drop in the ratio of peak to average tariff for HT industrial category, coincided with a drop in overall system load factor
  - In FY09 TOD made compulsory certain categories. The system load factor in FY09 shows an improvement over FY08.

Conclusion: Introduction of TOD tariff, besides other measures, has had an impact on the state's load profile, but due to huge demand-supply gap in the system the load profile of the state is being maintained through load shedding.

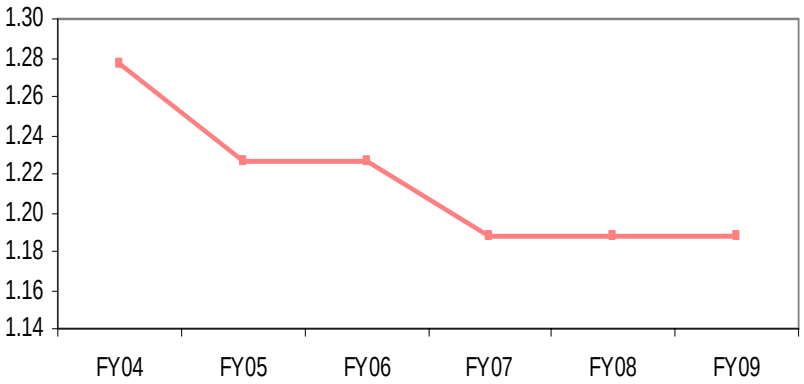


Impact analysis of TOD Tariffs: Maharashtra Uttar Pradesh Assam West Bengal Karnataka

- Peak Tariff 115% of NT Off Peak Tariff- 92.5% of NT
- Partial data from UPPCL and NPCL
- Differential between peak and average tariff has decreased over the years for the HV-2 category.
- Analysis of NPCL data for HV-2 category – load factor for this category is low (33%-38%) while ratio of peak to average tariff is 1.24.
- Scope of improvement in the load factor exists with appropriate tariff interventions

Conclusion: Due to incomplete data submitted by utilities in the state, no conclusion can be drawn on the impact of TOD tariff in the state.

Ratio of peak to average tariff



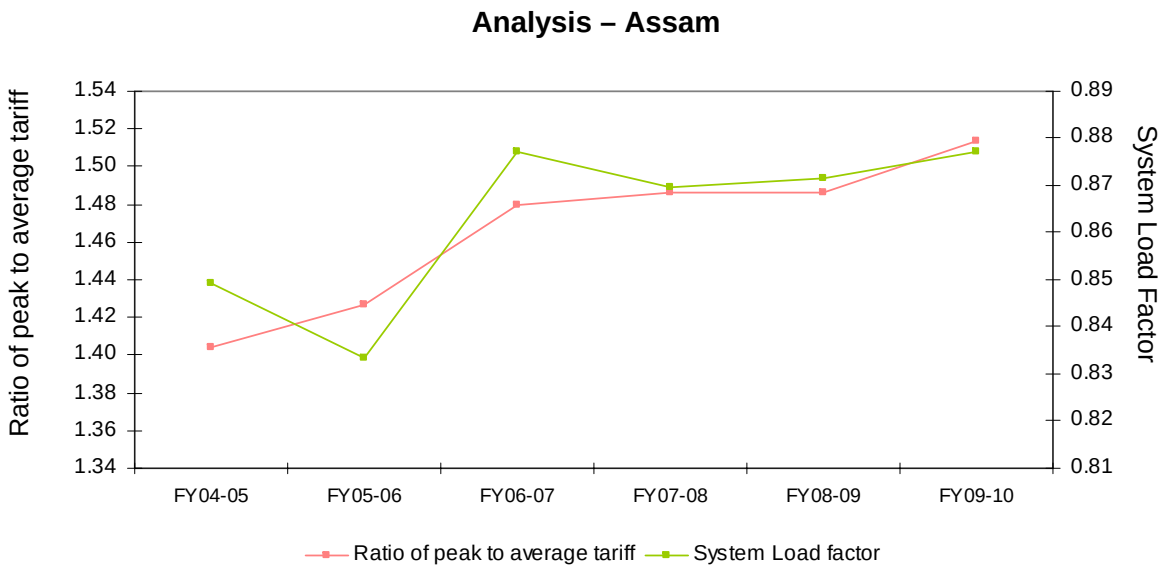
Profile of system load factor

Source: NRPC

Impact analysis of TOD Tariffs: Maharashtra Uttar Pradesh Assam West Bengal Karnataka

