



URBAN INGENUITY



DISTRICT ENERGY:  
Deploying Clean Energy  
Microgrids in the Nation's Capital

*Prepared for the Department of Energy and  
Environment*

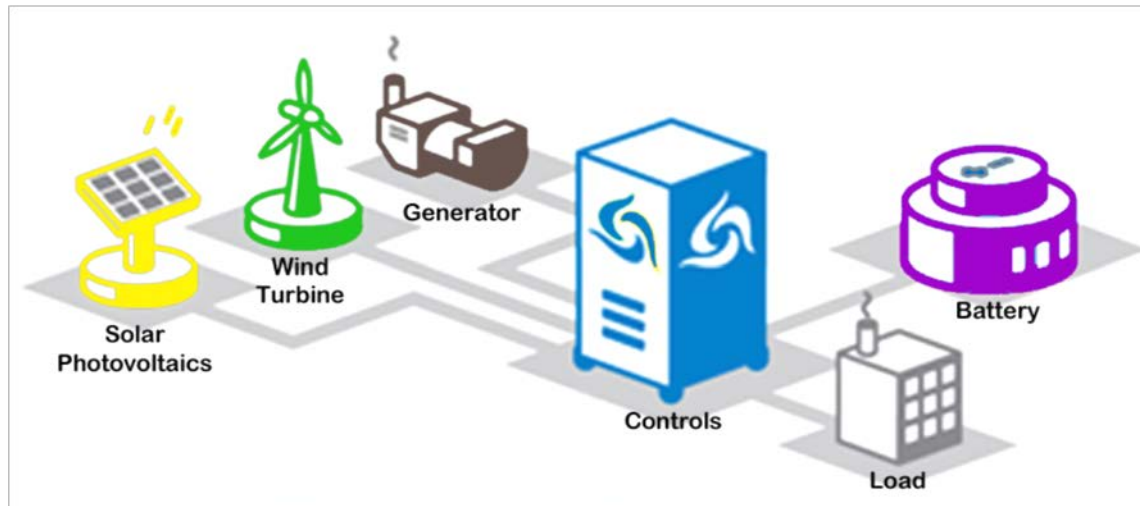
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# Microgrids 101: *An Introduction*

# What are Microgrids?

- Small energy system capable of balancing captive supply and demand resources to maintain stable service within a defined boundary
- Combines distributed generation (DG) resources
- Can work as an “island,” separate from the large grid, in case of outages

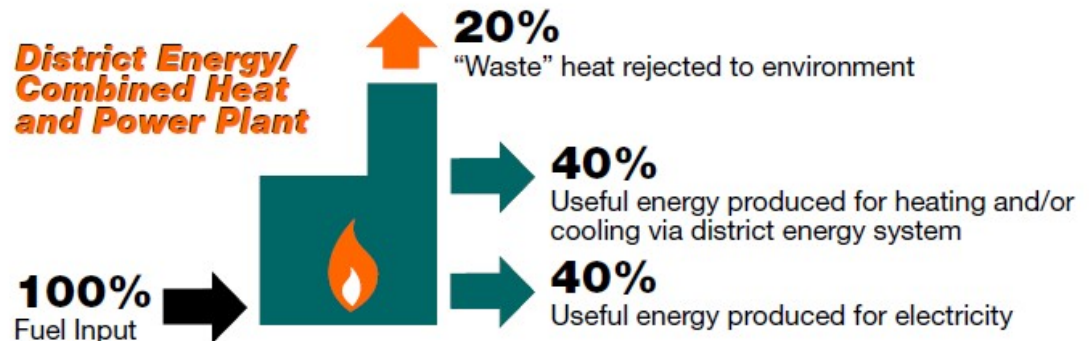
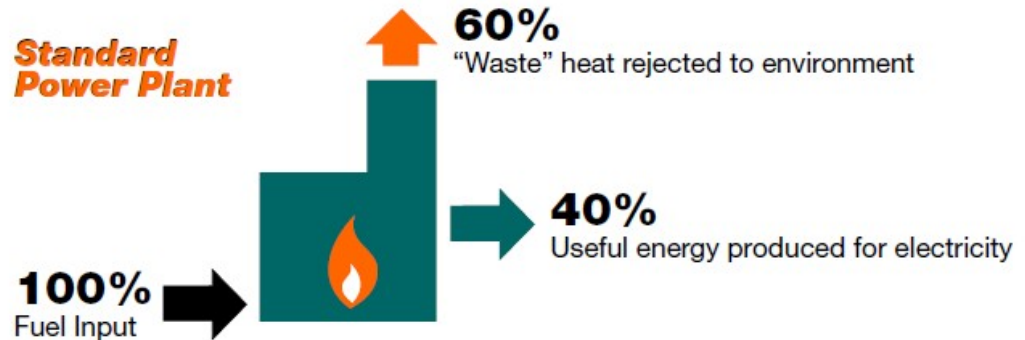


# The Three Types of Microgrids

- 1. Isolated microgrids**, islands, and other remote sites are not connected to a local utility grid.
- 2. Island-able microgrids** are fully interconnected and capable of both consuming and supplying grid power, but can also maintain some level of service during a utility outage.
- 3. Non-synchronous microgrids** are connected to utility power supplies, but aren't interconnected or synchronized to the grid (can consume power from the grid but can't supply it).

