Integrating a Community Energy System with Renewable Biomass - Saint Paul Case Study

Ken Smith
Ever-Green Energy

DISTRICT ENERGY
ST. PAUL™

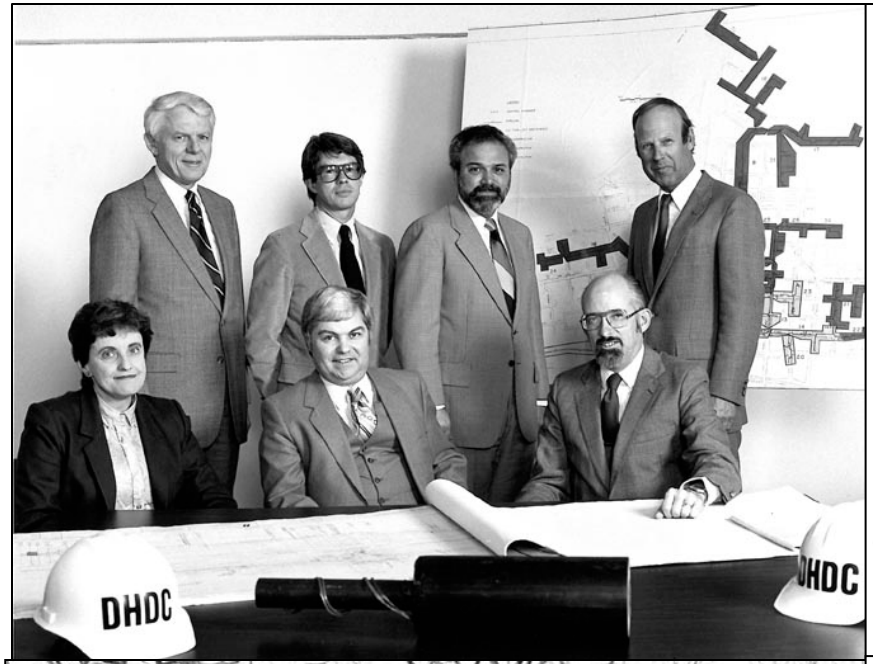
- 501(c)3 non-profit utility
  - No stockholders, cost-based rates
- Public-private partnership
  - city, county, state, federal agencies
  - BOMA, chambers of commerce, industry
- Compete for business
  - 80/60% market share for heating/cooling

EVER-GREEN ENERGY™

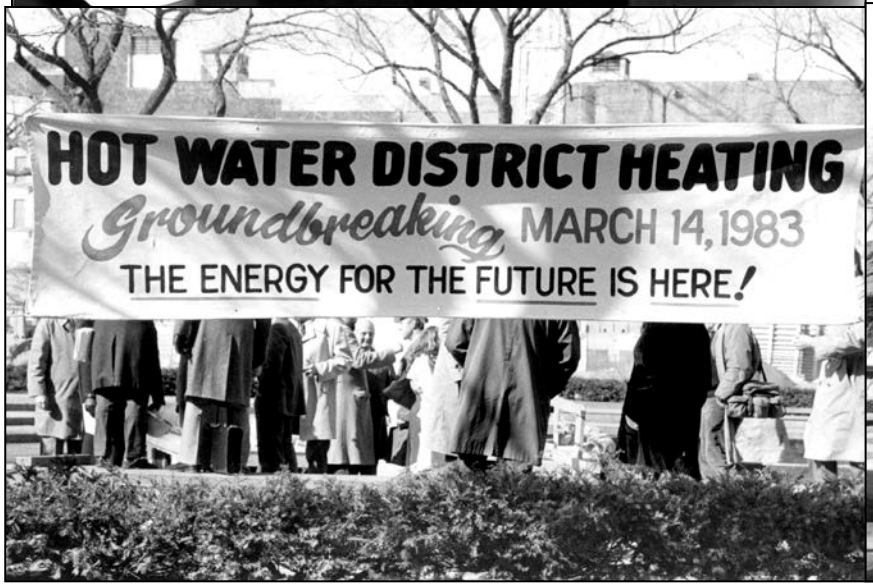
- OMM Services
  - Optimize capacity, reliability and efficiency
  - System advancement and integration
- Business Services
- Project Services
  - Complete lifecycle – planning through start-up
  - Integration of adv. tech. and strategies

