Department of Industrial and Management Engineering
Indian Institute of Technology Kanpur

Forum of Regulators

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4th Capacity Building Programme for
Officers of Electricity Regulatory Commissions
18 – 23 July, 2011

Issues on Distribution Open Access and Retail competition

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In this Presentation

- Issues in Open Access and way forward.
- Impact analysis- Case studies

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To begin with…

Issues in Open Access and way forward.

Impact analysis- Case studies

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Issues

Model Terms and Conditions of Intra State Open Access Regulation,2010

- Snap-shot of issues covered

Role Clarity

OA for Consumer connected to a meshed network.

Imbalance settlement

Charges payable by the OA consumer.

Other commercial matter- Billing disbursement

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Chapter Scheme of Model Terms and Conditions of Intra State Open Access Regulation,2010

1. Preliminary
2. Connectivity
3. General provisions for open access
4. Application procedure and approval
5. Open access charges
6. Scheduling, Metering, Revision and Losses
7. Imbalance and Reactive energy charges
8. Commercial matters
9. Limited Short Term Open Access
10. Information system
11. Open access to generating station connected to distribution system
12. Miscellaneous

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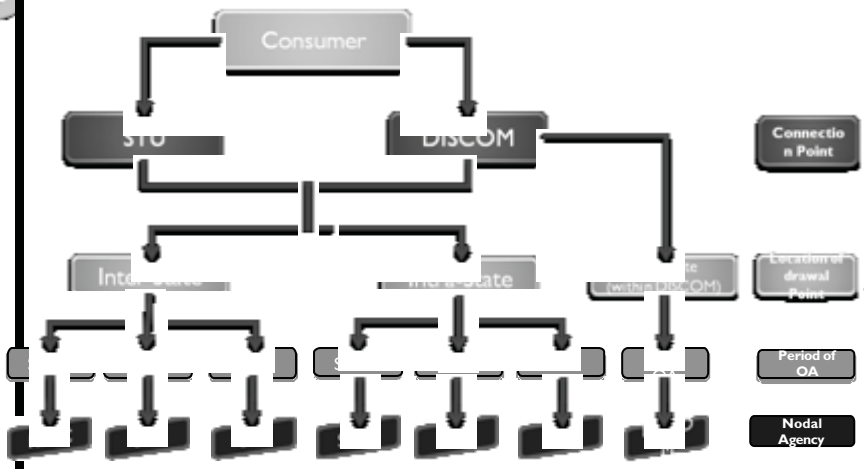
1. Role Clarity

Provision under 'FOR' Model regulation:



Application procedure and approval

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Consumer connected to Distribution System

Regulation 12

Period	Inter-se location of drawal and injection point	Nodal agency	Application fee (Rs.)	Documents to accompany the application	Time frame for disposal of application (days from the receipt of application)
Short-Term Open Access	Both within the same Distribution Licensee	Concerned Distribution Licensee	2000	Proof of payment of Application fee.	• 7 working days in case STOA applied for first time. • 3 working days on subsequent STOA applications.
	Both within the same State but in areas of different distribution licensees	SLDC	5000	Proof of payment of Application fee, Consent from concerned Distribution Licensee	• 7 working days in case STOA applied for first time. • 3 working days on subsequent STOA applications.
	Injection point in the Inter-State transmission system within the State	SLDC	5000	Consent from concerned Distribution Licensee, Proof of payment of Application fee,	• 7 working days in case STOA applied for first time. • 3 working days on subsequent STOA applications.
	In different States	RLDC of the region where consumer is located	5000	Consent from concerned SLDC(s) and Distribution licensee as applicable, Proof of payment of Application fee.	As per Central Commission's Regulation

Application procedure and approval

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Consumer connected to Distribution System

Regulation 12

Period	Inter-se location of drawal and injection point	Nodal agency	Application fee (Rs.)	Documents to accompany the application	Time frame for disposal of application (days from the receipt of application)
Medium-Term Open Access	Both within the same Distribution Licensee	Concerned Distribution Licensee	50000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, In case of generating station not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of MTOA.	28
	Both within the same State but different distribution Licensee	STU	100000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, In case of generating station not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of MTOA, consent from concerned distribution licensee.	40
	Injection point in the Inter-State transmission system within the State	STU	100000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, In case of generating station not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of MTOA, Consent from concerned Distribution licensee.	40
	In different States	CTU	100000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, In case of generating station not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of MTOA, Consent from concerned SLDC's and Distribution licensee, as applicable	As per Central Commission's Regulation

Application procedure and approval

Consumer connected to Distribution System

Regulation 12

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Long-Term Access

Period	Inter-se location of drawal and injection point	Nodal agency	Application fee (Rs.)	Documents to accompany the application	Time frame for disposal of application (days from the receipt of application)
Long-Term Access	Both within the same Distribution Licensee	Concerned Distribution Licensee	50000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, in case of generating station not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of LTA	28
	Both within the same State but different Distribution Licensees	STU	100000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, in case of generating station not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of LTA, consent from concerned distribution licensee	120 days where augmentation of transmission system is not required 150 days, where augmentation of transmission system is required.
	Injection point in the Intra-State transmission system within the State	STU	100000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, in case of generating station not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of LTA, Consent from concerned Distribution licensee	120 days where augmentation of transmission system is not required 150 days, where augmentation of transmission system is required.
	In different States	CTU	150000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, in case of generating station not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of LTA, Consent from concerned RLDCs and Distribution licensees as applicable	As per Central Commission's Regulation

Application procedure and approval

Consumer connected to Intra-State Transmission System

Regulation 12

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Short-Term Open Access

Period	Inter-se location of drawal and injection point	Nodal agency	Application fee (Rs.)	Documents to accompany the application	Time frame for disposal of application (days from the receipt of application)
Short-Term Open Access	Both within the same State (in the Intra-State transmission system)	SLDC	2000	Proof of payment of Application fee,	• 7 working days in case STOA applied for first time. • 5 working days on subsequent STOA applications.
	Injection point in the distribution system within the State	SLDC	2000	Consent from concerned Distribution licensee, Proof of payment of Application fee,	• 7 working days in case STOA applied for first time. • 5 working days on subsequent STOA applications.
	In different States	RLDC of the region where customer is located	2000	Consent from concerned SLDCs and Distribution licensee as applicable, Proof of payment of Application fee,	As per Central Commission's Regulation

Application procedure and approval

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Consumer connected to Intra-State Transmission System

Regulation 12

Period	Inter-se location of drawal and injection point	Nodal agency	Application fee (Rs.)	Documents to accompany the application	Time frame for disposal of application (days from the receipt of application)
Medium-Term Open Access	Both within the same State (in the Intra-State transmission system)	STU	100000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, in case of generating station or consumer not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of MTOA	20
	Injection point in the distribution system within the State	STU	100000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, in case of generating station or consumer not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of MTOA, Consent from concerned Distribution licensee	20
	In different States	CTU	100000	Proof of payment of Application fee, PPA or Sale-purchase agreement of power, in case of generating station or consumer not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of MTOA, Consent from concerned SLDCs and Distribution licensee as applicable	As per Central Commission's Regulation

Application procedure and approval

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Consumer connected to Intra-State Transmission System

Regulation 12

Period	Inter-se location of drawal and injection point	Nodal agency	Application fee (Rs.)	Documents to accompany the application	Time frame for disposal of application (days from the receipt of application)
Long-Term Access	Both within the same State (in the Intra-State transmission system)	STU	200000	Proof of payment of Application fee, Bank Guarantee, PPA or Sale-purchase agreement of power, in case of generating station or consumer not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of LTA	• 120 days where augmentation of transmission system is not required. • 150 days, where augmentation of transmission system is required.
	Injection point in the distribution system within the State	STU	200000	Proof of payment of Application fee, Bank Guarantee, PPA or Sale-purchase agreement of power, in case of generating station or consumer not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of LTA, Consent from concerned Distribution licensee	• 120 days where augmentation of transmission system is not required. • 150 days, where augmentation of transmission system is required.
	In different States	CTU	200000	Proof of payment of Application fee, Bank Guarantee, PPA or Sale-purchase agreement of power, in case of generating station or consumer not already connected to grid, documentary evidence for completion of the connectivity showing that the same shall be completed before intending date of LTA, Consent from concerned STU and Distribution licensee as applicable	As per Central Commission's Regulation

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2. Eligibility

- **Provision under 'FOR' Model regulation:**
  - Open access shall be permissible to the customers seeking for open access capacity upto which SERC has introduced open access and
    - connected through an independent feeder emanating from a grid substation of licensee or
    - industrial feeder provided that all the customers on such industrial feeder opt for open access and having simultaneous schedule of drawal under such open access.
  - Consumers who are not on independent feeders, shall be allowed open access subject to the condition
    - that they agree to rostering restrictions imposed by utility on the feeders serving them.

