Presentation to MERC
on

Long Term Capacity Planning

by

MSEDCL

August 09, 2005

Objectives

- Bring to focus MSEDCL's demand-supply projections and MSEDCL's plans to bridge the future demand-supply gap.
- Highlight various measures undertaken by MSEDCL to bridge the demand-supply gap.
- To share demand projection methodology for long term power purchase.

Structure of Presentation

- Demand-Supply position
- Analysis of Demand-Supply position
- Demand-Deficit projections upto 2011-12, Without Capacity Addition
- Factors considered for preparing the Capacity Addition Options
- Projected Availability during 10th and 11th Plan Period
- Projected Shortfall
- MSEDCL's Demand Projection Methodology
- Options for MSEDCL for Bridging Future Demand-Supply Gap
- MSEDCL's Proposal for Purchase of Power on Long Term Basis
- Conclusion

Demand Supply Position

Overview of Demand-Supply position

Year	2000-01	2001-02	2002-03	2003-04	2004-05*
Peaking Requirement	10473	10119	11425	11357	12749
MSEB's total Generation	7097	7323	6431	6661	6899
Central Sectors, Purchase from Others Sources & Exch. With TPCL	1554	1780	2573	2654	2805
Peaking Availability	8651	9103	9004	9315	9704
Deficit	-1822	-1016	-2421	-2042	-3045

Total shortfall of around 3045 MW in the year 2004-05.

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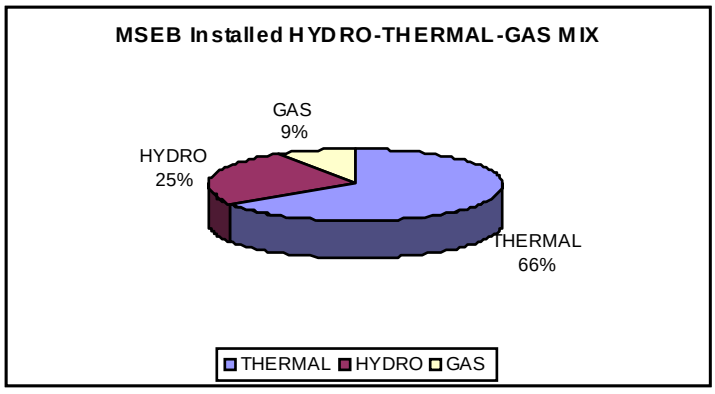
Overview of Demand-Supply position (contd)



Thermal-hydro-gas mix is in the ratio 66:25: 9.

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Overview of Demand-Supply position (contd)

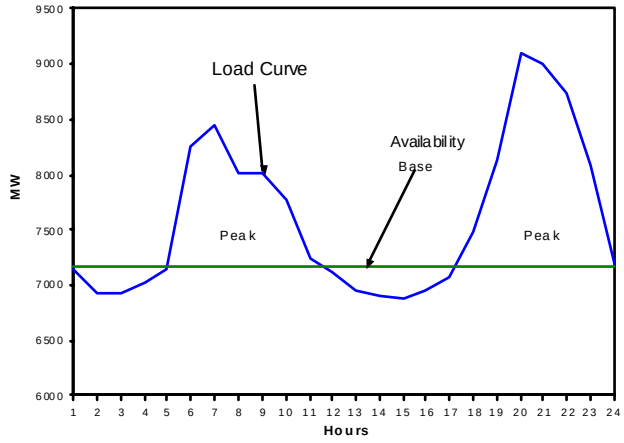
- CAGR of 5.04% for the peak demand,
- The reasons for shortages are:
  - Tremendous increase in demand
  - Zero availability from Dhabol power project and
  - MSEB did not make any capacity addition to its installed capacity in the last several years.

This widening gap between demand and supply gives the possibility of going for LTPP agreements with IPP's, Public sector units, traders etc.

