
Advancing Energy Systems through Integration

Presented in partnership with the United States Department of Energy
November 20, 2012 Webinar
Community Renewable Energy Success Stories: District Heating with
Renewable Energy



**EVER-GREEN
ENERGY™**



**DISTRICT ENERGY
ST. PAUL™**

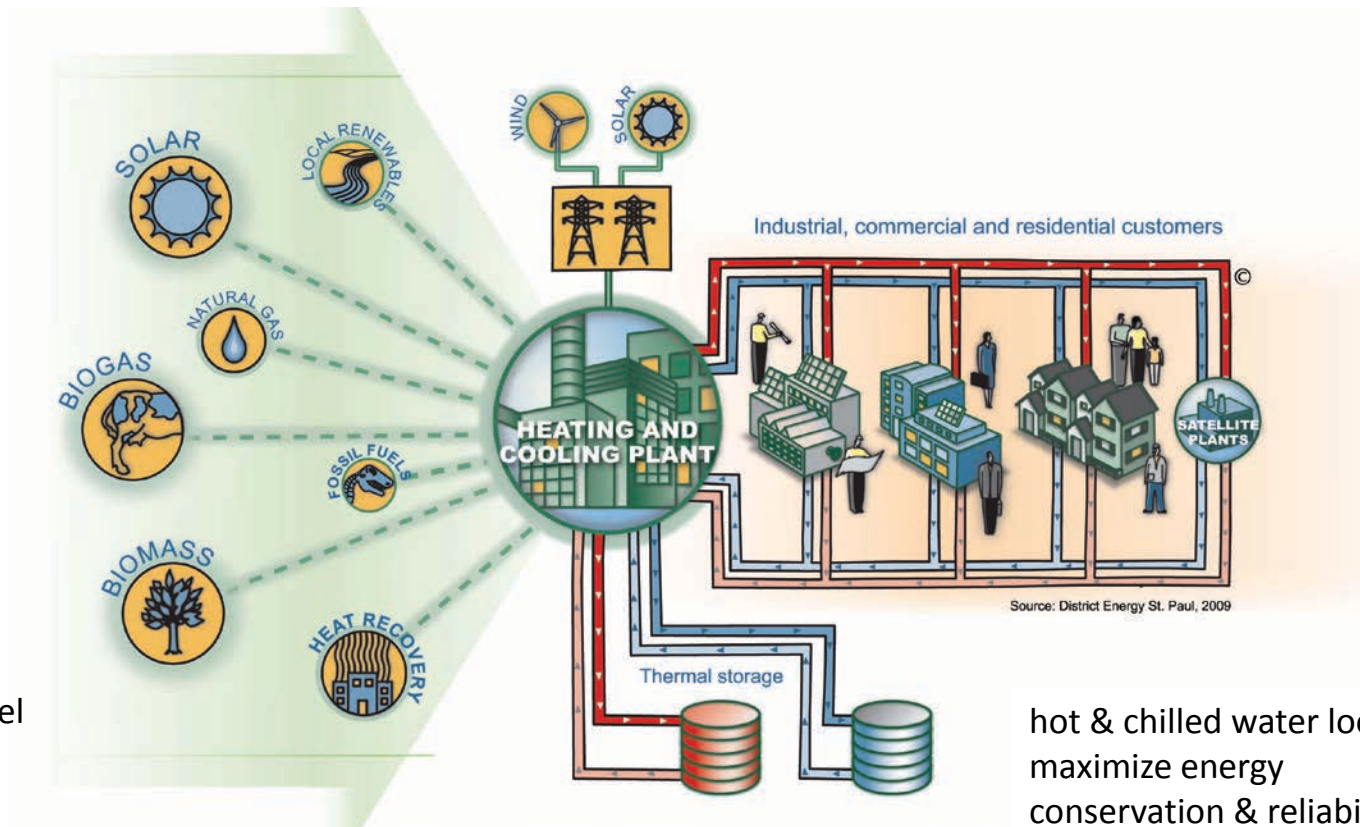
***Saint Paul's
Community Energy System***

Community Scale Heating and Cooling

- Underground network of pipes aggregate heating and cooling needs
- Aggregated thermal loads allows application of technologies and fuels not feasible for individual buildings
- Increases fuel flexibility, rate stability, and reliability