- Higher demand during evening hours is a characteristic of the load curve of the state
- Tariff structure
  - TOD tariffs have been applicable since FY05 for certain HT categories
  - Two-tier TOD tariff structure prevalent in FY05;
  - Three-tier TOD tariff introduced in FY06 for some categories succeeded to some extent in shifting load from peak to off-peak hours
    - > Peak Tariff – Varies from 180% of NT to 138% of NT
    - > Off Peak Tariff – Varies from 83% of NT to 94% of NT
- In the Tariff Order for FY08, AERC wanted to extend TOD tariffs to some other HT categories but didn't; due to lack of information

Impact analysis of TOD Tariffs: Maharashtra Uttar Pradesh Assam West Bengal Karnataka



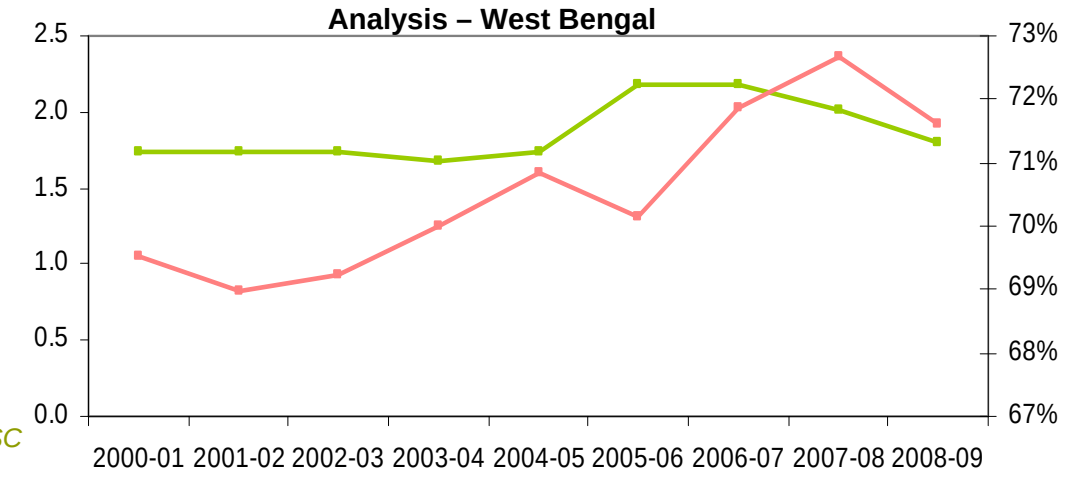
Source: Data submitted by state distribution utilities

Increase in the ratio of peak to average tariff has impacted system load factor.

Further improvement in the system load factor shall depend upon extending TOD tariff to other consumer categories

Impact analysis of TOD Tariffs: Maharashtra Uttar Pradesh Assam West Bengal Karnataka

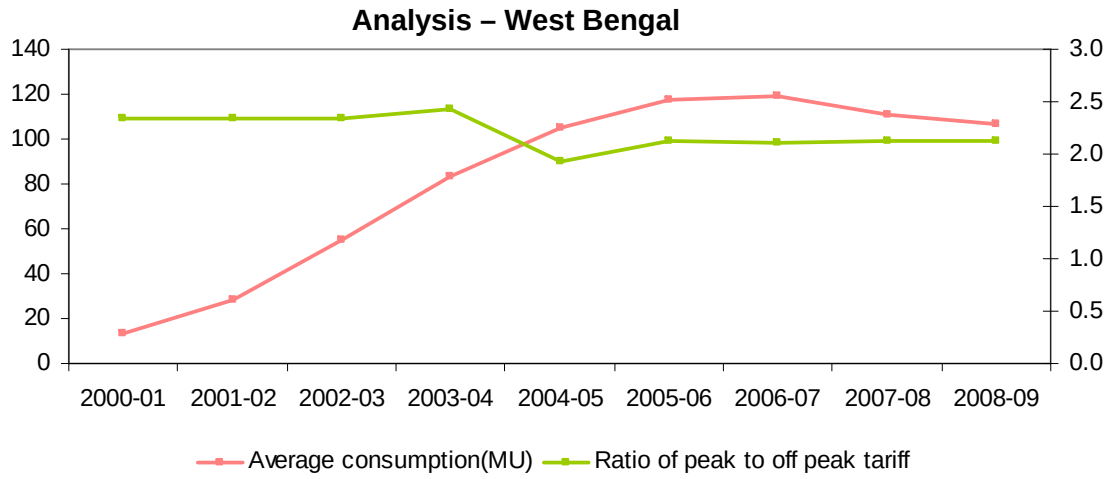
- Peak Tariff – Varies from 150% of NT to 110% of NT, Off Peak Tariff – Varies from 66% of NT to 93% of NT
- DPL, CESC, DPSCL provided information
- CESC analysis:
  - Improvement in system load profile during FY07 and FY08
  - In FY07 TOD extended to LT Commercial & Industrial and HT Commercial
  - In FY08, TOD made compulsorily applicable to HT Construction and Short term supply.