Community Scale Heating and Cooling

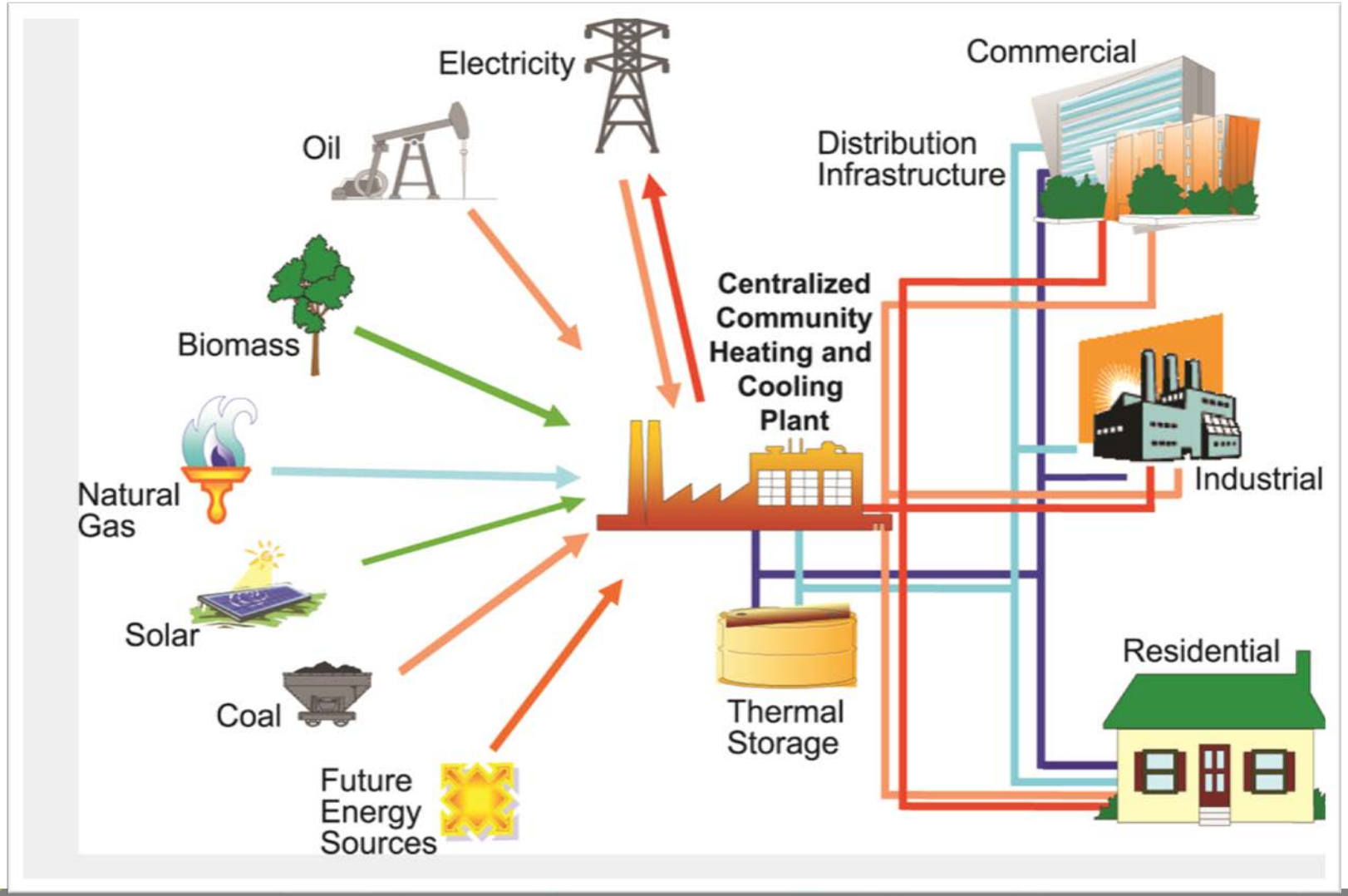
- Underground network of pipes that aggregate building heating and cooling (thermal) loads
- Aggregated thermal loads allows application of technologies and fuels not feasible for individual buildings
- Increases fuel flexibility, efficiency, rate stability, reliability & reduces emissions


