Challenges of Electricity Sector in a Developing Economy

Maharashtra Case Study

23rd April 2009

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Discussion Points

- Indian Power Scenario
- MSEDCL profile
- Challenges faced
- Steps taken
- Financial Performance
- Way Ahead

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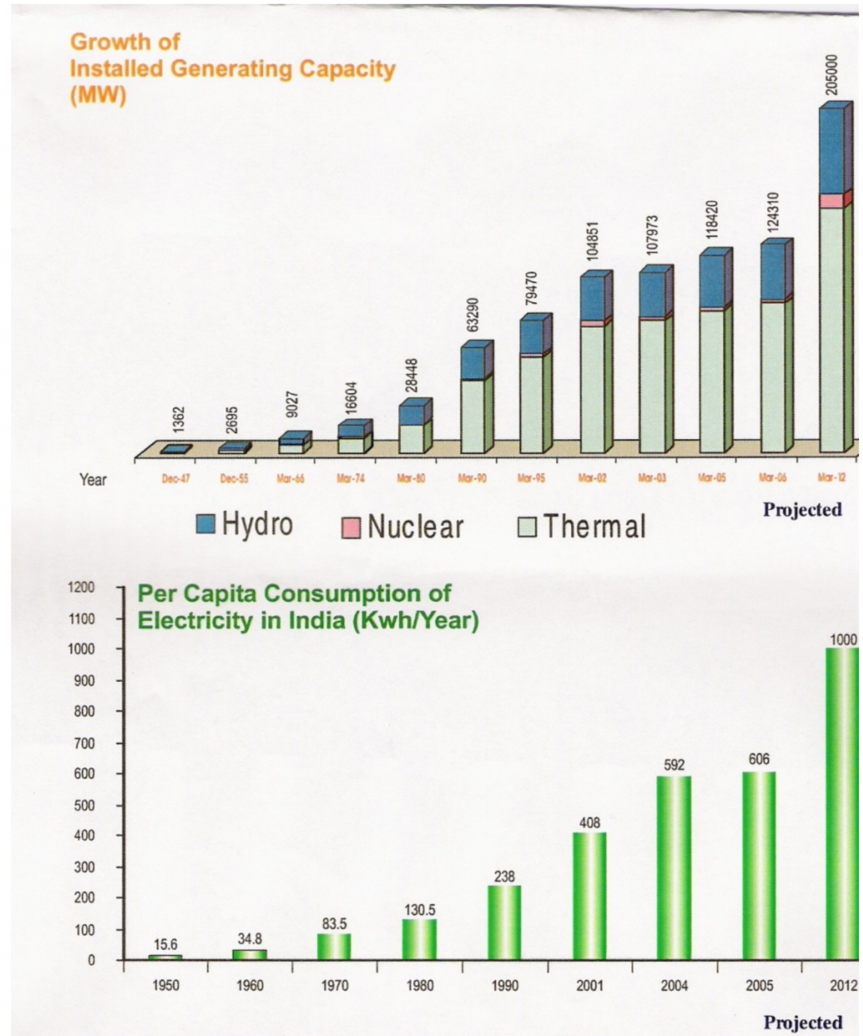
Indian Power Sector

- Installed Generation Capacity ~140 GW
- After United States, China, Japan, Russia, and Canada, India ranks Sixth in terms of Electricity Generation.
- Electricity Generation- 0.7 Trillion Kwh (2006-07)
- Per Capita Consumption-665 Kwh/Yr (2006-07) (China -2,444 Kwh, USA - 13,000Kwh)
- Shortages (Energy ~ 8.5%, Peak ~ 15%)
- Rapidly Expanding - GDP growing by around 7 - 8 %. Per Capita consumption expected to quadruple by 2020.
-
- Will require investment of US $ 900 Billion in generation, transmission and distribution by 2020



