A Presentation on
Cogeneration in Industries

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Generation of Electricity

• Sources
  ▲ Hydro
  ▲ Thermal
  ▲ Nuclear
  ▲ Wind
  ▲ Solar
Thermal Power Generation Cycle (coal based)
Thermal Power Generation Cycle
(Gas Turbine)
Cogeneration

- Cogeneration is simultaneous production of electrical energy and useful thermal energy
- Cogeneration systems include dual-purpose power plants, waste heat utilization systems and total energy systems.
Cogeneration Types

- **Topping System**
  - Electricity is produced first and the thermal energy exhausted is captured for further use in the process

- **Bottoming System**
  - Usable thermal energy is extracted from a waste stream (after it has been used in a process) to produce power, usually for driving a turbine to generate electricity
Topping System

Exhaust gases 150°C

Boiler
Fuel

Steam

Turbine

Condenser

Exhaust steam to Process
Bottoming System

Air → Compressor → Combustor → Gas Turbine → Exhaust Gas

Fuel → Combustor

Heat Rec. Steam Generator

Steam Turbine

Condenser

Generator

Pump
Bottoming System

- Exhaust gases at 1000 °C
- Supplementary Fuel
- Waste Heat Boiler
- Steam
- Exhaust steam to Process
- Exhaust gases 300 °C
- Kiln
- Fuel
- Condenser
- Turbine
# Efficiencies of Generation Cycles

<table>
<thead>
<tr>
<th>Type of Generation</th>
<th>Efficiency</th>
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</thead>
<tbody>
<tr>
<td>Thermal Plants (Coal Based)</td>
<td>30 to 40%</td>
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<tr>
<td>Thermal Plants (Gas Turbine)</td>
<td>25 to 30%</td>
</tr>
<tr>
<td>Combined Cycle</td>
<td>55 to 60%</td>
</tr>
<tr>
<td>Co – Generation</td>
<td>60 to 70%</td>
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</tbody>
</table>
Advantages of Co-gen in the present Power Sector Scenario

- Act as a Booster station
- Self reliance
- It can maintain grid stability
- Pollution reduction & Environmental friendly
- Helps to meet the national target of 10% of power generation thro’ co-gen route by 2010
- It offers cheap power in the long term
- GHG Mitigation
Potential Sectors

- Sugar industries
- Textile industries
- Chemical and Pharmaceutical industries
- Paper industry
- Refineries
- Fertilizers
Factors to be considered

- Steam Power ratio
- Type of process
- Fuel Availability
- Load profile