Analysis of Demand-Supply position

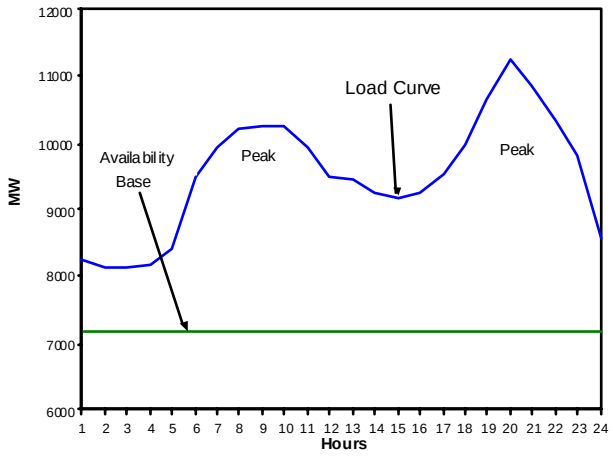
Analysis of Demand-Supply position

Demand in 2004-05 (Jun-Sep)



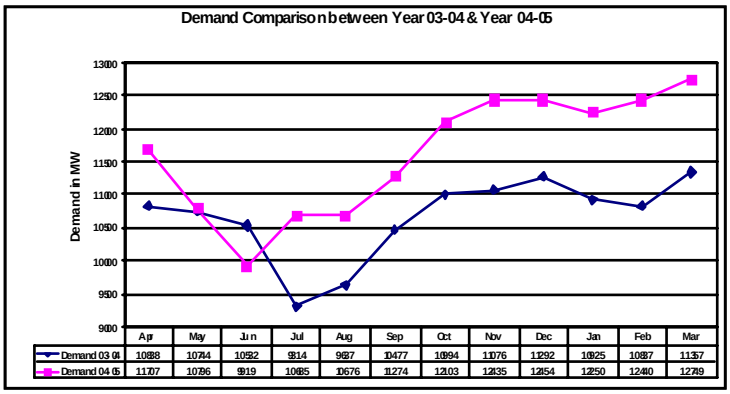
Analysis of Demand-Supply position

Demand in 2004-05 (Oct-May)



Analysis of Demand and Supply Position

Demand



Increase in demand attributable to new agricultural connections(≈579 MW) and increase in HT demand

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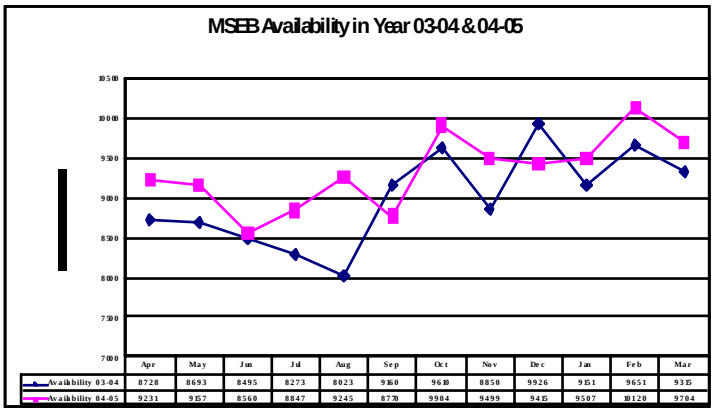
Analysis of Demand and Supply Position

Availability



Marginal increase in availability by 389 MW

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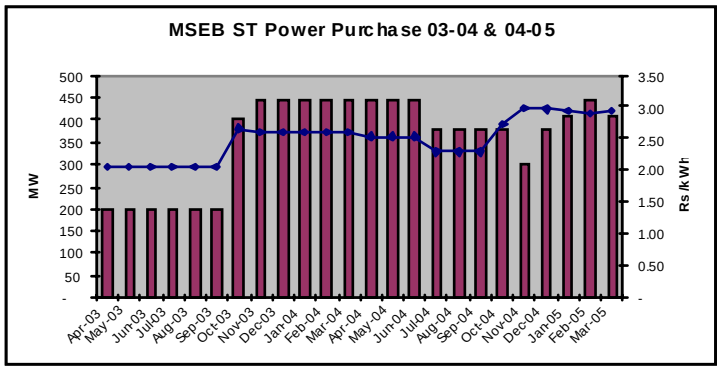
Analysis of Demand and Supply Position

Short Term Power Purchase



MSEDCL purchasing power on short term basis from power Trading corporation, Adani Energy ltd., NTPC Vidyut Vapar Nigam Ltd etc.