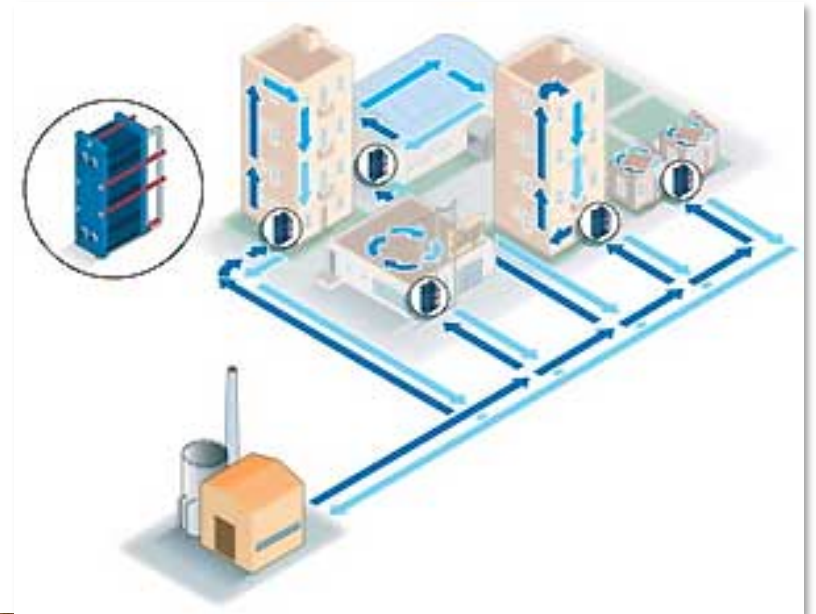
Integrated Energy System



District Heating



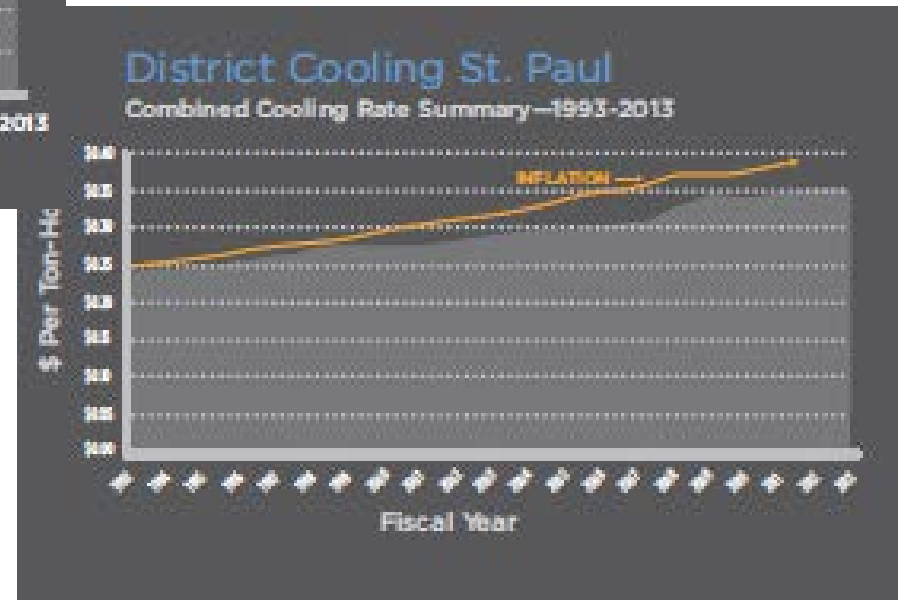
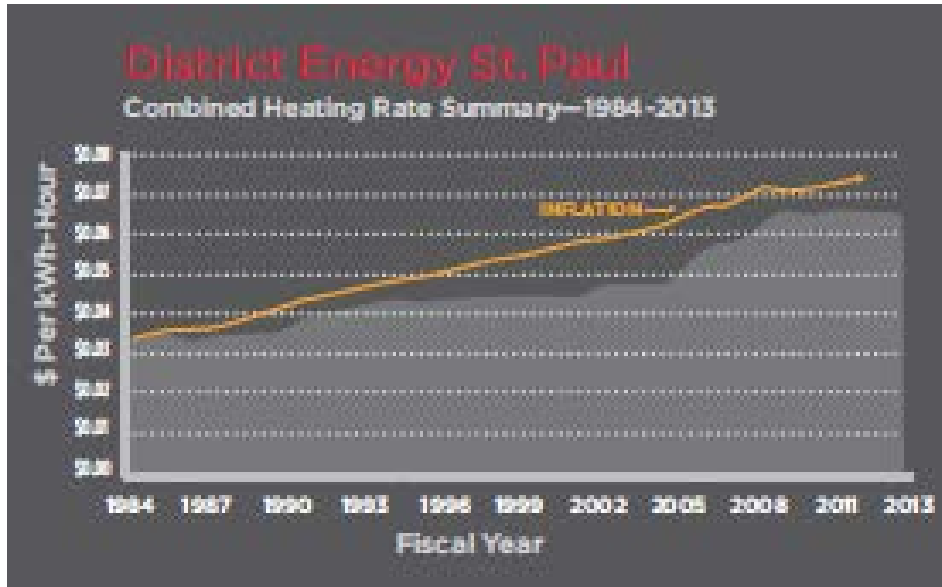
District Cooling



Heating and Cooling Saint Paul



Stable Rates



District Energy rates for heating and cooling have remained below the rate of inflation.

Thermal Storage

- 6.5 million gallons of storage capacity
- Chilled water storage reduces peak-electric demand
- Firm capacity for weather events



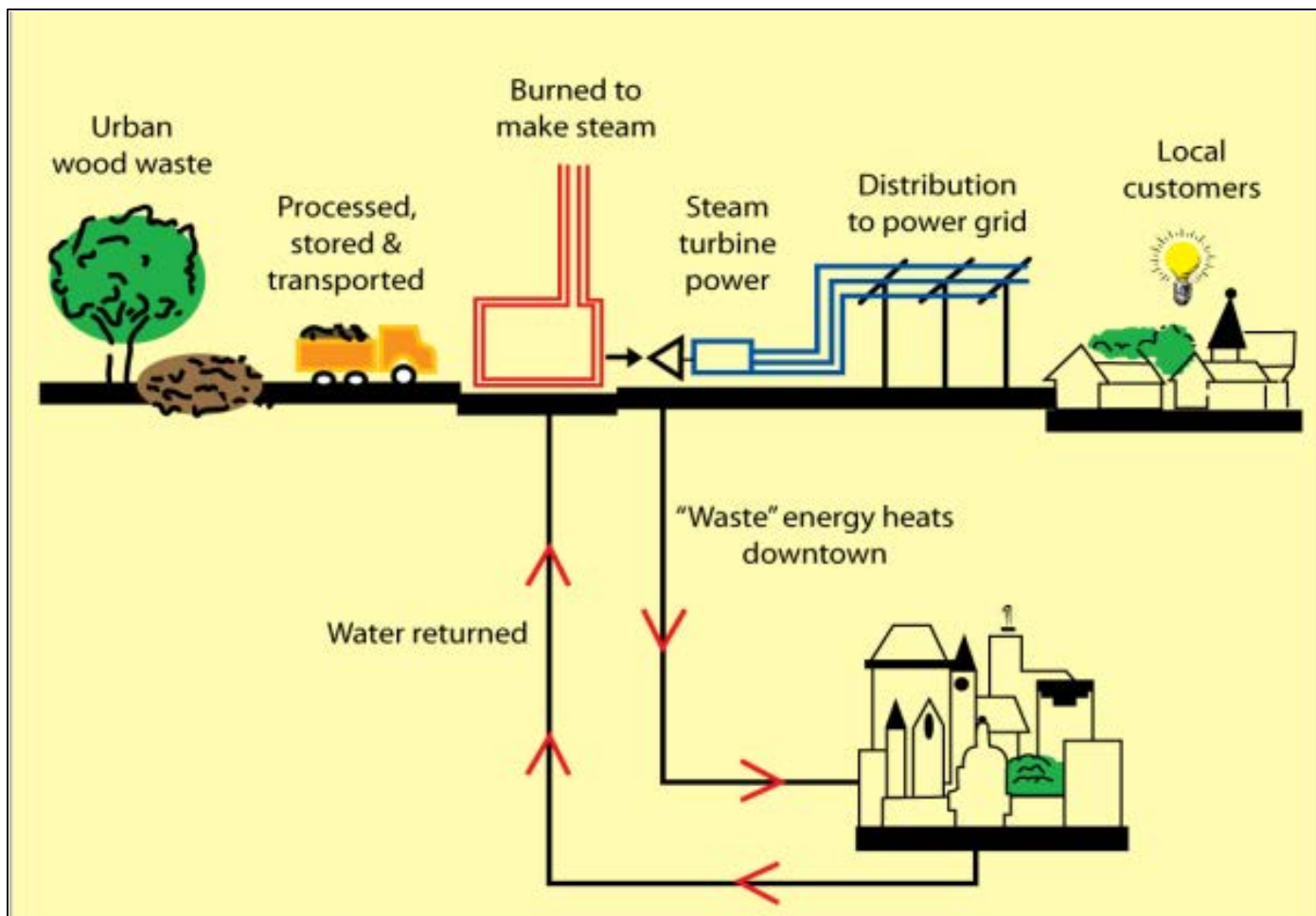
Combined Heat & Power



- 25 MW of electricity
- Renewable, clean, urban wood residue
- Greenhouse gas CO₂ reduced up to 280,000 tons per year



