



**USAID** | **JORDAN**  
FROM THE AMERICAN PEOPLE

# **Integrated Resource Planning (IRP)**

Sasan Salem

[12/18/2013]



**USAID** | **JORDAN**  
FROM THE AMERICAN PEOPLE

## **Integrated Resource Planning (IRP)**

- Load Forecast

# Load Forecast

## Summary

- NEPCO updated its load forecast in 2011. the long term elec. demand forecast is calculated for 3 scenarios. the medium scenario represents the continuation of the modest development of the economy an achievements of the country. And low and high scenarios are pessimistic and optimistic variations to the medium scenario.
- The most current load forecast also incorporates projections of increased industrial self-generation driven largely by lower wholesale

# Load Forecast

## Methodology

- Market Survey Approach
  - Based on marketing strategy of the bulk supply consumers on market demand for their products locally and abroad.
  - In addition, it gives indications of the demand management and energy efficiency activities that is considered in the forecasting process.
- Econometric model
- This is the most commonly used model, The econometric approach combines economic theory and statistical techniques for forecasting electricity demand. The approach estimates the relationships between energy consumption (dependent variables) and factors influencing consumption.

# Load Forecast

## Methodology

- End-use models
  - The end-use approach directly estimates energy consumption by using extensive information on end use and end users, such as appliances, the customer use, their age, sizes of houses, and so on. Statistical information about customers along with dynamics of change is the basis for the forecast.
- Statistical model-based learning (medium-term)
  - The end-use and econometric methods require a large amount of information relevant to appliances, customers, economics, etc.
  - learns the load model parameters from the historical data.

# Load Forecast

## Data & Assumptions

- Internal Data
  - obtained from NEPCO and other elec. Power companies
  - Include energy consumption, max demand, load coinciding with system peak load, no. of consumers,...
- External Data
  - Include Economic and demographic data such as GDP, population growth,...
  - Obtained from department of statistic, central bank, large industries,...

# Load Forecast

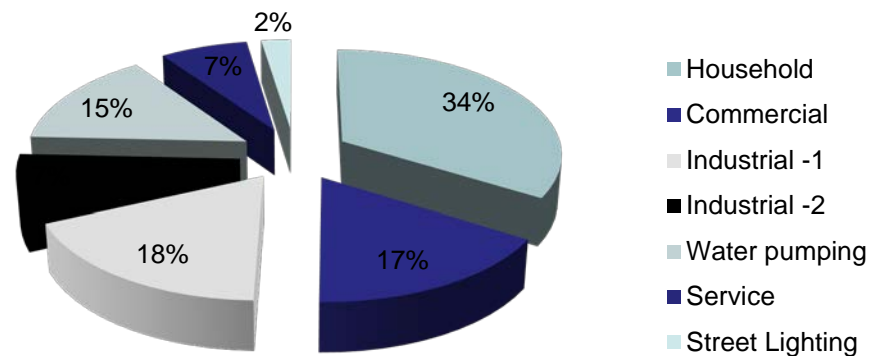
## Sector Classification

- Domestic
- Commercial
- Services
- Industrial
  - Small and medium scale
  - Large scale
- Water pumping
- Public lighting

# Load Forecast

## Demand Forecast 2010

Sector	Percent of Total Demand	GWh	Ave Growth rate
	2010	2010	1995-2010
Household	34%	4347	8%
Commercial	17%	2121	10%
Industrial -1	18%	2301	9.00%
Industrial -2	7%	958	1.00%
Water pumping	15%	1867	5.00%
Service	7%	935	5.00%
Street Lighting	2%	315	7.00%
Total	100.00%	12844.00	

