



Renewable District Energy in Cities

A conference hosted by the Community Energy Association

Session Notes

February 28, 2008

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Connecting communities,
energy and sustainability



1. Summary

Renewable district energy can help communities to save money, improve environmental performance and provide local jobs. Communities across British Columbia are already developing renewable district heating, and many more are exploring the opportunities. On February 28, 2008 the Community Energy Association supported these efforts by hosting *Renewable District Energy in Cities*, a one-day conference at the Fairmont Waterfront hotel in Vancouver, BC. Approximately 90 people participated, including elected officials and staff representing more than 15 local governments from across British Columbia.

Helen Iosfin, Manager, Distribution Planning, BC Hydro opened the conference and Laura Porcher, Executive Director, Community Energy Association provided closing remarks. Nine speakers delivered presentations on

- Ready for Renewable District Energy
- Setting up Projects
- Growing to Jurisdiction-wide Strategies

The Community Energy Association thanks each of the speakers for great presentations.

Renewable District Energy in Cities: Presenters and Topics

Ken Church, NRCan	Renewable District Energy in Canada
Michael Wilson, CEA	District Energy and Community Planning
Will McDowall, CEA	District Heating Utilities: Options for Ownership and Financing
Jonathon Rhone, Nexterra	Biomass Gasification for Renewable District Energy
Stacey Bernier, Corix	District Heating: a Utility Perspective
Chris Baber, City of Vancouver	False Creek Neighbourhood Energy Utility
Scott Schillereff, EBA	Assessing Geexchange Potential in Whitehorse, Yukon
David Johnson, City of Revelstoke	Biomass: the Revelstoke experience
Rick Quail, Town of Okotoks	Drake Landing Solar Community

Slides from the presentations are available from the CEA website, at:

<http://www.communityenergy.bc.ca/renewable-district-energy-conference-presentations-feb-2008>

The conference included two interactive workshop sessions. The first explored the benefits and opportunities for local governments in district energy. The second explored in more detail the options, policies and governance structures through which local governments can pursue district energy. These Session Notes provide a summary of those discussions. For more detailed information about renewable district energy, take a look at our *Renewable Energy Guide for Local Governments in BC*. The full conference program is contained at the end of this document as an appendix.

Some of the key ideas emerging from the conference include a general consensus on local governments having a key role to play in renewable district energy systems, though the specific role (ownership, encouragement, initiation) may vary by government. Participants also concluded that multiple technologies will play a role but there is no silver bullet and that a process should start by considering many technologies at a pre-feasibility stage. Involving a wide range of stakeholders at the beginning of the process was identified as important. This allows the stakeholders to see how technologies were considered and narrowed. One way to narrow technologies is mapping a community's energy sources and loads. Participants generally saw renewable district energy as an important long-term initiative requiring ongoing multi-year commitment and progress.

2. Workshop 1: Benefits, considerations and roles for local governments

2.1. Benefits

Why should local governments consider renewable district energy? The answers explored by the groups at the conference fall into three categories:

- demonstrating leadership,
- building sustainable communities, and
- managing risk.

The groups also identified several considerations for moving forward.

Demonstrating leadership

As a champion and supporter of renewable district energy, local governments can demonstrate leadership in their community. This leadership role provides both inspiration to the community, and education about the opportunities that renewable energy can provide. Lack of awareness, among not only the public but also developers, home builders and others, is one of the most frequently cited barriers to the uptake of community-scale renewable energy in North America. As leaders in the community, conference participants recognised the invaluable role that local governments can play in inspiring and education through action.

Building sustainable communities

Renewable district energy is closely tied to the creation of compact, connected and prosperous communities. District heating works best in compact communities, where distances between buildings are short, and the cost of piping correspondingly low. District energy also complements compact, mixed use urban design because the diversity of building types, uses and heating requirements improves the economics of the system. Since different building types use heat at different times of the day, a district heating system can serve mixed-use communities more efficiently than single-use areas, reducing the overall cost.

Renewable district energy also complements social connections by visibly increasing local independence and sustainability, which fosters a sense of community pride. Conference participants recognised the public's broad interest in local renewable energy and highlighted the way in which public engagement processes can strengthen ties in the community.