Source: Data submitted by CESC

Impact analysis of TOD Tariffs: Maharashtra Uttar Pradesh Assam West Bengal Karnataka

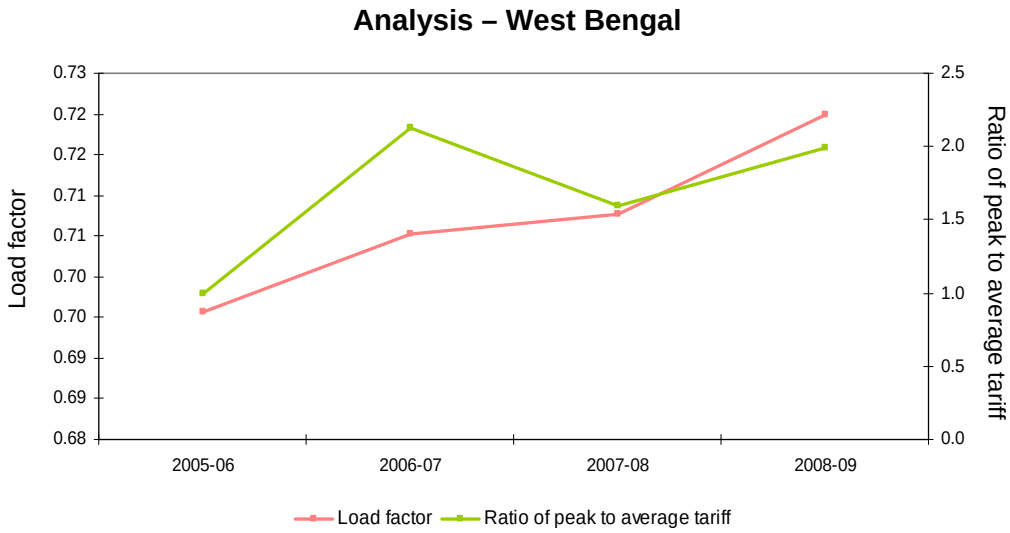
- DPL analysis
  - For HT industries, tariff differential earlier was more compared to recent years
  - No conclusion can be drawn on the impact of TOD tariff on HT industries in the absence of data on peak demand
  - For other consumer categories consumption data for only FY09 submitted, hence impact analysis not possible



Source: Data submitted by DPL

Impact analysis of TOD Tariffs: Maharashtra Uttar Pradesh Assam West Bengal Karnataka

- DPSCL analysis
  - Positive correlation between increase in tariff differential between peak & average tariff and improvement in the system load factor
  - In FY08, ratio of peak to average tariff dipped due to introduction of TOD tariff to other consumer categories