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Maharashtra

- Maharashtra – 2nd largest state in India in terms of area as well as population
- Maharashtra consumes12,500 MW electricity against India's total of around 100,000 MW. Per capita consumption of 1000 Kwh against India's average of 665 kwh
- Electricity Distribution utilities in Maharashtra
  - BEST (1500 MW)
  - Reliance Energy (1000MW)
  - Maharashtra State Electricity Distribution Company(10,000MW)

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MSEDCL's Profile

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- Largest Electricity Distribution Utility in India. Supplies 10,000 MW, which is approximately 10% of India's Electricity
- Area: 308,000 Sq. Km / 40615 Villages / 457 Towns.
- 15.6 million Live Consumers.
- Annual revenue US $ 4.5 Billions
- No of 33/11kV and 22/11 kV Substations = 1843 Nos.
- High Tension / Low tension Lines = 720,000 Km.
- Distribution transformers = 283,000 Nos.
- Administrative Structure: 11 Zones / 40 Circles / 586 Sub Divisions, 70,000(+) Employees/20,000 engineers

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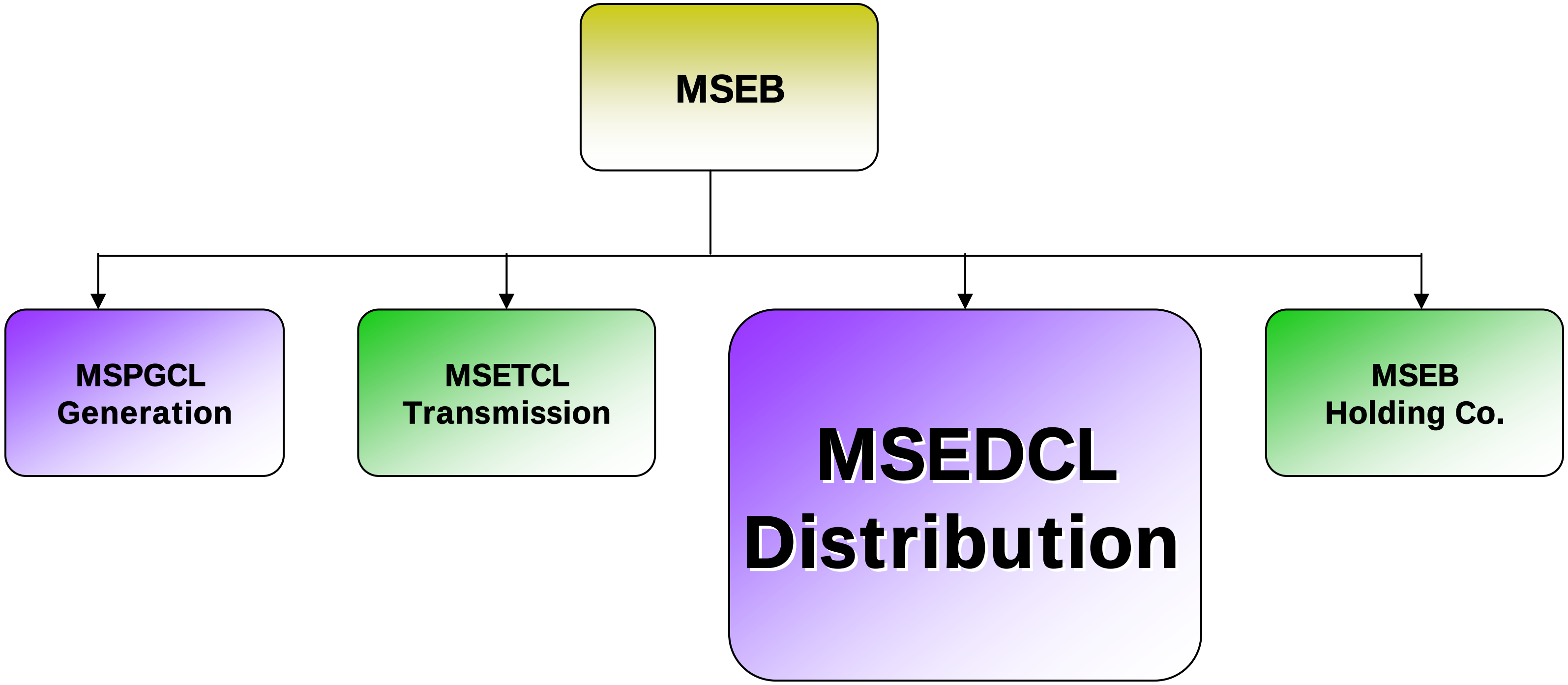
Power Sector Reforms in Maharashtra