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3. Imbalance settlement

- **Provision under 'FOR' Model regulation:**
  - with load of less than 10 MW
  - The difference between the applicable sanctioned Open Access load and the actual drawal shall be accounted through the Time of Day (ToD) Meters on monthly basis and settled at the rate of the imbalance charge as determined by the Commission *(where imbalance charge has not been determined by the Commission, UI rate as determined by the Central Commission shall be applicable)*.
  - In case of under drawal as a result of non availability of the distribution system or unscheduled load shedding, the open access consumer shall be compensated by the distribution licensee at the average power purchase cost of the distribution licensee.
  - with load of 10 MW and above
  - Settled based on the composite accounts for imbalance transactions issued by SLDC on a weekly cycle based on net metering in accordance with the rates specified by the Commission.

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4. Charges Payable

a) Transmission charges

b) Scheduling and system operation charges payable to State Load Dispatch Centre (SLDC)

c) Wheeling charges

d) Cross subsidy surcharge

e) Additional Surcharge

f) Standby charges

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a) Transmission charges

- Inter State – As per CERC Regulations
- Intra-State :

? Transmission Charges = ATC/(PLS_T X365)

(in Rs./MW-day)

Where,

- ATC= Annual Transmission Charges determined by the Commission for the State transmission system for the concerned year.
- PLS_T= Peak load projected to be served by the State transmission system in concerned year.

- Transmission charges shall be payable on the basis of contracted Capacity/ Scheduled Load or actual power flow whichever is higher.
- For Open Access for a part of a day, the transmission charges shall be payable on pro-rata basis

b) Scheduling and system operation charges payable to State Load Despatch Centre (SLDC)

- In respect of inter-State open access
  - ? Long term access or Medium term open access
    - RLDC fees and charges as specified by the Central Commission.
    - SLDC fees and charges as specified by the Commission under sub-section (3) of section 32 of the Act.
  - ? Short-term open access
    - RLDC and SLDC charges as specified by the Central Commission.
- In respect of intra-State open access
  - ? Long term access or Medium term open access
    - SLDC fees and charges as specified by the Commission under sub-section (3) of section 32 of the Act.
  - ? Short-term open access
    - A composite operating charge @ Rs.2,000/- per day or part of the day shall be payable by a short-term open access customer for each transaction to the SLDC or as determined by the Commission from time to time.

c) Wheeling charges

- Wheeling Charges = (ARR – PPC – TC) /(PLS_D X365)
  (in Rs./MW-Day)

Where,

- ? ARR=Annual Revenue Requirement of the distribution licensee in the concerned year
- ? PPC=Total Power Purchase Cost of distribution licensee in the concerned year
- ? TC =Total transmission charges paid by distribution licensee for State and Inter-State transmission system for the concerned year
- ? PLS_D=Total Peak load projected to be served by the concerned distribution system in the concerned year

- Wheeling charges shall be payable on the basis of contracted Capacity/ Scheduled Load or actual power flow whichever is higher.
- For Open Access for a part of a day, the wheeling charges shall be payable on pro-rata basis

c) Cross subsidy surcharge (1/2)

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- Surcharge should be computed by the Tariff Policy formula.
- S= T- [C (1+L/100)+D]
- Where
  - ? S is the surcharge
  - ? T is the Tariff payable by the relevant category of consumers;
  - ? C is the Weighted average cost of power purchase of top 5% at the margin excluding liquid fuel based generation and renewable power
  - ? D is the Wheeling charge in per kWh basis (to be derived from the wheeling charge in Rs./MW-Day referred to in Regulation 22)
  - ? L is the system Losses for the applicable voltage level, expressed as a Percentage

c) Cross subsidy surcharge (2/2)

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- In case the formula gives negative value of surcharge, the same shall be zero.
- The Commission may fix a lower surcharge in the situation of shortages and load shedding by the distribution licensee.
- Cross subsidy surcharge so determined by the Commission shall be reduced by 20% every year at a linear rate.
- In case power supply position or the consumer load seeking open access changes drastically, the Commission may review the Cross Subsidy Surcharge as and when required.
- In order to ensure regulatory certainty to a open access consumer applicant, any change in cross-subsidy surcharge level should be made applicable only to the new applicants and the open access already sanctioned should not be disturbed.

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d) Additional Surcharge

- This additional surcharge shall become applicable only if the obligation of the Licensee in terms of power purchase commitments has been and continues to be stranded or there is an unavoidable obligation and incidence to bear fixed costs consequent to such a contract.
- Any additional surcharge so determined by the Commission shall be applicable only to the new Open Access applicants.

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e) Standby Charges

- Standby arrangements in cases of outages of generator supplying to open access customer under open access.
- Standby arrangements for a maximum period of 42 days in a year, subject to the load shedding as is applicable to the embedded consumer of the licensee
  - ? Standby charges at the temporary rate of charge for that category of consumer subject to the condition that such tariff shall not exceed the highest consumer retail tariff.
- In cases where temporary rate of charge is not available for that consumer category,
  - ? the standby arrangements shall be provided by the distribution licensee for a maximum of 42 days in a year and on payment of fixed charges of 42 days and energy charges for that category of consumer in the prevailing rate schedule.
- In case of stand by arrangements sought by continuous process industries, the licensee shall charge on the basis of actual costs involved in arranging power.
- Open Access customers would have the option to arrange stand-by power from any other source.

5. Commercial Matters (1/3)

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Provision under 'FOR' Model regulation:

- **Billing, collection and disbursement**
  - **Inter-State transactions:**
    - Short-term Open Access
      - for use of CTU and STU systems as per CERC Regulations
      - for use of distribution system open access customer shall pay the charges payable to the distribution licensee within 3 days from the grant of the short-term open access by the nodal agency.
    - Long-term access and medium-term open access
      - Billing, collection and disbursement of charges payable to RLDC as per CERC Regulations.
      - Bills towards the charges payable to SLDC shall be raised by the STU/SLDC directly to the open access customer connected to STU and to the distribution licensee in respect of the customers connected to the distribution system.
      - Distribution licensee shall raise the bill with the open access customer connected to it within 3 days of receipt of bill from SLDC.
      - Open access customer connected to the distribution licensee shall pay the charges within five days of receipt of bill from distribution licensee.
      - The distribution licensee shall disburse the amount payable to STU/SLDC on a monthly basis.
      - Open access customer connected to the STU shall pay the bills within five working days of receipt of the bill.

5. Commercial Matters (2/3)

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- Intra-State transactions:

? Short-term Open Access

- The short-term open access customer shall deposit with SLDC the transmission charges and operating charges within 3 working days of grant of the short- term open access by SLDC.
- In addition to the above, the short-term open access customer connected to distribution system of a distribution licensee shall also pay to SLDC, the charges payable to the distribution licensee within 3 days from the grant of the short-term open access by the nodal agency. Such charges would be disbursed to the distribution licensee on a weekly basis.

? Long-term and Medium-Term open access

- SLDC, transmission licensees and distribution licensee, where applicable, shall communicate to STU the details of the bills due to them by the 3rd day of the succeeding calendar month.
- STU shall separately indicate the above charges and raise the bill with the open access customer, together with the charges receivable by it, if any, before the 5th day of the above month. The open access customer shall pay the charges within 7 days from the date of receipt of the bill. STU shall disburse the charges payable to SLDC, transmission licensee and distribution licensee on a monthly basis.

5. Commercial Matters (3/3)

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- Late payment surcharge
  - Delayed in payment by a open access customer beyond the due date, a late payment surcharge at the rate of 1.25% per month shall be levied.
- Payment Security Mechanism
  - In case of long-term access and medium-term open access, the applicant for open access will open an irrevocable Letter of Credit in favour of the agency responsible for collection of various charges for the estimated amount of various charges for a period of two months.

Moving on to…

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Issues in Open Access and way forward.