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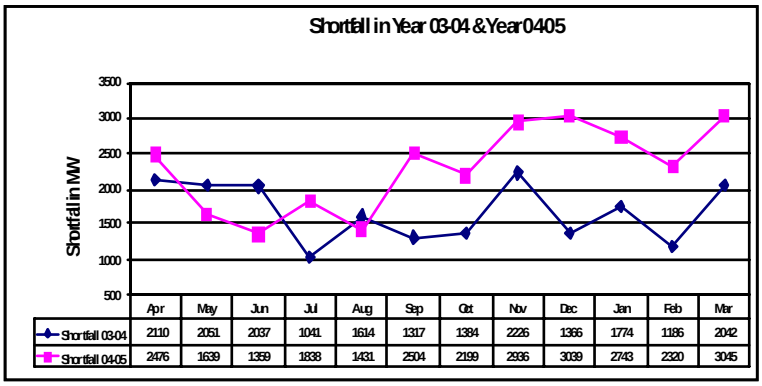
Analysis of Demand and Supply Position (Contd)

Short fall



The increase in demand does not commensurate with increase in availability

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Analysis of Demand and Supply Position (Contd)

MSEDCL'S load profile

Sr. No.	Area	Load (MW)	Percentage
1	Express Feeders for Industrial MIDC and waterworks	3108	27%
2	Urban	3311	28%
3	Rural	5329	49%

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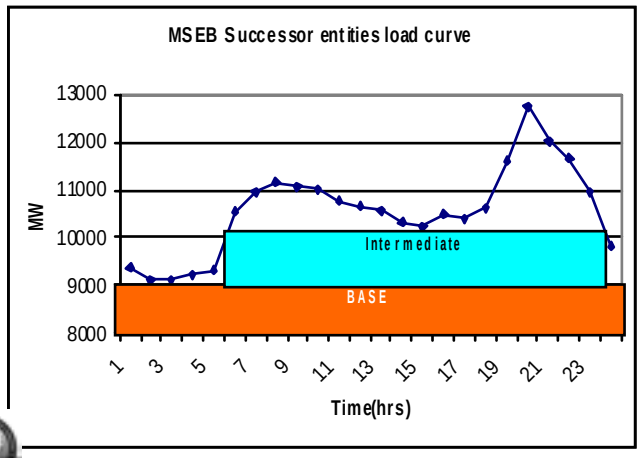
Analysis of Demand and Supply Position (Contd)

Load curve for MSEDCL



Observations:

- Morning peak during 7-11 hrs and evening peak during 18-22 hrs
- Peak Demand @ 20.00 hrs

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Demand-Deficit projections upto 2011-12, if no Capacity Addition is undertaken

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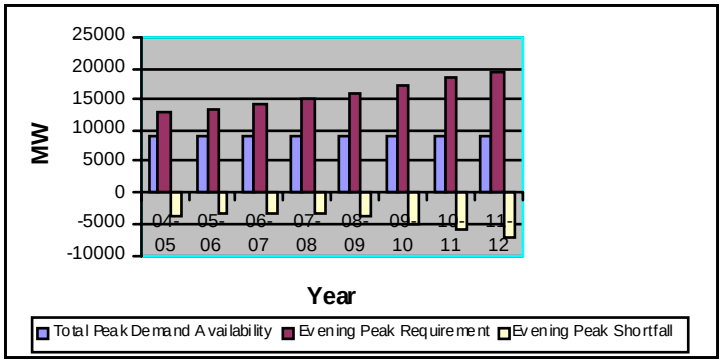
Demand & Deficit Projections if No Capacity Addition is undertaken



