



**IN THE NAME OF ALLAH THE  
MOST GRACIOUS AND MOST  
MERCIFUL**

# SAARC Training Workshop On Energy Audit And Efficiency In Power Sector

## *The Pakistan Perspective*



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# POWER SECTOR - BACKGROUND

Water and Power Development Authority (WAPDA) was formed in 1958. The major responsibilities of WAPDA were;

- Meet electricity demand of the country (except area of Karachi) by installing new power plants, transmission lines and distribution system.
- Develop hydro storage projects (dams) for meeting irrigation and demand of the country and install hydro plants at dams locations.

# POWER SECTOR- BACKGROUND

WAPDA had:

- Power wing –responsible for generation, transmission and distribution of power
- Water wing – responsible for development of water resources for irrigation and power sector

# POWER WING WAPDA

- 1. Hydro Generation**
- 2. Thermal Generation**
- 3. Transmission of power**
- 4. Distribution of power**

# PAKISTAN POWER SECTOR: BACKGROUND

1. In 1992, **GOP** approved Pakistan Power Sector Strategic Plan for restructuring WAPDA.
2. **Pakistan Electric Power Company (PEPCO)** was established in 1998 with mandate to restructure Pakistan Power Sector, corporatize & commercialize the restructured entities.
3. **PEPCO** initiated the restructuring and reform process in 1998.
4. In **October 2007**, **GOP** gave new mandate to PEPCO to reduce the load shedding in the country

# PEPCO SYSTEM

1. Hydro Generation

2. Thermal Generation

3. Transmission

4. Distribution

(Remains with WAPDA)

4 GENCOs

1 NTDC

10 DISCOs

# GENERATING CAPACITY (June 2012)

Type of Generation	Nameplate/ Installed Capacity (MW)	Dependable Capacity (MW)	Availability (MW)	
			Summer	Winter
Hydro	6627	6627	6500	2300*
GENCOs	4829	3580	2780	3222**
IPPs (incl Nuclear)	8959	8342	6950	7578**
Rental				
<b>Total</b>	<b>20415</b>	<b>18450</b>	<b>16320</b>	<b>13100</b>

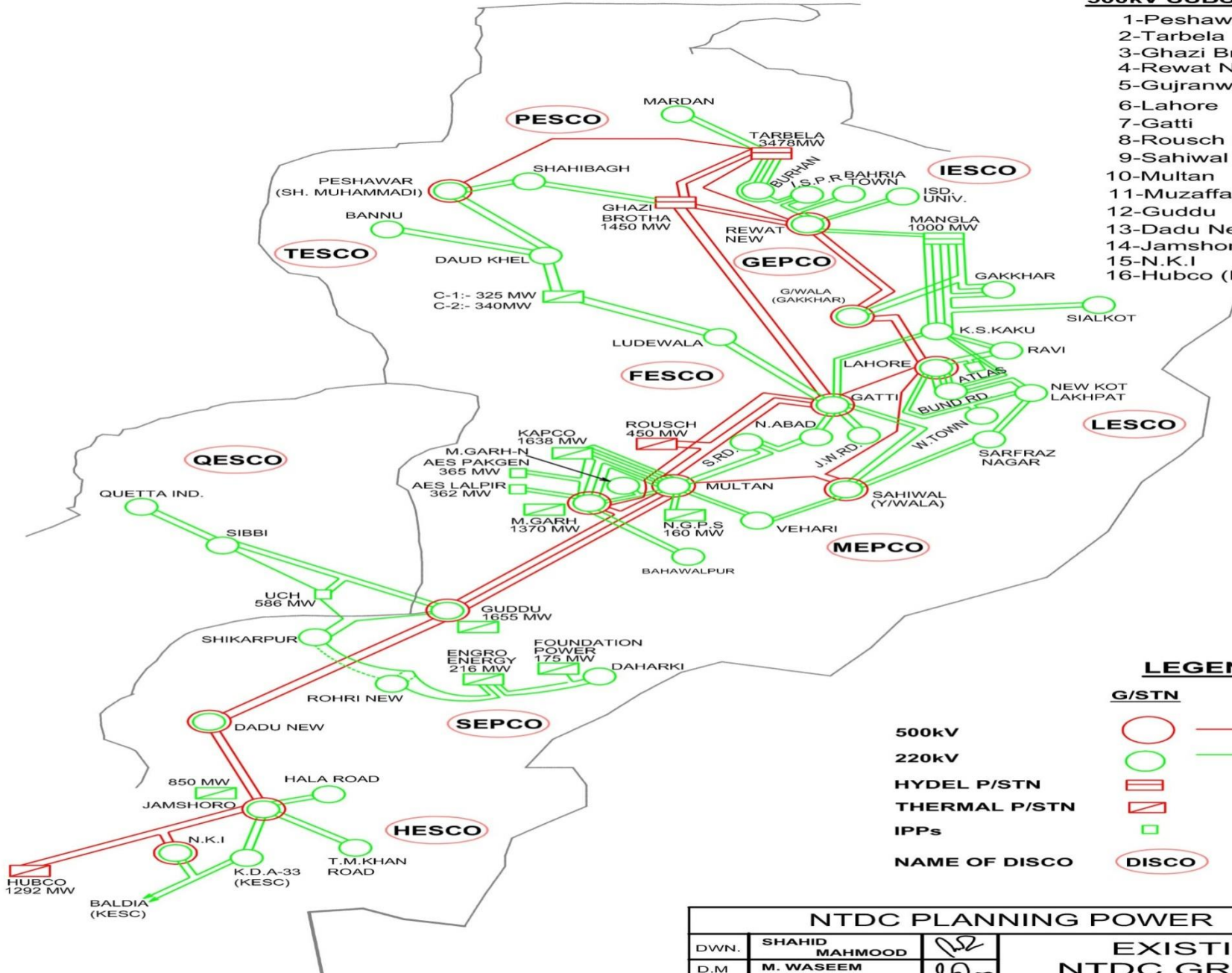
\* Hydro availability based on last 5 years average