- Indian Parliament passed Electricity Act – 2003.
- No license for Generation
- Entry of private sectors in generation, transmission, and distribution
- Long term power purchase only through competitive bidding and with the approval of regulator
- Mandatory Open Access for consumers and generators
- Trading in electricity
- Tariff determination by regulators – max 16 % return on equity allowed
- Gradual elimination of cross subsidy
- Strict Anti-theft provisions

Power Sector Reforms in Maharashtra

- Erstwhile Maharashtra State Electricity Board (MSEB) unbundled into 4 companies on June 6, 2005.



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Problems Inherited

- Shortage of power more than **3700 MW**
- **Peak shortage 23.1 %. Energy Shortage 18.1 %**
- High Distribution Losses (2004-05 : **34.72%)**
- Low Collection Efficiency - 89%.
- Loss making utility – Cash loss US $ 200 millions (2004-05).
- Inadequate Distribution Infrastructure.
- Forced power cuts from 7 to 14 hours every day
- Lack of Employee Motivation.

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Strategies adopted

- Improving economic viability :
  - Distribution loss of 34 % makes any power project completely unviable.
  - Reduction in distribution loss is must
  - Collection of bills, action against defaulters, disconnection etc
- Manage Power Gap: Demand side management
  - Sectorwise Power supply
  - Load shifting
  - Energy conservation
- **Consumer Satisfaction**
- Capacity addition
  - Generation
  - Transmission
  - Distribution

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Improving Economic Viability

- Energy Accounting & Accountability
- Photo Meter Reading/Billing.
- Strict Collection norms and disconnections
- Theft Control
- Amnesty schemes

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Improving Economic Viability

- Metering of all **9339** feeders & feeder wise EA carried out.
- Metering of 150,000 distribution transformers completed
- Monthly Energy Accounting at Division / Feeder / DTC level.
- Target for each Division / Subdivision for LT loss reduction (Monthly performance review).

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Improving Economic Viability: Management and Technology Measures

- Established our own State Wide Area Network, upto -date consumer data base of over 15 million consumers
- Consumer monitoring: billing, consumption pattern, payments, disconnections
- Communication with employees – monthly news letters, SMSes, emails
- Incentive and Disincentive scheme for the employees for loss reduction
- Concept of profit centres – Loss reduction and collection of revenue as a pert of their annual performance review
- Strict disciplinary action against delinquent employees.
- Speedy disposal of vigilance cases and strict action against defaulters.

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Metering

- Meter is a Cash Box for any Distribution company
- Over 5 million old meters replaced in three years.
- Monitoring of reading 16 million consumers meters was a challenge
- Complaints of meters not being read, under or over reporting, manipulations
- Consumers complaints/ dissatisfaction

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Photo Metering

- **Photo Metering : To address Billing complaints : wrong meter reading / more consumption**
- **Digital Photograph of Energy Meters is taken & photo image is pasted on energy bill & Billing as per meter reading in photograph**
- **Meter tampering also photographed & proper action against theft is taken**
- **Consumer billing complaints have reduced**
- **9 million Consumers covered**