DHDC
DHDC


DISTRICT HEATING PLAN
BUILDING OWNERS
9/82 ST. PAUL PIONEER PRESS


HOT WATER DISTRICT HEATING
Groundbreaking MARCH 14, 1983
THE ENERGY FOR THE FUTURE IS HERE!

Community Energy Vision



St. Paul Cogeneration
Combined Heat & Power

- 25 MW of electricity
- Dual fueled – NG and renewable, clean, urban wood residue
- Greenhouse gas CO_2 reduced up to 280,000 tons per year

Sources of Clean Biomass

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

Linking Habitat Restoration to Bioenergy

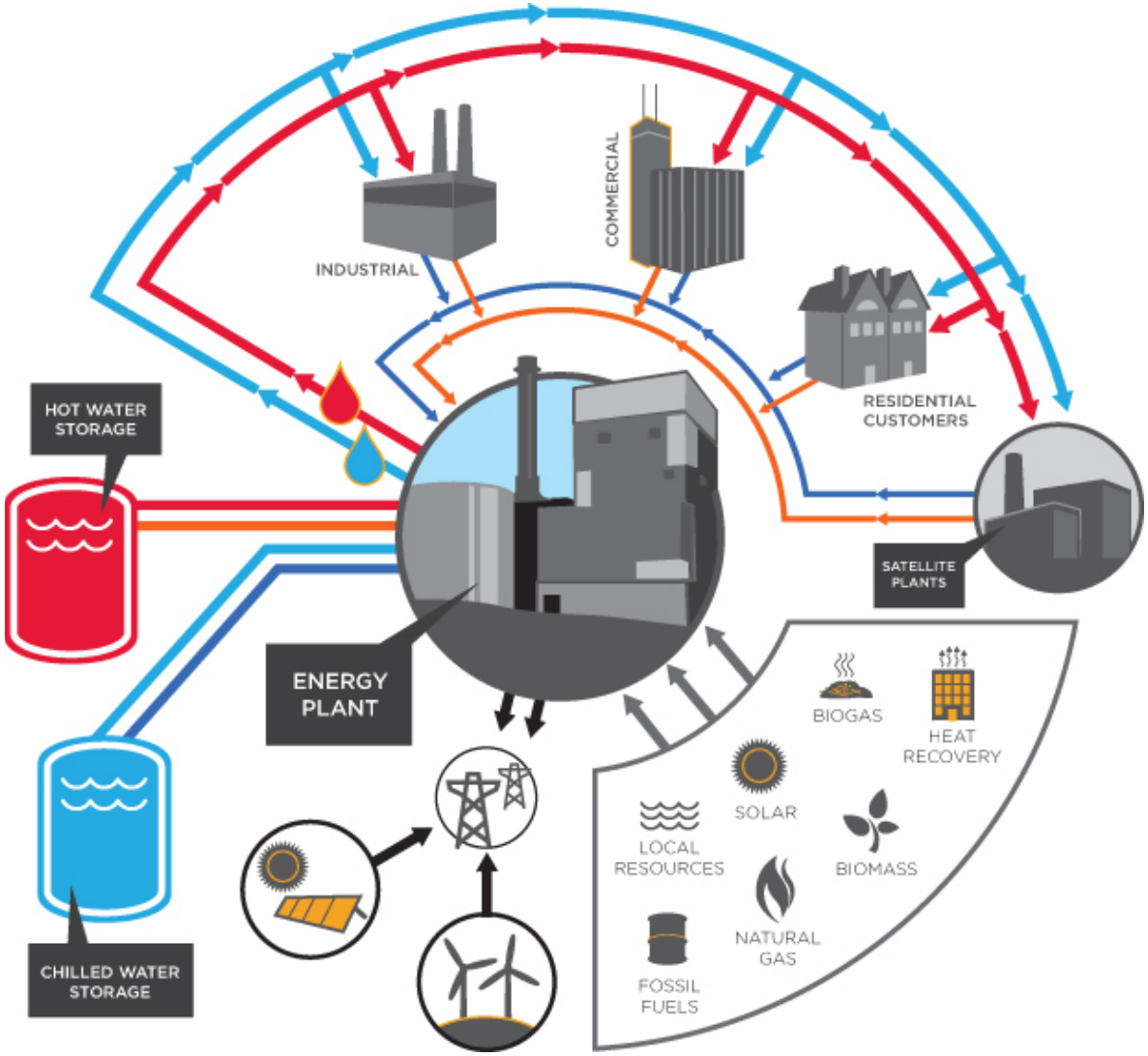
- In 2007, the Minnesota legislature appropriated $500,000 for ecological restoration by removing ecologically inappropriate woody plant material
- The Minnesota Department of natural Resources created small grants pilot project to cut, move and stage woody biomass material from public and private lands

