Integrated Community Energy Solutions: Update

MWAQC

June 22, 2011

Overview

- Community Energy Strategy Options and Benefits
- Examples of Systems in the US
- Challenges and Opportunities in the COG Region
- COG Resources
- Next Steps

Opportunity: CHP, District Energy, and Microgrids

1) Combined Heat and Power *– Generating electricity and thermal resources on site.*

2) District Energy *– Sharing the thermal resource.*

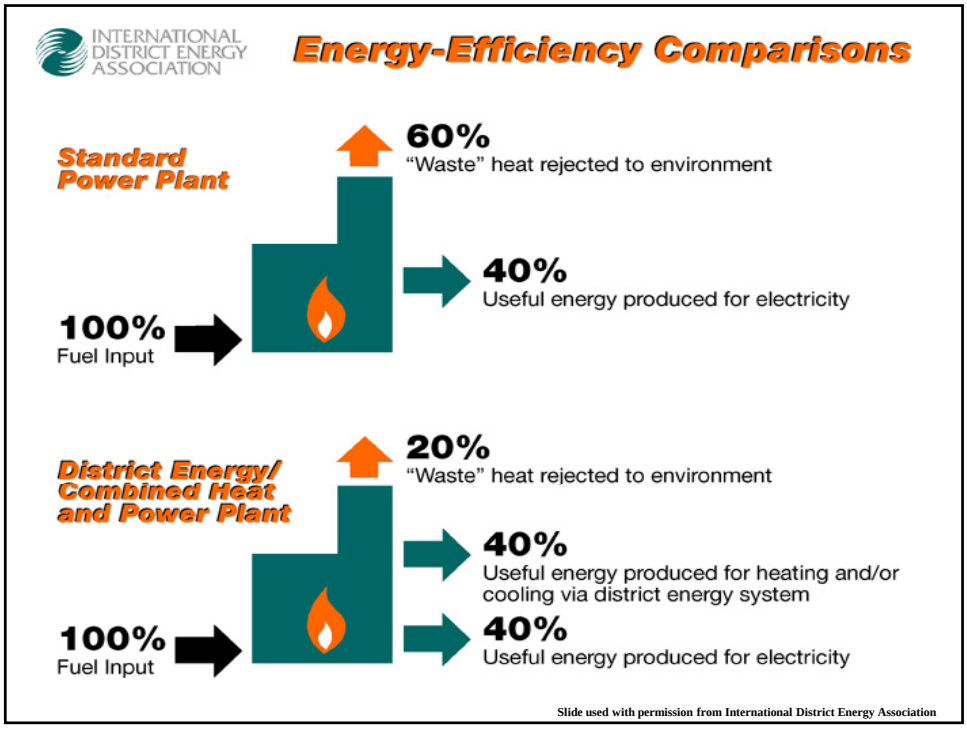
3) Microgrid *– Investing in the technology necessary to enable "Islanding" (off-grid) thereby reducing load on the grid.*

Examples in the Region

- ***DC Convention Center***
- ***Howard University***
- ***FDA White Oak***
- ***NIH Bethesda***
- ***George Mason University***
- ***University of Maryland***
- ***Washington Navy Yard***
- ***and more...***

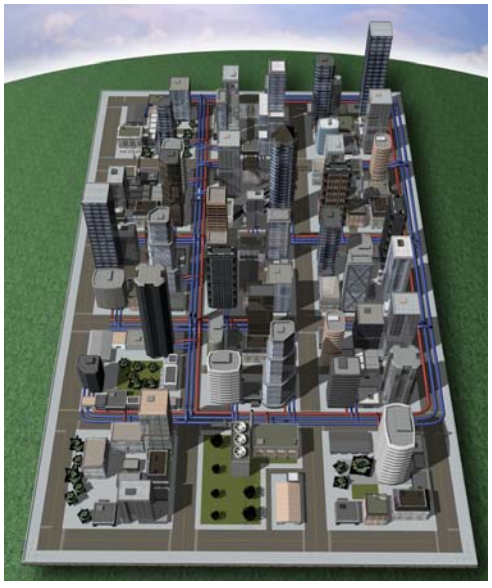
Benefits: CHP, District Energy, and Microgrid Combined

- More efficient use of fuel
- Frees up valuable commercial building space
- Can reduce electricity demand during peak load
- Can provide revenue from PJM Demand Response Program
- May enable use of multiple energy resources (solar, solar thermal, biomass, wind, etc)
- May improve reliability and power quality



District Energy – Community Scale Heating and Cooling

- **Underground network of pipes "combines" heating and cooling requirements of multiple buildings**
- **Creates a "market" for valuable thermal energy**
- **Aggregated thermal loads creates scale to apply fuels, technologies not feasible on single-building basis**
- **Fuel flexibility improves energy security, local economy**