Bill Format

महाराष्ट्र स्टेट इलेक्ट्रिसिटी डिस्ट्रीब्यूशन कंपनी लि.
वीज आकार देयक
महावितरण

वीज आकार देयकाचा महिना Aug-2007 बिलींग युनिट क्र. 4609 देयक दिनांक 17/08/07 देयक क्रं. 1
देयक कालावधी 07/07/07पासून 08/08/07 पर्यंत
ग्राहक क्रमांक : 160250179747 जुना ग्राहक क्र. 30701 525322 2 पी. सी. : 3
नाव CHAREJA PRAKASH S FL-9
पत्ता 350/A SOMWAR PETH
SHREE APT
PUNE पिन.: 411011
बिलींग युनिट : KASBA PETH SUB-DN. टेलीफोन नं.: 26564211
पी.सी./चक्र + मार्ग-क्रम 06/5363/2880 डी. टी. सी. क्र. 4609035 पोल नं. 5R56
श्रेणी RESI 1-PHASE दर संकेत LT1/01 वीज शुल्क संकेत : 51
संलग्न भार 4.00 KW मंजुर भार 4.00 KW पुरवठा तारीख : 03/07/01

		रु. पैसे
अंतिम तारीख	04/09/07	610.00
या तारखेपूर्वी भरल्यास	24/08/07	600.00
या तारखेनंतर भरल्यास	04/09/07	620.00

मिटर क्रमांक	चालू रिडिंग	मागील रिडिंग	गुणक अवयव	युनिट	समा. युनिट	एकूण वीज वापर
9000048927	9232	9048	1	184	0	184

मागील वीज वापर

महिना	युनिट	रक्कम
SEP-06	151	525
OCT-06	164	527
NOV-06	136	460
DEC-06	181	648
JAN-07	142	482
FEB-07	107	435
MAR-07	96	528
APR-07	160	598
MAY-07	232	856
JUN-07	120	76
JUL-07	182	638

विवरण		रु. पैसे
स्थिर आकार		30.00
वीज आकार		498.90
वीज शुल्क		65.23
इंधन अधिभार		14.72
अतिरिक्त पुरवठा आकार		0.00
वीज विक्री कर		0.00
जवळ सरासरी देयकाची रक्कम		0.00
व्याज		0.00
कॅपॅसीटर दंड		0.00
इतर आकार		0.00
एकूण		608.85
निव्वळ थकबाकी / जमा		1.10
समायोजीत रक्कम		0.00
व्याजाची थकबाकी		0.00
एकूण थकबाकी / जमा		1.10
देयकाची निव्वळ रक्कम		609.95
पूर्णांक देयक		610.00
मागील पावतीचा दिनांक	09/08/07	650.00
सुरक्षा ठेव जमा		****800

ग्राहक तक्रार निवारण केंद्राचा पत्ता Kasba path office, Pune., Ph. 24570520

Call centre Toll free No. 18002333435

BILL FOR 1 MONTHS (FR .06)
विशेष संदेश

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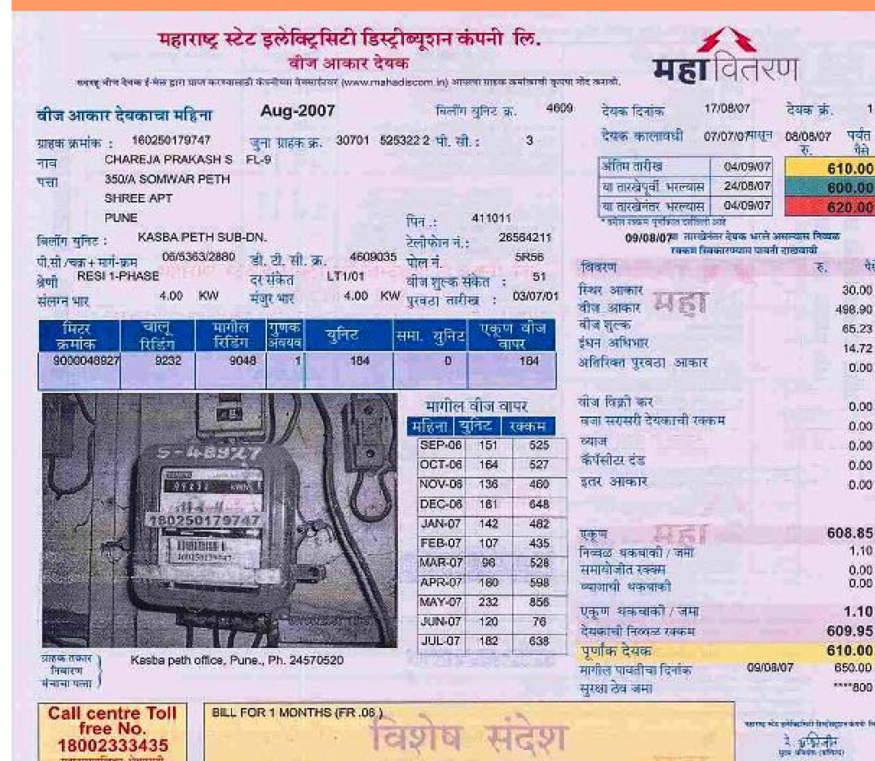
Old Vs New – Energy Bill Format

