Prospect Park: Integration of Community Energy Systems
Purpose

- Illustrate the potential of integrated energy systems at a community development scale
- Share the importance of multi-stakeholder collaboration
- Outline the benefit of integrating energy between new and existing district systems
Project Background
Twin Cities Metro District Systems

MSP Airport
Energy Island – 2012 DOE Study
2 systems currently serve downtown Mpls
1 proposed

Systems in Project Area

- U of M East Bank Campus
- U of M West Bank Campus
- Fairview Hospital
- Augsburg College
- Prospect Park Community Energy System (Proposed)
- RockTenn
- U of M St. Paul Campus
- District Energy St. Paul, EPUC, + 5 local college systems
Prospect Park 2020

- Community comprehensive planning
- Driven by local community leaders (residents and business)
- Development of “Green Fourth Street”
Initial Feasibility Analysis
Multiple infrastructure stakeholders brought to the table

- Prospect Park 2020
- University of Minnesota
- Met Council
- City of Minneapolis
  - Community Planning & Economic Development
  - Public Works
- Hennepin County
- The Wall Companies
- Metro CERTS (clean energy resource teams)
- Mississippi Watershed Management Organization
- Cunningham Architects
- The Cornerstone Group
- Local gas and electric utilities
Sustainable Guidelines and Standards

- Solid waste
- Water and wastewater
- Stormwater and groundwater
- Solid waste
- Food
- Transportation
- Energy
Proposed Land Use
New Buildings, Businesses and Increased Density
Project Approach
Feasibility Study
- System Data Collection
- Preliminary Concept Development
- Financial Analysis
- Draft Study

Business Plan Development
- Concept Refinement
- Customer & Community Relations Plan
- Conceptual Plan Development
- Develop Business Strategy
- Draft Business Plan
- Final Business Plan

System Development
- Conceptual System Layout
- Phasing Strategy
- Financial Model
- Detailed Project Development
- Detailed design and construction prep
- Compile System Financing Portfolio
- Proceed with Financing and Construction
Integrated Community Energy Systems
Benefits of an Integrated Approach

- Increase energy efficiency, reduce primary energy consumption and associated GHG emissions
- Enable beneficial use of surplus thermal energy from dispersed sources
- Ease transition to use of renewable energy
- Enables energy storage and smoothing of energy peaks
- Achieve significant energy conservation and GHG emissions reductions using currently available technology
Integration

- combined heat and power
- waste heat recovery
- biogas (local brewery)
- hot water storage
- solar thermal
- snowmelt systems
- traditional gas-fired boilers
- chilled water storage with adsorption or absorption cooling
- free cooling
- solar cooling
- traditional electric driven chillers.
Project Goals

- Smart infrastructure
- Fuel flexibility and renewable alternatives
- Local resources for local needs
- Technology innovations
- Overall system or multi-system efficiency
- Long-term energy price stability
Prospect Park System Vision Map
District Energy Systems
Phase 1 Implementation Plan

- Coordinate distribution network with plans for street improvements
- Implementation timed with initial build-out
- Traditional technologies for initial energy generation
- Design infrastructure to easily integrate into the long-term system vision
- Utilize stranded low-grade heat for snowmelt
## Phase 1 Load Potential

<table>
<thead>
<tr>
<th>Square Footage</th>
<th>Heating</th>
<th>Cooling</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>MMBtu</td>
<td>MMBtu/hr</td>
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<tr>
<td>Commercial/Retail</td>
<td>150,000</td>
<td>5,535</td>
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<tr>
<td>Office</td>
<td>150,000</td>
<td>5,760</td>
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<tr>
<td>Residential</td>
<td>1,360,000</td>
<td>45,560</td>
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<td>Arts Center</td>
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<tr>
<td>Research</td>
<td>250,000</td>
<td>10,600</td>
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<tr>
<td>Residential</td>
<td>160,000</td>
<td>5,360</td>
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<tr>
<td><strong>Total</strong></td>
<td>2,120,000</td>
<td>74,935</td>
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Phase 1 Distribution
## Phase 1 Distribution

### Hot Water Distribution

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<thead>
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<th></th>
<th>Trench Feet</th>
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<tbody>
<tr>
<td>Main Lines</td>
<td>4,000</td>
</tr>
<tr>
<td>Service Lines</td>
<td>750</td>
</tr>
<tr>
<td>Grand Total</td>
<td>4,750</td>
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</table>

### Chilled Water Distribution

<table>
<thead>
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<th>Trench Feet</th>
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<tr>
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Phase 1 Challenges

- Early acceptance from initial developers
- Local community group participation
- Initial infrastructure cost
- Existing energy sources
- Local system champion
Current Status

• Collaborative partnership formed
• Subject matter groups assigned to core objectives
• District energy design integration discussions with initial property developers
• Seeking funding for implementation phases
Conclusions

• Development of a new district energy requires a local system champion
• Optimize integration with existing energy sources and existing infrastructure
• Leverage connections to nearby energy systems
• Coordinate with infrastructure improvements
• Start small, but plan for the system vision
• Develop systems with a multi-faceted stakeholder group, including public and private participants
Questions?

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