Integration of Biomass-Fueled CHP

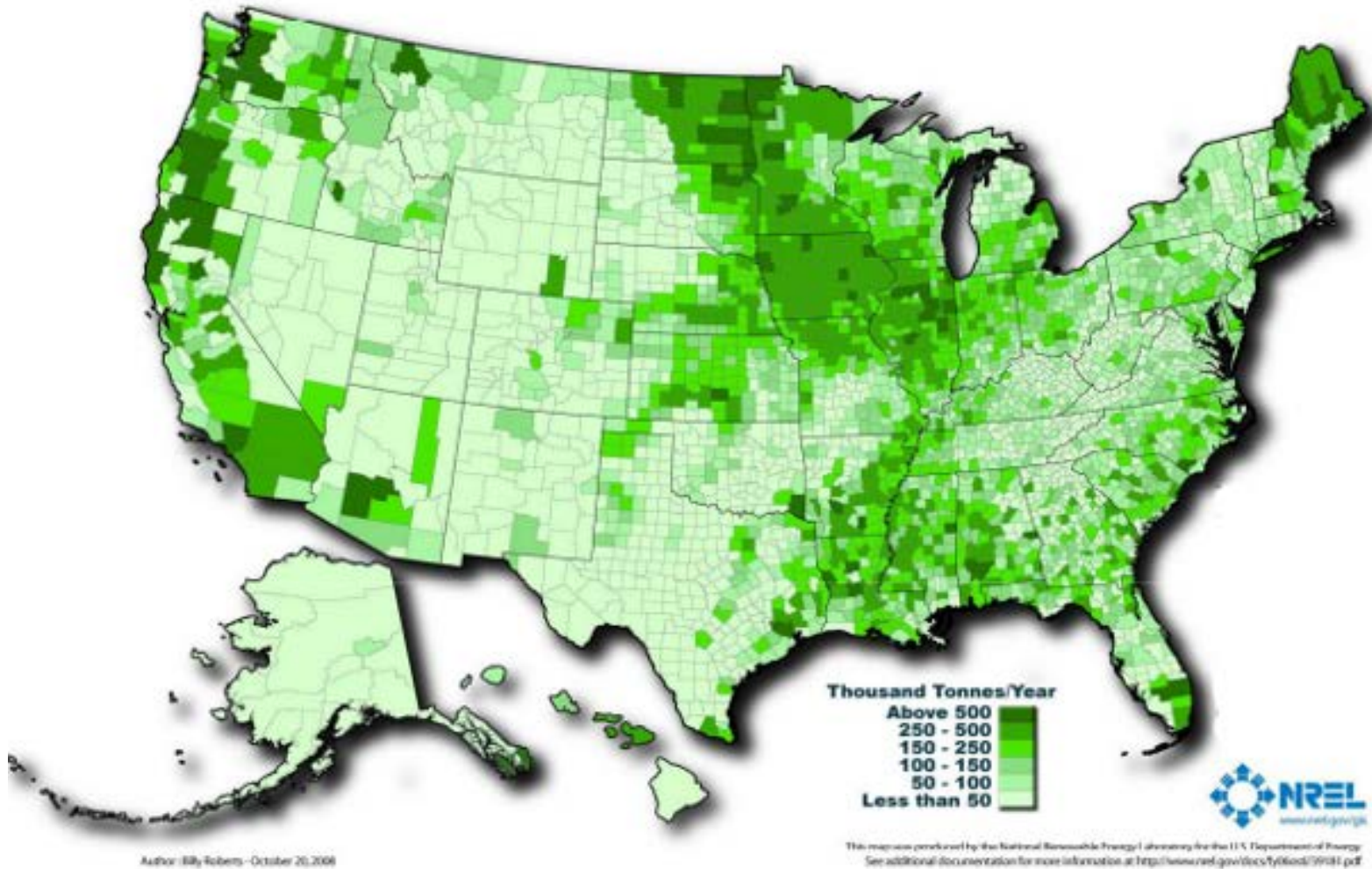


Biomass Sources

- Wood residuals from manufacturing processes
- Construction waste/clean dimensional lumber
- Urban and park tree trimmings
- Storm and disease damaged trees
- Trees removed as part of a timber management plan/restoration



