FORD SITE

A 21st Century Community

The Ford Site Energy Study

An Informational Meeting Hosted by the Ford Site Planning Task Force

January 29, 2015

7:00 – 8:30 p.m

Agenda

7:00 Welcome – Kyle Makarios, Ford Task Force

7:05 Mayor Chris Coleman

7:10 Energy – Anne Hunt, Mayor's Office

7:30 Making a Sustainable Site at Ford – Councilmember Chris Tolbert

7:35 Ford Energy Study introduction – Merritt Clapp-Smith, Planning & Economic Devel.

7:40 Ford Energy Study information – Ramboll

8:10 Q & A – Kyle Makarios

8:30 Adjourn

Upcoming Ford Meetings

Late February – Parks and Open Space

Early April – Walking, biking and transit systems

Late April/Early May – Streets and parking

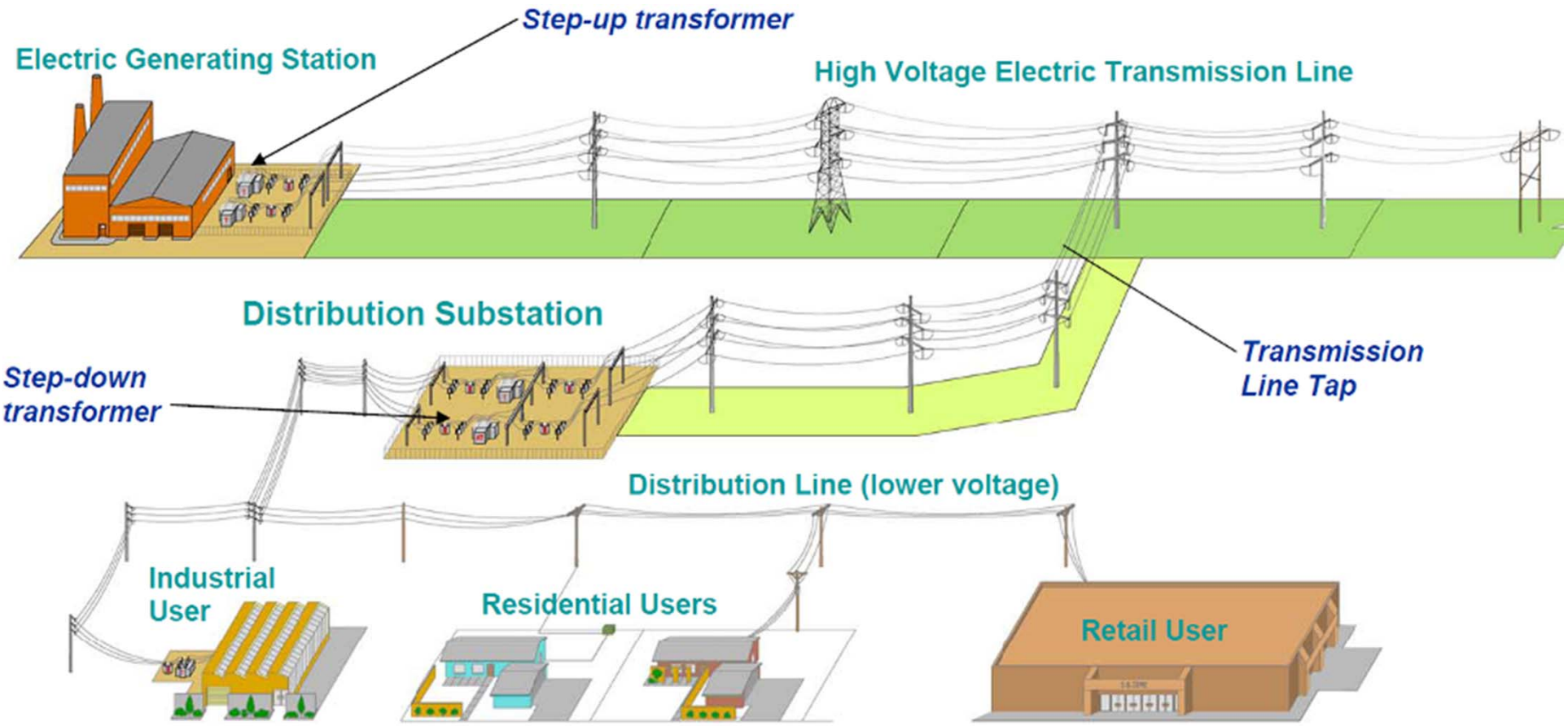
Late May / Early June – Stormwater management and other site infrastructure