Processing Wood Waste Into Biofuel

Biomass Advantages

- Large quantities in MSP metro area
- Using for biofuel diverts clean wood waste from landfills
- Provides communities an economical way to dispose of wood waste
- Stable fuel cost
- Biofuel expenditures stay in local community

Integrated Energy System Vision



Thermal Storage

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

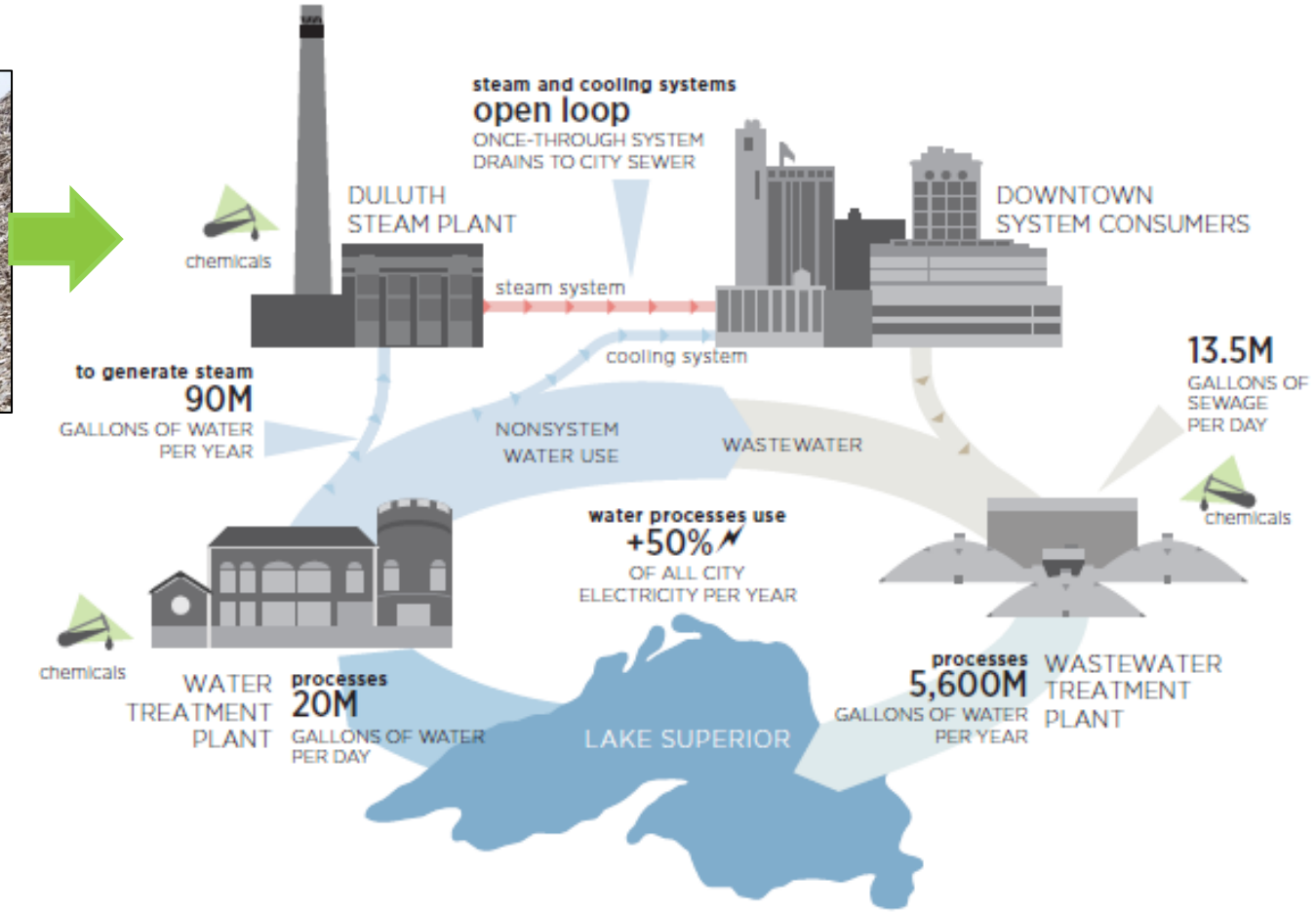
Solar Thermal Integration

Heating and Cooling a City


www.saintpaulecodistrict.com

Biomass Integration in Duluth

Biomass Co-firing