Local prosperity and economic development can be enhanced in many ways through renewable district energy. Dollars spent on energy can be kept circulating within the local economy, while municipal revenues can be shifted away from taxation (by using the renewable district energy system as a profit centre). District energy systems can create opportunities to build local expertise and jobs at the same time. The local government can also create fresh awareness in the development community through exploring and deploying renewable district energy. As a bonus, there could be carbon offset revenue or investment that can be obtained from projects. Structured carefully, there is also the potential to improve affordability for disadvantaged and low-income groups through setting rates that insulate them from energy price fluctuations. Add in local ownership, fuel source flexibility, and the potential to avoid upgrades to existing large-scale energy transmission infrastructure, and renewable district energy has the potential to be leveraged strategically for increased local prosperity and economic development.

Managing risk

The third area identified by the groups was related to risk management. Most of the concepts in this area were related to long-term resilience of communities amid fossil fuel price escalation and concerns about security of energy supply. Moving to renewable district energy can help in maintaining lifestyle as communities shift away from fossil fuels. Several participants used the term “future proofing”, to

describe the way in which renewable district energy can help insulate a community from the uncertainties of the future. With a reliable, local and renewable source of heating, a community can declare independence from fossil fuel shortages and price hikes.

2.2. Considerations for moving forward

Communities and local governments have many opportunities to benefit from renewable district energy; however it is an area that does require risk management and good governance to be successful. The considerations raised by the participants can be grouped around two broad concepts: risk / liability management and business management.

The liability and risk management concerns grew from recognizing that renewable district energy systems can be more complicated than existing utilities such as water and sewer. Furthermore, there are risks inherent with newer technologies that have not been broadly deployed. There is also the very real potential for start-up problems. All of these together, along with local government inexperience in the field, can make renewable district energy a daunting prospect for some local governments. It may be helpful if senior government provides a financial buffer or insurance against some of the risk.

The business management considerations start with a question as to whether renewable district energy is really the business of a local government. If it is, it is a whole new business function that requires expertise and staffing. This can be managed somewhat by choosing the most appropriate business structure based on control, risk, and financing. The business case for a local government to get into renewable district energy will also play a big role in the staffing decisions and ownership structure.

Communities will likely differ in their assessments of the appropriateness of local government involvement in the provision of district energy. The next section discusses the various roles that local governments can take with respect to district energy.

2.3. Local government roles: from education to ownership

There is a spectrum of roles that could be appropriate for local governments with renewable district energy based on how involved the local government would like to be. The spectrum starts with education and awareness-raising, moves to policy, then leadership, active facilitation, and ultimately owning or operating renewable district energy utilities.

Education and support

The least invasive role involves education and awareness-raising. This role encompasses three activity areas. The first is public outreach and engagement which includes providing information, education, and opportunities to engage to the community around renewable district energy. The next is bringing partners together. This could include fostering dialogue, information-sharing, and education with developers, residents, consultants, utilities, architects, mechanical contractors, local suppliers and others. The final activity area is education and information-sharing with other local governments.

Creating a friendly regulatory and policy environment

The policy role steps up local government involvement from creating awareness to creating the rule or playing field that fosters renewable district energy projects. One policy area is the use of bylaws, zoning, and permitting to encourage or require renewable district energy. A good example is the City of North Vancouver's lower Lonsdale development area. Financial incentives can also be provided by density bonusing and providing tax incentives for local renewable district energy.

Overall form can also be a significant factor in renewable district energy. The Official Community Plan not only provides long-term commitment and vision, it also helps to create the dense, mixed-use communities that make renewable district energy financially attractive.

Leadership and facilitation

Long term commitment and vision are elements of taking on a leadership role. Going beyond vision and commitment is using the municipal building stock to be an anchor customer for a renewable district energy system.

The facilitation role steps beyond the previous roles by becoming more actively involved in pushing or initiating specific projects. This could start with the local government funding heat load and heat source mapping for communities, conducting or funding baseline studies and energy audits, or investing in feasibility analysis and making the results available to the private sector. The local government could even manage or plan projects. It could even own a pilot project. This all occurs with the goal of accelerating renewable district energy.

