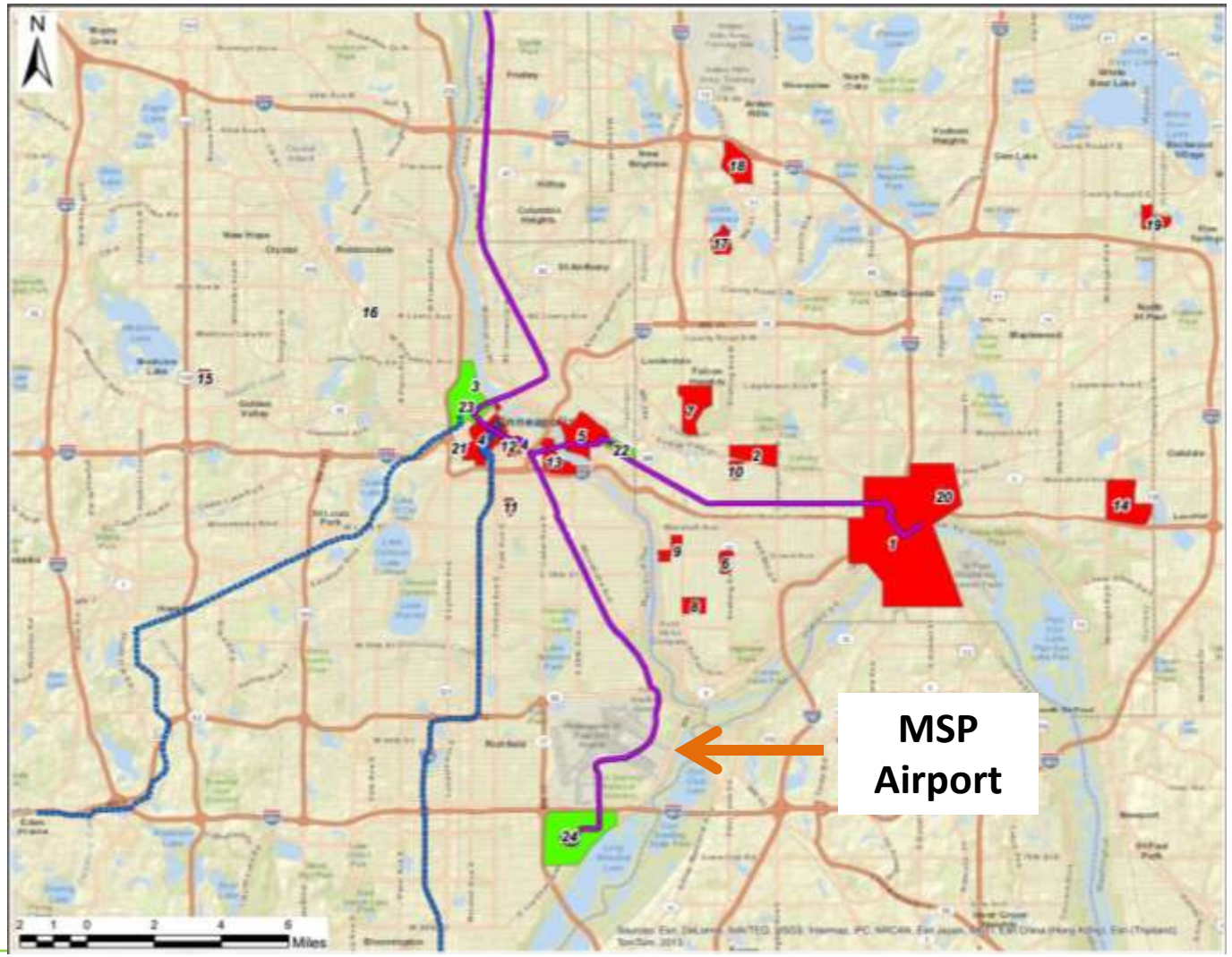
# *Prospect Park: Integration of Community Energy Systems*