- **Accountability has increased.**
- **Errors in meter reading are avoided.**
- **Past consumption pattern can be checked in the new bills.**

Old Bill Format

New Bill Format



Massive Theft Control & New Connections Drive

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Yearly Energy Balance

In MUs

Particulars	FY: 2006-07	FY: 2007-08	Difference
Input to MSEDCL	69718	73400	3682 (5.7%)
Total Sales	49147	57206	8058 (16%)
Distribution loss	20569	16194	-4375.73
% Distribution loss	29.50 %	24.0 9%	-5.41 %

Distribution loss reduction achieved is 7.63 % in Last 2 Years

Present Energy Balance (April to October)

In MUs

Particulars	FY: 2007-08	FY: 2008-09	Difference
Input to MSEDCL	41395	42174	779 (2%)
Total Sales	31880	34112	2232 (7%)
Distribution loss	9515	8062	-1453
% Distribution loss	22.99%	19.12%	-3.87%

Distribution Loss Reduction

Year	2005-06	2006-07	2007-08
Distribution Loss Reduction	31.72%	29.50%	22.06%
Collection Efficiency	95.62%	94.07%	97.90%
AT&C Loss Reduction	34.72%	33.69%	23.85%

Revenue Enhancement - Average monthly revenue increased from US $ 220 Millions to US $ 320 Millions.

1% reduction in loss = Gain of US $ 30 millions per annum

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Meeting Power Gap: Demand Side Management

Peak shortfall of around 5000 MW

- Uninterrupted power supply to industries, essential services
- Separate agricultural feeders: Guaranteed 8 hours of electricity to Agricultural Water Pumps
- One Staggering holiday in a week for Non-continuous industries
- Shifting of load through TOD tariff
- 3 to 7 hours of pre-declared forced power cuts in areas based on distribution losses and collection efficiency