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Demand & Deficit Projections if No Capacity Addition is undertaken(contd)

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Total Peak Demand Availability	9704*	9158**	9158	9158	9158	9158	9158	9158
Evening Peak Requirement	12749	13274	14161	15105	16110	17179	18318	19530
Evening Peak Shortfall	-3045	-4116	-5003	-5947	-6952	-8021	-9160	-10372

*Incl ST power purchase

** Excl ST power purchase

- **Demand projections expected to increase at CAGR 6.53%**
- **Current peakdeficit to escalate to 7140 MW by 2011-12**
- **Ideally capacity addition plan of about 10890 MW to bridge demand supply gap and bring load shedding to NIL level by 2011-12.**
- **Huge capital investment, around Rs. 43562 crs.**
- **Capacity addition plan to cater to such demand deficit would require certain provisions on building up spinning reserves in the system of the order of 5%.**

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Factors considered by MSEDCL for preparing capacity addition options

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Factors considered by MSEDCL for preparing capacity addition options

- Availability of Fuel(Coal,gas, water etc)
- Economics of various Fuel options i.e. tariffs for various fuel options.
- Requirement of new projects to be taken up in areas which have higher concentration of load.
- CEA and MoP suggestions on prioritization of projects.
- Possible financing options for capacity addition projects

Factors considered by MSEDCL for preparing capacity addition options

Status of Gas Availability & Cost

Sources :-

- **Indigenous Gas :**
  - Reliance – Price & Qty. not confirmed
  - MOU with NTPC @ USD 2.97 per million BTU at burner tip
- **Regassified LNG :**
  - GAIL Pipeline shall be available by the end of 2006. Availability by 2008 & expected Price USD 4.3 to 4.5 per million BTU

Factors considered by MSEDCL for preparing capacity addition options (contd)

Status of Availability of Coal

- **Pit Head Projects in Maharashtra**
  - ➔ WCL indicated no further coal available for expansion.
  - ➔ Efforts are made with Ministry of Coal for reallocation of more coal to MSEDCL.

Factors considered by MSEDCL for preparing capacity addition options (contd)

- **Pit Head projects in JV with Chhattisgarh :**
  - ➔ CSEB has requested MoP for Coal linkage(most probably from nearby SECL Mines.)
- **Transportation based Coal Projects**
  - ➔ Applied for Captive mines in Mahanadi coal fields in Orissa
- **Imported Coal**
  - ➔ Economically unviable option

Factors considered by MSEDCL for preparing capacity addition options (contd)

Economics of coal based & gas based Projects

Sr.No.	Type of Project		Project Name	Project Cost in Rs. Crs./MW (Tentative)	Tariff Rate in Rs./Unit (Tentative)
1	Pithead coal based Projects	a	Vindhyachal Stage III	4.2	1.83
		b	Sipat-I(NTPC)	4.04	1.5
		c	Kahalgaon II(NTPC)	3.73	1.72
		d.	Kahalgaon (NTPC)	4	1.78
		e	Barh(NTPC)	3.93	1.89
2	Indigenous Coal based Projects (with transportation of Coal)	a	Parli-I(MSEB)	4.2	2.22
		b	Paras-I(MSEB)	4.48	2.13
3	Gas based Projects	a	Kawas(NTPC)	2.47	1.9
		b	Gandhar(NTPC)	3.85	1.9
		c	Hazira(ESSAR)	2.7	2.82
4	Imported Coal Based Project		TPC Project	3.89	2.2

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Factors considered by MSEDCL for preparing capacity addition options (contd))

Areawisegeneration-Load(MW) Scenario -Maharashtra System

	WESTERN AREA	CENTRAL AREA	EASTERN AREA
Generation with Central assistance	6100	1200	5800
Local Load	8500	2100	2500
Surplus(+)/shortfall (-)	(-)2400	(-)900	(+)3300

Load concentration in western region(shortfall of 2400 MW)