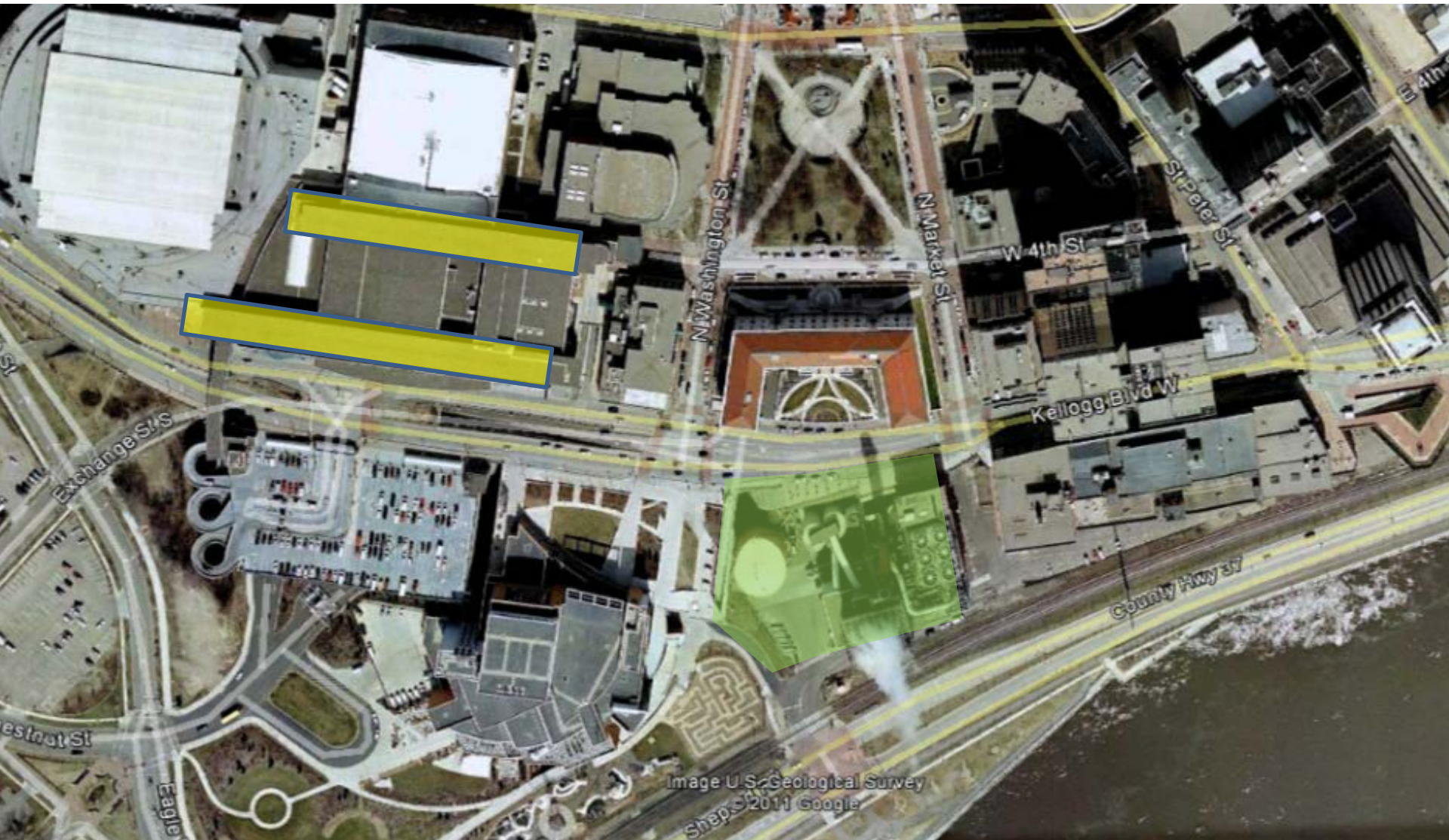
Biomass Availability

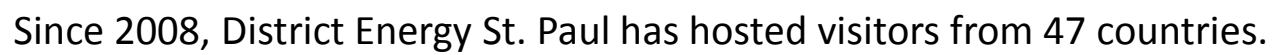


Solar Thermal - 2011



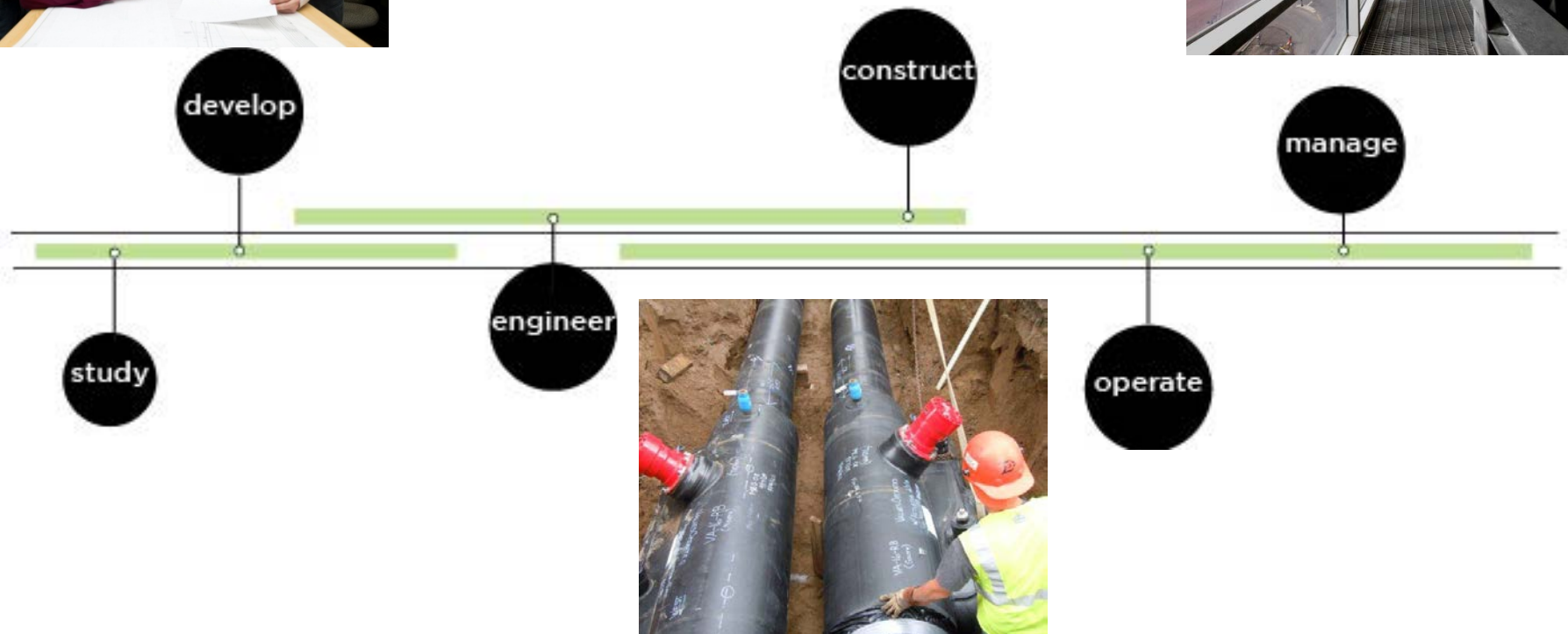
Science & Sustainability District





Community Energy Planning

Our Experience



Community Energy Systems Becoming the Preferred Solution

“This proliferation of local strategic energy efficiency planning, if effectively managed, presents an opportunity to achieve considerable energy savings, save money, create jobs, and protect the environment.”

Local Energy Planning in Practice - March 2012
American Council for an Energy-Efficient Economy
(ACEEE)