Summer meetings – zoning, jobs, environmental

UNITED STATES ENERGY USE BY SECTOR

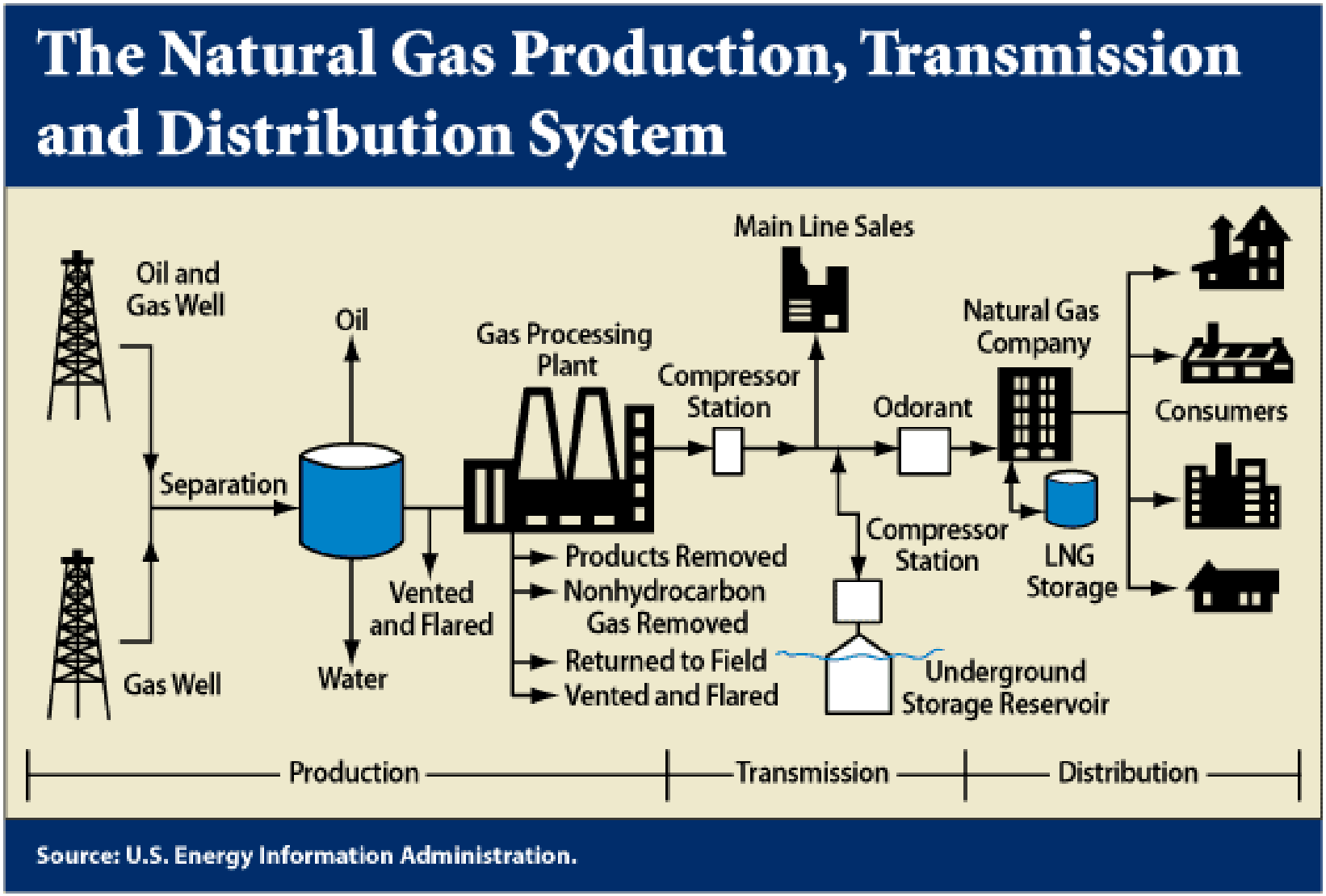
National Energy Consumption by Sector. USEIA 2009