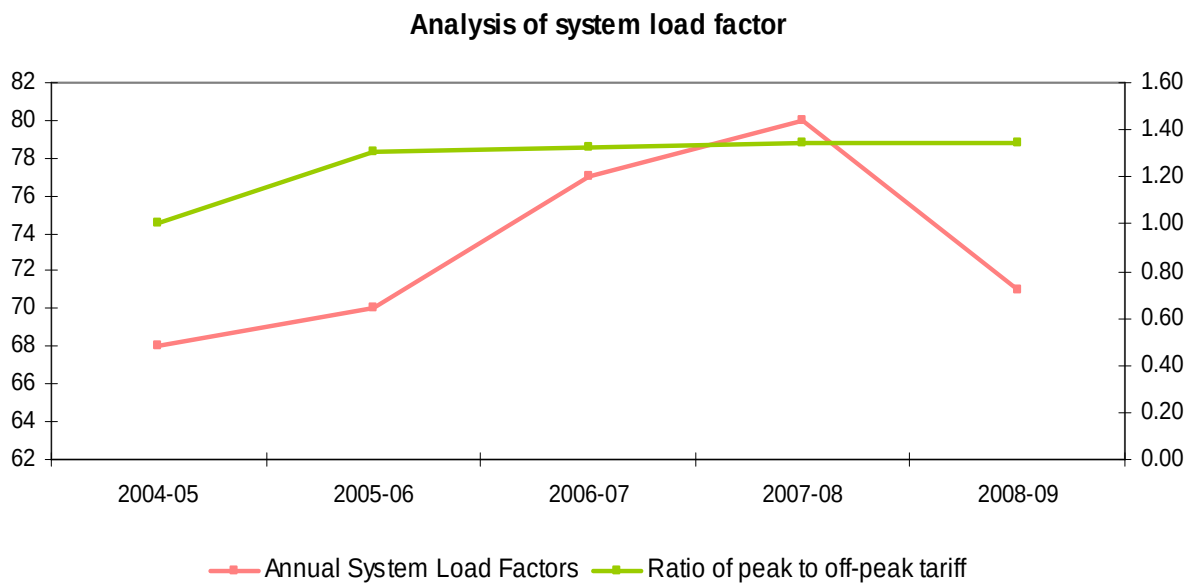
Source: Data submitted by DPSCL

Conclusion: Based on other licensees' data it is observed that

- Increasing tariff differential between peak and average hours has a positive impact on the system load factor
- Extension of TOD tariff to other consumer categories has a positive impact on the system load factor

Impact analysis of TOD Tariffs: Maharashtra Uttar Pradesh Assam West Bengal Karnataka

- Peak Tariff – Varies from NT +80p to NT,+60p Off Peak Tariff – Varies from NT-80p to NT-60p
- Introduced optional TOD tariff for consumers since FY06; we have received partial information from CESC
- System load factor has improved with the slight increase in tariff differential between peak and off-peak tariff
- In absenc ıct of TOD at consumer



Conclusions from impact analysis

- TOD tariff setting was not based on scientific studies and is an iterative process
- Establishment of a positive impact on the system load profile with increasing tariff differential between peak and off-peak tariff
  - Extension of TOD to other consumer categories, or introduction of compulsory TOD instead of optional TOD, has had a positive impact on the licensee's system load factor
- Establishing correlation factor between TOD tariff and load shift was not possible since system load profile is maintained through load shedding
- Impact of TOD tariff at consumer level cannot be established without consumer category wise hourly load profile based on which the end-consumer load profile analysis could be undertaken.

Section 4
Framework for cost-benefit analysis

Framework for cost-benefit analysis of implementing TOD tariff for utilities (1/6)

- Benefits
  - Revenue gain on account of TOD surcharge during peak hours
  - Cost reduction in power purchase due to reduction in peak consumption
  - Revenue gain due to increase in sales during normal hours (shifting of load from peak hours to normal hours)
  - Cost reduction in the capital investments in network
- Costs
  - Cost of TOD metering (including implementation) – LT meter (INR 3600); HT meter (INR 4200); varies across states due to local taxes
  - Revenue loss due to reduction in sales during peak hours

Framework for cost-benefit analysis of implementing TOD tariff for utilities (2/6)

- 2 scenarios created – Case 1 and Case 2
- Assumptions
  - Consumers shift their consumption from peak hours
    - > Some consumption shifts to other time of the day
    - > Some consumption is saved
  - Reduction in energy supplied during peak hours is purchased from outside sources (costly power) at a certain paisa/kWh
  - Consumption pattern of selected consumers is same through the year
  - No. of consumers, connected load and consumption remains constant for future years for the purpose of this analysis
  - No savings accounted from reduced network costs

Illustration of cost-benefit analysis for utilities (3/6)

- Illustration is for UPPCL; cost benefit analysis for extending TOD tariff to the following categories of consumers has been projected,
  - Small and medium power; Non- domestic consumers; and domestic consumers

Sl	Parameters	Unit	Case 1	Case 2
1	T&D losses	%	21.3%	
2	Peak and off-peak tariff	%	Peak - 115% NT; Off peak – 92.5% NT	
3	Power purchase cost	Rs/unit	2.67	4.50
4	Cost of TOD meter for LT consumers	Rs	3600	
5	Bank PLR	per annum	11.75%	
6	Life of TOD meter	years	10	
7	Network capital expenditure savings	Rs Cr	NIL	
8	Consumption saved post shift	%	50%	20%

Assumptions for the illustration

Illustration of cost-benefit analysis for utilities (4/6)
Case 1

Payback period in years

CASE-I (LOAD FACTOR: Small and medium power = 20%, Com = 30%, Dom = 20%)								
Load Relief Factor (LRF)	5%	10%	15%	20%	35%	30%	40%	50%
Payback period (years)	2.8	3.9	6.3	16.1	-	-	-	-

CASE-II (LOAD FACTOR: Small and medium power = 40%, Com = 50%, Dome = 40%)								
Load Relief Factor (LRF)	5%	10%	15%	20%	35%	30%	40%	50%
Payback period (years)	1.6	2.2	3.5	9.0	-	-	-	-