\*\* Excludes 10% Forced Outages for GENCOs & 6.0% for IPPs



### 500kV SUBSTATIONS

- 1-Peshawar
- 2-Tarbela
- 3-Ghazi Brotha
- 4-Rewat New
- 5-Gujranwala (Gakkhar)
- 6-Lahore
- 7-Gatti
- 8-Rousch (IPP)
- 9-Sahiwal (Y/Wala)
- 10-Multan
- 11-Muzaffar Garh
- 12-Guddu
- 13-Dadu New
- 14-Jamshoro
- 15-N.K.I
- 16-Hubco (IPP)



### LEGEND

- |              |            |
|--------------|------------|
| <b>G/STN</b> | <b>T/L</b> |
|              |            |
|              |            |
|              |            |
|              |            |
|              |            |
|              |            |

- 500kV
- 220kV
- HYDEL P/STN
- THERMAL P/STN
- IPPs
- NAME OF DISCO

NTDC PLANNING POWER			
DWN.	SHAHID MAHMOOD		<b>EXISTING NTDC GRID SYSTEM</b> <b>500 &amp; 220kV SYSTEM</b> DRG NO. GM(PP)014-1
D.M	M. WASEEM YOUNAS		
C.E			
G.M	NISAR AHMAD BAZMI		
			DATE 13-11-12