Electricity Supply Chain



Source: Xcel Energy

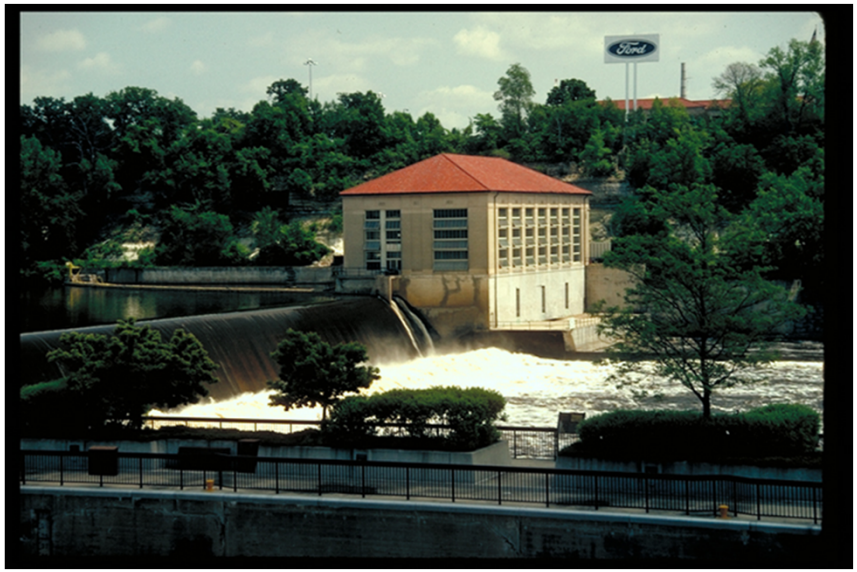
Natural Gas


The Natural Gas Production, Transmission and Distribution System
Oil and Gas Well
Gas Well
Separation
Oil
Water
Vented and Flared
Gas Processing Plant
Products Removed
Nonhydrocarbon Gas Removed
Returned to Field
Vented and Flared
Compressor Station
Main Line Sales
Underground Storage Reservoir
Compressor Station
Odorant
Natural Gas Company
LNG Storage
Consumers
Production
Transmission
Distribution
Source: U.S. Energy Information Administration.

The Energy System

Status of Hydro Facility

- Ford's 14- 18 MW Hydro Facility
- Sold in 2008 to Brookfield Energy
- Still generating electricity and sold to grid
- Using this would require Legislative and Public Utilities Commission authority



Xcel Energy

- In 2006, Xcel demolished their 250 MW coal-burning power plant
- In 2008, built a new natural gas-fired, combined cycle 550 MW power plant
- Significant emissions reduction
  - 92% particulates
  - 97% NOX
  - 99% SOX
  - 100% Mercury
- Reduced CO2 by approx. 650,000 tons annually

Xcel's Carbon-free Mix

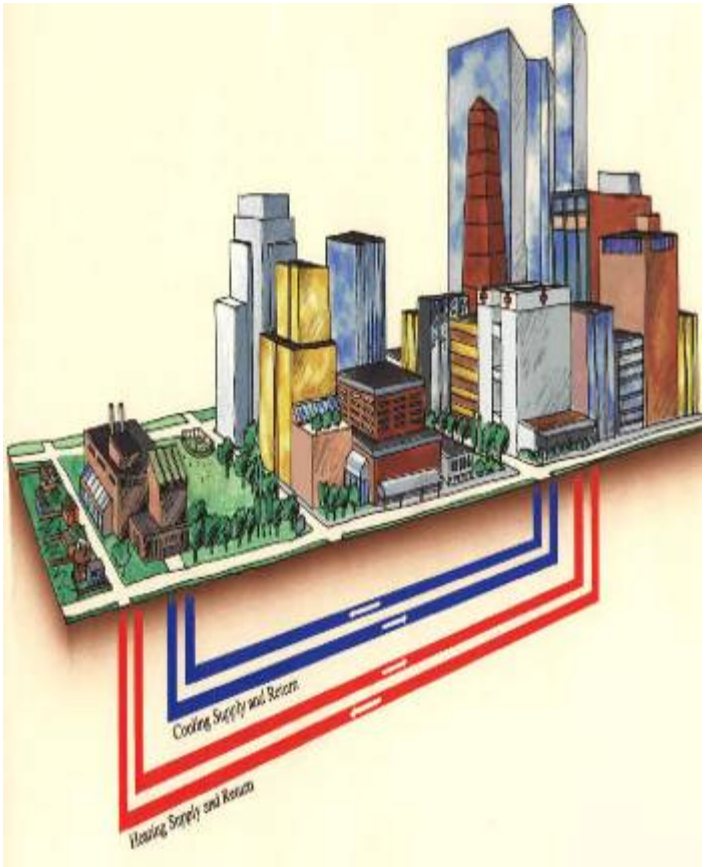
- 51% Carbon-free electricity
- #1 Wind Energy provider for last 10 years & proposing another 1,800 MW by 2030
- Top 10 in solar in the US & proposing another 1,700 MW by 2030
- Windsource – 3rd largest voluntary green energy program in the US