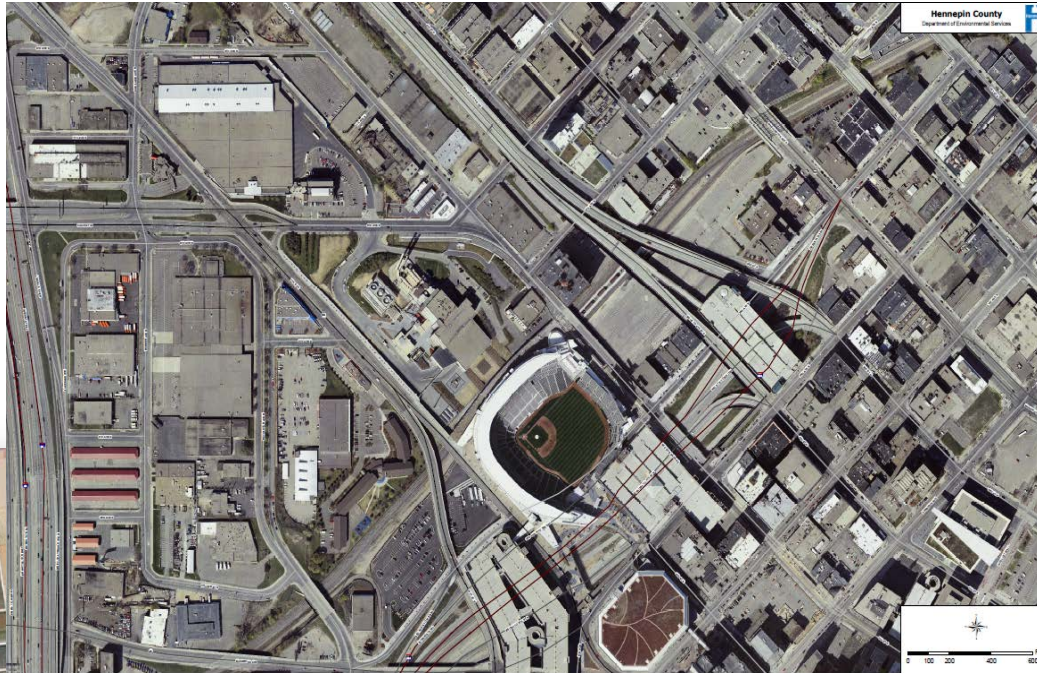


Integrated Energy Master Plan Crystal City, Virginia



“The Integrated Energy Master Plan (IEMP) will provide a roadmap for increased energy efficiency, energy security, and sustainable energy solutions while significantly reducing greenhouse gas emissions.”

Minneapolis North Loop

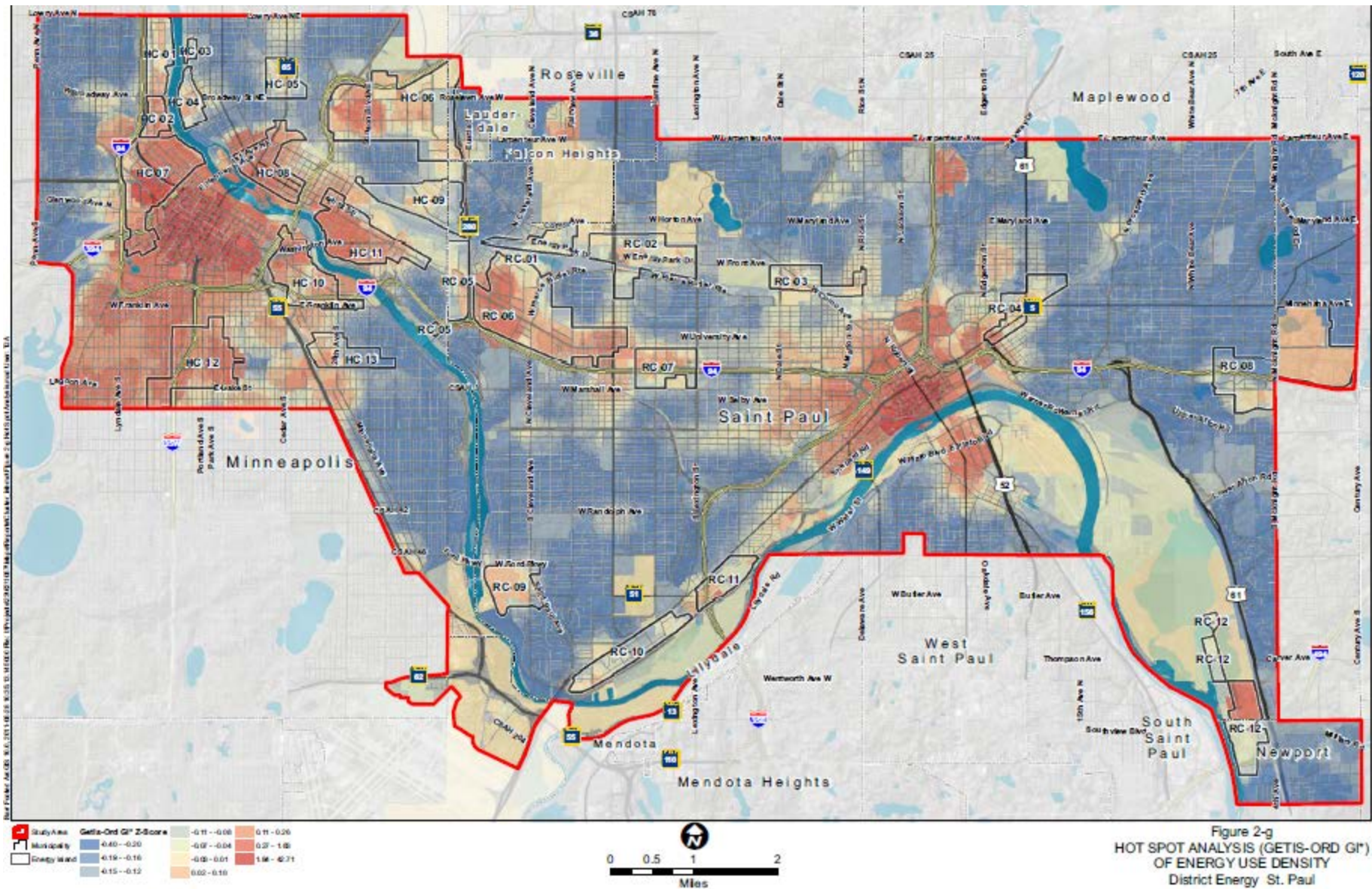


Markham Centre, Ontario



“Over the past 10 years nearly 6 million square feet of building space was connected to this community energy system including the IBM Canada, Markham YMCA, Honeywell, Motorola, Bill Crothers and Unionville High Schools, and all of the new condominium buildings in Markham Centre. When fully built-out, Markham Centre is intended to be home to over 25 million square feet of “live-work-play” developments.”