Impact analysis- Case studies

MSEDCL

A UTILITY OF MAHARASHTRA

YEAR 2010-2011

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Snapshot of Tariff Order of MSEDCL for FY 2010-2011

Annual Revenue Requirement(2010-11)		Rs. Cr.	30901
Total Sales		MUs	70,480
Total revenue from sales		Rs. Cr.	29,993
Sales to 1 MW and above consumers		MUs	12984.25
Revenue from Sales to 1 MW and above consumers		Rs. Cr.	7175.37
Transmission Loss		%	4.85%
Wheeling Loss(at 22/11 kv)		%	9.00%
Wheeling Charge (at 22/11 kv)		Rs/kWh	0.21
Average Cost of Supply		Rs./Unit	4.38
Tariff of Consumer (5MW at 11 KV)		Rs./Unit	5.53
No of Applications pending	For 1 MW and Above	Nos	128
	Less than 1 MW	Nos	511185
Contracted Demand of Pending Applications	For 1 MW and Above	MW	NA
	Less than 1 MW	MW	NA
Total Power Purchase		MUs	90793
Total Power Purchase Cost		Rs. Cr.	23791
Average Power Purchase Cost		Rs./Unit	2.62

Maharashtra Case Study (MSEDCL) 2010-11

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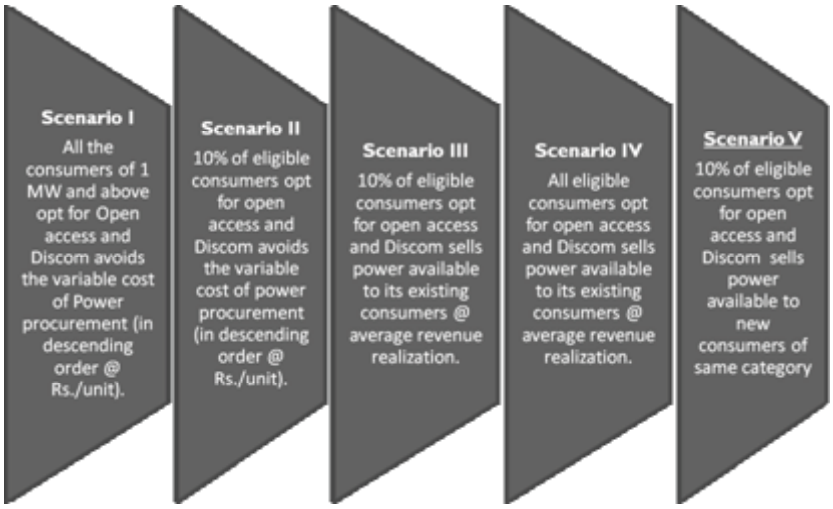

Scenario-I-MSEDCL

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All the consumers of 1 MW and above opt for Open access and Discom avoids the variable cost of Power procurement (in descending order @ Rs./unit).

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	30901	W
Total Power Purchase Cost	Rs Cr.	23791	X
Total Sales	MUs	70480	Y
Average Cost of Supply	Rs./Unit	4.38	Z=W*10/Y
Total units sold to eligible Open Access Consumers (1 MW and above)	MUs	12,984	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	14,268	B=A/(1-wheeling loss)
Total Energy purchase avoided by DISCOM	MUs	14,996	C=B/(1-Transmission loss)
Expenditure/Revenue Loss			
Revenue from sales to outgoing consumers	Rs. Cr.	7,175	D
Total	**Rs. Cr.**	**7175**	E=D
Savings / Receipts			
Power procurement variable cost avoided	Rs. Cr.	3925	F
wheeling charges (@ 21 paise/unit)	Rs. Cr.	300	G=.21*B/10
Total	**Rs. Cr.**	**4224**	H=F+G
Loss in case consumer opts for Open Access	Rs. Cr.	2951	I=E-H

Impact on ARR

Revised ARR	Rs Cr.	33852	W'=W+H
Revised Sales	MUs	57496	Y'=Y-A
Revised Average Cost of Supply	Rs./Unit	5.89	Z'=W'/Y'*10

Scenario-II MSEDCL

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10% of eligible consumers opt for open access and Discom avoids the variable cost of power procurement (in descending order @ Rs./unit).

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	30901	W
Total Power Purchase Cost	Rs Cr.	23791	X
Total Sales	MUs	70480	Y
Average Cost of Supply	Rs./Unit	4.38	Z=W*10/Y
Total units sold to 10% of eligible Open Access Consumers (1 MW and above)	Mus	1,298	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	1,427	B=A/(1-wheeling loss)
Total Energy purchase avoided by DISCOM	MUs	1,500	C=B/(1-Transmission loss)
Expenditure/Revenue Loss			
Revenue from sales to 10% of outgoing consumers	Rs. Cr.	718	D
Total	**Rs. Cr.**	**718**	E=D
Savings / Receipts			
Power procurement variable cost avoided	Rs. Cr.	421.65	F
Wheeling charges (@ 25 paise/unit)	Rs. Cr.	29.96	G=B*.21/10
Total	**Rs. Cr.**	**451.62**	H=F+G
Surplus in case 10% of eligible consumer opts for Open Access	Rs. Cr.	265.92	I=E-H

Impact on ARR

Revised ARR	Rs Cr.	30635	W'=W-I
Revised Sales	MUs	69182	Y'=Y-A
Revised Average Cost of Supply	Rs./Unit	4.43	Z'=W'/Y'*10

Scenario-III MSEDCL

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10% of eligible consumers opt for open access and Discom selling power available to its existing consumers @ average revenue realisation.

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	30901	W
Total Sales	MUs	70480	Y
Average Cost of Supply	Rs./Unit	4.38	Z=W*10/Y
Total units sold to 10% of eligible Open Access Consumers (1 MW and above)	Mus	1,298	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	1,427	B=A/(1-wheeling loss)
Revenue realisation from sale pf Power	Rs. Cr.	29,993	C
Avg. Revenue realisation	Rs./kWh	4.26	D=C*10/Y
Expenditure/Revenue Loss			
Revenue from sales from 10% of outgoing consumers	**Rs. Cr**	**718**	E
Savings / Receipts			
Revenue from sale of units @ avg. revenue realisation to existing consumer	Rs. Cr	552.55	F=D*A/10
Wheeling charges (@ 21 paise/unit)	Rs. Cr	29.96	G=.21*B/10
Total	**Rs. Cr**	**582.51**	H=F+G
Loss in case consumer opts for Open Access	Rs. Cr.	135.02	I=E-H

Impact on ARR

Revised ARR	Rs Cr.	31036	W'=W+I
Revised Average Cost of Supply	Rs./Unit	4.40	Z'=W'/Y*10

Scenario-IV MSEDCL

Forum of Regulators

All eligible consumers opt for open access and Discom selling power available to its existing consumers @ average revenue realisation.

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	30901	W
Total Sales	MUs	70480	Y
Average Cost of Supply	Rs./Unit	4.38	Z=W*10/Y
Total units sold to eligible Open Access Consumers (1 MW and above)	MUs	12,984	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	14,268	B=A/(1-wheeling loss)
Revenue realisation from sale of Power	Rs. Cr.	29,993	C
Avg. Revenue realisation	Rs./kWh	4.26	D=C*10/Y
Expenditure/Revenue Loss			
Revenue from sales from outgoing consumers	**Rs. Cr**	**7175**	E
Savings / Receipts			
Revenue from sale of units @ avg. revenue realisation to existing consumer	Rs. Cr	5525.49	F=D*A/10
Wheeling charges (@ 21 paise/unit)	Rs. Cr	299.64	G=.21*B/10
Total	**Rs. Cr**	**5825.13**	H=F+G
Loss in case consumer opts for Open Access	Rs. Cr.	1350.24	I=E-H

Impact on ARR

Revised ARR	Rs Cr.	32251	W'=W+I
Revised Average Cost of Supply	Rs./Unit	4.58	Z'=W'/Y*10

Scenario-V MSEDCL

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10% of eligible consumers opt for open access and Discom selling power available to new consumers

Particulars	Unit	Details	Formulae
Total units sold to 10% of eligible Open Access Consumers (1 MW and above)	Mus	1,298	A
Average tariff of HT Category	Rs./kWh	5.53	B
Expenditure/Revenue Loss			
Revenue from sales from 10% of outgoing consumers	**Rs. Cr.**	**717.54**	C
Savings / Receipts			
Revenue from sale of saved units to new consumers	Rs. Cr.	717.54	D=C
Wheeling charges (@ 21paise/unit)	Rs. Cr.	29.96	E
Total	**Rs. Cr.**	**747.50**	F=D+E
Surplus in case 10% existing consumer opts for Open Access and being replaced by new HTP Consumers	Rs. Cr.	29.96	G=F-C

Note: As per the information received by the distribution utility, there are more than 120 applications pending for new connection with contracted demand of 1 MW and above. This implies, that the expected consumption of new connection will be more than consumption of 10% of the consumers, leaving for OA.

Consumer Perspective-MSEDCL

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Maharashtra - Comparative analysis for a 5 MW, 11 kV embedded consumer procuring power through open access.

(Rs./kWh)

Particulars	Short term		Long term		Formulae
	Max	Min	Case I***	Case II****	
Power Purchase cost assumed *	4.00	2.73	2.64	2.95	A
Tariff (Discom) **	5.53	5.53	5.53	5.53	B
Intra State Open Access					
Open Access Charges Payable	0.31	0.31	0.25	0.25	C
Loss Compensation	0.62	0.42	0.41	0.46	D
Net Charge payable by OA Consumers	0.93	0.74	0.66	0.71	E=C+D
Net Cost payable by intra-State OA Consumers (including cost of procurement	4.93	3.47	3.30	3.66	F=A+E
Difference (Rs/ kWh)-Intra State	-0.59	-2.06	-2.23	-1.87	G=F-B
Inter State Open Access within the region (WR)					
Loss Compensation (Rs./kWh)	0.92	0.63	0.61	0.68	H
Inter state transmission charges (WR)	0.15	0.15	0.15	0.15	I
Net Cost payable by inter-State OA Consumers (including cost of procurement	5.07	3.51	3.40	3.78	J=H+I
Difference (Rs/ kWh)-Inter State	-0.46	-2.02	-2.13	-1.75	K=J-B

*Power purchase cost assumed as per the CERC's MMC report for the month of October,2010.
**Tariff for an embedded consumer of 5MW at 11 KV.
***Average levellized tariff of total nine projects under case I bidding across the country.
**** Average levellized tariff of total five projects under case II bidding across the country.