District Energy St. Paul

- Serving Saint Paul customers since 1983
- North America's largest hot water district energy system
- Minnesota's leading biomass, renewable energy system
- National model for integrations of renewable energy and combined heat & power
- 30 MW of electricity from 300,000 tons urban wood waste
- CO2 reduced by 250,000 tons/year

District Energy

- Underground pipes connect users to flexible fuel sources, including solar
- Systems utilize steam, hot or chilled water
- Efficient delivery and consumption of energy



Source: District Energy St. Paul

District Energy Solar Thermal

- First solar project in nation integrated with district energy system
- Over 1 MW system with 144 commercial-grade solar collectors
- 21,000 sq. ft. of roof with 220,000 lbs. of American steel and 1,600 linear feet of American made pipe.
- $1 M DOE Grant and $1.2
- Add'l solar thermal at Ramsey County Law Enforcement Center

Energy-Efficient City Facilities

- Since 2009, completed 117 projects with estimated demand reduction of 1172 kW & annual energy savings of 4 million kWh
- Federal stimulus paid 35% - $900,000
- Leverage $675,267 Xcel Energy Rebates
- $300,000 annual savings & reduced energy 30 %

Saint Paul Solar Photovoltaic

220 kW of solar on 6 facilities:

- St. Anthony Park Rec Center (7.75 kW)
- Rondo Library (40kW)
- Western District Police Station (40kW)
- Public Works Garage (40kW)
- RiverCentre Parking Ramp (82kW)
- Science Museum (10.4kW)

3 solar electric vehicle (EV) charging stations

$1.5 M federal stimulus grant and $400,000 Xcel rebates

A SUSTAINABLE FORD SITE

- Green Manufacturing Reuse Study (MN Legis. Grant)
- Open Space Priorities & Financing Study
- Sustainable Stormwater Management (MPCA Grant)
- Roadmap to Sustainability for the Ford Site (MPCA Grant)
- Historic Preservation Eligibility Study (Ford)
- Geotechnical Evaluation of the Ford Tunnels (Ford)
- Environmental Assessment Under MPCA Review (Ford)

What's the Ford Energy Study?

1) Identify credible opportunities, technologies and strategies to pursue a "net zero" redevelopment at the Saint Paul Ford site

2) Provide analysis and implementation framework to land owner, developers, and policy makers with the expectation that it will advance

3) Share concepts, study template and findings with other developments

- Once in a lifetime opportunity to create a regional/international model
- Incredible local talent who want to create world class project in the region
- Urgent timeline to guide Ford and prospective developers
- Funded by a McKnight Foundation grant and the U.S. Environmental Protection Agency