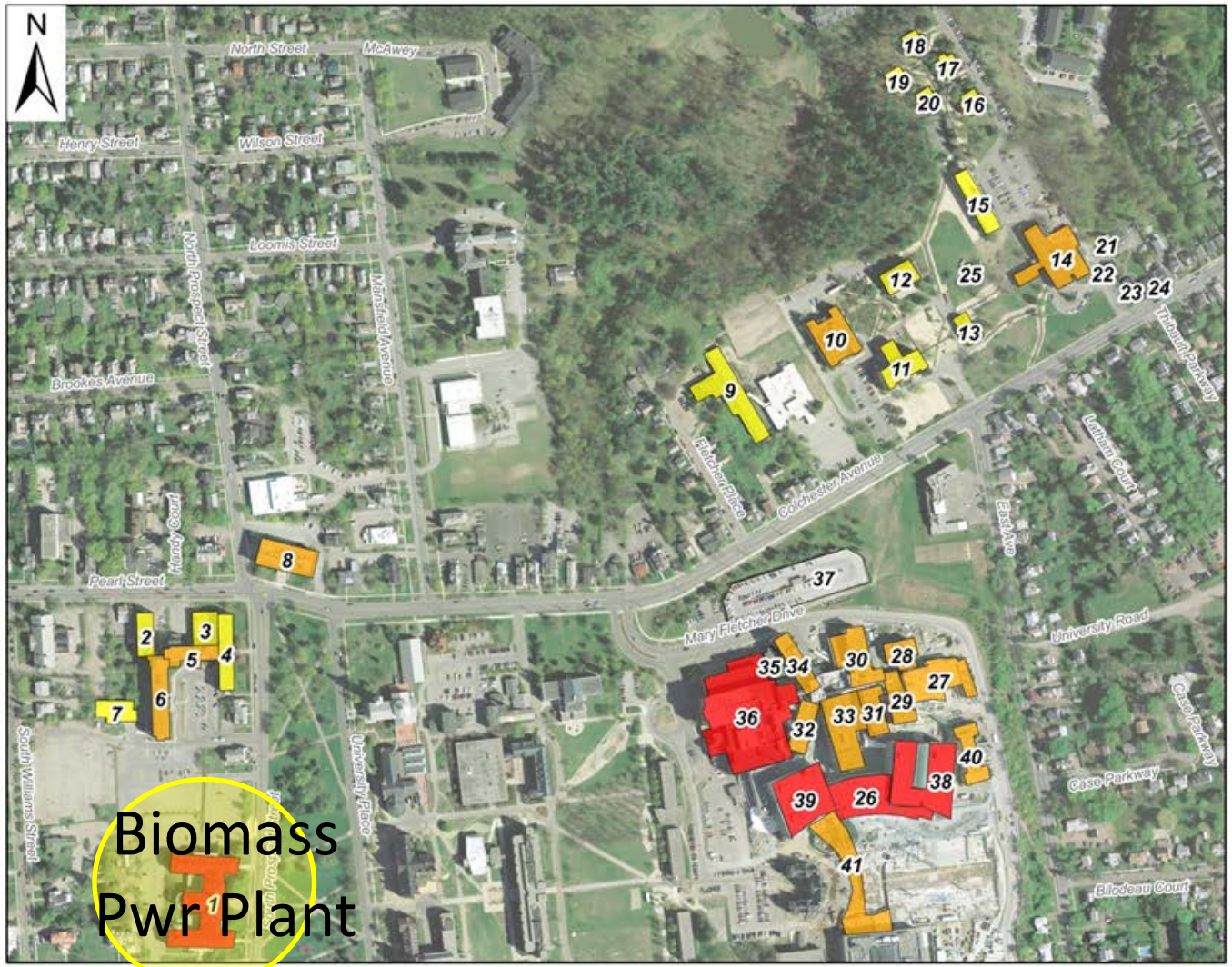


Montpelier, Vermont

DISTRICT HEAT MONTPELIER
AN ENERGY INDEPENDENT DOWNTOWN

- City/State Partnership
- Biomass-fired steam and hot water district heating system

Burlington, Vermont



Bldg_ID	Building Name
0	McNeill Station
1	Waterman
2	Rehabilitation
3	Clinic
4	Old Hall
5	St Joeseph's Pavillio
6	Arnold Pavillion
7	Boiler House
8	Dewey Hall
9	Ira Allen
10	Delhanty
11	Mann Hall
12	Farrell Hall
13	The Villa
14	McAuley Hall
15	Mercy Hall
16	McCann Hall
17	Hunt Hall
18	Ready Hall
19	Sichel Hall
20	Richardson Hall
21	Cottage 1
22	Cottage 2
23	Cottage 3
24	Cottage 4
25	Boiler Plant
26	Main Pavilion
27	Central Plant
28	Fletcher
29	Engineering
30	Shepard North
31	Shepard South
32	Smith
33	Baird
34	Patrick
35	Mod B
36	McClure
37	Parking Garage
38	East Pavilion

The DMC Initiative Opportunity

DMC Aspirations

- *"…transforms the epicenter of Rochester into a vibrant urban center and one of America's model cities."*
- *Energy Vision: "Implement the most progressive, responsive, and resilient district energy network in the country"*
- *Climate Vision: "Achieve climate neutrality across the Destination Medical Center"*