CASE-III (LOAD FACTOR: Small and medium power = 60%, Com = 70%, Dom = 60%)								
Load Relief Factor (LRF)	5%	10%	15%	20%	35%	30%	40%	50%
Payback period (years)	1.1	1.5	2.4	6.27	-	-	-	-

Illustration of cost-benefit analysis for utilities (5/6)
Case 2

Payback period in years

CASE-I (LOAD FACTOR: Small and medium power = 20%, Com = 30%, Dom = 20%)								
Load Relief Factor (LRF)	5%	10%	15%	20%	35%	30%	40%	50%
Payback period (years)	2.50	2.87	3.37	4.07	5.14	6.97	10.83	24.28

CASE-II (LOAD FACTOR: Small and medium power = 40%, Com = 50%, Dom = 40%)								
Load Relief Factor (LRF)	5%	10%	15%	20%	35%	30%	40%	50%
Payback period (years)	1.40	1.61	1.89	2.28	2.88	3.91	6.07	13.61

CASE-III (LOAD FACTOR: Small and medium power = 60%, Com = 70%, Dom = 60%)								
Load Relief Factor (LRF)	5%	10%	15%	20%	35%	30%	40%	50%
Payback period (years)	0.98	1.12	1.31	1.58	2	2.71	4.22	9.45

Illustration of cost-benefit analysis for utilities (6/6)

- Sensitivity : Effect of various parameters on payback period for the utility

Change in value of parameter (Keeping other parameters constant)	Effect on payback period
Increase in load factor	Reduces
Increase in Load Relief Factor (LRF)	Increases

Section 5
International experience

International Experience

- TOU tariffs are linked to generation and transmission tariffs which are differentiated across time slots
- Puget Sound Energy (Washington Electric Utility)
  - First experiment in TOU pricing on 9,00,000 customers in 2000
  - Peak tariffs – 17% higher; Off-peak tariff – 12% lower than normal tariffs
  - 4% shift in peak load; net decrease in consumption due to conservation
- California utilities offer higher price differences in their TOU tariffs

	Peak tariff	**Off-peak tariff**
> Baseline consumption	103%	42%
> 300% over Baseline consumption	35%	15%

  - Shifts are to the tune of 15%

Section 6
Recommendations and way forward

Recommendations (1/5)

- Implementation of TOD tariffs in existing consumer categories is possible
  - Choice of distribution of hours across the various pricing periods:
    - Study of system load profile
    - Study of consumer load profile
  - Degree of price differentiation across time periods:
    - Requires information on the cost structure of the utility;
    - demand and price elasticity of the nature of demand during each time period

Recommendations (2/5)

- Peak / Off-peak Period: Based on analysis of regional peak demand, following time bands for peak and off-peak is suggested

Region	Peak Hours	Off Peak Hours
Northern Region	2000-0000, 0600-0800	0000-0600
Western Region	1800-0000	0000-0600
Eastern Region	1700-2300	0000-0600
North East Region	1700-2300	0000-0600
Southern Region	0500-0700, 1100-1300, 2000-2200	0000-0500, 1700-1800

- Suggested Time of Day Tariffs
  - Structured across 3 slabs: Normal, peak and off-peak
  - Peak Tariff @ 20% - 30% higher than normal tariff.
  - Off-peak tariff @ 15% - 20% lower than normal tariff.

Recommendations (3/5)

- Feasibility of introduction of TOD Tariff
  - Introduction of TOD Tariff is feasible for LT consumers with connected load more than 10 KW
  - We suggest introduction of TOD tariff in a phased manner over next 5 years
    - Phase I: Compulsory for HT Consumers
    - Phase II: Compulsory for LT Consumers more than 25 KW
    - Phase III: Compulsory for LT Consumers more than 10 KW

Way Forward (4/5)

- Use advanced communication technologies along with metering infrastructure for proper deployment and penetration of TOD programs
- Develop TOD metering infrastructure in an integrated manner as per the metering companion standards considered in R-APDRP, under which all installed meters shall be TOD compatible
- Regulators should consider introducing differential TOD tariffs for generation as well
  - In order to develop a proper market response for peaking power supply, it is necessary for appropriate market signals to be generated with separate procurement contracts for peaking power supply.
  - Differential TOD generation contracts would bring fresh investment in generation plants for peaking power and help in mitigating peaking power shortages for consumers who are willing to pay for uninterrupted power supply.