DGVCL

A UTILITY OF GUJARAT

YEAR 2010-2011

Snapshot of Tariff Order of DGVCL for FY 2010-2011

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Annual Revenue Requirement		Rs. Cr.	4454.5
Total Sales		MUs	9761
Total revenue from sales		Rs. Cr.	4119.4
Sales to 1 MW and above consumers		MUs	1424
Revenue from Sales to 1 MW and above consumers		Rs. Cr.	901.77
Transmission Loss		%	4.20%
Wheeling Loss		%	10.01%
Average Cost of Supply		Rs./Unit	4.56
Tariff of Consumer (5MW at 11 KV)		Rs./Unit	6.33
No of Applications pending	For 1 MW and Above	Nos	11
	Less than 1 MW	Nos	19
Contracted Demand of Pending Applications	For 1 MW and Above	MW	90.5
	Less than 1 MW	MW	28.8
Total Power Purchase		MUs	11789
Total Power Purchase Cost		Rs. Cr.	4140.4
Average Power Purchase Cost		Rs./Unit	3.51

Scenario-I- DGVCL

Forum of Regulators

All the consumers of 1 MW and above opt for Open access and Discom avoids the variable cost of Power procurement (in descending order @ Rs./unit).

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	4454	W
Total Power Purchase Cost	Rs Cr.	4140	X
Total Sales	MUs	9761	Y
Average Cost of Supply	Rs./Unit	4.56	Z=W*10/Y
Total units sold to eligible Open Access Consumers (1 MW and above)	MUs	1,424	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	1,582	B=A/(1-wheeling loss)
Total Energy purchase avoided by DISCOM	MUs	1,652	C=B/(1-Transmission loss)
Expenditure/Revenue Loss			
Revenue from sales to outgoing consumers	Rs. Cr.	901.77	D
Total	**Rs. Cr.**	**901.77**	E=D
Savings / Receipts			
Power procurement variable cost avoided	Rs. Cr.	349	F
wheeling charges (@ 12 paise/unit)	Rs. Cr.	19	G=.21*B/10
Cross Subsidy Surcharge (@ 51 Ps/unit)	Rs. Cr.	72.62	H=.51*A/10
Total	**Rs. Cr.**	**440**	I=F+G+H
Loss in case consumer opts for Open Access	Rs. Cr.	462	J=E-I

mpact on ARR

Revised ARR	Rs Cr.	4916	W'=W+J
Revised Sales	MUs	8337	Y'=Y-A
Revised Average Cost of Supply	Rs./Unit	5.90	Z'=W'/Y'*10

Scenario-II- DGVCL

Forum of Regulators

10% of eligible consumers opt for open access and Discom avoids the variable cost of power procurement (in descending order @ Rs./unit).

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	4454	W
Total Power Purchase Cost	Rs Cr.	4140	X
Total Sales	MUs	9761	Y
Average Cost of Supply	Rs./Unit	4.56	Z=W*10/Y
Total units sold to 10% of eligible Open Access Consumers (1 MW and above)	Mus	142	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	158	B=A/(1-wheeling loss)
Total Energy purchase avoided by DISCOM	MUs	165	C=B/(1-Transmission loss)
Expenditure/Revenue Loss			
Revenue from sales to 10% of outgoing consumers	Rs. Cr.	90.18	D
Total	**Rs. Cr.**	**90.18**	E=D
Savings / Receipts			
Power procurement variable cost avoided	Rs. Cr.	5.10	F
Wheeling charges (@ 12 paise/unit	Rs. Cr.	1.90	G=B*.21/10
Cross Subsidy Surcharge (@ 51 Ps/unit	Rs. Cr.	7.26	H=.51*A/10
Total	**Rs. Cr.**	**14.27**	I=F+G+H
loss in case 10% of eligible consumer opts for Open Access	Rs. Cr.	76	J=E-I

mpact on ARR

Revised ARR	Rs Cr.	4379	W'=W+J
Revised Sales	MUs	9619	Y'=Y-A
Revised Average Cost of Supply	Rs./Unit	4.55	Z'=W'/Y'*10

Scenario-III- DGVCL

Forum of Regulators

10% of eligible consumers opt for open access and Discom selling power available to its existing consumers @ average revenue realisation.

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	4454	W
Total Sales	MUs	9761	Y
Average Cost of Supply	Rs./Unit	4.56	Z=W*10/Y
Total units sold to 10% of eligible Open Access Consumers (1 MW and above)	Mus	142	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	158	B=A/(1-wheeling loss)
Revenue realisation from sale of Power	Rs. Cr.	4,119	C
Avg. Revenue realisation	Rs./kWh	4.22	D=C*10/Y
Expenditure/Revenue Loss			
Revenue from sales from 10% of outgoing consumers	**Rs. Cr.**	**90.18**	E
Savings / Receipts			
Revenue from sale of units @ avg. revenue realisation to existing consumer	Rs. Cr.	60.10	F=D*A/10
Wheeling charges (@ 12 paise/unit)	Rs. Cr.	1.90	G=.21*B/10
Cross Subsidy Surcharge (@ 51 Ps/unit)	Rs. Cr.	7.26	H=.51*A/10
Total	**Rs. Cr.**	**69.26**	I=F+G+H
Loss in case consumer opts for Open Access	Rs. Cr.	20.92	J=E-I

Impact on ARR

Revised ARR	Rs Cr.	4475	W'=W+J
Revised Average Cost of Supply	Rs./Unit	4.58	Z'=W'/Y*10

Scenario-IV- DGVCL

All eligible consumers opt for open access and Discom selling power available to its existing consumers @ average revenue realisation.

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	4454	W
Total Sales	MUs	9761	Y
Average Cost of Supply	Rs./Unit	4.56	Z=W*10/Y
Total units sold to eligible Open Access Consumers (1 MW and above)	MUs	1,424	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	1,582	B=A/(1-wheeling loss)
Revenue realisation from sale of Power	Rs. Cr.	4,119	C
Avg. Revenue realisation	Rs./kWh	4.22	D=C*10/Y
Expenditure/Revenue Loss			
Revenue from sales from outgoing consumers	**Rs. Cr.**	**901.77**	E
Savings / Receipts			
Revenue from sale of units @ avg. revenue realisation to existing consumer	Rs. Cr.	600.97	F=D*A/10
Wheeling charges (@ 12 paise/unit)	Rs. Cr.	18.99	G=.21*B/10
Cross Subsidy Surcharge (@ 51 Ps/unit)	Rs. Cr.	72.62	H=.51*A/10
Total	**Rs. Cr.**	**692.58**	I=F+G+H
Loss in case consumer opts for Open Access	Rs. Cr.	209.19	J=E-I

mpact on ARR

Revised ARR	Rs Cr.	4664	W'=W+J
Revised Average Cost of Supply	Rs./Unit	4.78	Z'=W'/Y*10

Forum of Regulators

Scenario-V- DGVCL

10% of eligible consumers opt for open access and Discom selling power available to new consumers

Particulars	Unit	Details	Formulae
Total units sold to 10% of eligible Open Access Consumers (1 MW and above)	Mus	142	A
Average tariff of HT Category	Rs./kWh	6.33	B
Expenditure/Revenue Loss			
Revenue from sales from 10% of outgoing consumers	**Rs. Cr.**	**90.18**	C
Savings / Receipts			
Revenue from sale of saved units to new consumers	Rs. Cr.	90.18	D=C
Wheeling charges (@ 12 paise/unit)	Rs. Cr.	1.90	E
Cross Subsidy Surcharge (@ 51 Ps/unit)	Rs. Cr.	7.26	F=A*.51/10
Total	**Rs. Cr.**	**99.34**	G=D+E+F
Surplus in case 10% existing consumer opts for Open Access and being replaced by new HTP Consumers	Rs. Cr.	9.16	H=C-G

Forum of Regulators

Consumer Perspective-DGVCL

Forum of Regulators

Gujarat - Comparative analysis for a 5 MW, 11 kV embedded consumer procuring power through open access.

(Rs./kWh)

Particulars	Short term		Long term		Formulae
	Max	Min	Case I	Case II	
Power Purchase cost assumed *	4.00	2.73	2.64	2.95	A
Tariff (Discom)	6.30	6.30	6.30	6.30	B
Intra State Open Access					
Open Access Charges Payable	0.69	0.69	0.77	0.77	C
Loss Compensation	0.64	0.44	0.42	0.47	D
Net Charge payable by OA Consumers	1.33	1.13	1.20	1.25	E=C+D
Net Cost payable by intra-State OA Consumers (including cost of procurement)	5.33	3.86	3.84	4.20	F=A+E
Difference (Rs/ kWh)-Intra State	-0.97	-2.44	-2.46	-2.10	G=F-B
Inter State Open Access within the region (WR)					
Loss Compensation (Rs./kWh)	0.92	0.63	0.61	0.68	H
Inter state transmission charges (WR)	0.15	0.15	0.15	0.15	I
Net Cost payable by inter-State OA Consumers (including cost of procurement	5.76	4.20	4.17	4.55	J=A+C+H+I
Difference (Rs/ kWh)-Inter State	-0.54	-2.10	-2.13	-1.75	K=J-B

*Power purchase cost assumed as per the CERC's MMC report for the month of October,2010.
Tariff for an embedded consumer of 5MW at 11 KV.
**Average levellized tariff of total nine projects under case I bidding across the country.
*** Average levellized tariff of total five projects under case II bidding across the country.