# NTDC Transmission System Data

## NTDC 500 kV SYSTEM

1.	Grid Stations	14 Nos., Total Capacity = 14,850 MVA
2.	Transmission Lines	Total Lengths = 5078 km

## NTDC 220 kV SYSTEM

1.	Grid Stations	29 Nos., Total Capacity =16,494 MVA
2.	Transmission Lines	Total Lengths = 7427 km

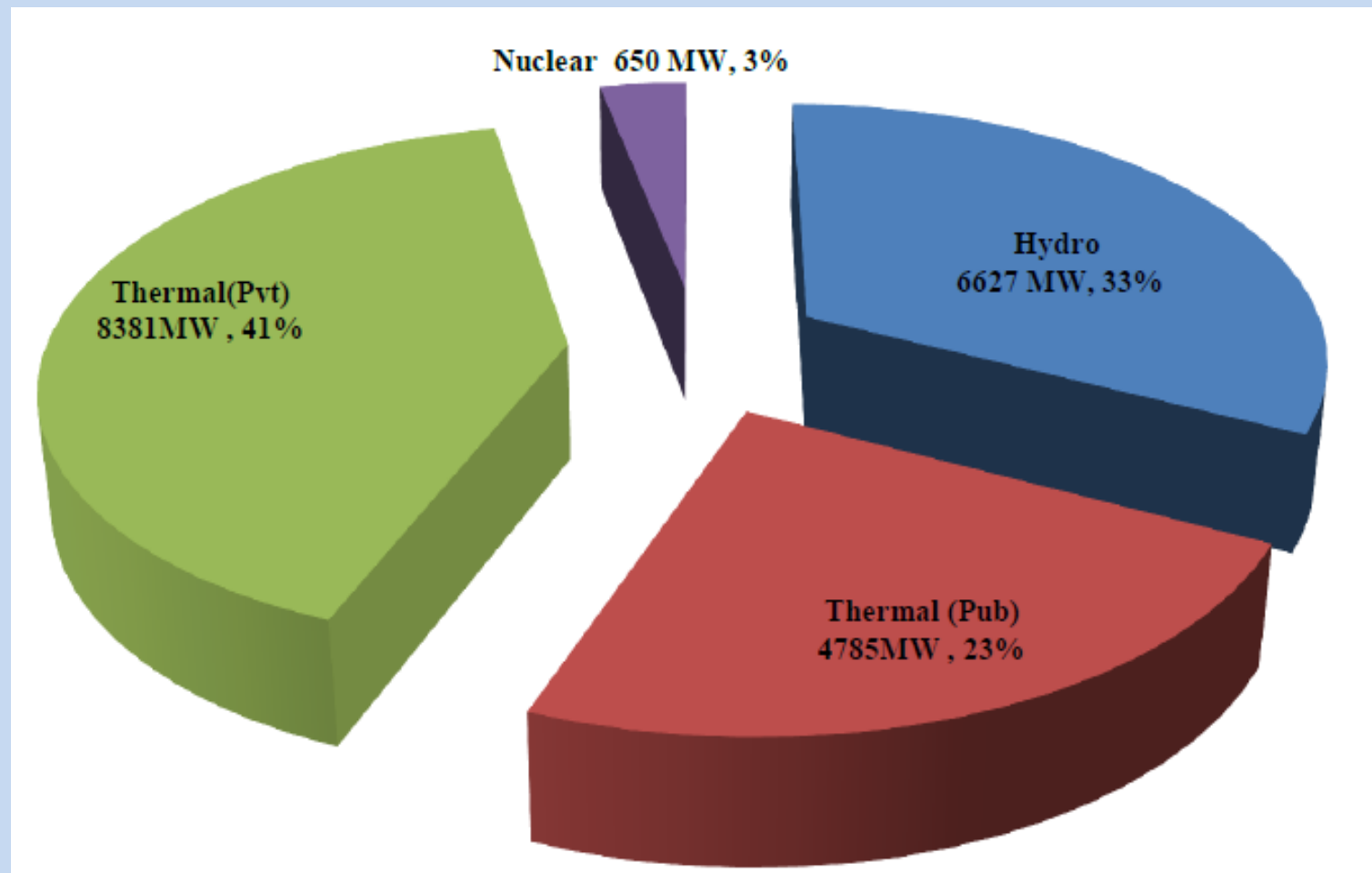
\* All the above data has been taken from Electricity Marketing Data (36<sup>th</sup> Issue)

# Generation Mix %age

Year	Hydel	Thermal
1995	50%	50%
2000	34%	66%
2005	35%	65%
2010	32%	68%
2012	32%	68%

# GENERATION Mix for June 2012

## Installed Generation Capacity (MW in Pakistan) in June 2012



# PEPCO SYSTEM HISTORICAL SURPLUS / DEFICIT

Years	Available Capability	Computed Peak Demand	Surplus/ Shortfall
2001-02	10894	10459	435
2002-03	10958	11044	-86
2003-04	11834	11598	236
2004-05	12792	12595	197
2005-06	12600	13847	-1247
2006-07	13292	15838	-2546
2007-08	12442	17398	-4956
2008-09	13637	17852	-4215
2009-10	13445	18467	-5022
2010-11	13193	18521	-5328
2011-12	13733	20058	-6325