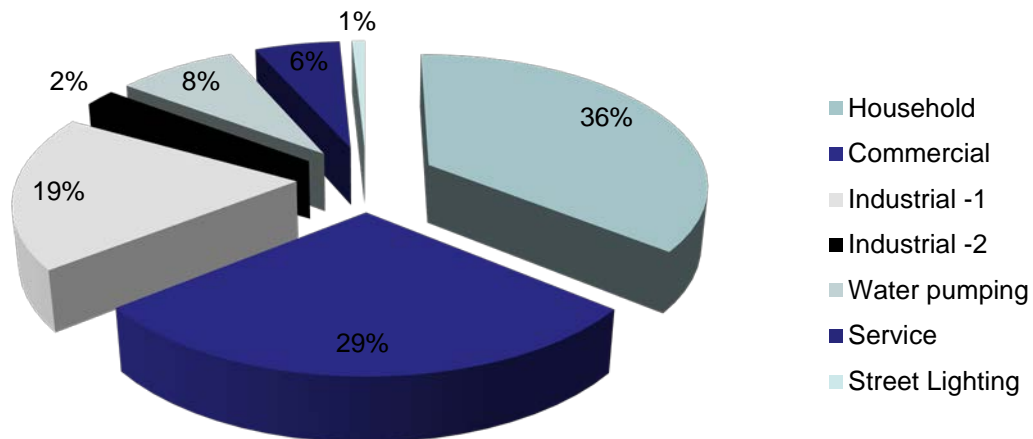




# Load Forecast

## Demand Forecast 2040

Sector	Percent of Total Demand	GWh	Ave Growth rate
	2040	2040	2010-2040
Household	36%	27616	6.50%
Commercial	29%	21972	8.40%
Industrial -1	19%	14463	6.30%
Industrial -2	2%	1637	1.80%
Water pumping	8%	6262	4.10%
Service	6%	4442	5.30%
Street Lighting	1%	670	2.60%
Total	100.00%	77062.00	



# Load Forecast

## Load Forecast Comparison

Sector	Percent of Total Demand	GWh	Ave Growth rate	Percent of Total Demand	GWh	Ave Growth rate
	2010	2010	1995-2010	2040	2040	2010-2040
Household	34%	4347	8%	36%	27616	6.50%
Commercial	17%	2121	10%	29%	21972	8.40%
Industrial -1	18%	2301	9.00%	19%	14463	6.30%
Industrial -2	7%	958	1.00%	2%	1637	1.80%
Water pumping	15%	1867	5.00%	8%	6262	4.10%
Service	7%	935	5.00%	6%	4442	5.30%
Street Lighting	2%	315	7.00%	1%	670	2.60%
Total	100.00%	12844.00		100.00%	77062.00	

# Load Forecast

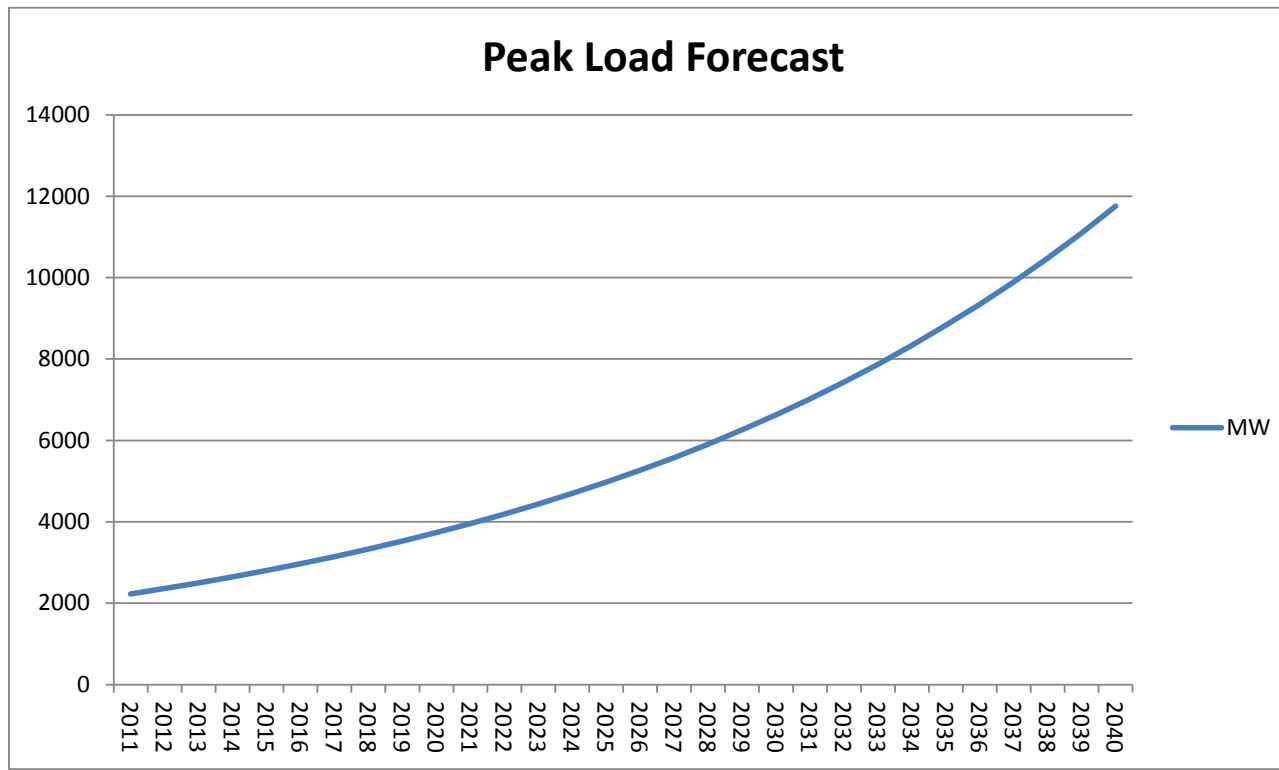
Load & Coincident Factors for all sectors