# 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



# Energy Island – 2012 DOE Study

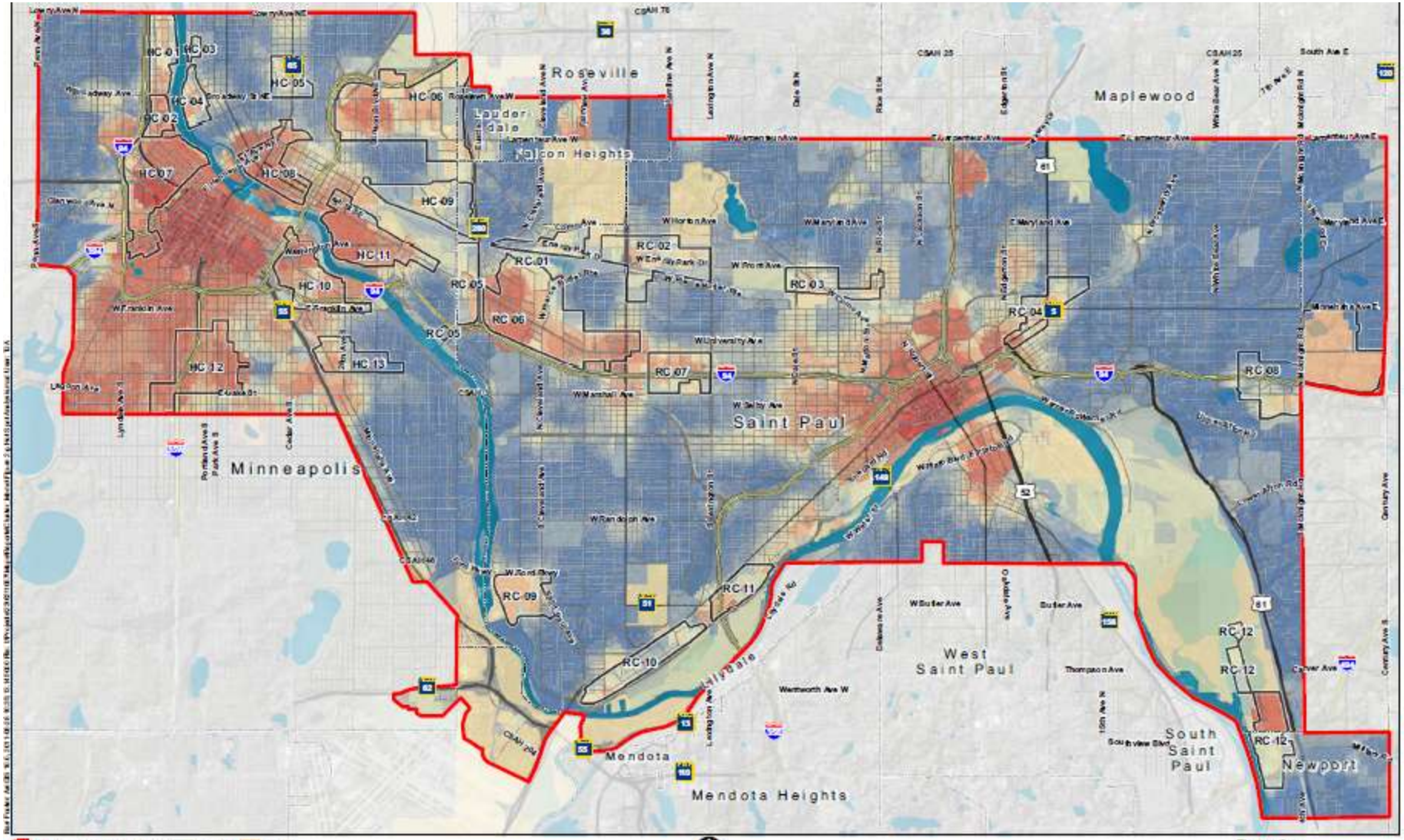
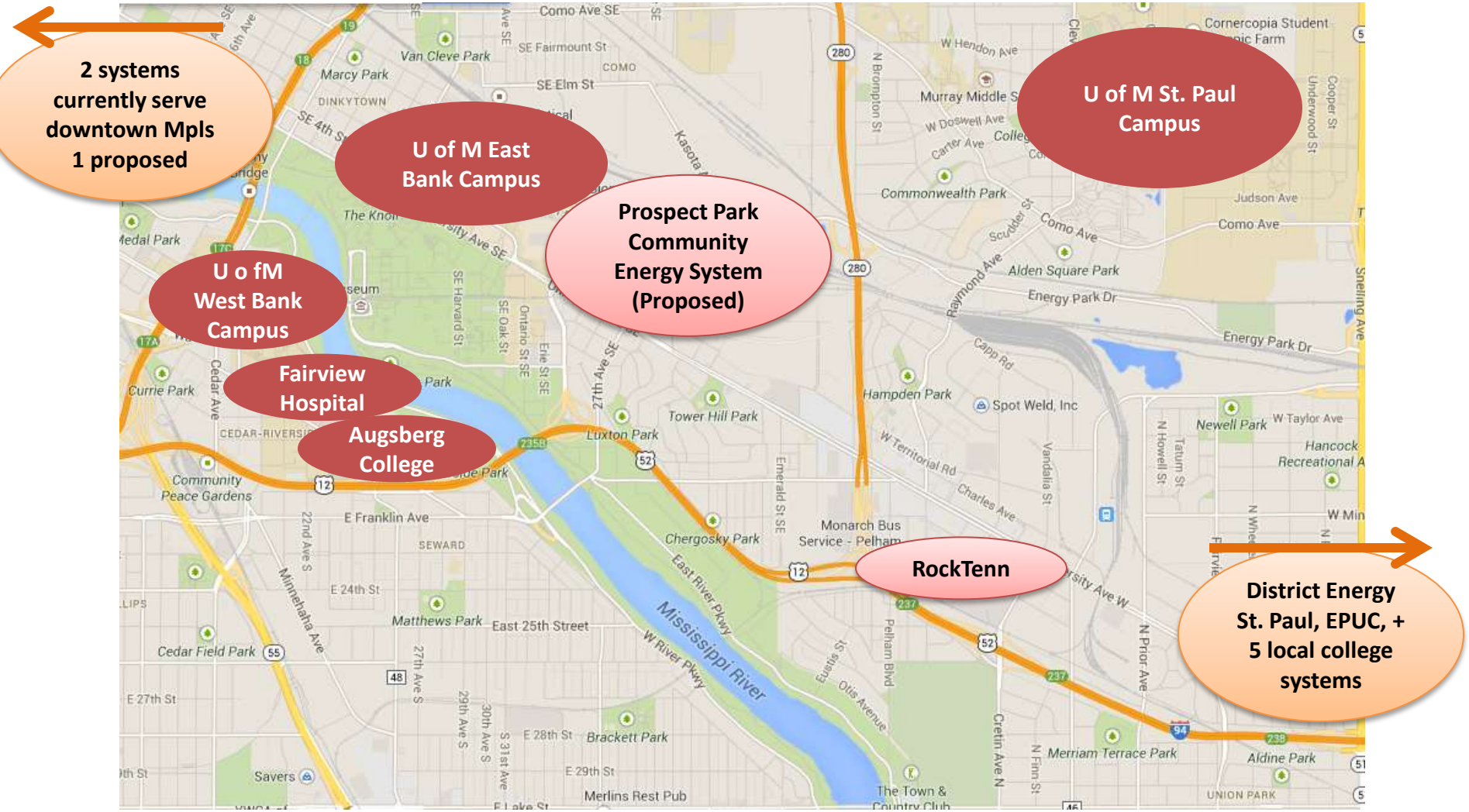