# Load Forecast NTDC, KESC and Country (MW)

<b>Year</b>	<b>NTDC</b>	<b>KESC</b>	<b>Country</b>
2011-12	19400	3021	22199
2012-13	20401	3240	23407
2013-14	21556	3484	24792
2014-15	22761	3762	26261
2015-16	24018	4157	27896
2016-17	25352	4592	29647
2017-18	26810	5067	31562
2018-19	28353	5587	33604
2019-20	30036	6144	35822
2020-21	31757	6752	38127

Note

*Diversity Factor 1.01 is applied to get country demand*

*NTDC demand is PMS based prepared in March 2012*

*KESC demand is Regression Based prepared in January 2011*

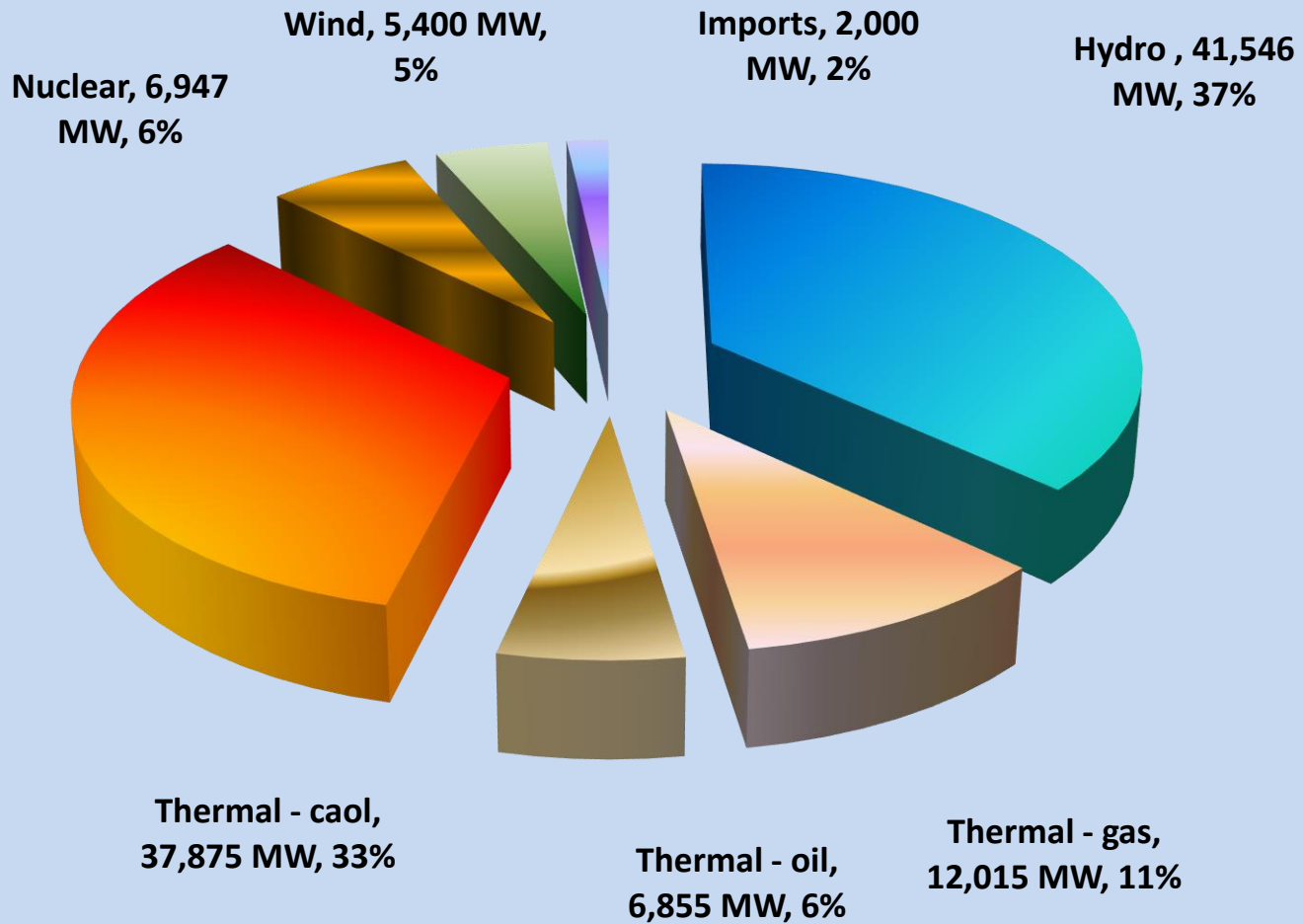
# NATIONAL POWER SYSTEM EXPANSION PLAN (NPSEP) 2030 INSTALLED GENERATION CAPACITY