Energy Island – Hot Spot Analysis



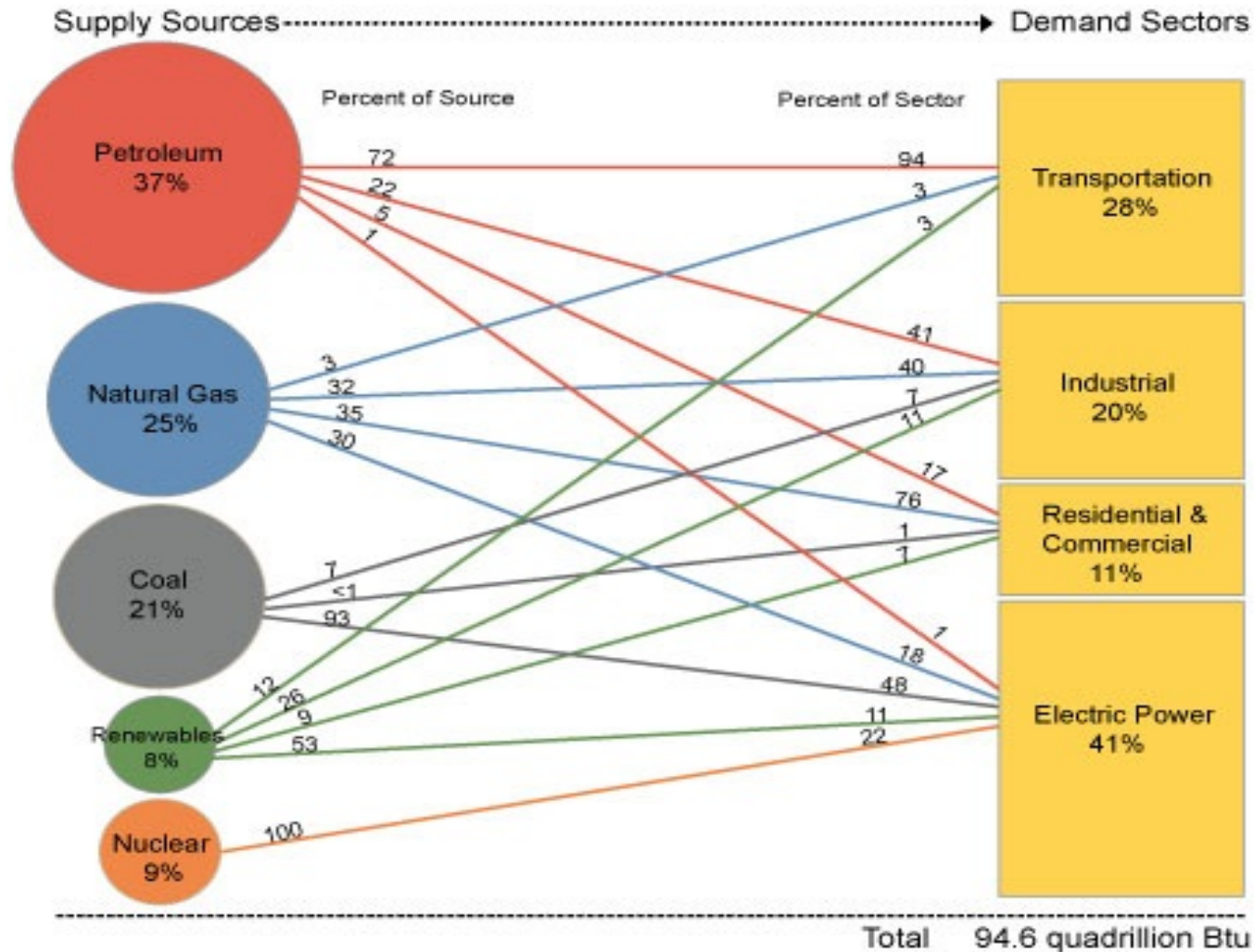
Common Themes

- Led by local government, businesses, and utilities
 - Widespread use of Public-Private Partnerships
 - Environment and sustainability
 - Reduced emissions
 - Carbon and greenhouse gas goals
 - Interest in community competitiveness
 - Increase energy efficiency
 - Stabilize rates, save money
 - Create jobs, encourage economic development
 - Need for community security and resilience
 - Reliable supply
 - Flexibility
 - Integration of local energy sources
-

The Evolving Energy System

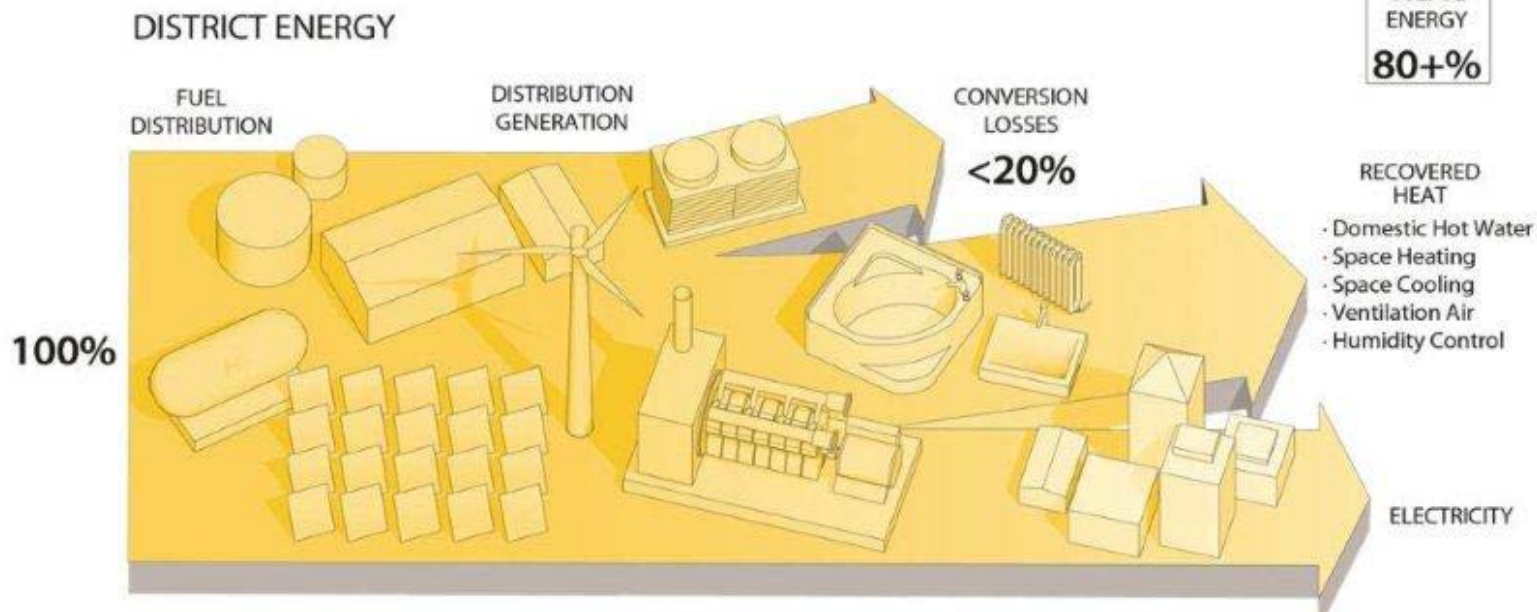
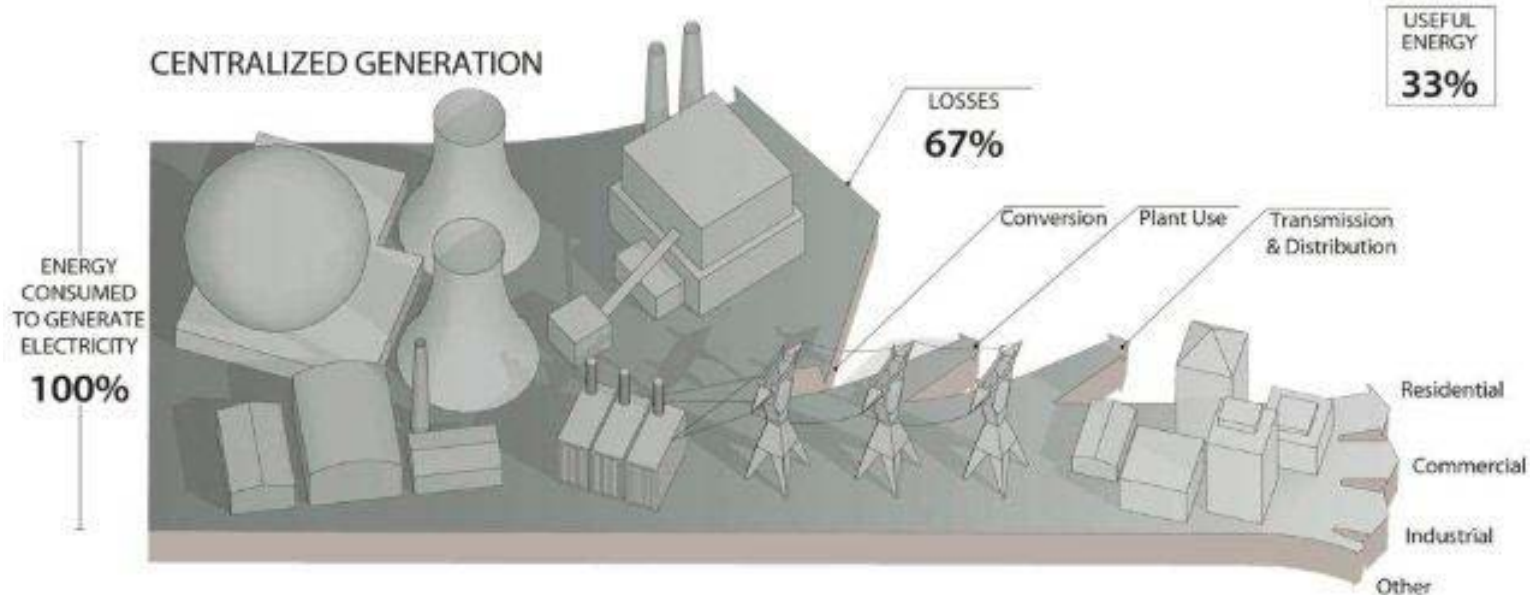


