

FUTURE SEATTLE DISTRICT HEATING POLICY

1. INTRODUCTION

Review of the existing district heating market in the City has suggested that any future district heating policy in the City would need to be aimed at both encouraging the development of future district heating network infrastructure and capacity as well as encouraging (or requiring) consumers to connect to networks for their domestic hot water or space heating requirements. An overview of some of the challenges to be overcome is outlined below; however this should not be considered as a comprehensive study of all options available to the City. The policy options presented here are largely based on discussion with Seattle's existing sole district heating supplier, Seattle Steam, along with the case studies conducted on existing district heating policy in London and Vancouver.

2. CURRENT CHALLENGES

There are a number of challenges faced by district heating suppliers in Seattle currently limiting the expansion of district heating infrastructure into the City. In particular,

Carbon content of electricity

Data from Seattle City Light shows that over 86% of the City's electricity is produced from hydro power, with more than half of the remaining load provided by wind, nuclear and biomass sources; therefore currently electric resistance heating is the lowest carbon option for the Seattle. The heat produced by Seattle Steam is currently produced from 100% fossil fuels, although this is expected to reduce to 40% from July 2009, following conversion of one of the company's two steam plants to burn waste wood products, with a long term goal of reaching 100% renewable production by 2020.

The future of Seattle's hydro electricity is vulnerable to inevitable shrinking of the snow melt supplying the turbines due to climate change and the prospect that the snow pack may eventually disappear. In this instance, allowing continuing installation of electric heating is setting Seattle's resident and business populations up for widescale and costly retrofitting.

If future growth within the City outstrips energy efficiency improvements, Seattle City Light will need to purchase an increasing % of fossil fuel generated peak power.

In order for district heating to become an attractive and sustainable proposition, future district heating policy must be based on both recognizing the potential for that the current and future district heating networks to be powered through waste heat or renewable resources such as biomass, and the need to future proof the powering of the City's buildings.

Encouraging and expanding the use of district heating would also help to reduce the need for additional fossil fuelled electricity to be purchased by the utility companies to service the City's electrical requirements, thus reducing the overall carbon content of the City's fuel mix.

High cost of district heating compared to electric resistance heating

Electric resistance heating is around two thirds of the price of purchasing heat from Seattle Steam. The cost differential can be contributed to:

- High cost of gas and oil to produce steam compared with hydro generated electricity.
- Seattle Steam is currently 'double taxed' compared to other service organizations, due to gas use tax (GUT). Although long term the company intends to move to 100% renewable steam generation, in the short to medium term it is estimated that the additional tax liabilities compared to other utility companies costs Seattle Steam in the region of \$1.5MM per year.
- The costs of installing district steam or hot water infrastructure is high and infrastructure development costs currently must be met and recouped by the company through existing rate structures. Ultimately this means the costs of supplying district heat to customers is higher than an electric solution.

3. POLICY OPTIONS

Future district energy policy in Seattle should largely be focused on facilitating infrastructure development in order to increase market penetration in the City. Jurisdictions with existing comprehensive district heating

infrastructures (such as Copenhagen) focused policy in creating funding streams to develop new infrastructure for example through carbon tax and facilitated cheap loans from the national Treasury and banks. The city also put into place special zoning for district heating and put in place an obligation to connect to the system (time depending on building usage).

3.1. Infrastructure Development

The City should consider a number of ways to finance development in district thermal network infrastructure:

- **Remove gas use tax liabilities on district heating suppliers:** Staff at Seattle Steam estimated that the additional taxes the company pays compared to other utility companies (largely due to State and City gas use tax) costs the company in the region of \$1.5MM per year. Bringing tax requirements in line with other utility providers would provide the company with an additional source of funds, which, it was noted could be used as annuity on a loan of up to around \$15MM. This could be invested in improving the City's existing network (for example to assist in constructing CHP plant) or creating new infrastructure.
- **Encourage the selling of waste heat to power community district heating networks:** The City should consider ways to encourage waste heat producing industries to sell heat to community district heating schemes. Much of the development of Copenhagen's district heating infrastructure was funded through a carbon tax which gave value to the waste heat produced by industrial processes (as selling waste heat provided a carbon offset). Proceeds from the carbon tax are used to fund the development of the infrastructure in the City; to the point where the district heating network serves nearly 95% of households in central Copenhagen. Due to the success of the carbon tax scheme in encouraging industry to sell waste heat, the oversupply of waste heat during the summer months lead to the introduction of a district cooling network in the City, with cooling supplied by absorption chillers connected to the City's district heating network.
- **Develop a "Savings by Design" rebate scheme:** In California, financial incentives are available from utility companies to building owners and designers in building energy efficient buildings which reduce demand on the existing transmission networks. This concept could be used in Seattle, with rebate funds from utility providers being apportioned between customers and a district energy fund, which could be used to finance the development of district CHP plant to supply electricity to the electrical utilities and heat to district heating utilities.

3.2. Market Penetration

Additional policy should be considered by the City to encourage the use of district heating networks by consumers in areas where connection is available:

- **Develop 'energy masterplans'** mapping heat loads and networks in the different areas of the city to show the areas where decentralized energy projects are viable. Each 'energy masterplan' would identify zones for decentralized energy systems based on the densities of heat demand, location of existing and potential future heat networks, location of existing building 'anchor tenant' heat loads, location of sources of waste heat or excess capacity and land to locate energy centers. 'Anchor tenant' heat loads would include civic centers, hospitals, libraries and leisure centers. The city should commit to connect its estate (if not already) to current or future heating networks.
- **Require mandatory participation in district heating systems:** The City could require all new developments and buildings undergoing major renovation to connect to district heating systems within the 'energy masterplan zones' and/or where existing networks are available. If not available, the developer would pay into a green investment fund (a community infrastructure levy) to help establish future heating networks. Although this would virtually guarantee 100% participation, developers may not be able to recover the additional costs of district installing hydronic heating systems from the market which could place an undue financial burden on complying, particularly for small commercial developers, residential developers and low income housing developers. The City would help developers to access low cost borrowing for connecting to existing networks and to DH operators to establish new networks.
- **Restrict the use of electric resistance heating:** The City should consider restricting the use of electric resistance heating in new developments in the City within energy masterplan zones. This may apply to all developments, or, more realistically only those exceeding a certain threshold size or use. This would encourage developers to make use of district heating, where available, as well as to encourage the installation of hydronic heating systems where not currently available, which would facilitate later connection to district heating systems when future infrastructure allows. Threshold targets could be set so as not to impact those most vulnerable to increases in development costs, for example low income housing providers.

- **Offer connection grants to offset the costs of hydronic heating systems:** Grants could be offered to developers to offset the cost of installing hydronic heating systems. This would facilitate connection to district heating networks, whilst reducing the financial burden on developers in installing hydronic heating. Policies previously assessed by the new construction green building task force may be considered worthy of further investigation for alignment with district heating policy.
- **Standardize contractual agreements:** Underpinning any of these relationships will be a contract between developer, energy suppliers and neighboring development. The City could help facilitate the development of a contractual toolkit supported by service level agreements which include language relating to service failure which can take time to draft (and are technically demanding).

4. KEY DECISION POINTS

If the City is convinced of the long term benefits – both economic and environmental – of investing in district heating networks it should consider

- Providing anchor heat loads
- Getting involved with the ongoing governance structure to provide protection to consumers
- Providing leases for energy centre sites
- Providing grant funding for initial stages of projects
- Setting up and managing a Green Investment Fund
- Subsidizing heat from the district heating network so it is cost equivalent with electric heating in the short term
- Providing low cost borrowing to fund extension of steam network
- Bringing tax liabilities of district heating providers in line with those of other utility companies

This will send clear signals to the developer market that this is the route that Seattle wishes to pursue to deliver long term low carbon, low cost energy to its population.

5. REFERENCES

Cutting the Capital's Carbon Footprint – Delivering Decentralised Energy – London First and Buro Happold.
 Michael King, Associate, Combined Heat and Power Association, UK; conversation 1 November 2008
 Stan Gent, CEO and President, Seattle Steam