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Factors considered by MSEDCL for preparing capacity addition options (contd)

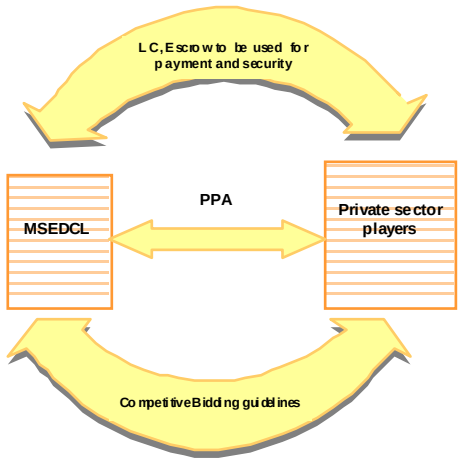
CEA and MoP's suggestions on prioritization of projects

- **Pit head power plants**
  - Min size: 800 MW or multiple
  - Cost to be Rs.3 Cr. To 4 Cr. Per MW
  - Tariff: In the range of Rs. 1.50-Rs. 1.90/unit
  - Projects of 3200 MW or above should be taken up
- **Imported Coal power plants**
  - Projects to be preferably located in the coastal areas near load centers
- **Gas based power plants**
  - Lowest capital cost and to be located near load centers

Factors considered by MSEDCL for preparing capacity addition options (contd)

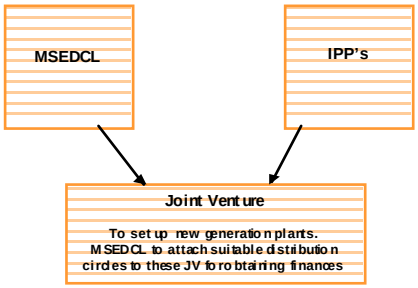
Possible financing

- **Purchase of power from private IPPs:**



Factors considered by MSEDCL for preparing capacity addition options (contd)

- **Purchase of power from NTPC**
  - ➔ NTPC has inherent advantage of being able to set up large scale pit head based thermal projects
- **Joint ventures**



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Factors considered by MSEDCL for preparing capacity addition options (contd)

- **Subsidiary Plants**
  - ➔ MSEDCL to separate some existing plants under its new subsidiary. The new company on strength of its equity to set up new plants with lending from PFC/REC

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MSEDCL'S Projected Availability during 10th Plan and 11th plan period

MSEDCL'S Projected Availability during 10th Plan and 11th plan period

Firmed Up Projects

APPROVED PROJECTS	YEAR OF AVAILB.	CAP. IN MW	AX.C. IN %	P. LF. IN %	04 - 05	05 - 06	06 - 07	07 - 08	08 - 09	09 - 10	20 10- 11	20 11- 12
Existing Capacity					915 8	915 8	915 8	915 8	915 8	915 8	915 8	915 8
a) MSEB Projects												
i) Utilisation of existing Cap. Of GTPS	20 06 - 07	79 2	3	27			20 8	20 8	20 8	20 8	20 8	20 8
ii) Parli TPS Extn. St-I	20 06 - 07	25 0	9	80			182	182	182	182	182	182
iii) Paras TPS Expn. Stage - I	20 06 - 07	25 0	9	80			182	182	182	182	182	182
b) Central Sector Projects												
I) Tarapur Unit - 4	20 05 - 06	196		80		157	157	157	157	157	157	157
ii) Tarapur Unit - 3	20 05 - 06	197		80		158	158	158	158	158	158	158
iii) Vindhyachal Stage - 3	20 06 - 07	32 6		80			26 1	26 1	26 1	26 1	26 1	26 1
iv) Kahalgaon	20 07 - 08	100		80				80	80	80	80	80
v) Sipat Stage - II	20 07 - 08	319		80				25 5	25 5	25 5	25 5	25 5
vi) Sipat Stage-I Unit-1	20 08 - 09	1 5		80					92	92	92	92
vi) Sipat Stage-I Unit-2	20 09 - 10	1 5		80						92	92	92
vii) Sipat Stage-I Unit-3	20 09 - 10	1 5		80						92	92	92
viii) Kawas Expansion Project	20 07 - 08	50 0		80				40 0	40 0	40 0	40 0	40 0
ix) Gandhar Expansion Project	20 07 - 08	50 0		80				40 0	40 0	40 0	40 0	40 0
x) Bath	20 08 - 09	100		80					80	80	80	80
xi) North Karanpura	20 09 - 10	100		80						80	80	80
c) Inter State Projects												
I) Sardar Sarovar Project	20 04 - 05	39 1.5		80		313	313	313	313	313	313	313
Irrigation project Ghatghar PSS	20 06 - 07	25 0		80			20 0	20 0	20 0	20 0	20 0	20 0
Peak Demand Availability with firmed projects					915 8	97 86	108 18	119 54	12126	123 90	123 90	123 90