Figure 2-g
HOT SPOT ANALYSIS (GETIS-ORD GI*)
OF ENERGY USE DENSITY
District Energy St. Paul

# Systems in Project Area



# Prospect Park 2020

- Community comprehensive planning
- Driven by local community leaders (residents and business)
- Development of “Green Fourth Street”

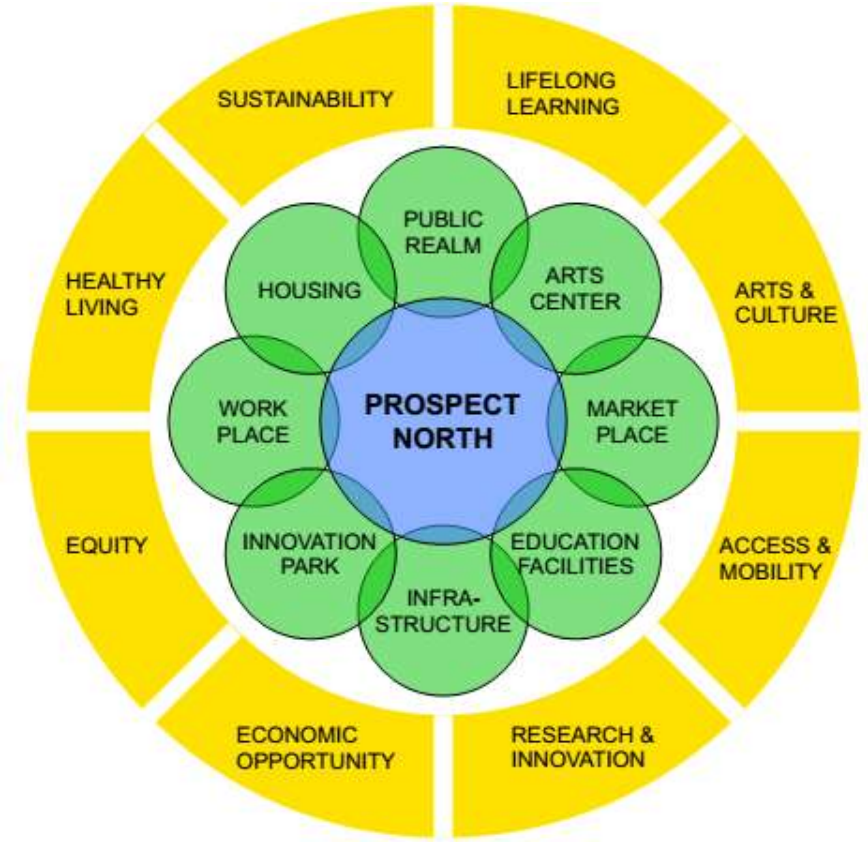
# Initial Feasibility Analysis

## 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

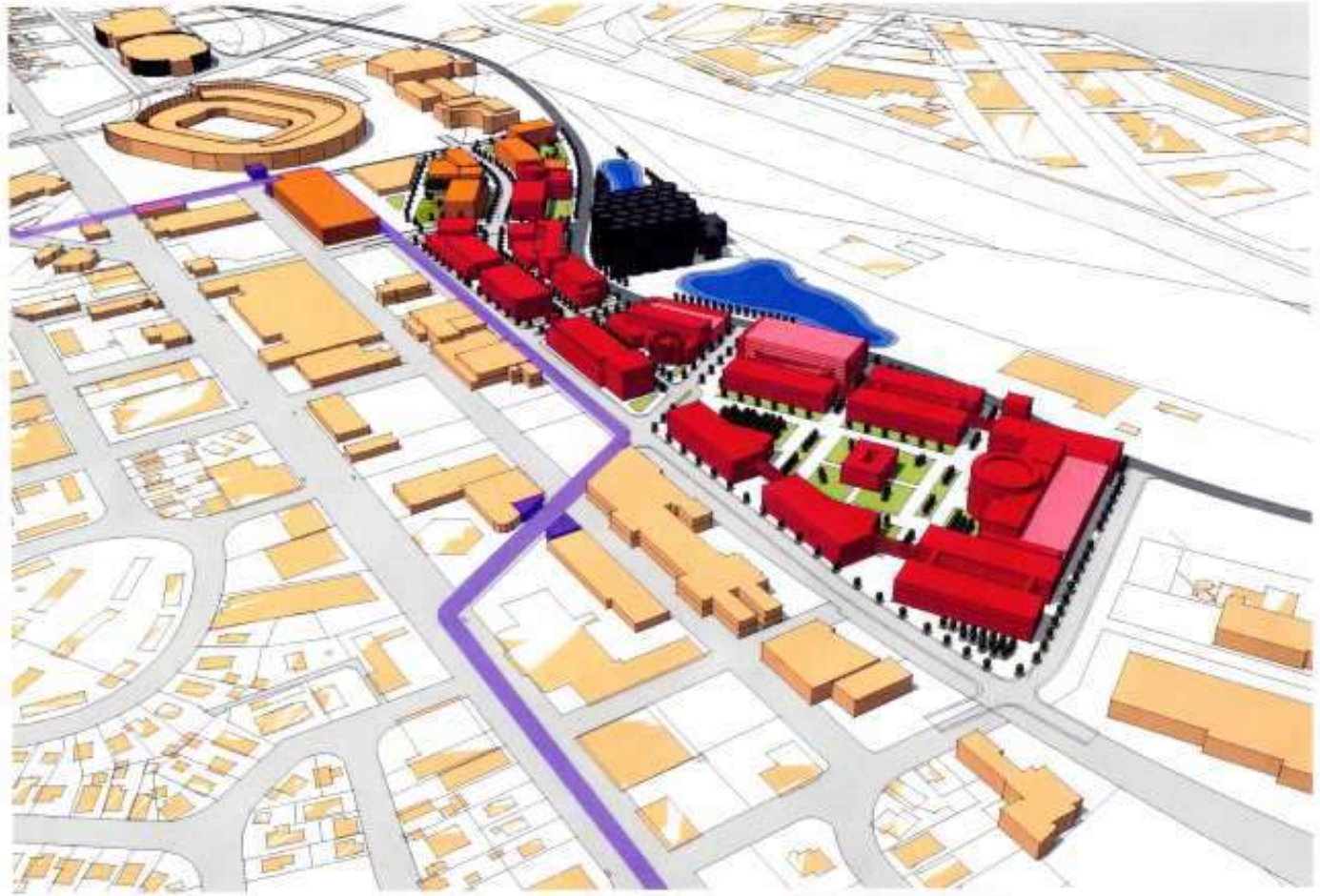