Way Forward (5/5)

- Regulators should prescribe target reduction of energy consumption under each DSM measure which utilities should try to achieve over the stipulated period, wherein the entire capex incurred under each DSM scheme could be allowed (after the Commission's prudence check) as a pass-through in the Annual Revenue Requirement filing of the utility.

Thank You

PRICEWATERHOUSECOOPERS

Annexure I

TOD Tariffs in different states

Annexure I

TOD tariffs in different states (1/4)

* = First Tariff Order

State	TOD tariff introduced in:	Categories for which TOD tariff applicable	Time band currently applicable			TOD energy charge currently applicable		
			Normal hrs	Peak hrs	Off-peak hrs	Normal	Peak hrs	Off-peak hrs
Assam	FY 2004-05*	HT Industries 1	0600 – 1700	1700 – 2200	2200 – 0600	A_1	160% of A_1	83% of A_1
		HT Industries 2	1700 – 2200	0600 – 1700	2200 – 0600	A_2	138% of A_2	87% of A_2
		Tea, Coffee & Rubber	0600 – 1700	1700 – 2200	2200 – 0600	A_3	143% of A_3	94% of A_3
Bihar	FY 2008-09	HTS-I, HTS-II, HTS-III, HTSS	0500 – 1700	1700 – 2300	2300 – 0500	B	120% of B	90% of B
Chhattisgarh	FY 2005-06*		0500 – 1700	1700 – 2300	2300 – 0500	C	130% of C	80% of C
Himachal Pradesh	FY 2001-02	▪ Industries ▪ Water Pumping supply (load > 20 kW)	0600 – 1900	1900 – 2200 (Summer) / 1830 – 2130 (Winter)	2400 – 0600	D	200% of D	D – 20p
Jharkhand (Only JSEB, not TSL)	FY 2003-04	HTS	–	0600 – 1000, 1800 – 2200	1000 – 1800, 2200 – 0600	E_1	114% of E_1	89% of E_1
		HTSS	–	0600 – 1000, 1800 – 2200	1000 – 1800, 2200 – 0600	E_2	115% of E_2	90% of E_2
Tamil Nadu	Even before TO for FY 2002-03	HT Industries	0900 – 1800, 2100 – 2200, 0500 – 0600	0600 – 0900, 1800 – 2100	2200 – 0500	F	120% of F	95% of F
Tripura	FY 2005-06	Industrial, Tea/Coffee/Rubber, Bulk Supply, Water works, Irrigation	0500 – 1700	1700 – 2300	2300 – 0500	G	140% of G	60% of G
Kerala	FY 1997-98	HT and EHT	0600 – 1800	1800 – 2200	2200 – 0600	H	130% of H	85% of H
Karnataka	FY 2005-06	LT (with trivector meter)	0600 – 1800	1800 – 2200	2200 – 0600	I_1	I_1 + 80p	I_1 – 80p
		HT Water Supply & Sewerage	0600 – 1800	1800 – 2200	2200 – 0600	I_2	I_2 + 60p	I_2 – 60p
		HT Industrial	0600 – 1800	1800 – 2200	2200 – 0600	I_3	I_3 + 80p	I_3 – 80p

Annexure I

TOD tariffs in different states (2/4)

* = First Tariff Order

State	TOD tariff introduced in:	Categories for which TOD tariff applicable	Time band currently applicable			TOD energy charge currently applicable		
			Normal hrs	Peak hrs	Off-peak hrs	Normal	Peak hrs	Off-peak hrs
Madhya Pradesh	FY 2002-03	▪ Hv-2 (Coal mines) ▪ HV-3 (Industrial, Non Industrial, Shopping malls) ▪ HV-4 (Seasonal consumers) ▪ HV-5 (Irrigation, public works, water supply etc.) ▪ HV-7 (Bulk supply to exemptees under Section 13 of the E-Act)	0600 – 1800	1800 – 2200	2200 – 0600	J	115% of J	92.5% of J
Orissa	FY 2005-06	Three phase consumers (except Public Lighting and Emergency supply to CPPs) having static meters recording hourly consumption with 30-day memory	0600 – 2200	–	2200 – 0600	K	N.A.	K – 10p
U.P.	FY 2003-04	HV–2 (Large and Heavy Power)	0600 – 1700	1700 – 2200	2200 – 0600	L	115% of L	92.5% of L
West Bengal	FY 2001-02*	HT as well as LT, optional for some						
		▪ TOD Scheme A	0600 – 1700	1700 – 2300	2300 – 0600	M	In most cases, 110% / 140% / 150% of M	In most cases, 93% / 66% / 69% of M
		▪ TOD Scheme B	0600 – 1700, 2000 – 2300	1700 – 2000	2300 – 0600			
Uttara-khand	FY 2003-04*	RTS-7 (LT Industry above 25kW)	0700 – 1800 (Summer) / 0930 – 1730 (Winter)	1800 – 2300 (Summer) / 0600 – 0930, 1730 – 2200 (Winter)	2300 – 0700 (Summer) / 2200 – 0600 (Winter)	N_1	150% of N_1	90% of N_1
		HT Industry (incl agro-industrial, power loom, and other power consumers not covered under any other Rate Schedule)				N_2	LF<33%: 180%, 33%<LF<50%: 164%, LF>50%: 150%	90% of N_2