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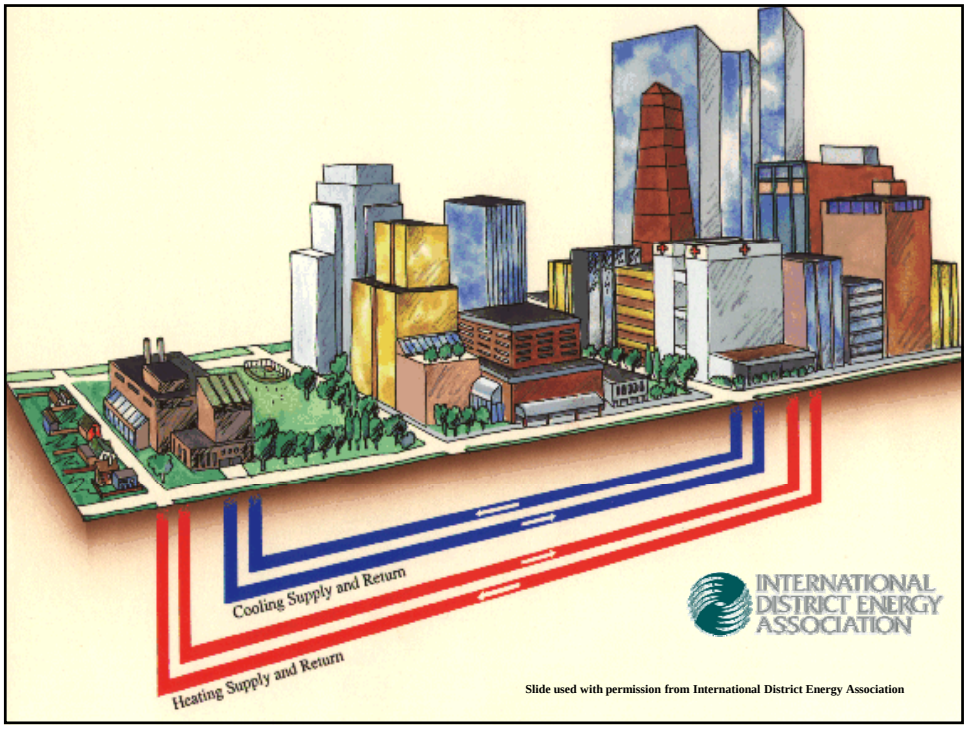
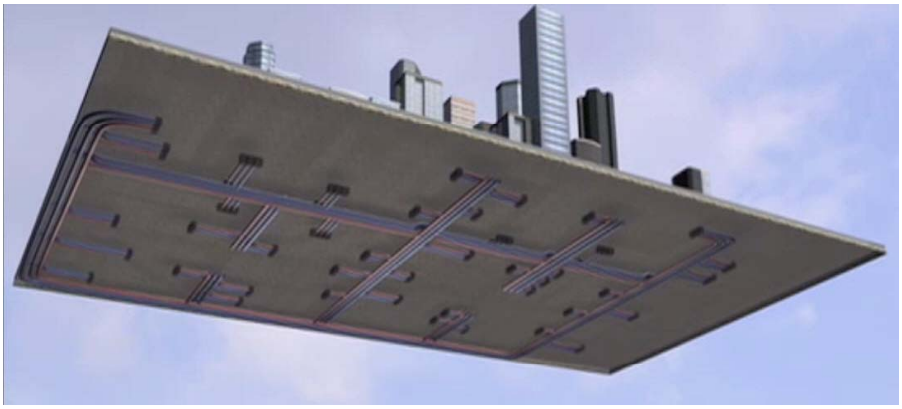


Infrastructure for Local Clean Energy Economy



- **Connects thermal energy sources with users**
- **Urban infrastructure – hidden community asset**
- **Energy dollars re-circulate in local economy**
- **Locate generation near the power & thermal load**

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Commercial, Government, Events

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Residential, Hospitality, Healthcare

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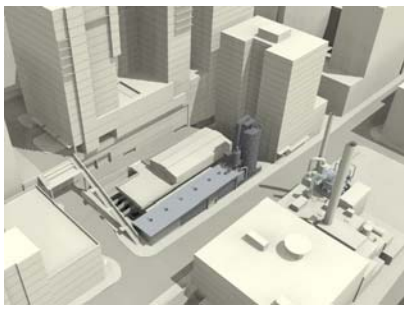
Seattle Steam – Urban Biomass