MSEDCL'S Projected Availability during 10th Plan and 11th plan period(Contd)

Proposed Projects

PROJECTS	YEAR OF AVAILB.	CAP. IN MW	AX.CS. IN %	PLF IN %	`04-05	`05-06	`06-07	`07-08	`08-09	`09-10	10-11
Peak demand availability withfirmed projects					9158	9786	10818	11954	12126	12390	12390
Proposed Projects											
1) Dabhol Power Company	`06-07	2210		80			1768	1768	1768	1768	1768
2)Uran Expan.Project Additional	`07-08	1040	3	80				807	807	807	807
3)Talegaon Gas Project	`09-10	1400	3	80						1086	1086
6)Khaperkheda TPS (1x500 MW)	`09-10	500	9	80						364	364
Addition to Peak Load Availability with proposed projects							1768	2575	2575	4025	4025
Total Peak Demand Availability					9158	9786	12586	14529	14701	16415	16415

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MSEDCL's Projected Shortfall

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MSEDCL's Projected Shortfall

MSEDCL's projected shortfall with all firmed up and proposed projects

Year	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12
Total Peak Demand Availibilty with firmed up and proposed projects	9158	9786	12586	14529	14701	16415	16415	16415
Peak Requirement	12441	13274	14161	15105	16110	17179	18318	19530
Peak Shortfall	-3283	-3488	-1575	-576	-1409	-764	-1903	-3115

MSEDCL's Demand Projection Methodology

Methodology

- Base data for 2004-05: Kalwa LDC
- Aggregation of Typical monthly load Curves (2004-05)
  - Monsoon period (Jun-Sep)
  - Non Monsoon period (Oct-May)
- Projections for non-monsoon period
  - Hourly Ratio (for 2004-05) = Demand during any hrs / Peak demand at 20.00 hrs
  - Peak load projection till 2011-12 (I.e. @ 20.00 hrs): Based on 16th EPS peak load projections
  - Projected hourly demand=Hourly Ratio (for 2004-05) * Projected monsoon peak load

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Methodology(Contd)

- Projections during Monsoon Period
  - Monsoon to non-monsoon peak load data from 04-05 data.
  - 16th EPS projections- for non-monsoon period
  - Projected monsoon peak load=monsoon/non-monsoon peak load*16 EPS projections
  - Hourly ratio for monsoon projections from 04-05 data
  - Projected hourly demand=Hourly ratio* Projected monsoon peak load

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Methodology(Contd)

- Projected Availability till 2011-12: Provided by MSEDCL (excluding Hydro, which is proposed to be utilized for unmet peak load demand)
- Accordingly, hourly shortfalls have been worked out for 2011-12