Source: DMC Development Plan

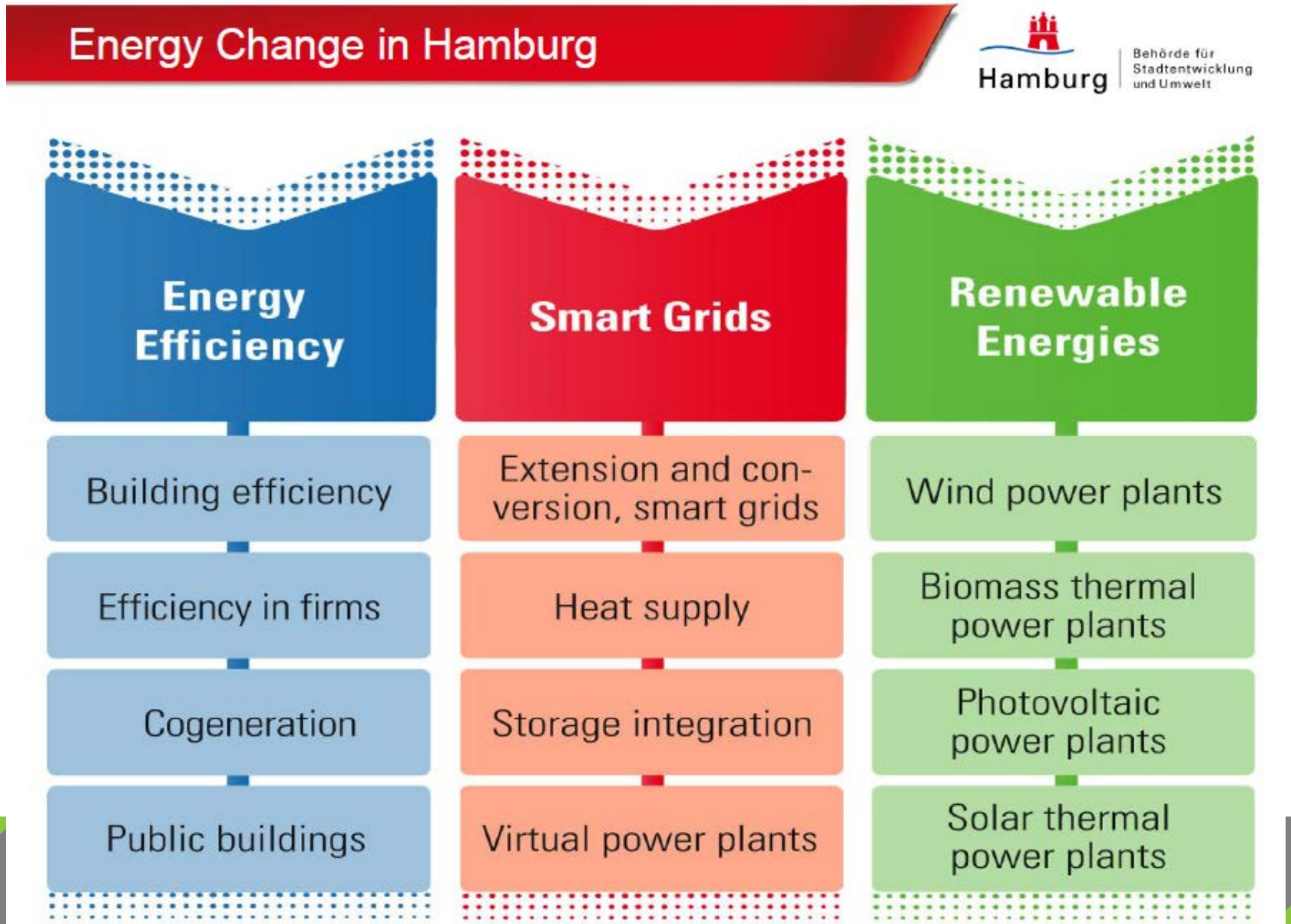
Achieving Energy Goals Requires Planning

Local Energy Planning – Where We Start

- What is the vision? What are the goals?
- What are the wants and needs?
- Are we just as willing to solve future problems as we are to fix current ones?
- What local resources are available to meet the goals and vision? How can they be applied in a practical matter?
- Can we find a balance between environmental AND economic stewardship?
- Are there opportunities for partnership?
- *Are we willing to admit from the start that we may not yet fully understand the challenge, therefore we can't possibly know the answer?*

What are the Goals?

