

# DISTRICT ENERGY ANALYSIS: South Waterfront — North District

## Background

The 402-acre North Macadam urban renewal area, a subset of which is the South Waterfront District, was created in 1999 with the purpose of turning this former industrial area, and largest supply of vacant land in Portland, into a mixed-use central city neighborhood. The current development of a Conceptual Utility Master Plan for the South Waterfront North District (representing about a third of the total South Waterfront planning area) offers a critical opportunity to accommodate district energy infrastructure in future street grading, utility planning, and possibly the redevelopment of SW Moody Avenue. District stakeholders are currently considering two district energy scenarios. One scenario includes a system serving only OHSU's Schnitzer campus (outlined in red at right), while the second scenario (outlined in yellow) considers serving the entire North District study area, including OHSU and all private developments, offering greater economies of scale and diversity of uses.

The complete North District study area has a higher energy density than the North Pearl study area and is comparable to the energy density of the Southeast False Creek area of Vancouver, which currently operates an economically successful district energy system. The North District has other important characteristics that are well suited to district energy. Compared with North Pearl, it has a more diverse mix of uses (including hospital/university, office, residential and mixed-use) that improves the utilization of equipment and the ability to capture synergies between heating and cooling loads. The North District also consists entirely of new construction on a former brownfield site. New construction simplifies district energy integration, though it creates additional uncertainty with respect to development timelines.



### North District Key Statistics

Million Square Feet of Floor Area (Existing/New)	0 / 9.4
Annual Space Heating / Cooling (MW.h)	69,000 / 50,500
Peak Heating / Cooling Demand (MW)	27 / 38.5
On-site Boiler & Chiller Space Req.s (1000 sq. feet)	33 - 42
District Energy Center Space Req.s (1000 sq. feet)	21 - 27

### Potential GHG Reduction by Technology (tons/year)

Baseline Emissions	25,000
Gas Boilers & Electric Chillers with Waste Recovery from Cooling	7,700
Natural Gas Cogeneration	14,000
Biomass Heating	18,000
Cogeneration with 60% Biogas	29,000
Sewer Heat Recovery	TBD

*Note: Cogeneration can offer emissions reductions beyond the Baseline, due to the upstream reductions resulting from excess electricity generation.*

### For Further Information:

Compass Resource Management's January 2011 "District Energy Screening: South Waterfront North District" and its November 2010 study "Neighborhood Infrastructure: Doing More with Less" provided much of the source material for this summary and contains more detailed information on district energy opportunities in the South Waterfront North District.



Photo: Flickr user Todd Mecklem

## Potential Benefits

In addition to the reduced space requirements / greenhouse gas (GHG) benefits listed above, district energy could provide the following benefits to the South Waterfront North District node:

- For developers, the main benefit of district energy is the upfront cost savings (mainly on boiler, chiller and cooling tower equipment purchases), which could be as much as \$50 million for the North District, based upon preliminary development assumptions.
- Operating cost savings for tenants and residents will be positive, though small in the early years. Savings could become more substantial over time as the cost for traditional fuels increases, given the potential for higher efficiency and alternative fuels in a district energy system. Additional savings are possible through economies of scale, integration of different types of loads, and additional flexibility provided by a larger, centralized system.
- District energy reduces technology and fuel risk to building owners and tenants through sharing of equipment, improved equipment maintenance, greater equipment efficiency, and greater use of waste energy and alternative fuels.

## Next Steps

- Infrastructure planning is already underway to accommodate the imminent reconstruction of SW Moody Ave for light rail ROW construction, so expedited decision-making is needed if Moody is to remain an option for laying pipe.
- A project sponsor / steering committee is needed to move district energy forward, to direct additional study and to guide decisions on system ownership, whether this ends up being a cooperative arrangement between OHSU and other private landowners, a joint venture between OHSU and a private district energy company, or third party ownership and operation.

## Opportunities

- There are a few large landowners in this node and all of them are actively engaged in the discussions. OHSU, the proposed anchor tenant of a new system, already owns and manages a district energy system serving its Marquam Hill campus, and OHSU is receptive to another system in South Waterfront. However, there may be a need for an alternative ownership and operating model for a larger system that would serve both OHSU and surrounding development.
- If combined heat and power (CHP) is pursued as a heat source for a larger district heating system, there may also be opportunities to create a local micro-grid, a supplemental strategy to extract additional value (reliability benefits in the form of electrical power) from local generation. While a micro-grid is not designed to replace existing electric utility service, clinical and research space at OHSU will place a high value on an outage-free power supply.
- Two potential thermal plant sites have already been identified (north end near Marquam Bridge & west side near Ross Island Bridge) based upon various factors including ownership, land use, proximity to loads and important resources, and available space. The more central Ross Island Bridge location offers better opportunities for future system expansion to the south and west.
- The North District requires a clear energy policy or sustainable infrastructure master plan that incorporates renewable energy goals or planned infrastructure development to uncover potential synergies with district energy systems. Formalized planning will provide additional security to developers and/or other investors.
- A Phase II feasibility analysis is required to confirm the economic and environmental benefits of district energy identified in the screening study. A detailed study will also be required to refine estimated loads, confirm the location of the energy center, evaluate and narrow the identified technology options, and support ownership and operating decisions.