Consultant Team

Ramboll Energy

- Lead Pernille M Overbye
- Jakob Bjerregaard

Based in Copenhagen

Krifcon Engineering

- Lead Flemming Kristenssen

Based in New York City

Technical Advisory Group

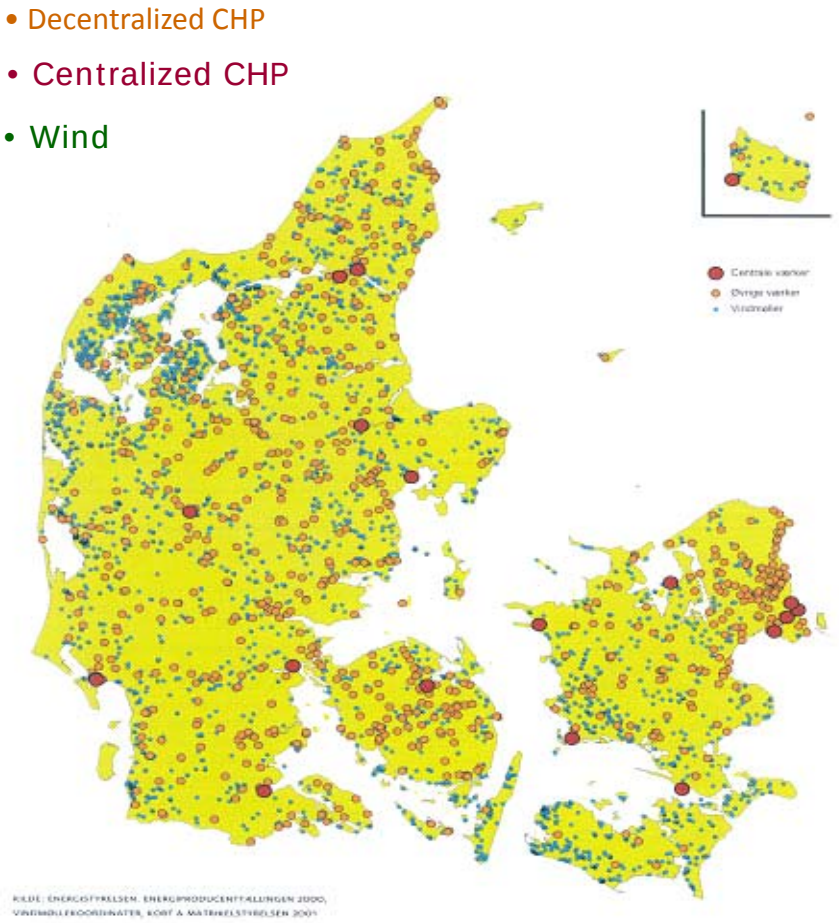
- George Andraos, Ford Motor Company
- John Carmody, Senior Fellow, University of Minnesota
- Eric Engh, Ryan Companies
- Bill Grant, MN Department of Commerce
- Richard Graves, U of M Center for Sustainable Building Research
- Zack Hansen, Ramsey County Environmental Health
- Alexandra Klass, U of M Law School
- Matt Kramer, St. Paul Chamber of Commerce
- Laura McCarten, Xcel Energy
- Michael Noble, Fresh Energy
- Matt Schuerger, Energy Systems Consulting
- Ken Smith, District Energy St. Paul
- Sheldon Strom, Center for Energy and Environment
- David Thornton, MN Pollution Control Agency