Annexure I

TOD tariffs in different states (3/4)

* = First Tariff Order

State	TOD tariff introduced in:	Categories for which TOD tariff applicable	Time band applicable			TOD energy charge currently applicable			
			Peak hrs	Off-peak hrs	Night hrs	Normal	Peak hrs	Off-peak hrs	Night hrs
Gujarat	FY 1999-2000*	Water Works	N.A.	1100 – 1800	2200 – 0600	O_1	N.A.	O_1 – 30p	O_1 – 75p
		HTP-I (Load > 100kVA)	0700 – 1100, 1800 – 2200	N.A.	2200 – 0600	O_2	O_2 + 75p	N.A	O_2 – 75p
		HTP-II and HTP-III	0700 – 1100, 1800 – 2200	N.A.	N.A.	O_3	O_3 + 75p	N.A.	N.A.

State	TOD tariff introduced in:	Categories for which TOD tariff applicable	Time band applicable			TOD energy charge currently applicable			
			Morning peak hrs	Evening peak hrs	Night off-peak hrs	Normal	Morning peak hrs	Evening peak hrs	Night off-peak hrs
Maharashtra	FY 2000-01	Compulsory for HT I, HT II, HT IV, LT II (B), LT II (C), LT III, LT V (B) Optional for LT - II (A) and LT V (A)	0900 – 1200	1800 – 2200	2200 – 0600	P	P + 80p	P + 110p	P – 85p

Back to Main Presentation

Annexure I

PLEC / Seasonal tariff applicable in different states (4/4)

* = First Tariff Order

State	Introduced in	Categories for which PLEC / Seasonal tariff applicable	Description
Haryana	2001	HT Industries	HT Industrial consumers where metering is through electronic tri-vector meters, using electricity by availing permitted special dispensation or exemption during peak load hours to be billed at extra charge of Rs 2 per kWh over and above the normal tariff on the consumption recorded during this period. If consumption during peak load hours in a month exceeds the prescribed limit, it shall be charged at Rs 4 per kWh extra over and above the normal tariff.
Punjab	1998	All Large Supply consumers except essential services	PLEC charges calculated at Rs 120 per kW of permitted load beyond reduced load per month if the permitted load during peak hours is up to 100 kW. When the permitted load exceeds 100 kW, PLEC charges are calculated on the load permitted for peak hours at Rs 1.80 per kW per hour up to 65% of Contract Demand and Rs 2.70 per KW per hour for exemption allowed beyond 65% of Contract Demand. PLEC charges are calculated for a minimum of 3 hours per day and these charges are recoverable over and above the normal energy bill.
Delhi	2009	Industrial category	Seasonal TOD tariff was introduced in Delhi for the Industrial category in the Tariff Order for FY 2009-10, with the energy charges for summer (April to September) being 2~7% higher than in winter (October to March).
Himachal Pradesh	-	▪ Small & Medium Industrial Power ▪ Large Industrial Power ▪ Water and Irrigation Pumping Supply	In addition to TOD tariff, Peak Load Exemption Charge (PLEC) of Rs 50/KVA/Month is also applicable and in case demand exceeds PLEC during peak hours there is an additional charge which is levied termed as Peak Load Violation Charge (PLVC). The duration of peak load hours for which PLEC is applicable is three hours in the evening – during summers from 1900 to 2200 hours, and during winters from 1830 to 2130 hours.