# Land Use Map

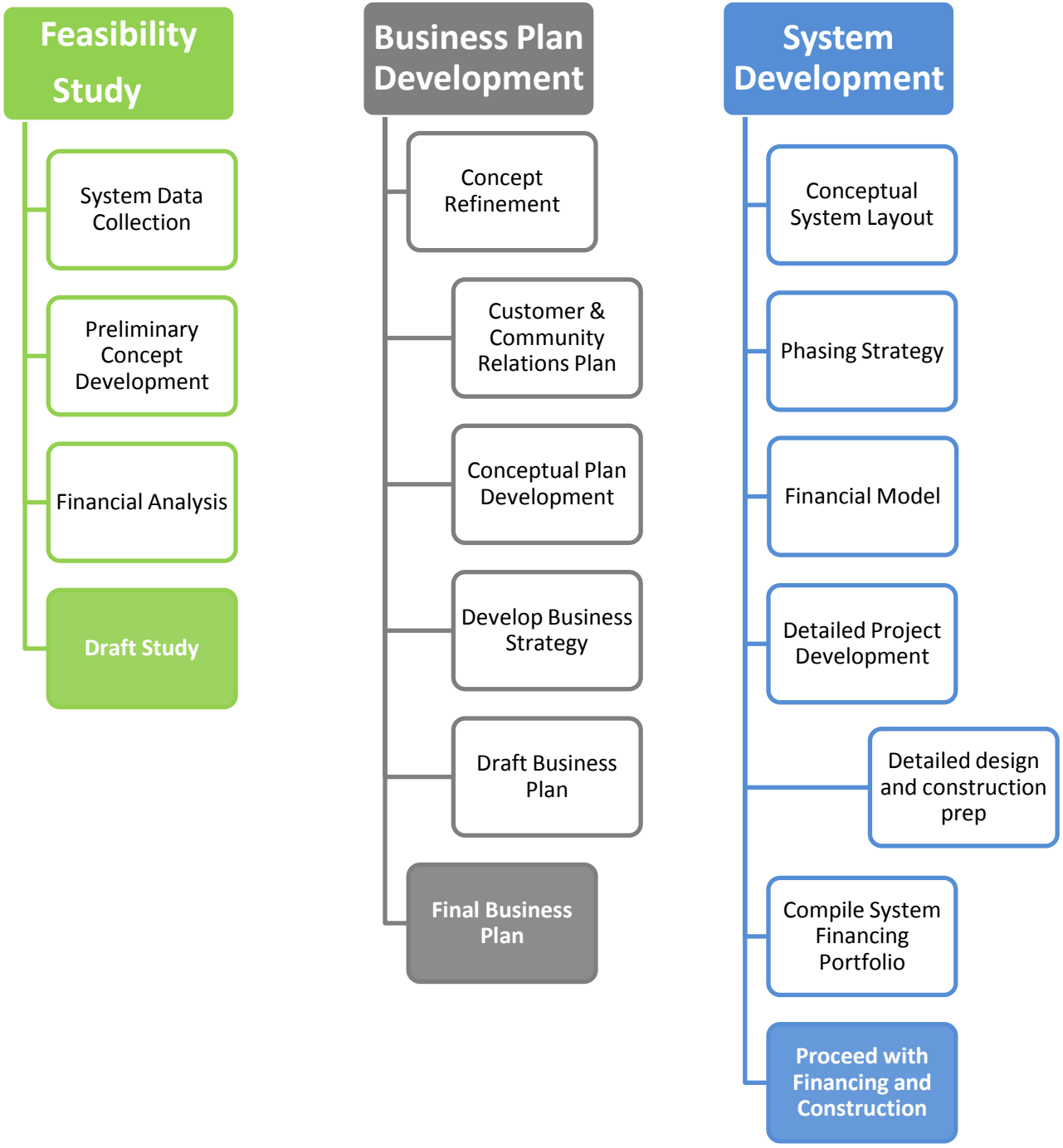

U of M
U of M
U of M
U of M
Hotel
Research Park
Conference Center/Hotel
Existing Industrial
High Density
High Density
High Density
High Density
Light Industrial
Pratt School
Legend