FORD SITE

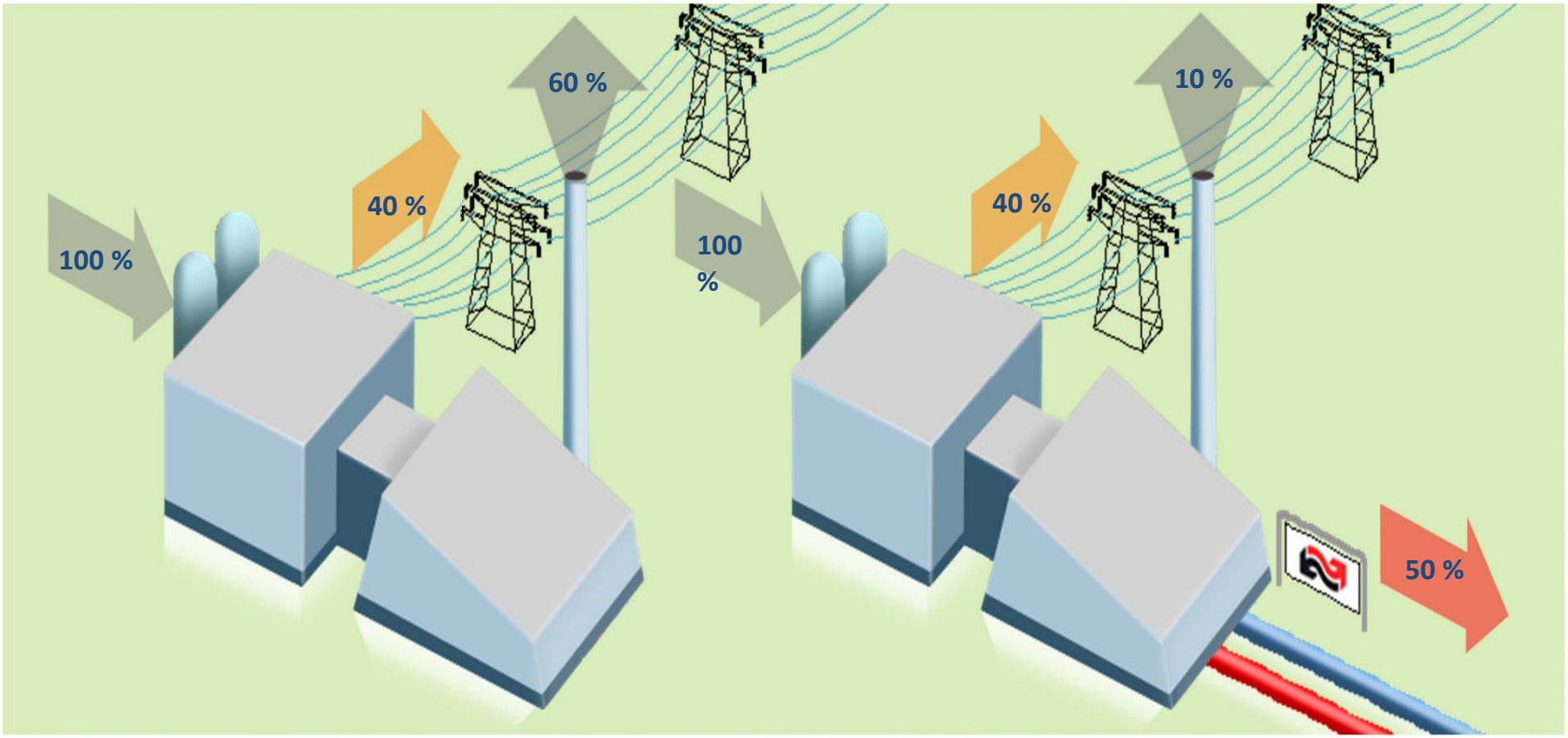
A 21st Century Community

Our Danish Background

- No Power Station without heat off-Take
- Over 400 District Heating schemes in DK
- Over 60% of all households in Denmark are connected to a heat network (and it is increasing)
- More than 90% connection to most networks



Co-Generation



POWER

CHP/COGENERATION

CARLSBERG DEVELOPMENT

Rendering: luxigon


NORDHAVN DEVELOPMENT


CHICAGO LAKESIDE DEVELOPMENT
Centered around a design for living differently. Lakeside's vision for the nearly 600-acre site includes plans for a connected and accessible community, next generation infrastructure, innovative architecture and lakefront access, all surrounded by a vibrant mix of residential, retail and commercial space, a new high school and a 1,500 slip marina.

Work To Date

- Toured Ford Site and met with key stakeholders
- Hosted two Technical Advisory Meetings in September and November 2014
- Completed reuse study of existing tunnels and steam plant buildings
- Draft report best practices in alternatives to car use
- Draft report on building requirements
- Draft report on energy technologies and systems
- Third Technical Advisory Meeting, developer and community meetings scheduled this week