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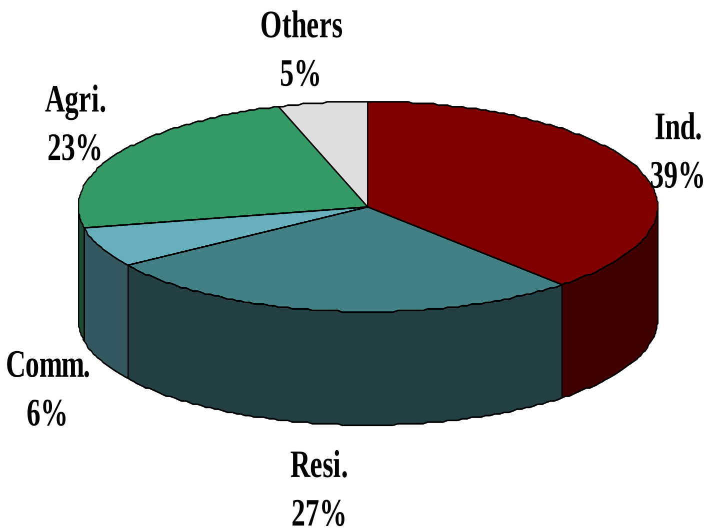
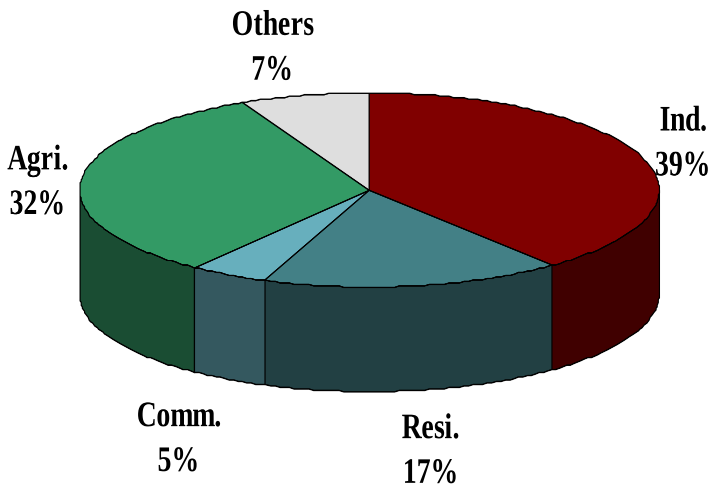
CL and MW load derived from MUS (sale)for the year 2007-08.



Connected Load MW



Mus

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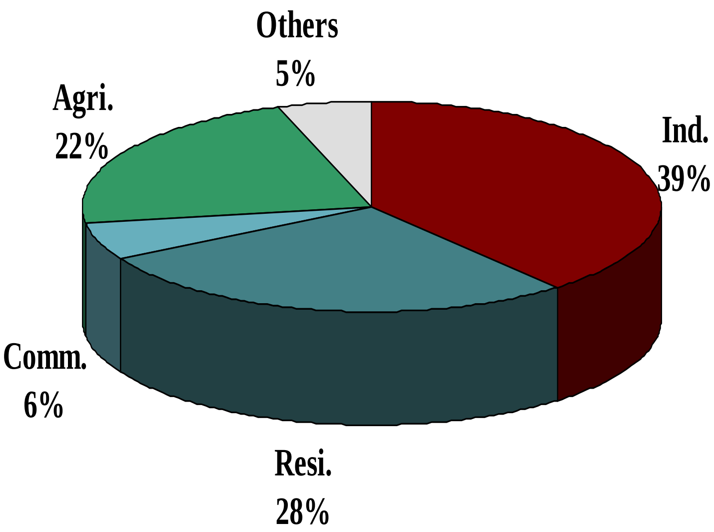
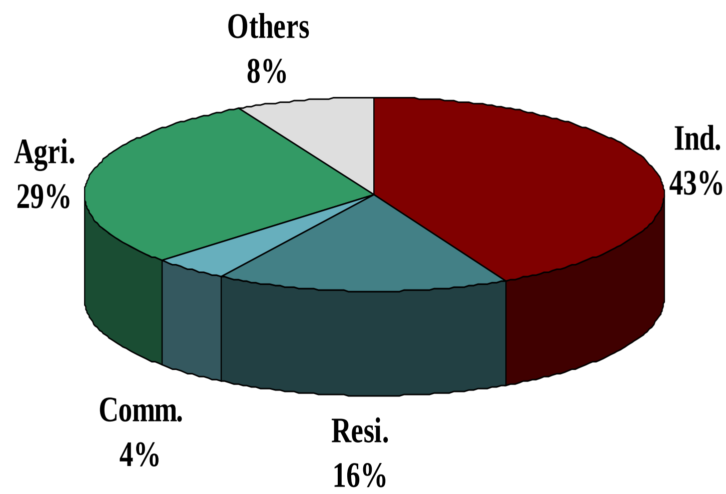
CL and MW load derived from MUS (sale)for the year 2006-07