	2010-11		2020-21		2029-30	
	(MW)	(%)	(MW)	(%)	(MW)	(%)
Hydro	6,555	28%	17,590	30%	41,546	37%
Thermal – gas	7,200	31%	11,242	19%	12,015	11%
Thermal – oil	8,471	37%	7,056	12%	6,855	6%
Thermal – coal	150	1%	15,691	27%	37,774	34%
Bagass and Bio Waste Plants	0	0%	100	0.20%	100	0.10%
Nuclear	803	3%	3,187	5%	6,947	6%
Wind	0	0%	1,800	3%	5,400	5%
Imports	0	0%	2,000	3%	2,000	2%
<b>Total</b>	<b>23,179</b>	<b>100%</b>	<b>58,866</b>	<b>100%</b>	<b>112,639</b>	<b>100%</b>
<b>PEPCO SYSTEM</b>	<b>21,021</b>		<b>58,281</b>		<b>112,639</b>	
<b>*KESC SYSTEM</b>	<b>2,158</b>		<b>585</b>		<b>0</b>	

\*KESC has following committed generation projects:

1. Bin Qasim CC, 560MW
2. Bin Qasim Retrofit Project, 420MW
3. KESC Bio Waste to Energy Project 25MW

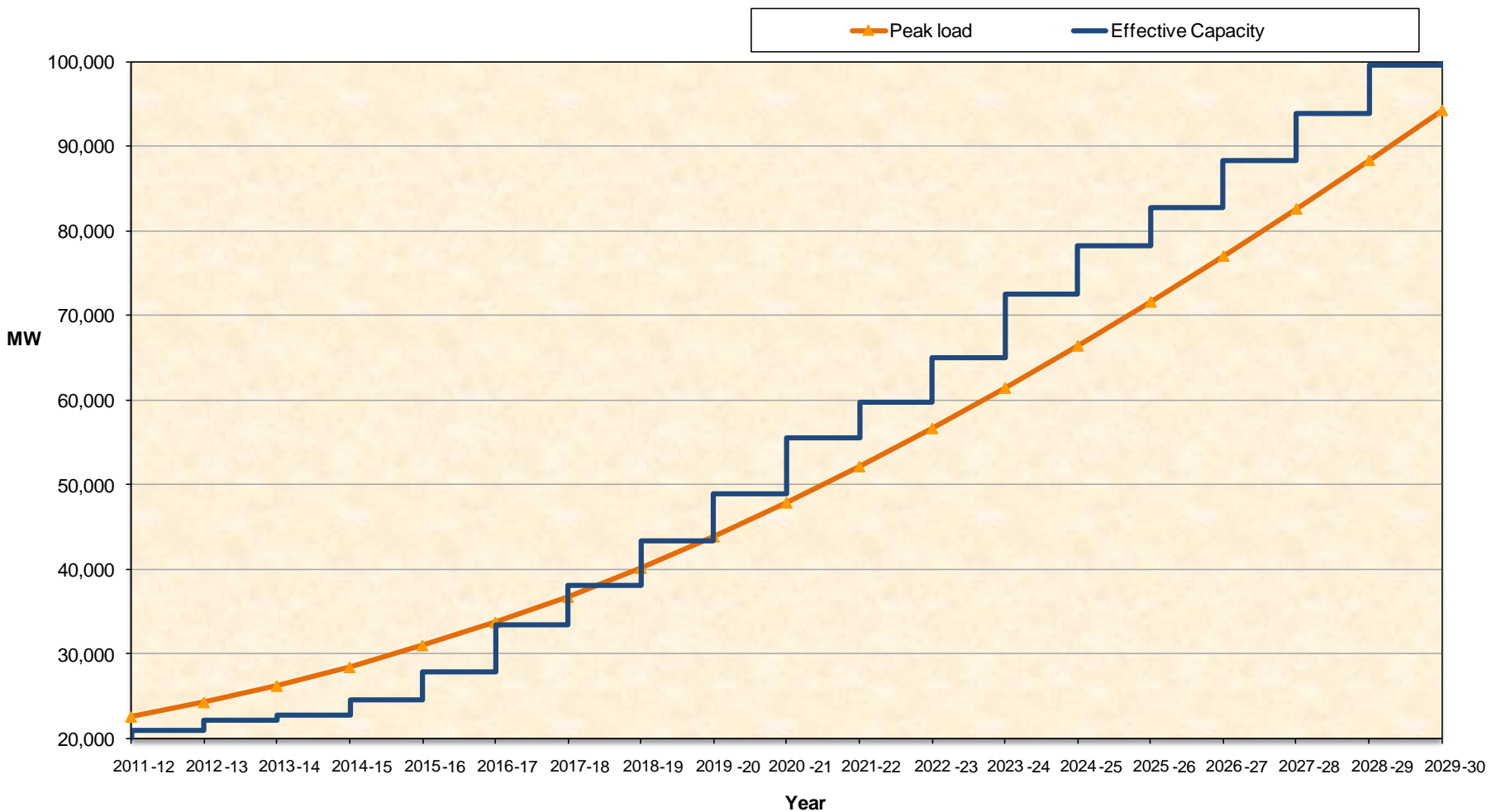
# NPSEP 2030-GENERATION Mix by the Year of 2029 - 2030





# NPSEP 2030-GENERATION EXPANSION PLAN

## DEMAND-SUPPLY POSITION (COUNTRY)



# DISTRIBUTION COMPANY LOSSES (132KV & Below System) 2011-12

DISCOs	2010-11			%age Losses		Inc/ dec (%)
	UNITS (MkWh)			2011-12	2010-11	
	Recvd	Billed	Lost			
LESCO	16727	14467	2260	13.51	13.3	0.2
GEPCO	6960	6178	782	11.24	12.0	-0.76
FESCO	9631	8580	1051	10.91	11.2	-1.3
IESCO	8330	7537	793	9.52	9.8	- 0.3
MEPCO	12453	10218	2235	17.94	18.3	- 0.4
PESCO+ TESCO	13137	8528	4609	30.27	35.2	-5