# What is District Energy?

- Uses steam or hot and chilled water to provide heating and cooling to many buildings
- Often include combined heat and power (CHP) plants to meet both electric and thermal needs



# Microgrid and DG Technology

## Cogen & Thermal:

- Gas or diesel cogeneration
- Combined Heat Power (CHP)

## Renewable Energy:

- Fuel cells and microturbines
- Solar Photovoltaic (PV)
- Geothermal

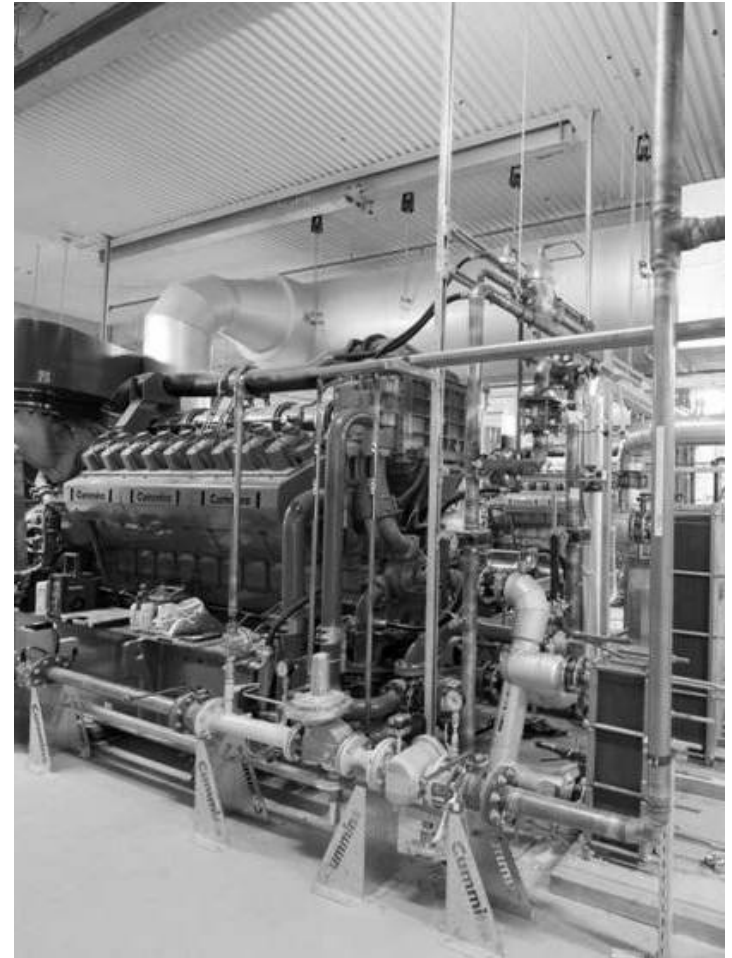
## Storage and Controls:

- Storage capacity (batteries, Flywheel)
- Energy management and automation systems



# Why Microgrids and District Energy?

- Microgrids combine local energy assets, resources, and technologies into a system to satisfy host requirements
- Provides economies of scale that are necessary to make alternative and renewable fuels practicable
- More reliable, efficient, cost-effective energy infrastructure for the community





# Operational Benefits

**Microgrids improve system reliability, reduce costs, and provide other operational benefits:**

- Cut energy demand and fuel use by integrating renewables, demand management, and reducing energy losses
- Lower maintenance costs and operational expenses
- Improved reliability and resiliency of electricity and thermal systems
- ‘Future proof’ energy systems by allowing easy integration of newer, more efficient technology as it is developed



# Environmental and Community Benefits

## **Microgrids support community infrastructure and environmental sustainability:**

- Cut carbon emissions, other waste, and pollution
- Improve grid security and system efficiency
- Reduces the need for new transmission and distribution infrastructure
- Boost economy through infrastructure investment and local job creation
- Create competitive advantage for local businesses
- Back-up power for critical community infrastructure

# Financial Benefits

## **Microgrids improve the bottom line for property owners and local businesses:**

- Reduced energy costs and more predictable energy expenditures for property owners and businesses
- Displaces the need to install separate space heating and cooling and hot water systems in each building, reducing building capital costs
- Retain more money in the local economy
- Increase investment through public private partnerships

# Thank You

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