

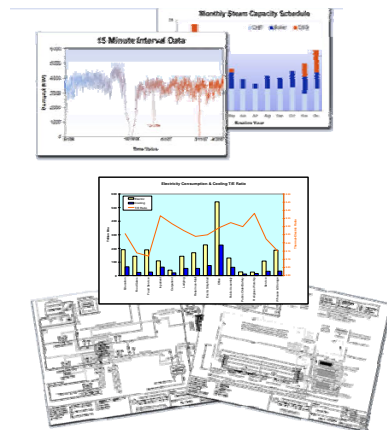


CHP, Waste Heat & District Energy

Module 2: Defining CHP Owner & Societal Benefits

Module 2 Topics

- **What is CHP?**
- **Background**
- **Drivers**
- **Benefits**

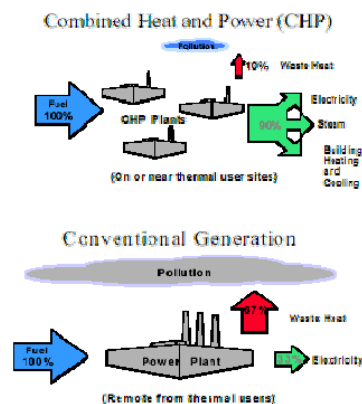


What is CHP?

- Combined Heat and Power (CHP) describes any system that simultaneously generates electricity and useful, recovered thermal energy. It is the oldest commercially demonstrated form of power generation, as Thomas Edison's Pearl Street Station in Manhattan was a CHP facility.
- CHP is also known as CCHP or Cogeneration
- Fundamentally, CHP is a form of recycling, as it converts waste materials into valuable commodities, thus providing both enhanced revenue and reduced environmental impact.

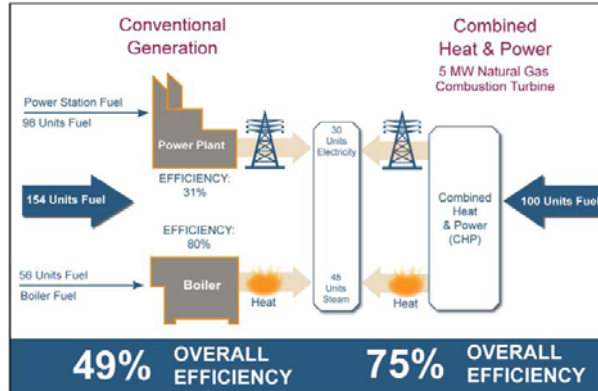
What is CHP?

- 'Conventional' grid based generators are located remote from thermal applications while CHP plants are located close to thermal applications
- While thermal energy is recovered directly from CHP systems as heat, it may be used for cooling, heating, refrigeration or dehumidification applications



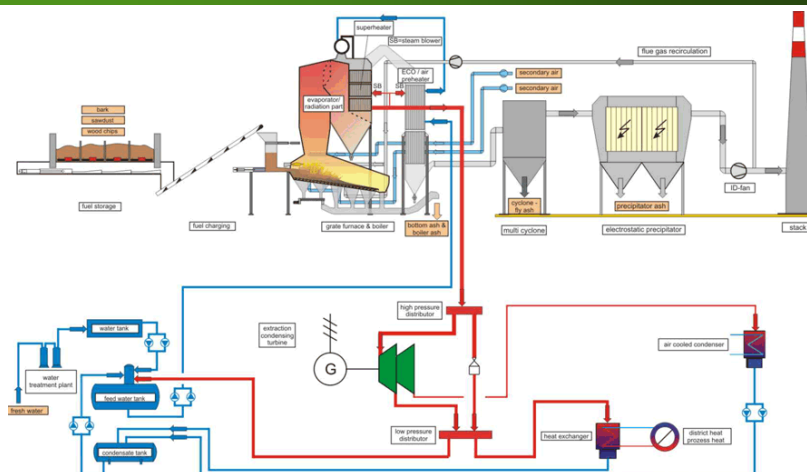
What is CHP?

When considering both thermal and electrical processes together, CHP typically requires only 2/3 of the primary energy input that separate heat and power systems require.



Source: EPA's Handbook of CHP Technologies

Solid Biomass CHP Plant



Background

- High energy costs favor Energy Efficiency while the positive Emissions Impact and Infrastructure Support offered by CHP is gaining regulatory recognition
- CHP has a **high private-to-public investment ratio** and provides a **very cost effect means of reducing carbon emissions**
- CHP is **Supply Side Energy Efficiency**
- The Federal Government, States as well as other entities have developed CHP support programs towards meeting the goals of reducing Energy Cost and Emissions , while increasing Grid Reliability and Energy Security through implementation of CHP

Background

- The economic, reliability, and environmental consequences of the “business as usual” scenario are unacceptable. Actions must be implemented to ensure that the state’s future energy environment provides energy that is competitively priced, reliable and consistent with greenhouse gas targets NJ BPU EMP
 - Maximize energy conservation and energy efficiency.
 - Reduce peak electricity demand.
 - Meet XX% of the State’s electricity needs from renewable sources. **1st Call Biomass CHP**
 - Develop new low carbon emitting, efficient power plants to help close the gap between the supply and demand of electricity. **CHP**
 - Invest in innovative clean energy technologies and businesses to stimulate the industry’s growth and job creation. **CHP & Biomass CHP**

Drivers

- **Cost Savings #1**
 - Offset Utility/3rd Party kWh's + Therms
 - Reduce Utility Demand Charges - Demand Response
 - Offset Capital Costs – Require Redundancy
 - Improved Power Reliability/Quality
- **Emissions Reductions**
 - In the same way that it saves fuel cost, CHP reduces pollution by using the fuel's energy twice, yielding half to a third of the emissions from separate fossil fuelled grid power and boilers.
 - Supported by US DOE & US EPA

Drivers

- **Reliability**
 - Provides local grid support and improves power quality
 - Can often be configured to provide emergency power back-up
 - Natural Gas grid can be more reliable for long term outages
- **National Security**
 - Reduced fossil fuel usage extends US resources and reduces dependence on foreign energy imports
 - Multiple points of power generation are less subject to catastrophic failure or attack

Drivers

- **Biomass CHP**
 - **Potentially significant job creation through Biomass CHP**
 - Higher local area equipment supply chain
 - Biomass growth, harvesting, handling
 - Higher installation costs
 - **Utilization of local natural resources**
 - **Beneficial land use**
 - **Sustainable local power source**

Benefits

- **Owner/Host Site Benefits**
 - **Cost Savings**
 - **Environmental Stewardship/Good PR**
 - **Power Quality/Availability**
- **Societal Benefits**
 - **Lower Energy & Infrastructure Costs**
 - **Emissions Reductions/Health Care Benefits**
 - **Increased Grid Reliability**
 - **Resource Extension/National Security**
 - **Job Creation**



Benefits

- **State Level CHP Grant Programs**
 - Capital Grants - \$/kW
 - Production Credits - \$/(kWh + Therm)
 - Corporate Income Tax Offsets
- **Sources of Funding**
 - Societal Benefits Charge
 - Portfolio Standard Compliance Payments
 - Rate based programs
 - Tax based programs
- **Federal CHP Tax Programs**
 - Investment Tax Credit
 - Accelerated Depreciation

*A Grant does
not make a
Bad project
Good
But it does
make a Good
Project Better*

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