Sector	Load Factor	Coincident Factor Morning time	Coincident Factor Evening time
Household	0.50	0.43	0.80
Commercial	0.45	0.80	0.49
Industrial	0.64	0.74	0.46
Water pumping	0.37	0.83	0.26
Service	0.73	1.00	1.00
Street Lighting	0.50	0.00	1.00

# Load Forecast

## Customer Peak Load forecast

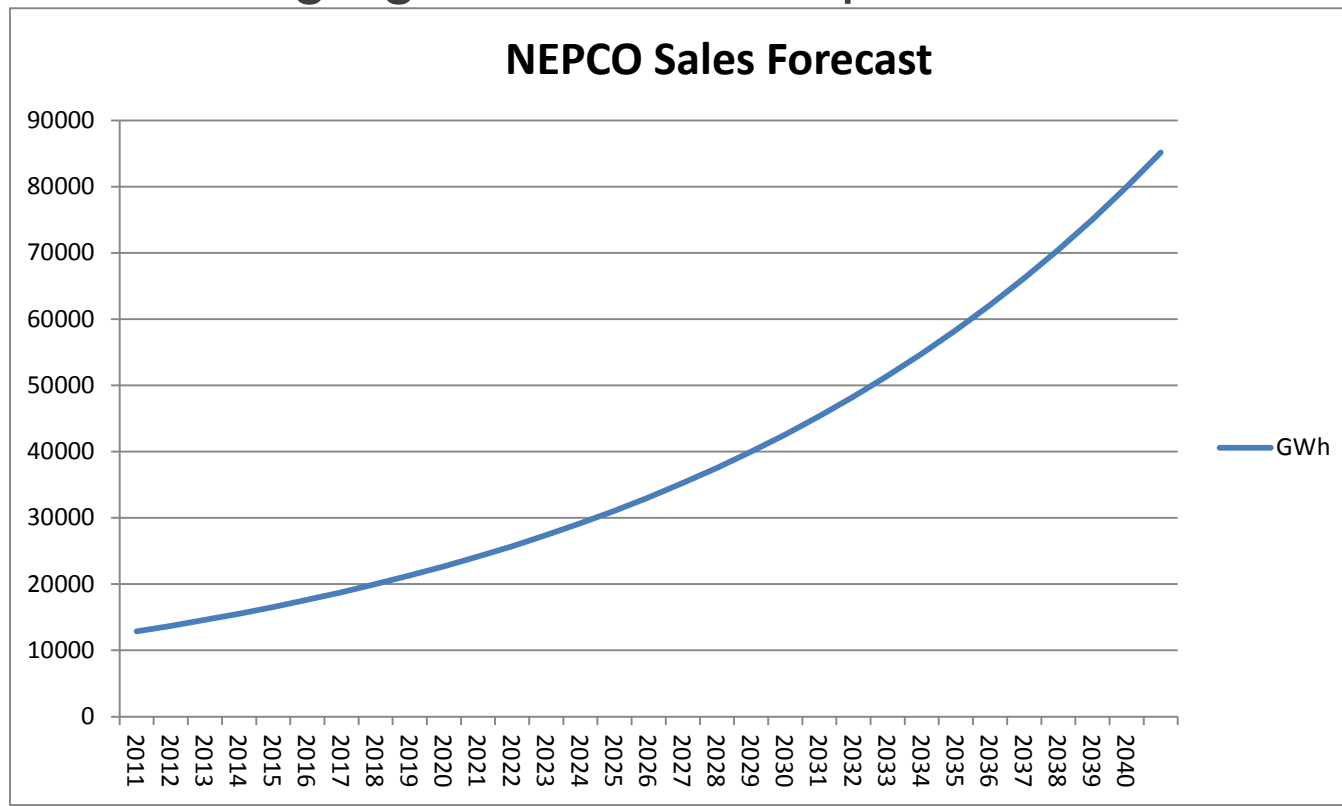
- The peak load forecast is expected 11.7 GW in the year 2040
- The average growth rate is equal to 5.9%



# Load Forecast

## NEPCO Electricity Sales Forecast

- Electricity sales are expected to be 85.3 GWh in the year 2040
- The average growth rate is equal to 6.1%



# Load Forecast

## Peak Load Sales Forecast

- Peak load is expected to be 13.2 GW in the year 2040
- The average growth rate is equal to 5.8%
- The distribution system losses are between 10% to 12% for the study time frame

# Load Forecast

## Peak Load Sales Forecast