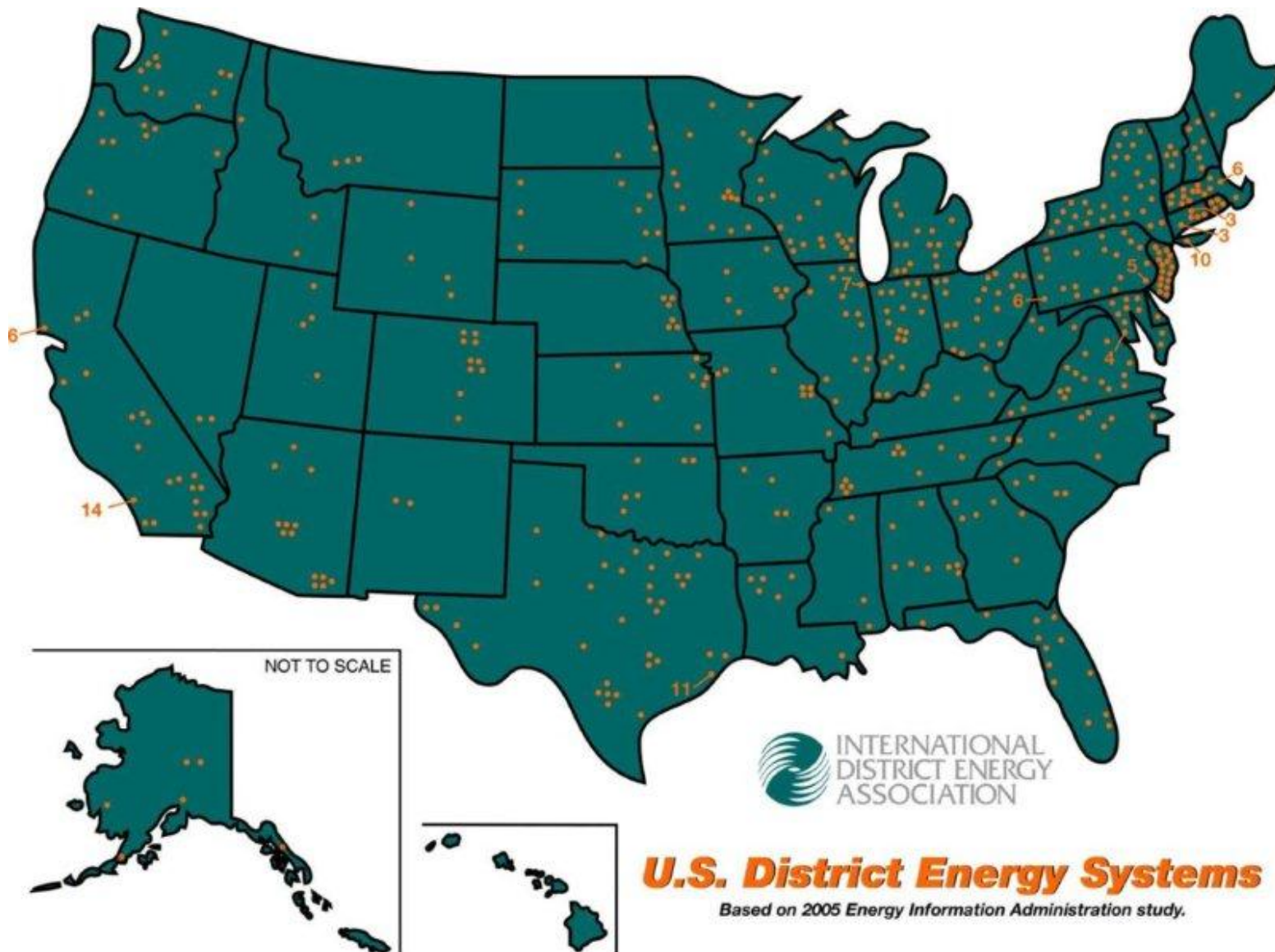
U.S. Energy Sources & Demand Sectors



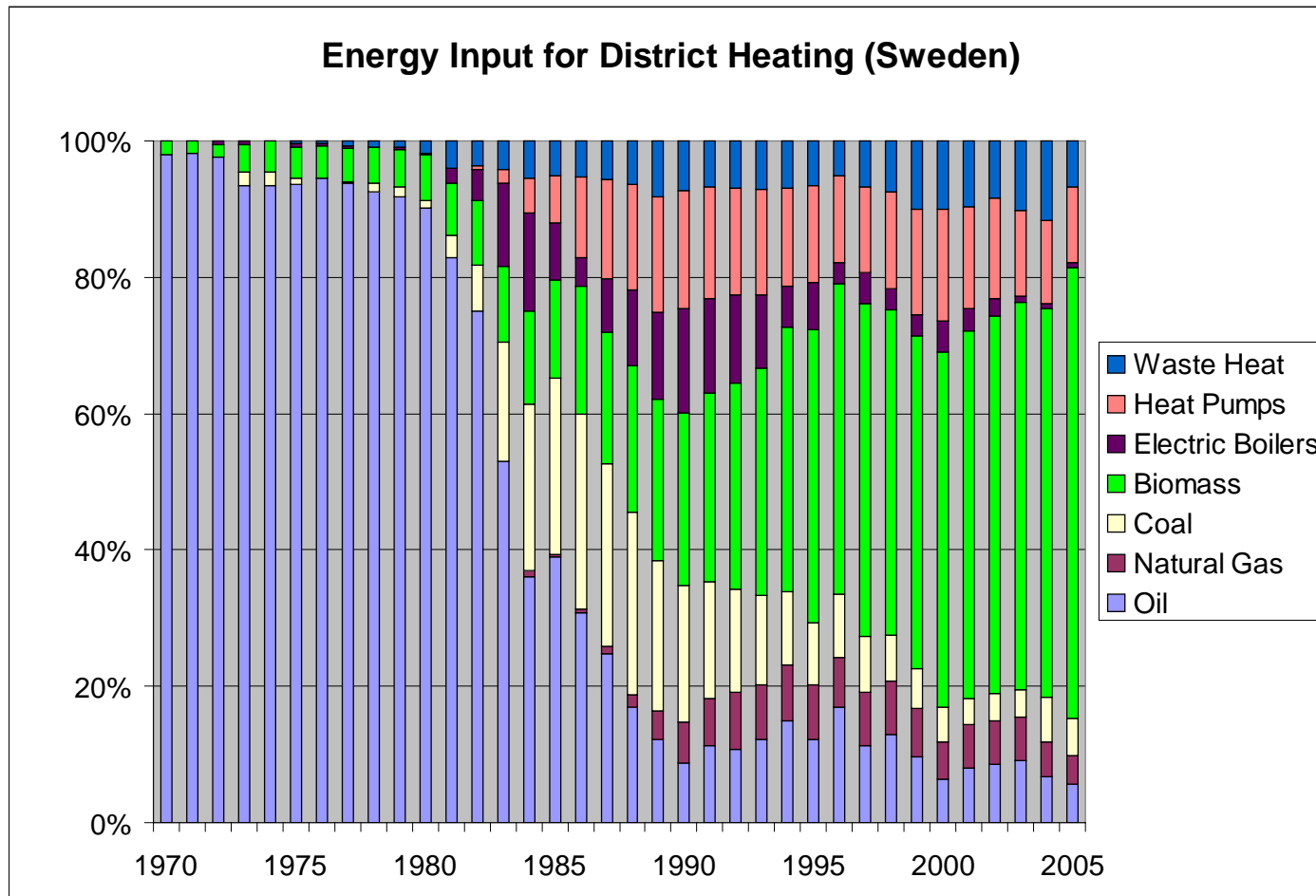
Source: Energy Information Administration, *Annual Energy Review 2009*



