Electric System Economics

“Turning Triangles into Rectangles”
Con Edison Load Duration Curve

NYC Service Area
2010 Load Duration Curve

<table>
<thead>
<tr>
<th>Load Range (MW)</th>
<th>Number of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,000 - 5,000</td>
<td>698</td>
</tr>
<tr>
<td>5,001 - 6,000</td>
<td>1,652</td>
</tr>
<tr>
<td>6,001 - 7,000</td>
<td>1,902</td>
</tr>
<tr>
<td>7,001 - 8,000</td>
<td>2,593</td>
</tr>
<tr>
<td>8,001 - 9,000</td>
<td>952</td>
</tr>
<tr>
<td>9,001 - 10,000</td>
<td>438</td>
</tr>
<tr>
<td>10,001 - 11,000</td>
<td>378</td>
</tr>
<tr>
<td>11,001 - 12,000</td>
<td>167</td>
</tr>
<tr>
<td>12,001 - 13,000</td>
<td>61</td>
</tr>
</tbody>
</table>

Forecasted Peak = 13,500 MW
Actual Peak = 12,963 MW
The Electric System

Generating Station (electricity generated at 13.8 to 22.0 kV)

Transformers (voltage stepped up to transmission voltage)

Transmission Substation

Area Substation (voltage stepped down to distribution voltage)

Transformers (voltage stepped down to 460, 208, or 120 V)

Connection To Others

Feeders

Network Customers (residential, commercial, industrial, hospitals, schools, and street and traffic lights)

Radial Customers
Energy Efficiency Example

Demand Response Example

Hourly Demand (MW)

Hour of event day

Baseline

Demand curve with energy efficiency implemented

Baseline

Demand curve with DR implemented
Targeted Curtailment

**Smart Building Technologies** such as in-house energy management systems empower customers to track their energy usage, receive informational messages from the utility, and participate in demand response programs.

**Fuel Cells** are high efficiency, ultra low emission energy sources which can be integrated into the electric system, lessening our dependence on foreign oil.

**Feeder Switches** can be controlled to isolate faults, restore service, and optimize load to improve grid efficiency.

**Control Centers** analyze critical information real time throughout the grid allowing us to manage, plan and forecast the energy system to meet ever-changing needs.

**Intelligent Grid Systems** use sophisticated communications technology that find problems on the grid and fix them faster, enhancing reliability.

**Energy Storage Devices** can be charged during “off peak” times and used to feed power back into the grid when needed.

**Plug-In Electric Vehicle Charging Stations** can be controlled to reduce power demand during peak times.

**Plug-in Electric Vehicles** can connect to the grid and charge when demand is low and may be used as an energy resource to feed power back into the grid.

**Smart Meters** gather information about how customers are using energy, so we can monitor the supply more.

**Remote Monitoring Equipment** provides information about the electrical system and feeds this data to load flow modeling software which can signal potential problems.

**Distributed Generation Customers** generate their own power and send excess energy back to the grid.

Cyber Security enables secure communications for controlling and distributing energy across the electrical system, and maintaining consumer privacy. Cyber security must be implemented on all smart-grid assets and communications to provide reliable operation, and prevent cyber attacks.
http://www.ny1.com/content/top_stories/143427/ny1-exclusive--con-ed-command-post-plans-for-heat-wave