Connected Load MW



Mus

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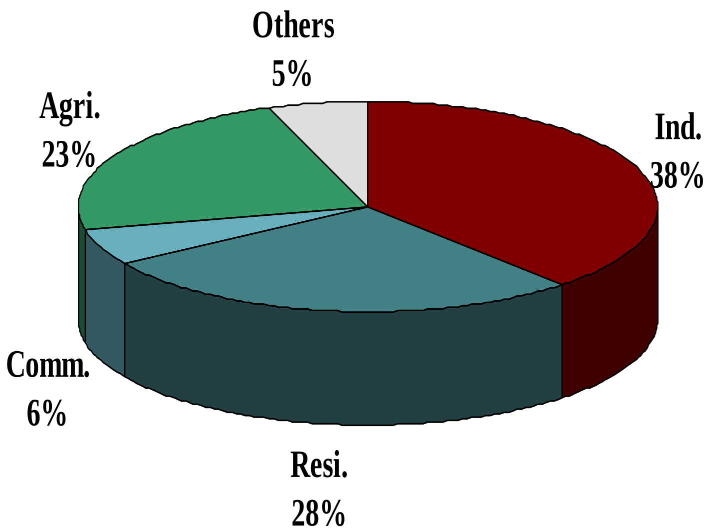
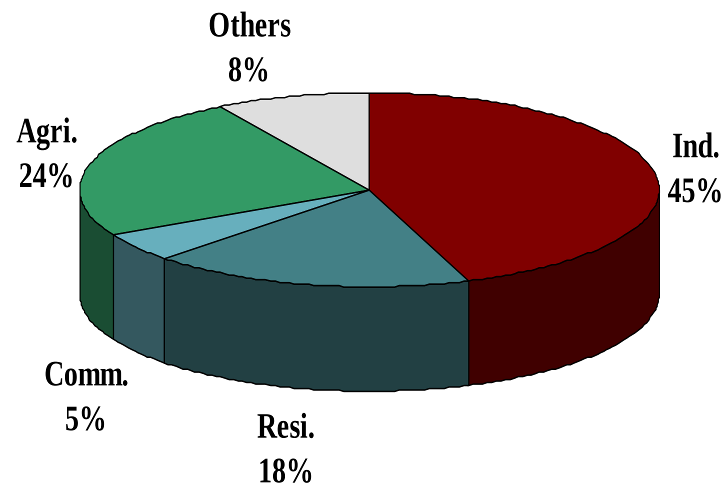


Connected Load MW



Mus

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Demand– Supply Scenario

DEMAND, AVAILABILITY AND SHORTFALL (Peak Demand)							
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
	MW	MW	MW	MW	MW	MW	MW
Peak Demand	11425	11357	12749	14061	14749	15689	15859
Availability	9004	9315	9704	9856	9700	10412	10987
Shortfall	2421	2042	3045	4205	5049	5277	4872

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Energy Conservation initiatives

- Awareness campaign
- Energy efficient pumps
- Promoting use of CFLs
- Power factor corrections : Installing capacitors in the network
- Association with Indian Bureau of Energy Efficiency, Lawrence Berkley National Lab

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Distribution Franchisee (DF)

Bhiwandi handed over to M/s. Torrent Power on 26th Jan 2007.

- Concept introduced first time in country by MSEDCL
- Promoting policy of Public Private Participation (PPP) through Franchisee model.
- Input based distribution franchise model.
- DF: Appointed by MSEDCL to purchase & distribute electricity in franchisee area.
- DF to charge tariff as per MERC's tariff order only.
- DF expected to reduce distribution losses & increase collection efficiency
- DF to carry out capital expenditure for the area.

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Capacity addition

- Long gestation period
- Fuel linkage
- Land
- Environment concerns
- Commercial Viability

Approximately 10,000 MW capacity addition tied up. Will get added in the next five years.