DHBVNL

A UTILITY OF HARYANA

YEAR 2010-2011

Snapshot of Tariff Order of DHBVNL for FY 2010-2011

Forum of Regulators

Annual Revenue Requirement		Rs. Cr.	6476.65
Total Sales		MUs	13,915
Total revenue from sales		Rs. Cr.	4300.89
Sales to 1 MW and above consumers		MUs	1473.00
Revenue from Sales to 1 MW and above consumers		Rs. Cr.	780.99
Transmission Loss (intra state)		%	2.10%
Wheeling Loss		%	6.00%
Average Cost of Supply		Rs./Unit	4.65
Tariff of Consumer (5MW at 11 KV)		Rs./Unit	5.30
No of Applications pending	For 1 MW and Above	Nos	63
	Less than 1 MW	Nos	425
Contracted Demand of Pending Applications	For 1 MW and Above	MW	162.56
	Less than 1 MW	MW	163.85
Total Power Purchase		MUs	17102
Total Power Purchase Cost		Rs. Cr.	4874.388
Average Power Purchase Cost		Rs./Unit	2.85

Scenario-I- DHBVNL

Forum of Regulators

All the consumers of 1 MW and above opt for Open access and Discom avoids the variable cost of Power procurement (in descending order @ Rs./unit).

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	6477	W
Total Power Purchase Cost	Rs Cr.	4874	X
Total Sales	MUs	13915	Y
Average Cost of Supply	Rs./Unit	4.65	Z=W*10/Y
Total units sold to eligible Open Access Consumers (1 MW and above)	MUs	1,473	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	1,567	B=A/(1-wheeling loss)
Total Energy purchase avoided by DISCOM	MUs	1,601	C=B/(1-Transmission loss)
Expenditure/Revenue Loss			
Revenue from sales to outgoing consumers	Rs. Cr.	780.99	D
Total	**Rs. Cr.**	**780.99**	E=D
Savings / Receipts			
Power procurement variable cost avoided	Rs. Cr.	343	F
wheeling charges (@ 30 paise/unit)	Rs. Cr.	47	G=.21*B/10
Total	**Rs. Cr.**	**390**	H=F+G
Loss in case consumer opts for Open Access	Rs. Cr.	391	I=E-H

Impact on ARR

Revised ARR	Rs Cr.	6868	W'=W+H
Revised Sales	MUs	12442	Y'=Y-A
Revised Average Cost of Supply	Rs./Unit	5.52	Z'=W'/Y'*10

Scenario-II- DHBVNL

Forum of Regulators

10% of eligible consumers opt for open access and Discom avoids the variable cost of power procurement (in descending order @ Rs./unit).

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	6477	W
Total Power Purchase Cost	Rs Cr.	4874	X
Total Sales	MUs	13915	Y
Average Cost of Supply	Rs./Unit	4.65	Z=W*10/Y
Total units sold to 10% of eligible Open Access Consumers (1 MW and above)	Mus	147	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	157	B=A/(1-wheeling loss)
Total Energy purchase avoided by DISCOM	MUs	160	C=B/(1-Transmission loss)
Expenditure/Revenue Loss			
Revenue from sales to 10% of outgoing consumers	Rs. Cr.	78.10	D
Total	**Rs. Cr.**	**78.10**	E=D
Savings / Receipts			
Power procurement variable cost avoided	Rs. Cr.	53.07	F
Wheeling charges (@ 30 paise/unit)	Rs. Cr.	4.70	G=B*.21/10
Total	**Rs. Cr.**	**57.78**	H=F+G
Loss in case consumer opts for Open Access	Rs. Cr.	20.32	I=E-H

Impact on ARR

Revised ARR	Rs Cr.	6456	W'=W-I
Revised Sales	MUs	13768	Y'=Y-A
Revised Average Cost of Supply	Rs./Unit	4.69	Z'=W'/Y'*10

Scenario-III- DHBVNL

Forum of Regulators

10% of eligible consumers opt for open access and Discom selling power available to its existing consumers @ average revenue realisation.

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	6477	W
Total Sales	MUs	13915	Y
Average Cost of Supply	Rs./Unit	4.65	Z=W*10/Y
Total units sold to 10% of eligible Open Access Consumers (1 MW and above)	Mus	147	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	157	B=A/(1-wheeling loss)
Revenue realisation from sale pf Power	Rs. Cr.	4,301	C
Avg. Revenue realisation	Rs./kWh	3.09	D=C*10/Y
Expenditure/Revenue Loss			
Revenue from sales from 10% of outgoing consumers	**Rs. Cr.**	**78.10**	E
Savings / Receipts			
Revenue from sale of units @ avg. revenue realisation to existing consumer	Rs. Cr.	45.53	F=D*A/10
Wheeling charges (@ 30 paise/unit)	Rs. Cr.	4.70	G=.21*B/10
Total	**Rs. Cr.**	**50.23**	H=F+G
Loss in case consumer opts for Open Access	Rs. Cr.	27.87	I=E-H

Impact on ARR

Revised ARR	Rs Cr.	6505	W'=W+I
Revised Average Cost of Supply	Rs./Unit	4.67	Z'=W'/Y*10

Scenario-IV- DHBVNL

Forum of Regulators

All eligible consumers opt for open access and Discom selling power available to its existing consumers @ average revenue realisation.

Particulars	Unit	Details	Formulae
Total ARR	Rs Cr.	6477	W
Total Sales	MUs	13915	Y
Average Cost of Supply	Rs./Unit	4.65	Z=W*10/Y
Total units sold to eligible Open Access Consumers (1 MW and above)	MUs	1,473	A
Total units wheeled for eligible Open Access Consumers (1 MW and Above)	MUs	1,567	B=A/(1-wheeling loss)
Revenue realisation from sale of Power	Rs. Cr.	4,301	C
Avg. Revenue realisation	Rs./kWh	3.09	D=C*10/Y
Expenditure/Revenue Loss			
Revenue from sales from outgoing consumers	**Rs. Cr.**	**781**	E
Savings / Receipts			
Revenue from sale of units @ avg. revenue realisation to existing consumer	Rs. Cr.	455.28	F=D*A/10
Wheeling charges (@ 30 paise/unit)	Rs. Cr.	47.01	G=.21*B/10
Total	**Rs. Cr.**	**502.29**	H=F+G
Loss in case consumer opts for Open Access	Rs. Cr.	278.70	I=E-H
Impact on ARR			
Revised ARR	Rs Cr.	6755	W'=W+I
Revised Average Cost of Supply	Rs./Unit	4.85	Z'=W'/Y*10

Scenario-V- DHBVNL

Forum of Regulators

10% of eligible consumers opt for open access and Discom selling power available to new consumers

Particulars	Unit	Details	Formulae
Total units sold to 10% of eligible Open Access Consumers (1 MW and above)	Mus	147	A
Average tariff of HT Category	Rs./kWh	5.30	B
Expenditure/Revenue Loss			
Revenue from sales from 10% of outgoing consumers	**Rs. Cr.**	**78.10**	C
Savings / Receipts			
Revenue from sale of saved units to new consumers	Rs. Cr.	78.10	D=C
Wheeling charges (@ 30 paise/unit)	Rs. Cr.	4.70	E
Total	**Rs. Cr.**	**82.80**	F=D+E
Surplus in case 10% existing consumer opts for Open Access and being replaced by new HTP Consumers	Rs. Cr.	4.70	G=F-C

Consumer Perspective- DHBVNL

Forum of Regulators

Haryana - Comparative analysis for a 5 MW, 11 kV embedded consumer procuring power through open access.