# Proposed Land Use

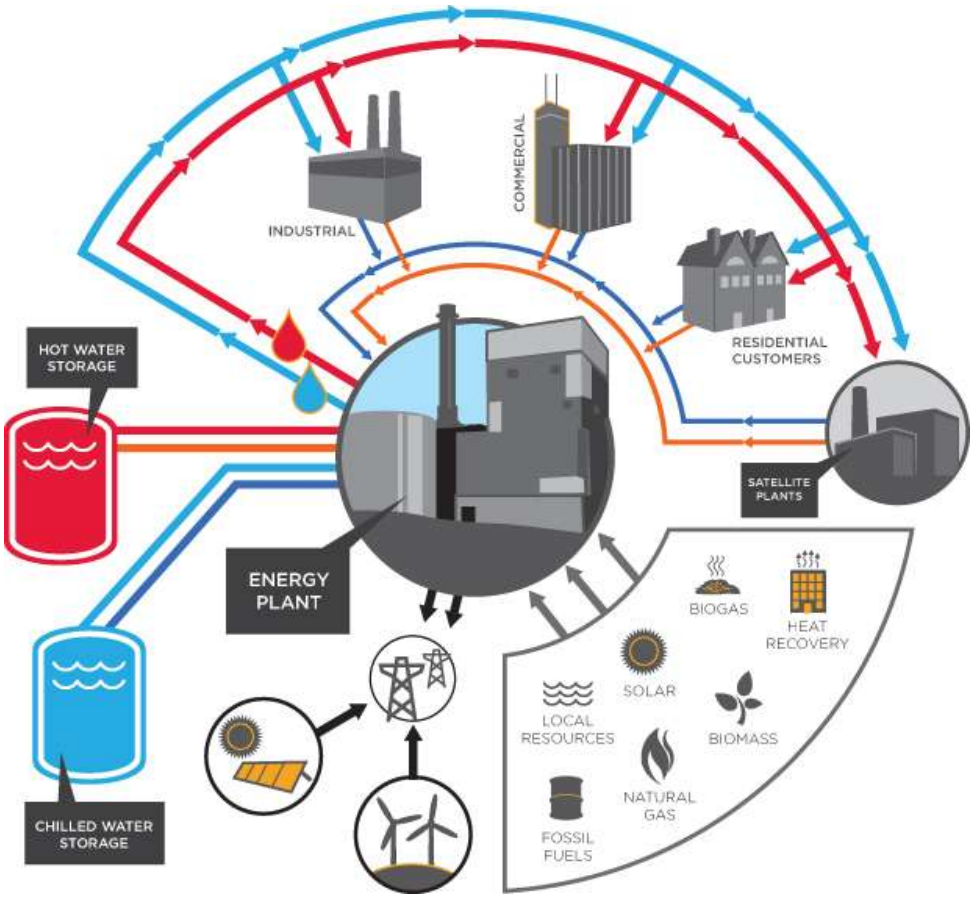
## New Buildings, Businesses and Increased Density



# *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

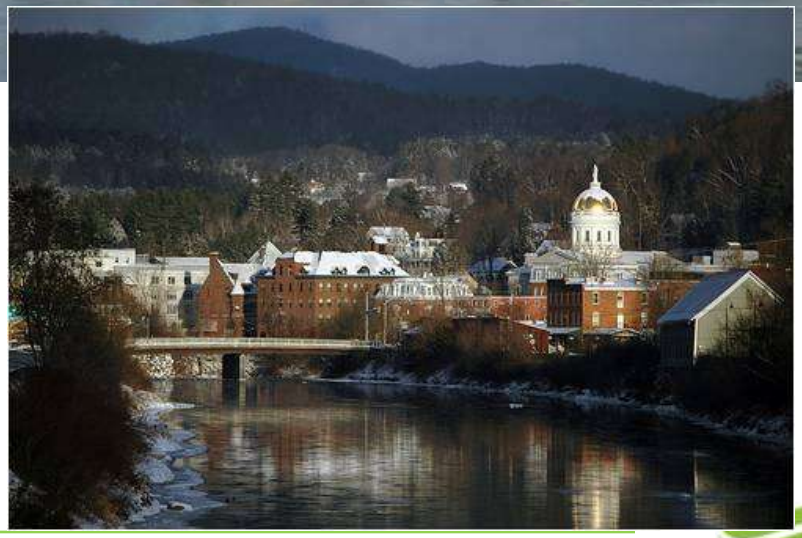
- combined heat and power
- waste heat recovery
- biogas (local brewery)
- hot water storage
- solar thermal
- snowmelt systems
- traditional gas-fired boilers
- chilled water storage with adsorption or absorption cooling
- free cooling
- solar cooling
- traditional electric driven chillers.

# 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

| Square Footage | | Heating | | Cooling | |
|---|---|---|---|---|---|
| | | MMBtu | MMBtu/hr | Tons | Ton-hrs |
| **Commercial/Retail** | 150,000 | 5,535 | 3.26 | 180 | 162,000 |
| **Office** | 150,000 | 5,760 | 3.39 | 345 | 310,500 |
| **Residential** | 1,360,000 | 45,560 | 26.78 | 1,360 | 1,224,000 |
| **Arts Center** | 50,000 | 2,120 | 1.25 | 60 | 54,000 |
| **Research** | 250,000 | 10,600 | 6.24 | 575 | 517,500 |
| **Residential** | 160,000 | 5,360 | 3.15 | 160 | 144,000 |
| **Total** | **2,120,000** | **74,935** | **44** | **2,680** | **2,412,000** |