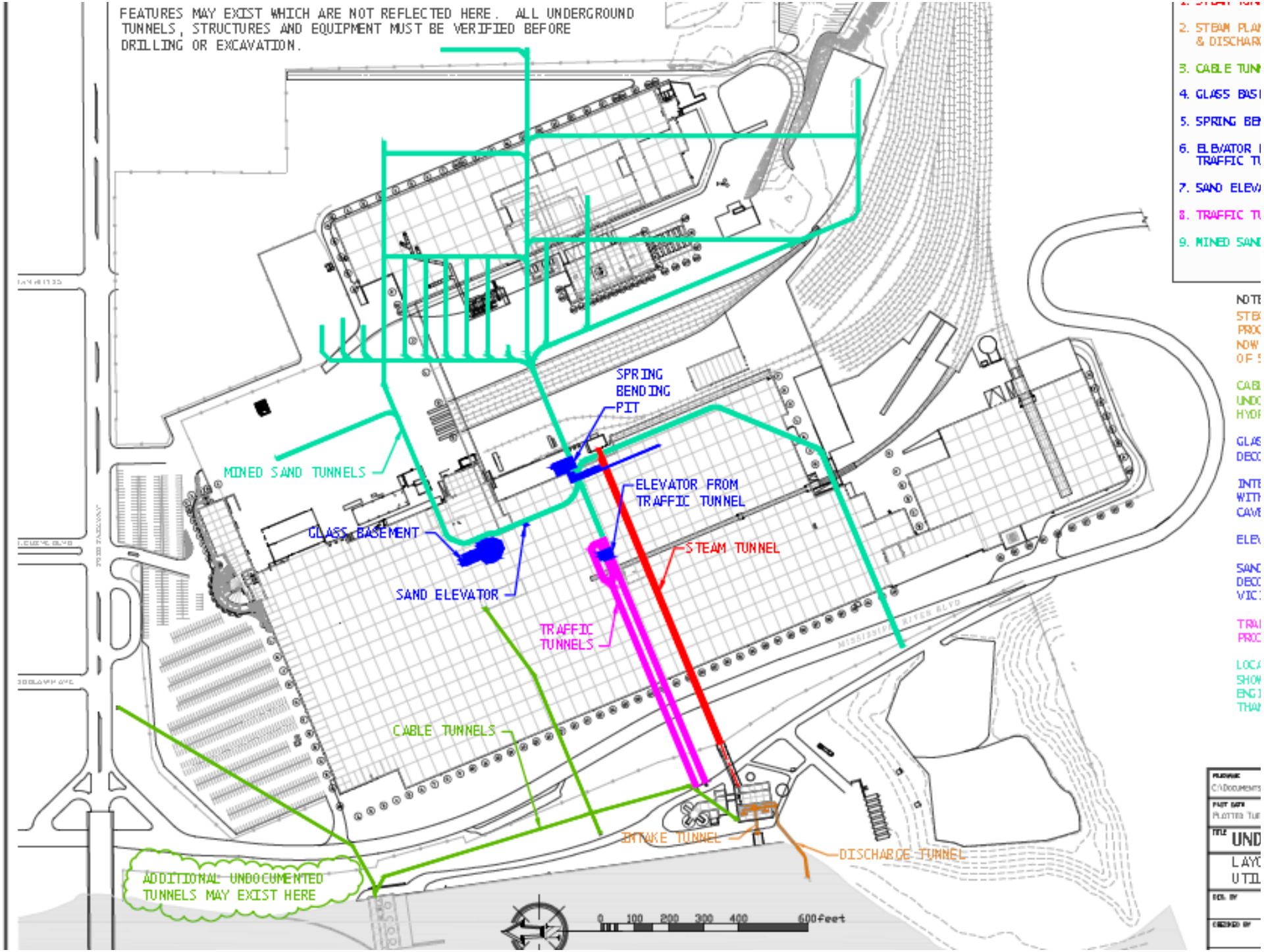
Goals and Means

GOALS

- Inspirational project
- Competitiveness
- Security of supply
- Sustainability
- Energy efficiency

POSSIBLE MEANS

- Design standards
- Micro grid
- Onsite production
- District energy
- Storage
- Electrification


FEATURES MAY EXIST WHICH ARE NOT REFLECTED HERE. ALL UNDERGROUND TUNNELS, STRUCTURES AND EQUIPMENT MUST BE VERIFIED BEFORE DRILLING OR EXCAVATION.
2. STEAM PLA & DISCHAR
3. CABLE TUN
4. GLASS BAS
5. SPRING BE
6. ELEVATOR TRAFFIC T
7. SAND ELEV
8. TRAFFIC T
9. MINED SAN
SPRING BENDING PIT
MINED SAND TUNNELS
ELEVATOR FROM TRAFFIC TUNNEL
GLASS BASEMENT
STEAM TUNNEL
SAND ELEVATOR
TRAFFIC TUNNELS
CABLE TUNNELS
INTAKE TUNNEL
DISCHARGE TUNNEL
ADDITIONAL UNDOCUMENTED TUNNELS MAY EXIST HERE
0 100 200 300 400 600 feet

Ford Steam Tunnels

Steam Plant & Waste Water Treatment

Estimated Site Energy Utilization Intensity (EUI) for different new building types in climate zone 6A (St. Paul) using different energy codes or certification systems.

kBtu/ft^2/yr

Code / Building Type	Prototype Floor Area (sf)	ASHRAE 90.1-2004 (~ Current MN Energy Code)	2012 IECC / ASHRAE 90.1-2010	SB 2030 (2020) -80%	Danish Building Code BR 2010	Danish Building Code Class 2015
Small office	5,502	53.7	41.8	31.5	37.1	25.8
Medium office	53,628	62.2	46.2	31.0	36.1	25.2
Large office	498,588	99.7	84.8	30.0	36.1	25.1
Stand-alone retail	24,692	107.2	71.9	29.5	36.3	25.2
Strip mall retail	22,500	118.3	85.4	30.0	36.3	25.3
Supermarket	n/a	208.0	145.0	59.5	36.0	25.1
Primary school	73,959	100.1	75.1	35.0	36.1	25.1
Secondary school	210,887	98.4	64.7	30.0	36.1	25.1
Mid-rise apartment	33,741	68.0	60.4	41.0	28.6	19.6
High-rise apartment	84,360	72.1	65.8	44.0	28.5	19.5

Transportation

1. Holistic infrastructure concept
2. Land use based on principles of mixed use
3. Balanced physical planning measures - matching density to the transit capa
4. Increased density around transit nodes
5. Compact community with short commutes
6. Walkability – neighborhoods that promotes walking
7. Cyclable city – direct, safe and fast cycle routes with high connectivity
8. High quality transit supply – BRT and/or LRT
9. Mode shift facilities – regulation of parking, P&R incentives
10. Strategic infrastructure design
11. Strategic parking policy
12. Branding and communication measures
13. Economic incentive planning