(Rs./kWh)

Particulars	Short term		Long term		Formulae
	Max	Min	Case I	Case II	
Power Purchase cost assumed *	4.00	2.73	2.64	2.95	A
Tariff (Discom)	5.30	5.30	5.30	5.30	B
Intra State Open Access					
Open Access Charges Payable	0.59	0.59	0.59	0.59	C
Loss Compensation	0.35	0.24	0.23	0.26	D
Net Charge payable by OA Consumers	0.93	0.82	0.82	0.84	E=C+D
Net Cost payable by intra-State OA Consumers (including cost of procurement	4.93	3.55	3.46	3.79	F=A+E
Difference (Rs/ kWh)-Intra State	-0.37	-1.75	-1.85	-1.51	G=F-B
Inter State Open Access within the region (WR)					
Loss Compensation (Rs./kWh)	0.54	0.37	0.36	0.40	H
Inter state transmission charges (WR)	0.15	0.15	0.15	0.15	I
Net Cost payable by inter-State OA Consumers (including cost of procurement	5.28	3.83	3.73	4.08	J=A+C+H+I
Difference (Rs/ kWh)-Inter State	-0.03	-1.47	-1.57	-1.22	K=J-B

*Power purchase cost assumed as per the CERC's MMC report for the month of October,2010.
Tariff for an embedded consumer of 5MW at 11 KV.
**Average levellized tariff of total nine projects under case I bidding across the country.
*** Average levellized tariff of total five projects under case II bidding across the country.

METHODOLOGY TO DETERMINE CROSS SUBSIDY SURCHARGE.

SAMPLE STUDY FOR 9 STATES.

Forum of Regulators

Assumptions

- Study has been done based on the approved ARR/Tariff orders of various Discoms for year FY2010-11.
- Where breakup of variable and fixed cost of station-wise Power Purchase cost was not available, variable cost assumed as 60% of total power purchase cost.
- Tariff ('T') of the consumer category has been calculated as the average realization from that particular category (i.e. revenue/sales).
- For States where approved sales and revenue numbers were not available, T has been calculated by adding demand and energy charges with assumption of 80% as load factor.

Forum of Regulators

Methodology for calculation of Surcharge

1. T - ACS
2. T - (C*(1+L)+D)
3. T - (C*(1+(L+TI)+D)
4. T - (APPC*(1+L)+D)
5. T - (C/(1-L)+D)
6. T - (AR+D/(1-L))

Where,

T = Tariff payable by the relevant category of consumers (Revenue/sales)

ACS = Average Cost of Supply (ARR/Sales)

C = Weighted average cost of power purchase of top 5% at the margin excluding liquid fuel based generation and renewable power

L = System Losses for the applicable voltage level, expressed as a percentage

D = Wheeling charge of relevant consumer category

TI = Intra-State Transmission Losses

APPC = Average Power purchase Cost

AR = Average Revenue Realization (Revenue from sale of power/total sales)

Other methods for surcharge calculation: LRIC/Marginal Cost method and Cost to Serve method, not feasible in the absence of data.

Forum of Regulators

Snapshot of CSS analysis for Nine states.(1/2)

		Median of all consumer category						Weighted Average of all consumer categories	
State	DISCOM	T-ACS	T- (C*(1+L)+D)	T- (c*(1+(L+T)+D)	T- (appc*(1+L)+D)	T- (C/(1-L)+D)	T-(ARR+D/(1-L))	T- (C/(1-L)+D)	T-(ARR+D/(1-L))
Andhra Pradesh	CSPDCL	0.55	0.78	0.66	1.08	0.75	0.54	0.24	-0.05
	EPDCL	-3.41	-3477.12	-3489.42	-2.34	-2.62	-3.19	0.39	-0.10
	NPDCL	0.56	1.43	1.30	1.71	1.42	2.07	-0.77	-0.01
	SPDCL	-3.55	-2.64	-2.76	-2.35	-2.64	-2.81	0.05	-0.02
Bihar	BSEB	-1.44	-0.76	-0.91	0.68	-0.79	-0.22	-0.94	-0.39
Gujarat	DGVCL-GJ	-0.56	-3.21	-3.47	0.05	-3.28	-0.66	-2.75	-0.12
	PGVCL-GJ	-0.36	-2.97	-3.20	0.94	-3.03	0.20	-3.36	-0.13
	MGVCL-GJ	-0.85	-3.24	-3.50	0.22	-3.31	-0.36	-2.95	0.01
	UGVCL-GJ	1.45	1.08	0.95	1.95	1.04	1.84	1.19	1.99
Haryana	UHBVNL	-0.80	0.54	0.34	1.07	0.53	1.34	-0.64	-0.19
	DHBVNL	-0.80	0.54	0.34	1.07	0.53	0.72	-0.64	-0.15
Karnataka	BESCOM	0.44	-0.30	-0.50	1.67	-0.31	0.70	-1.32	-0.19
	MESCOM	0.25	-2.91	-3.19	1.63	-2.93	0.83	-4.25	-0.36
	HESCOM	-4.56	-5.59	-5.79	-3.18	-5.64	-2.39	-3.61	-0.55
	GESCOM	-4.17	-5.71	-5.92	-2.56	-5.73	-2.60	-3.71	-0.47
	CESC	-4.38	-5.57	-5.77	-2.90	-5.59	-2.92	-3.10	-0.36
Maharashtra	MSEDCL	0.82	-0.31	-0.54	1.99	-0.38	0.62	-0.68	0.24
Madhya Pradesh	EAST	0.35	0.25	1.02	1.70	-0.15	-0.13	-0.31	-0.29
	WEST	0.06	-1.84	-2.07	1.53	-2.27	-0.24	-2.30	-0.27
	CENTRAL	-0.10	-0.26	-0.41	1.02	-0.76	-0.44	-0.62	-0.30
Punjab	PSEB	0.09	-1.58	-1.58	0.94	-1.63	-0.27	-1.79	-0.42
Uttarakhand	UPPCL	-0.30	-2.65	-6.42	0.78	-2.88	-0.37	-2.60	-0.11

Forum of Regulators

Snapshot of CSS analysis for Nine states.(2/2)

		Median of subsidizing category						Weighted Average of subsidizing consumer categories	
State	DISCOM	T-ACS	T- (C*(1+L)+D)	T- (c*(1+(L+T)+D)	T- (appc*(1+L)+D)	T- (C/(1-L)+D)	T-(ARR+D/(1-L))	T- (C/(1-L)+D)	T-(ARR+D/(1-L))
Andhra Pradesh	CSPDCL	1.17	1.54	1.42	1.83	1.54	1.24	1.40	1.12
	EPDCL	-0.75	0.03	-0.09	0.31	0.03	-0.54	1.80	1.29
	NPDCL	-3.09	-2.22	-2.35	-1.94	-2.23	-1.58	1.48	2.21
	SPDCL	0.79	1.71	1.59	1.99	1.70	1.53	1.62	1.52
Bihar	BSEB	0.14	0.86	0.68	2.26	0.80	1.36	0.94	1.50
Gujarat	DGVCL-GJ	0.34	-2.03	-2.29	1.24	-2.10	0.55	-2.12	0.53
	PGVCL-GJ	0.81	-1.80	-2.03	2.11	-1.86	1.37	-1.55	1.70
	MGVCL-GJ	0.15	-2.00	-2.26	1.46	-2.07	0.90	-2.11	0.86
	UGVCL-GJ	1.53	1.36	1.23	2.23	1.33	2.15	1.97	2.78
Haryana	UHBVNL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DHBVNL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Karnataka	BESCOM	0.21	-0.70	-0.89	1.32	-0.71	0.40	0.76	1.83
	MESCOM	0.15	-3.02	-3.29	1.53	-3.03	0.73	-1.84	1.99
	HESCOM	0.19	-0.85	-1.09	1.56	-0.90	2.33	-0.12	3.03
	GESCOM	-4.17	-5.71	-5.92	-2.56	-5.73	-2.60	-0.67	2.51
	CESC	-4.38	-5.57	-5.77	-2.90	-5.59	-2.92	-0.06	2.66
Maharashtra	MSEDCL	2.42	1.54	1.31	3.79	1.50	2.37	0.43	1.27
Madhya Pradesh	EAST	1.18	1.03	1.79	2.49	0.64	0.66	0.61	0.64
	WEST	-0.73	-2.63	-2.86	0.74	-3.06	-1.03	-1.23	0.80
	CENTRAL	0.14	-0.03	-0.18	1.26	-0.53	-0.21	0.45	0.77
Punjab	PSEB	0.25	-1.42	-1.42	1.10	-1.47	-0.11	-1.57	-0.20
Uttarakhand	UPPCL	0.49	-1.97	-5.74	1.46	-2.19	0.31	-2.14	0.35

Forum of Regulators

Inferences/suggestions (1/3)

- Difficult to apply a uniform formula for surcharge calculations for all states.
- Surcharge can vary depending on the level of 'T', 'C', 'L', 'D','APPC' ,'ACS' and 'AR'.
- Prerequisite for reasonableness of surcharge is the rationalization of Tariff ('T').
  - ? Act/Tariff Policy requires SERCs to specify a roadmap for tariff rationalization.

Forum of Regulators

Inferences/suggestions (2/3)

- Surcharge can be calculated by the following formula:

  Weighted average of [T-(AR+(D/(1-L))]

  Where,

  T = Tariff payable by the relevant category of consumers (Revenue/sales)

  L = System Losses for the applicable voltage level, expressed as a percentage

  D =Wheeling charge of relevant consumer category

  AR = Average Revenue Realization (Revenue from sale of power/total sales)

Inferences/suggestions (3/3)

Forum of Regulators

- FOR decision in its meeting held on 16.06.2011:

  ? SERCs to calculate Cross-Subsidy Surcharge based on the assumptions that the power available as a result of exit of open access consumer will be sold at the average revenue realization rate. This is the most practical scenario in a situation of shortage of power supply. The SERCs may assume certain percentage (say, 10%) of the total consumption by eligible open access consumers for the purpose of estimation of power available for sale at average realization rate. The wheeling charge (grossed up by the system loss at appropriate level) to be recovered from the open access consumers should also be factored into computation of surcharge.