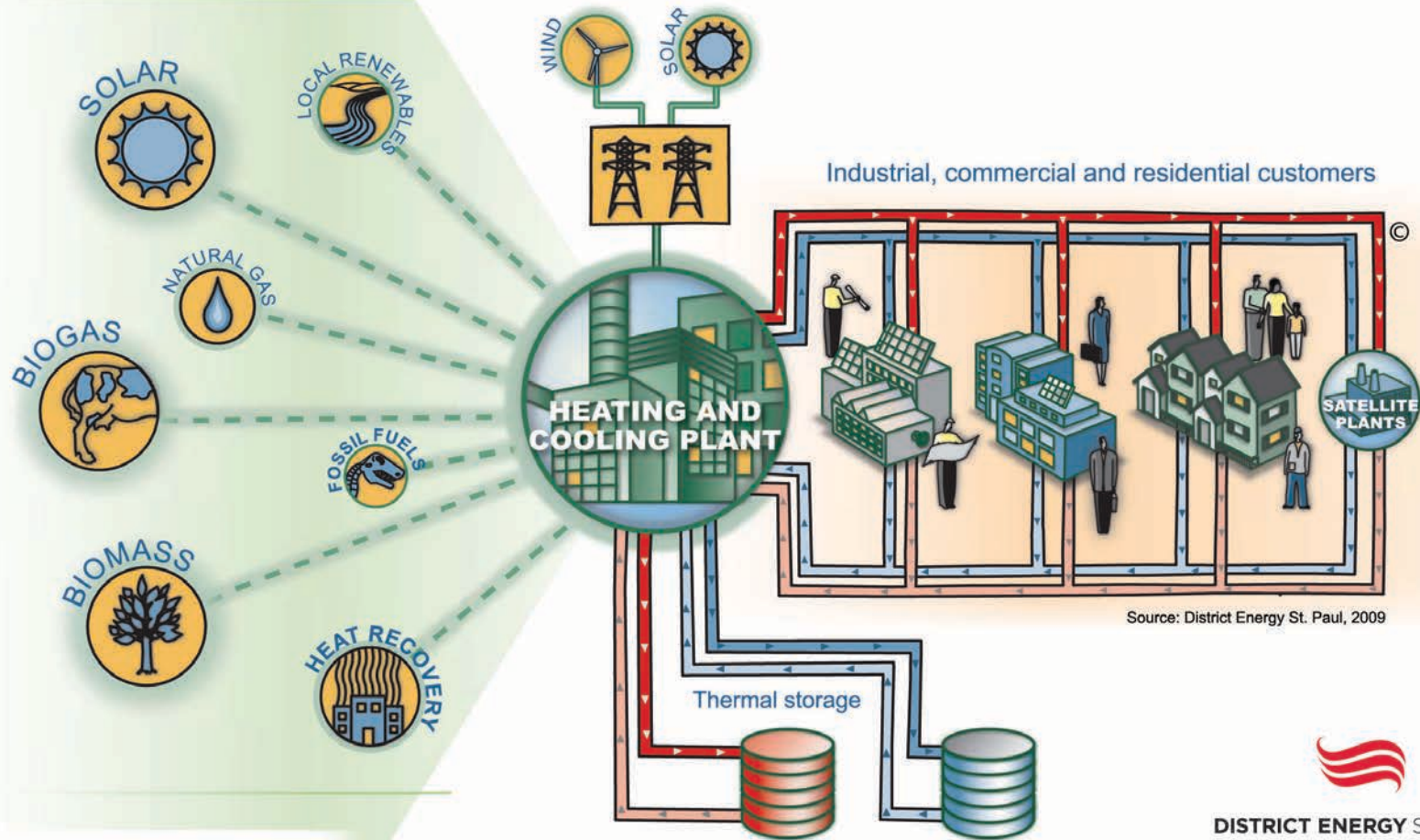




What is possible?



Integrated Energy System



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Questions?



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