Solutions screening

Cost effectiveness

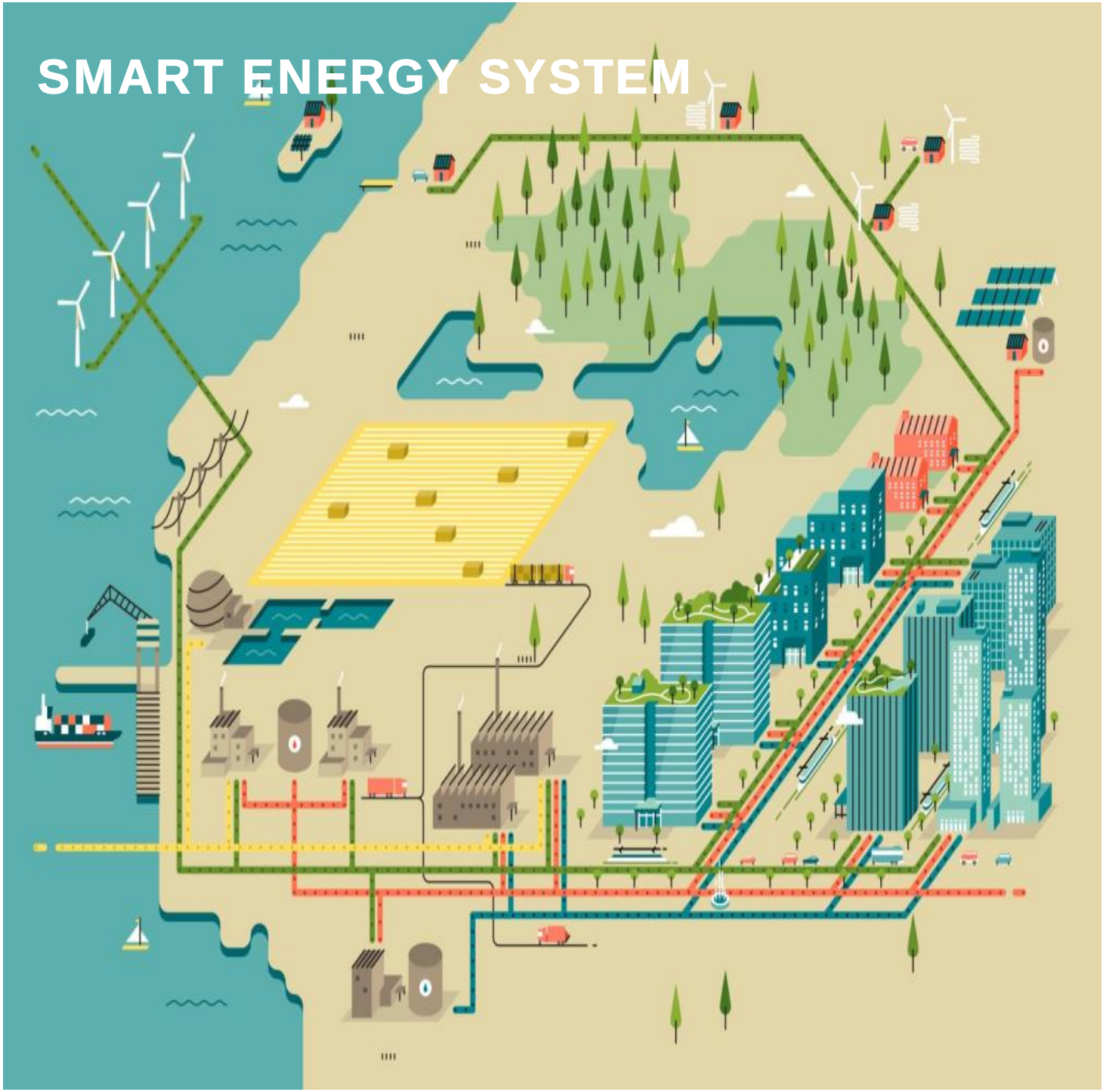
Energy efficiency

Net Zero

Resilience

Legacy/Innovation

SMART ENERGY SYSTEM



- Surplus biomass for CHP plant
- Surplus straw for CHP plant
- Offshore wind farm
- Large building
- Residential building
- Harbour, unloading of biomass
- Wastewater treatment and biogas plant
- Solar heating plant and heat storage
- Distant building w/solar PV
- Outskirt building w/ heat pump, solar PV and wind turbine
- CHP plant fuelled by gas, straw, wood, city waste + heat storage
- District heating/ cooling plant + cold water storage
- Industry with process energy and surplus heat
- Electricity
- District heating
- District cooling
- Gas

Questions and Comments

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