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Consumer Satisfaction

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Consumer satisfaction

- Infrastructure Upgradation plan costing US $ 3 Billion initiated. To be completed within three years.
- At 15 Municipal Corporation areas Call Centers established (Pune, Kalyan, Bhandup, Nagpur, Akola, Amaravati, Nashik, Dhule, Jalgaon, Ahmednagar, Kolhapur, Sangli, Solapur, Nanded, Aurangabad).
- To improve the supply related complaint handling process and enhance the customer servicing capabilities: – Toll Free No. 18002 333435.
- Single coordinating agency not only with customer but also to monitor the operational resolution of the complaint within MSEDCL.
- To ensure that escalations happen at the prescribed time to the right personnel.

Consumer services

- Data Centre is established at Head Quarter.
- LT Consumers Bills can be viewed on Website.
- On line payment facility
- Energy bills can be obtained through e – mail.

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Consumer Services

- Bill printing with digital photo image of meter - 90 lakh Consumers covered.
- At office level communication & decision support through E-mail.
- SMS – Bill information through SMS.
- Registered mobile holder consumers can get power failure/ interruptions information through SMS.

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Financial Accounts of MSEDCL

MAHARASHTRA STATE ELECTRICIY DISTRIBUTION COMPANY LIMITED

REVENUE ACCOUNT

SR.NO	PARTICULARS	2005-06 (10 Months) (Audited)	2006-07 (Audited)	2007-08 (Audited)	% Expenditure
	INCOME				
1	Revenue from Sale of Power	13628	18864	20158	
2	Other Income	623	887	840	
	TOTAL INCOME	14251	19751	20999	
	EXPENDITURE				
3	Purchase of Power	11950	16277	17006	81.4%
4	Repairs and Maintenance	215	416	526	2.5%
5	Employee Costs	1272	1922	1795	8.6%
6	Administration and General Expenses	94	148	273	1.3%
7	Depreciation	416	502	539	2.6%
8	Interest and Finance Charges	319	572	660	3.2%
	Sub Total A	14267	19837	20801	97.5%
9	Other Debits	83	237	519	2.5%
	Sub Total B	83	237	519	2.5%
	TOTAL (A+B)	14350	20075	21654	100%
10	Provision for Doubtful Debts etc.	204	283		
11	Prior Period Charges	0	-473	319	
	TOTAL EXPENDITURE	14555	19885	20904	
	SURPLUS/(DEFICIT)	-303	-134	117	

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Where are we ?

2005

- Peak Shortage 3709 MW. (23.1%)
- Energy Shortage: 18.1 %
- Distribution Loss : 34.72 %
- Loss – US $ 200 million.
- Inadequate Distribution Infrastructure.
- 7 to 14 hours of power cuts

2009

- Peak Shortage – 4700 MW. (25.1 %)
- Energy Shortage : 21.5 %
- Distribution Loss – 21.09 %
- Profit – US $25 million
-
- Infrastructure projects costing US 3 Billion underway.
- 3 to 7 hours of Power cuts

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Way Ahead – Distribution

- Distribution loss to be brought down to 15%.
- Collection efficiency to be improved to 100%.
- All old meters beyond 10 and more years of service to be replaced.
- Centralized MIS system to be in place for better information flow from sub-division to corporate office.
- Geographical information system to be commissioned for mapping distribution network in major cities.
- AMR (Automated Meter Reading) for 20,000 revenue intensive consumers to be introduced.
- AMR for over 9000 HV feeders to be introduced.
- Reliable and affordable power supply with up gradation and modernization of the existing infrastructure with investment US $ 3 Billion
- Power surplus by 2012-13.

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Way Ahead – Generation

- Hydro
- Green Energy
  - Wind
  - Biomass
- Nuclear energy
  - Presently constitutes only around 3% of total electricity.
  - Limited and depleting Coal reserves
  - Green House effect, High ash content in Indian coal and other environment concerns
  - Recent 123 agreement
  - Nuclear energy- only viable option for India's long term bulk energy needs

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Thank You