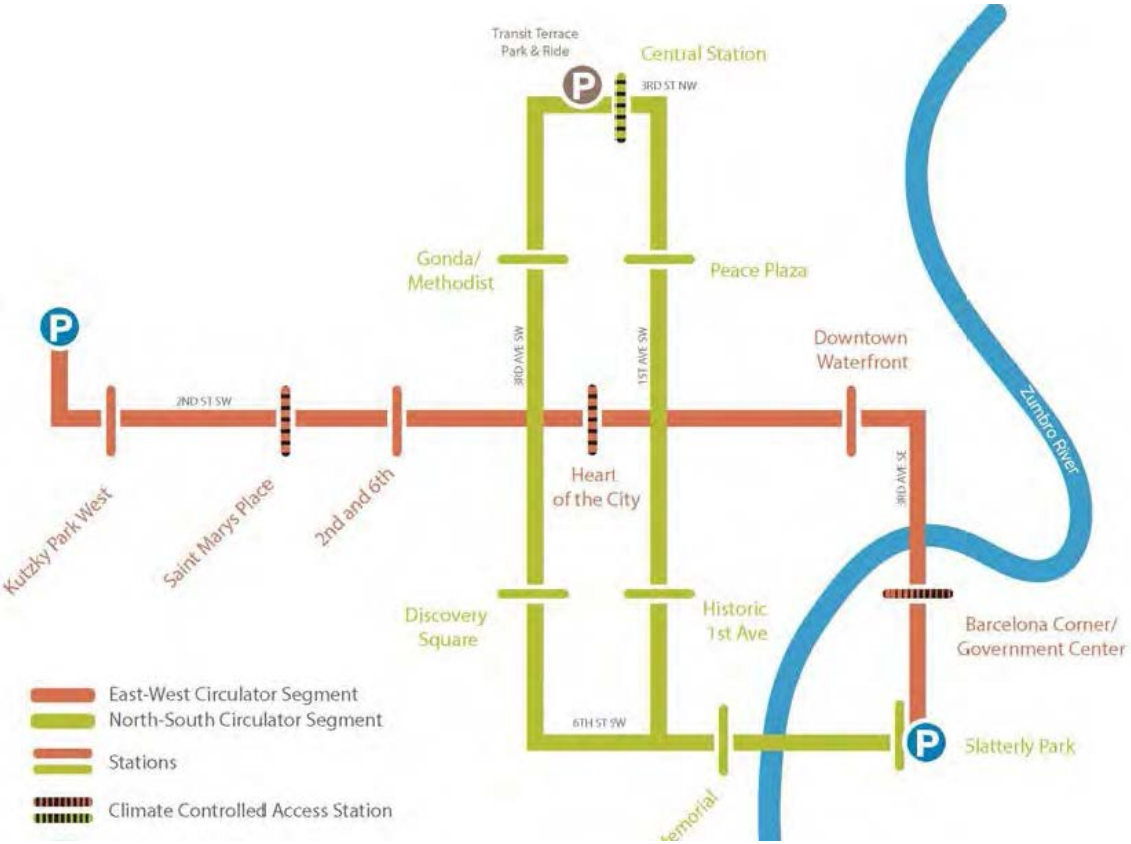
New Normal in “Model” Cities



Local Energy Planning – What are the trends?

- District approach – address energy, transit, water, waste, fiber, and other infrastructure needs
- Infrastructure grids are becoming less isolated (electric, thermal, transportation, water, waste)
- Increased diversity of energy sources & technical solutions
- Increased stakeholder involvement
- Local government leadership
- Finding alternatives that are environmentally-minded and cost-competitive – the market is changing

Infrastructure Partnership Opportunities



Lessons from Leading “Model” Cities

- Breakdown the silos
  - Holistic approach to energy planning
  - System integration
- Define shared vision, principles and metrics, and measure results
- Engage the community
- Competition / contests used to encourage creativity
- Achieving world class results requires planning, collaboration/partnership, perseverance, leadership

Questions

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