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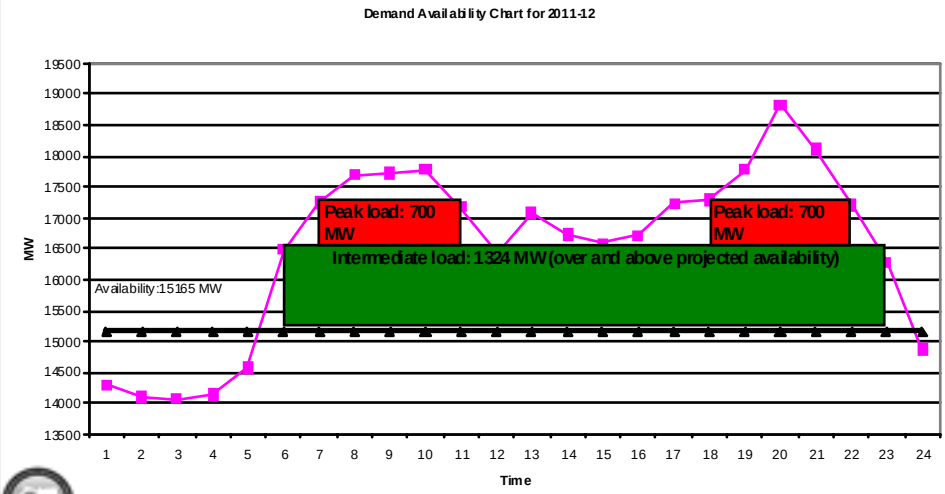
Projections for 2011-12 (Oct-May)



Balance demand to be met through hydro resources

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Results

Hourly Shortfall projections for 2011-12

Hour	1	2	3	4	5	6
Total Demand	14302	14090	14068	14141	14581	16489
Availability	15165	15165	15165	15165	15165	15165
Shortfall	0	0	0	0	0	1324
Hour	**7**	**8**	**9**	**10**	**11**	**12**
Total Demand	17243	17701	17731	17789	17185	16449
Availability	15165	15165	15165	15165	15165	15165
Shortfall	2078	2536	2566	2624	2020	1284
Hour	**13**	**14**	**15**	**16**	**17**	**18**
Total Demand	17073	16736	16592	16717	17239	17291
Availability	15165	15165	15165	15165	15165	15165
Shortfall	1908	1571	1427	1552	2074	2126
Hour	**19**	**20**	**21**	**22**	**23**	**24**
Total Demand	17788	18830	18106	17201	16289	14877
Availability	15165	15165	15165	15165	15165	15165
Shortfall	2623	3665	2941	2036	1124	0

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Options for MSEDCL for Bridging Future Demand-Supply Gap

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Options for MSEDCL for Bridging Future Demand-Supply Gap

Various options other than capacity addition considered by MSEDCL to bridge demand supply gap:

- **Loss reduction**
- **Single phasing scheme**
- **Demand side management (incl Ag feeder separation, HVDS,installation of capacitors, Akshay Prakash Yojana)**
  - **Above measures are expected to give some load relief, but not sufficient to meet the entire demand-supply gap**
- **Hence, power purchase on long tem basis through competitive bidding**

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MSEDCL's Proposal for Purchase of Power on Long Term Basis

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MSEDCL's Proposal for Purchase of Power on Long Term Basis

Year	Time	Non-monsoon
2011-12	0 to 6 Hrs	Nil
	6 to 23 Hrs	1324 MW
	7 to 11 & 18 to 22 Hrs	700 MW

Conclusion

Conclusion

- Year 2004-05 witnessed evening peak shortfall of around 3045 MW.
- Load pattern vary across Monsoon/Non Monsoon period,High surplus during Monsoon period
- Demand CAGR is 5.045% as compared to MSEDCL's generation CAGR of 2.7% showing wide gap between demand and supply
- If no capacity addition and no additional purchase of power, current peak deficit of 3591 MW to escalate to 7140 MW by 2011-12
- Peak demand availability with firmed up and proposed project in the 10th and 11th plan is 16415 MW
- Peak requirement is around 19530(2011-12), showing shortfall of 3115 MW
- Even after adopting various methodologies like loss reduction, DSM, MSEDCL's not able to bridge entire demand supply gap.
- Long term power purchase serves as the only viable option left for MSEDCL

Thank You