# Phase 1 Distribution


Green Line LRT

# Phase 1 Distribution

**Hot Water Distribution**

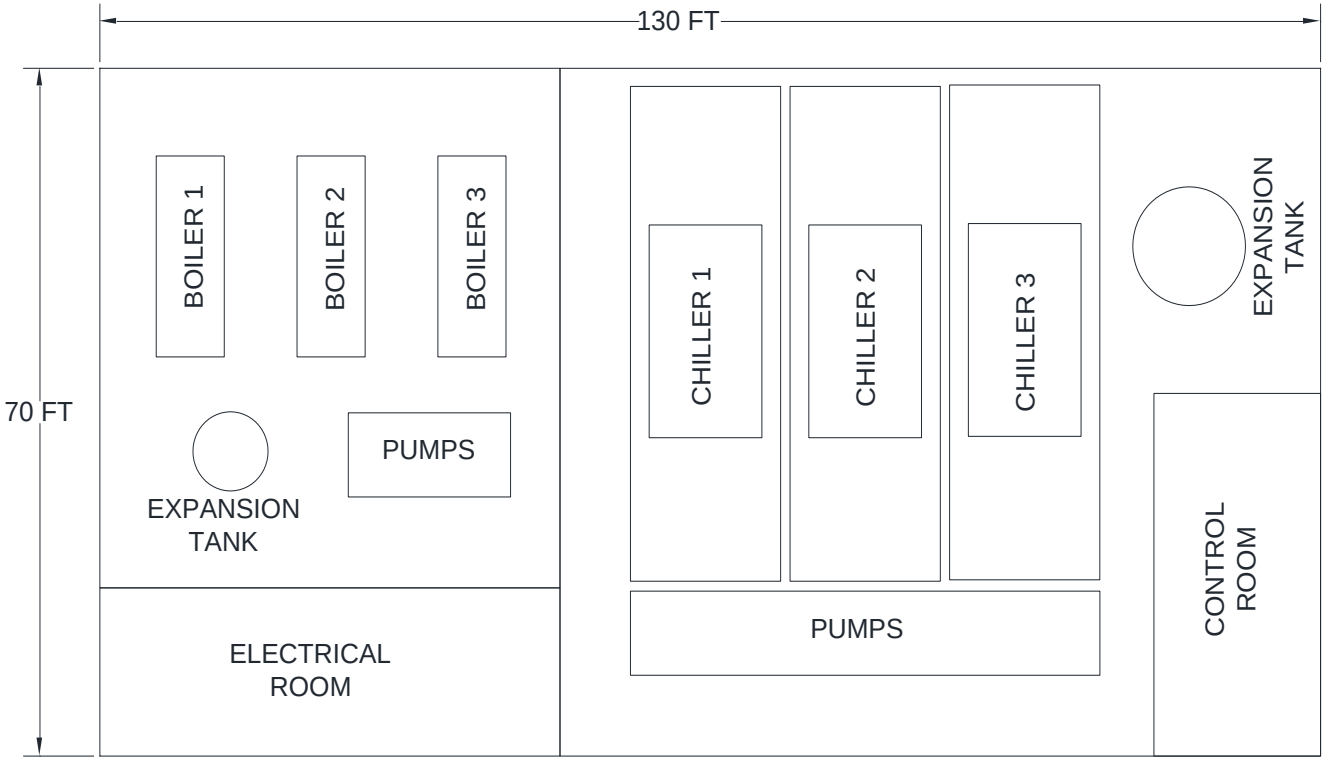
| | Trench Feet |
|---|---|
| **Main Lines** | 4,000 |
| **Service Lines** | 750 |
| **Grand Total** | 4,750 |

**Chilled Water Distribution**

| | Trench Feet |
|---|---|
| **Main Lines** | 4,000 |
| **Service Lines** | 750 |
| **Grand Total** | 4,750 |

# Phase 1 Production

## Central Plant



# 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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