HESCO	4679	3381	1298	27.73	27.2	0.5
SEPCO	4408	2666	1742	39.51	41.0	- 1.5
QESCO	5164	4086	1078	20.87	20.8	0.1
<b>DISCOS Total</b>	<b>81489</b>	<b>65641</b>	<b>15848</b>	<b>19.5</b>	<b>19.6</b>	<b>- 0.1</b>

# SERIOUS CONCERNS

- The generation of additional 25000 MW in next 10 years requires about 50 billion US\$.
- Generation through fossil fuels is very expensive as compared to indigenous hydro generation
- Domestic gas reserves are sharply depleting. The present shortfall of gas is of 25% and by year 2019-20 the gas shortfall will increase to 66 % if more gas reserves are not explored.

# CONCLUSION

- The restructuring of Generation, Transmission and Distribution companies be completed on war footing basis to eliminate uncertainty amongst stakeholders
- Generation mix should be shifted towards less expensive hydro units to reduce subsidies and provide relief to consumer and government
- New generation should be planned near load centers to avoid Transmission & Distribution losses

# CONCLUSION

- Distribution losses should be reduced to permissible level by up-gradation of power system and elimination of power theft
- Demand side management program be introduced by educating the utility employees and consumers through awareness program to adopt and use energy efficient devices



*THANKS*