Annexure II

Cost-benefit analysis of implementing TOD tariff

Annexure II

Methodology for cost-benefit analysis of implementing TOD tariff (1/2)

A. Compute MW load during peak hrs assuming various probable values of load factor (LF) during peak hrs

MW load during peak (MW_{PL}) = Load Factor (LF) x Total Connected Load

B. Compute actual load relief (in MW) achieved during peak hours by implementing TOD tariff based on various probable values of load relief factor (LRF)

MW load relief during peak (MW_{LR}) = Load Relief Factor (LRF) x MW_{PL}

C. Calculate peak hour energy surcharge per kWh (TOD surcharge in absolute term)

Energy surcharge (E_S) in paise/kWh = Rate of TOD surcharge x Nominal energy charge (E_N)

D. Calculate additional revenue due to TOD surcharge after implementation of TOD tariff

Addl Revenue (R_A) (in Rs.) = (E_s/100) x (MW_{PL} - MW_{LR}) x (No of Peak Hrs) x 365 x 1000

E. Calculate revenue loss due to reduced sale during peak hours due to TOD tariff

Revenue Loss (R_L) (in Rs.) = (E_N / 100) x (MW_{LR}) x (No of Peak Hours) x 365 x 1000

F. Calculate revenue gain due to increased sale during normal hours due to TOD tariff

Revenue Gain (R_G) (in Rs.) = 0.5 x (E_N /100) x (MW_{LR}) x (No of Peak Hrs) x 365 x 1000

Annexure II

Methodology for cost-benefit analysis of implementing TOD tariff (2/2)

G. Calculate effective power purchase rate of costly power at consumer end considering T&D losses

Effective Power Purchase Rate (PP_E) = Rate of Costly Power Purchased in Peak Hours / [1- (T&D losses in %)]

H. Calculate saving in power purchase cost from reduction in sale due to TOD surcharge

Saving in power purchase cost (S_P) (in Rs.) = (PP_E / 100) x (0.5 x MW_{LR}) x (No of Peak Hours) x 365 x 1000

I. Calculate net gain/loss due to additional revenue (TOD surcharge during peak hours), revenue loss (reduction in peak hour sales), revenue gain (increase in normal hour sales) and saving in power purchase cost (reduction in peak hour sales):

Net Gain (+) / Loss(-) (NGL) (in Rs.) = (R_A) - (R_L) + (R_G) + (S_P)

J. Calculate total cost of new TOD metering system (including implementation cost):

Total Cost of Metering (C_M) (in Rs.) = Cost of each Meter x No. of Consumers to be covered

K. Calculate payback period (in years) using values from steps I and J.

Back to Main Presentation

Annexure II

- The following data on consumers has been considered for analysis:

S. No.	Category	Considered for analysis	Total No. of Consumers	Total Connected Load (MW)	Total Sales (MU)	Average Load Factor**	% of Consumers already having TOD Meter*	Base Energy charges	TOD surcharge ****
1	Small and medium power	Overall	111436	1233.626	1612	30.00%	10%	4.95	0.15
2	Non domestic consumers	Overall	1031203	2278.621	2819				
		> 100 units/month (taken 50% of overall)***	515601.5	1595.0347	1973.3	25.00%	10%	4.95	0.15
3	LMV1 (domestic consumers with consumption > 200 units/month)	Overall	8452430	13736.28	15084		1%		
		> 1000 units/month (taken 5% of Overall)***	845.243	84.52	666.39	20%	2%	3.8	0.15

* Assumption considered in absence of actual TOD metering data

** Average load factor considered although it can be based on the actuals

*** Values assumed taking into consideration applicability of TOD on consumers having monthly consumption above a certain threshold

****Assumed as per existing peak tariff for HT consumers in the state

/ Annexure-IV /

Uttarakhand had introduced ToD tariff in its first Tariff Order for 2003-04. A surcharge @ 25% was levied for peak hour consumption and a rebate of 5% was given for off-peak hour consumption. This arrangement continued up to Oct 2009. UERC in its order dated Oct 2009 for FY 2009-10 modified this and tariff for peak hours consumption had been fixed at Rs 4.50/kWh instead of percentage. Commission has analysed the impact of increasing tariff for Peak hour consumption. Commission compared consumption of 2255 consumers during Oct-Nov 2008 (old tariff) with consumption during Oct-Nov 2009 (new tariff) and found that where as overall consumption of these consumers by more than 10%, peak hour consumption has reduced by 3.34%. Out of this 3.34%, 1.73% consumption was shifted to normal hours and 1.61% to off-peak hours.

	Oct-Nov 2008	**Oct-Nov 2009**	**Increase**
Normal Hrs	161.48	188.57	27.09
Peak Hrs	135.96	135.15	-0.81
Off-peak Hrs	143.82	168.28	24.26
Total	441.26	492.00	50.74
Ratio N/T	36.60%	38.33%	1.73%
Ratio P/T	30.81%	27.27%	-3.34%
Ratio O/T	32.59%	34.20%	1.61%

****