  ? For a situation where there is no power cut, SERCs may calculate Cross-Subsidy Surcharge based on the estimation that the DISCOM will avoid purchase of the quantum of power for which open access has been sought. This principle of avoided cost method should be adopted in areas where there are no power shortage. Other assumptions relating to quantum of power avoided and the wheeling charges could be on the same lines as above.

STANDBY CHARGES

SAMPLE STUDY OF ISPAT INDUSTRY OF MAHARASHTRA.

Stand-by Support-Sample case (MSEDCL)

MSEDCL Consumer - Ispat industries Ltd.

General Data

Contract Demand	**300 MVA**		V
Monthly consumption	**160 Mus**		X
Tariff Category	**HT-I industry Express feeder**		
	Energy charge (Rs./ unit)	5.27	Y
	Demand/fixed charge (Rs./ kVA per month)	150.00	Z

Calculation for Standby Charges as per FOR recommendation-Model regulation (42 days)

	Total units consumed for 42 days	224 Mus	A=X*42/30
Scenerion A	**If the consumer opts for OA and seeks standby facility (at tariff of consumer)**		**Formulae**
	Energy charge	118.05 Rs. Cr	B=A*Y
	Demand Charges	6.30 Rs. Cr	C=Z*V(42/30)*1000/10^7
	Total bill	124.35 Rs. Cr	D=B+C
	Per unit cost	5.55 Rs./unit	E=D*10/A
	Standby charges (Fixed/demand charge)	6.30 Rs. Cr Lumpsum for a year	F=C
	Standby charges (Fixed/demand charge) per unit	0.28 Rs./unit	G=F*10/A
	Demand charges spreadover 365 days so per day charge	0.017 Rs. Cr per day	H=C/365
Scenerion 2	**If the consumer opts for OA and seeks standby facility (at temporary supply tariff)**		**Formulae**
	Energy charge per unit	10.12 Rs./unit	a
	Demand/fixed charge	150.00 Rs. Per 10 kW per month	b
	Energy charge	226.69 Rs. Cr.	c=a*A/10
	Demand Charges	0.63 Rs. Cr.	d=b*V(42/30)*1000/(10*10^7)
	Total bill	227.32 Rs. Cr.	e=c+d
	Per unit cost	10.15 Rs. /unit	f=e*10/A
	Standby charges (Fixed/demand charge)	0.63 Rs. Cr Lumpsum for a year	g=d
	Standby charges (Fixed/demand charge) per unit	0.028 Rs./unit	h=g*10/A
	Demand charges spreadover 365 days so per day charge	0.0017 Rs. Cr per day	i=g/365

At present in Maharashtra, the Standby charges is equal to the temporary supply tariff

	Standby charges (Fixed/demand charge)	5.40 Rs. Cr Lumpsum for a year	S=b*V*1000*12/(10*10^7)
	Energy charge per unit	10.12 Rs./unit	

Forum of Regulator's

THANK YOU

BACKUP SLIDES

Forum of Regulators

Power Purchase Portfolio-MSEDCL(2010-11)

Source	Mus	Rs. Cr.	Rs./unit
NCE	4114	2028	4.93
RGPPL	11000	5155	4.69
CPP	392	172	4.39
GANDHAR	1314	573	4.36
DODSON II	43	15	3.49
KhTPS-I	61	19	3.11
KhTPS-II	511	149	2.92
DODSON I	21	6	2.86
TAPP 3&4	1934	529	2.74
FSTPP	129	35	2.71
IPP - JSW	1310	354	2.70
Sipat TPS	2242	593	2.64
KAWAS GAS	1345	321	2.39
VSTP III	2211	520	2.35
MSPGCL	50490	11359	2.25
KAPP	368	80	2.17
SSP	635	130	2.05
PENCH	240	49	2.04
VSTP II	2652	501	1.89
TSTPS	84	13	1.55
VSTP I	3395	488	1.44
KSTPS	5096	587	1.15
TAPP 1&2	1206	115	0.95
Total Power Purchase	90793	23791	2.62

Discom may avoid procurement from these sources in descending order of per unit cost

Source: Tariff order MSEDCL for FY 10-11

*Variable cost assumed as 60% of the total Power procurement cost from each source

Power Purchase Portfolio-DGVCL(2010-11)

Forum of Regulators

Power Purchase for FY 2009-10	Units Available (MU)	Units Dispatched (MU)	Fixed Cost (Rs. Lacs)	Variable Cost (Rs./ Unit)	Variable Cost (Rs. Lacs)	Incentive (Rs. Lacs)	Total Cost (Rs. Lacs)	Per Unit Cost (Rs./Unit
Dhuvaran oil	1038	508	5951	3.44	17492	0	23442	4.61
Wind (New Policy)	408	408	0	3.37	13750	0	13750	3.37
NTPC-KAWAS	935	281	7663	3.09	8668	0	16331	5.82
Tarinilnds Limited	7	7	0	3	218	0	218	3
NPC -Tarapur-3&4	911	911	0	2.73	24859	0	24859	2.73
GPEC	2223	667	26174	2.47	16472	0	42646	6.39
Captive Power Plant	9	9	0	2.34	210	0	210	2.34
Dhuvaran Gas-I	489	147	3235	2.21	3243	136	6615	4.51
Dhuvaran Gas-II	645	193	5453	2.21	4278	179	9911	5.2
GIPCL-I(145)	174	52	645	2.17	1131	0	1776	3.41
Utran Gas Based	739	222	4166	2.16	4787	241	9194	4.14
GSEG Expansion	409	123	239	2.12	2598	0	2838	2.32
GSPC-Pipavav	292	88	479	2.12	1856	0	2335	2.67
NPC-Kakrapar	241	241	0	2.03	4892	0	4892	2.03
ESSAR	1249	375	7774	2.01	7532	0	15306	4.08
Utran Extension	1657	497	18721	1.86	9246	0	27967	5.63
GIPCL, Expansion	380	114	4380	1.75	1994	0	6374	5.59
Wind (Old Policy)	11	11	0	1.75	190	0	190	1.75
NTPC-JHANOR	838	251	6225	1.73	4350	0	10575	4.21
Sikka TPS	1129	339	10029	1.72	5826	0	15854	4.68
GIPCL II (160)	218	65	1027	1.72	1124	0	2151	3.29
NTPC Kahalgaon	152	46	1647	1.7	777	0	2424	5.3
Sipat Stage-I	117	35	1261	1.7	595	0	1857	5.3
Wanakbori I to VI	2561	862	12737	1.69	14569	377	27682	3.21
Gandhinagar I to IV	1943	1943	15987	1.59	30895	0	46882	2.41
Gandhinagar V	462	462	3329	1.48	6838	151	10318	2.23
GSEG	361	361	3917	1.48	5345	0	9263	2.56
Ukai TPS	1002	1002	5459	1.43	14325	0	19784	1.97
NTPC-Kahalgoan	305	305	2833	1.21	3687	0	6519	2.14
Kutch Lignite IV	116	116	2521	0.96	1110	0	3631	3.14
VINDHYACHAL-III	637	637	4425	0.94	5986	0	10410	1.63
NTPC-Sipat-II	466	466	0	0.54	2517	0	2517	0.54
Ukai Hydro	0	0	0	0	0	0	0	0
Wanakbori VII	0	0	0	0	0	0	0	0
Kutch Lignite I to III	0	0	0	0	0	0	0	0
KadanaHydro	47	47	1871	0	0	0	1871	3.97
Sikka Extension	0	0	0	0	0	0	0	0
GIPCL-SLPP	0	0	0	0	0	0	0	0
GMDC-Akrimota	0	0	0	0	0	0	0	0
NPC-Tarapur-1&2	0	0	0	0	0	0	0	0
NTPC-KORBA	0	0	0	0	0	0	0	0
VINDHYACHAL-I	0	0	0	0	0	0	0	0
VINDHYACHAL-II	0	0	0	0	0	0	0	0
SSNNL-Hydro	0	0	0	0	0	0	0	0
NTPC NtKaranpura	0	0	0	0	0	0	0	
APPL	0	0	0	0	0	0	0	0
Aryan	0	0	0	0	0	0	0	0
Total	22169	11789	158150	1.88	221360	1083	380593	3.23

Discom may avoid procurement from these sources in descending order of per unit cost

Source: Tariff order DGVCL for FY 10-11

Power Purchase Portfolio-DHBVNL(2010-11)