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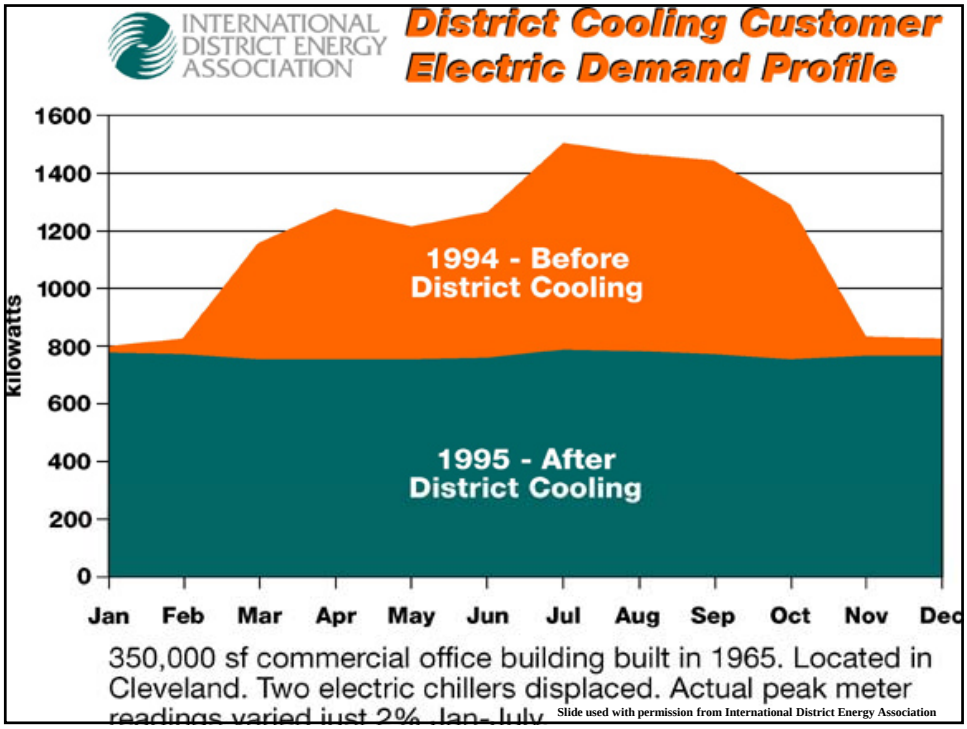

Princeton Campus Energy System – Benefit to Local Grid

- **2005 campus peak demand on grid 27 MW**
- **2006 campus peak demand on grid 2 MW**
- **Campus energy system "freed up" 25 MW to local grid**
- **CHP/District cooling reduces peak load on local wires, enhances reliability, avoids brownouts**
- **Benefit to local economy**

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Impact on End User

- **Customer capital costs reduced or amortized over long term service agreement**
- **Reduces size mechanical room; electrical vaults; condenser shafts and roof loads**
- **Colder CHW supply improves HVAC performance**
- **Lower owning, operating and maintenance costs**
- **More leasable space**

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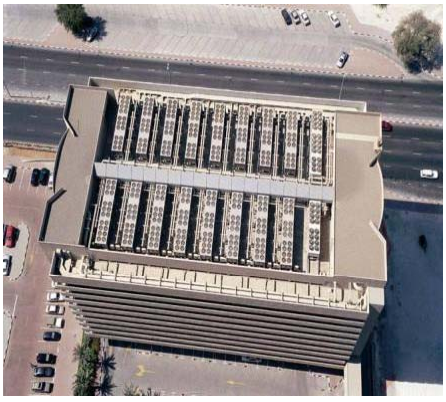
Higher Value Buildings

Without District Energy



With District Energy

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Opportunities and Challenges in the Metropolitan Washington Region

- **Several Locations Under Consideration:**
  - **Crystal City; Moorefield Station; White Flint; Walter Reed; St. Elizabeth's**
- **Utilities Interested in Reducing Peak Load**
  - **Building capacity to meet peak load is very expensive.**
- **FERC Order**
  - **PJM Demand Response $$: Generators and Demand Response Providers get equivalent rate (may double value in next year => capital for expansion of microgrids)**
- **Challenges**
  - **Limited experience; Utility Law and Regulations; Financing; Existing energy infrastructure and markets**

COG Support for Regional Initiatives

- **Inventory of Installed Systems Completed**
- **Formed Expert Task Force in Fall 2010**
  - **Local energy managers, university experts, DOE, EPA, Mid Atlantic Clean Applications Center**
- **Hired FVB Energy Spring 2011 (2 tasks)**
  - **Local Policies, Gap Analysis, Recommendations based on International Best Practice**
  - **Technology Overview, Business Case, Costs and Benefits**
  - **Reports: Draft in July, Final September**
- **Held Workshop in January**
- **Topic for COG Board Retreat in July**

For more information:

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Resources:

http://www.maceac.psu.edu/

http://www.districtenergy.org/