Forum of Regulators

Source of Power	Volume (Mus)	Rate (RS./unit)	HERC approved cost (Rs. Mn)
Tehri HEP	117	5.85	682.1
Unchhahar II NTPC	246	5.34	1314.2
Unchhahar III NTPC	139	5.05	702.3
Dulhasti NHPC	187	4.94	922.4
Unchhahar I NTPC	109	3.4	369.6
Dadri CCGT	299	3.21	958.1
Auraiya CCGT NTPC	322	3.13	1008.5
Anta CCGT NTPC	183	3.12	572.1
Dhauliganga NHPC	99	3.07	303.5
HPGCL	19297	3.054	58933
RAPP 3&4 NPCIL	244.59	2.95	720.5
Kahalgaon I	217	2.83	615.7
Faridabad NTPC	3091	2.78	8595
Kahalgaon II	317	2.77	879.1
SJVNL	438	2.66	1163
New Projects	1091.14	2.54	2771.5
Ch. Devial **Sugar**	2	2.5	5
Farakka CCGT	99	2.48	246.3
Rihand II NTPC	590	2.42	1427
NAPP NPCIL	54.7	2.11	115.5
Rihand I NTPC	708	2.06	1458.4
Tala HEP	53	1.9	100.1
Singrauli STPS NTPC	1811	1.65	2981.6
Chamera II NHPC	124	1.51	188.4
Chamera I NHPC	331	1.44	477.6
Uri NHPC	138	1.42	196.8
Tanakpur NHPC	28	1.34	37.4
Bairasiul NHPC	178	1.01	180.1
Salall NHPC	465	0.77	359.5
BBMB	3225	0.22	709.5
IPGCL	0	0	0
TOTAL	34204	2.6018	88994

Discom may avoid procurement from these sources in descending order of per unit cost

Source: Tariff order DHBVNL for FY 10-11

Variable cost assumed as 60% of the total Power procurement cost from each source

Loss Compensation-MSEDCL

Particulars	Short term		Long term		Formulae
	Max	Min	Case I	Case II	
Contracted Load (MW)	5	5	5	5	W
Base Energy Consumption (kWh)	3600000	3600000	3600000	3600000	X=W*30*24*1000
Power Purchase cost assumed *	4.00	2.73	2.64	2.95	Y
Intra State Open Access					
Wheeling Loss (%)	9.00%	9.00%	9.00%	9.00%	A
Energy injected into system at T>D (kWh)	3956043.96	3956043.96	3956043.96	3956043.96	B=X/(1-A)
Transmission loss (%)	4.85%	4.85%	4.85%	4.85%	C
Energy injected into system at G>T (kWh)	4157692.02	4157692.02	4157692.02	4157692.02	D=B/(1-C)
Loss (kWh)	557692.02	557692.02	557692.02	557692.02	E=D-X
Loss in Rs.	2230768.08	1522499.21	1472306.93	1645191.46	F=E*Y
Loss Compensation (Rs./kWh)	0.62	0.42	0.41	0.46	G=F/X
Inter State Open Access					
Transmission loss (WR) (%)	6.06%	6.06%	6.06%	6.06%	H
Energy injected into system at G>T (kWh)	4425901.66	4425901.66	4425901.66	4425901.66	I=D/(1-H)
Loss (kWh)	825901.66	825901.66	825901.66	825901.66	J=I-X
Loss in Rs.	3303606.64	2254711.53	2180380.38	2436409.90	K=J*Y
Loss Compensation (Rs./kWh)	0.92	0.63	0.61	0.68	L=K/X

Forum of Regulators

Loss Compensation- DGVCL

Particulars	Short term		Long term		Formulae
	Max	Min	Case I	Case II	
Contracted Load (MW)	5	5	5	5	W
Base Energy Consumption (kWh)	3600000	3600000	3600000	3600000	X=W*30*24*1000
Power Purchase cost assumed *	4.00	2.73	2.64	2.95	Y
Intra State Open Access					
Wheeling Loss (%)	10.01%	10.01%	10.01%	10.01%	A
Energy injected into system at T>D (kWh)	4000444.49	4000444.49	4000444.49	4000444.49	B=X/(1-A)
Transmission loss (%)	4.20%	4.20%	4.20%	4.20%	C
Energy injected into system at G>T (kWh)	4175829.33	4175829.33	4175829.33	4175829.33	D=B/(1-C)
Loss (kWh)	575829.33	575829.33	575829.33	575829.33	E=D-X
Loss in Rs.	2303317.30	1572014.06	1520189.42	1698696.51	F=E*Y
Loss Compensation (Rs./kWh)	0.64	0.44	0.42	0.47	G=F/X
Inter State Open Access					
Transmission loss (WR) (%)	5.70%	5.70%	5.70%	5.70%	H
Energy injected into system at G>T (kWh)	4428238.95	4428238.95	4428238.95	4428238.95	I=D/(1-H)
Loss (kWh)	828238.95	828238.95	828238.95	828238.95	J=I-X
Loss in Rs.	3312955.78	2261092.32	2186550.82	2443304.89	K=J*Y
Loss Compensation (Rs./kWh)	0.92	0.63	0.61	0.68	L=K/X

Forum of Regulators

Loss Compensation-DHBVNL

Forum of Regulators

Particulars	Short term		Long term		Formulae
	Max	Min	Case I	Case II	
Contracted Load (MW)	5	5	5	5	W
Base Energy Consumption (kWh)	3600000	3600000	3600000	3600000	X=W*30*24*1000
Power Purchase cost assumed *	4.00	2.73	2.64	2.95	Y
Intra State Open Access					
Wheeling Loss (%)	6.00%	6.00%	6.00%	6.00%	A
Energy injected into system at T>D (kWh)	3829787.23	3829787.23	3829787.23	3829787.23	B=X/(1-A)
Transmission loss (%)	2.10%	2.10%	2.10%	2.10%	C
Energy injected into system at G>T (kWh)	3911937.93	3911937.93	3911937.93	3911937.93	D=B/(1-C)
Loss (kWh)	311937.93	311937.93	311937.93	311937.93	E=D-X
Loss in Rs.	1247751.72	851590.55	823516.14	920216.90	F=E*Y
Loss Compensation (Rs./kWh)	0.35	0.24	0.23	0.26	G=F/X
Inter State Open Access					
Transmission loss (WR) (%)	4.23%	4.23%	4.23%	4.23%	H
Energy injected into system at G>T (kWh)	4084721.66	4084721.66	4084721.66	4084721.66	I=D/(1-H)
Loss (kWh)	484721.66	484721.66	484721.66	484721.66	J=I-X
Loss in Rs.	1938886.63	1323290.12	1279665.17	1429928.89	K=J*Y
Loss Compensation (Rs./kWh)	0.54	0.37	0.36	0.40	L=K/X

Details of Case-I Projects

Forum of Regulators

S. No.	Project	Size	Status	State	Developer	COD Date: 1st Unit	Levelized Tariff (Rs/kWh) as per Competitive Bidding
1	Kamalanga	3 X 350 MW	Tariff Approved	Haryana, Case 1	PTC/GMR	Oct. 2011	**2.54**
2	Babandh	4 X 660MW	Approved	Haryana, Case 1	LANCO	Jul-12	**2.075**
3	Mandva	2 X 660 MW	Approved	Maharashtra, Case 1	LANCO Mahanadi	Oct. 2012 *	**2.7**
4	Tiroda Ph.1	2 X 660 MW	Approved	Maharashtra, Case 1	Adani Maharashtra	Aug. 2012	**2.642**
5	Chitrangi, Ph 1	3 X 660 MW	Petition	MP, Case 1	Reliance	June, 2012	**2.45**
6	Mahan	2 X 600 MW	Petition	MP, Case 1	Essar	May, 2011*	**2.45**
7	Nandgaonpeth	2 X 660MW	Petition	Maharashtra, Case1	India Bulls	Mar. 2014	**3.26**
8	Tiroda Ph. 2	2 X 660 MW	Petition	Maharashtra, Case 1	Adani Maharashtra	Sept. 2014	**3.28**
9	Mahanadi	3 X 600 MW	Petition	Gujarat	KSK Energy	Mar. 2015	**2.345**
Average levellised tariff							2.64

Details of Case-II Projects

Forum of Regulators

S. No.	Project	Size	Status	State	Developer	COD Date: 1st Unit	Levelized Tariff (Rs/kWh) as per Competitive Bidding
1	Talwandi Sabo	3 x 660 MW	Tariff Approved	Punjab/Case 2	Sterlite	Aug-12	**2.8643**
2	Rajpura	2 X 660 MW	Tariff Approved	Punjab/Case 2	L&T	Jan-14	**2.89**
3	Jhajjar	2 X 660 MW	Approved	Haryana, Case 2	CLP Power	Nov-Dec., 2012	**2.996**
4	Prayagraj	3 X 660MW	Petition	UP, Case 2	JP Associates	Jul-14	**3.02**
5	Sangam	2 X 660 MW	Petition	UP, Case 2	JP Associates	Jan, 2014	**2.97**
Average levellised tariff							**2.95**