Local government district energy utility

The most active role a local government can take on is owning or operating a renewable district energy utility itself. The cities of North Vancouver (Lonsdale Energy Corporation) and Revelstoke (Revelstoke Community Energy Corporation) are examples of local governments owning district energy utilities. There are many ownership models¹. The local government does not have to have 100% ownership. The local government could play a bridging role to engage private partners or to help secure funding.

¹ See the Community Energy Association's guide: *Utilities and Financing, a module of the Renewable Energy Guide for Local Governments in British Columbia*, available from the CEA website.

3. Workshop 2: Local government projects and programs

3.1. Technologies

Renewable district energy systems can be fuelled by a number of renewable energy technologies. The ultimate choice of technology will depend on local factors and considerations, including those described in table below.

Technical characteristics	Cost	Project scale	Site conditions
<ul style="list-style-type: none"> • Availability • Lifespan • Environmental impact – greenhouse gases and other emissions • Regulatory constraints • Risk-safety, proven technology • Repeatability • Reliability 	<ul style="list-style-type: none"> • Maintenance cost • Energy cost competitiveness • Government funding availability 	<ul style="list-style-type: none"> • Potential for growth / expansion 	<ul style="list-style-type: none"> • Schedule of the project • Operational complexity • Demand profile • Proximity of existing utility structure • Public acceptance • Available local technical expertise • Seasonal or daily availability of energy source • Storage requirements

There are many technologies that could be considered but none without some drawbacks or considerations. Conference participants shared insights into these advantages and disadvantages, as described in the table below.

Technology	Pros	Cons
Natural gas	Available, easy, known, reliable, no particulate emissions, transition for renewables, good for peaking, works well with other technologies, low capital cost	Non-renewable, produces greenhouse gases, high price – going higher and increasing price volatility, fuel must be transported, money spent leaves community, safety
Sewage heat recovery	Free / clean, can be well located, under municipal control, security of supply, proven	Public perception, low temperature (heat pump required), cost, maintenance
Solid waste	Reduces landfill volume, reliable source, good revenue stream (tipping fees and energy sales), proven, high temperature, co-generation potential, ghg benefit	Transportation is required, public perception, emissions, ash to deal with, difficult to locate in residential areas (public resistance)
Landfill gas	Reduces greenhouse gases, free, co-generation potential, proven revenue stream, can be shipped (but costly)	Often not located near major heat loads, not forever
Geo-exchange	Renewable, clean, integrates well with low-temperature systems, government incentives, low maintenance, good public acceptance, flexible for land, out of sight	Needs certain ground conditions, high cost (depends on scale, type of system, and type of ground that is being bored into), not good for retrofit, requires electricity to operate, dependant on price / emissions of electricity
Industrial heat	Free (maybe), zero greenhouse gas emissions, simple, proven, non-industrial (datacenters, ice rinks) could be zoned into place	Has to be close by, requires collaboration, risk that source disappears, daily variability, profile mismatch
Solar	Renewable, free, no land requirements, low technology, integrates into current systems, predictable, proven technology, low impact, scalable	Shortage of roof space, geographically constrained, night/day variability, access for maintenance, visual impact, cost
Wind	Renewable / free, scalable, proven, lots of funding available	Produces electricity not heat, highly dependant on location, unpredictable, cost, public resistance
Biomass	Renewable, cheap, supported by BC government policy, consistent feed source, proven technology, extends life of landfills, can be used for combined heat and power, compatible with high temperature systems	Requires transportation and processing, emissions, high cost, public perception
Lake / ocean	Free, renewable, can be used directly for cooling, proven, reliable	Regulatory issues, requires heat pump for heating, often not close to heat or cooling loads

3.2. Developing district heating projects: priorities and process

Participants recognised that there is no shortage of enthusiasm for district energy among local governments in British Columbia. However, given limited local government resources, prioritising the different options can be challenging. Several participants suggested that major projects such as renewable district energy tend not to happen without a champion or group of champions, ideally including senior staff, council, and developers.

The process of priority setting starts with engaging stakeholders. Engaging early, authentically and widely is an essential first step towards success. Grounding the process with both vision and the evidence to support it will also pay dividends throughout the process of prioritizing. The vision can create alignment on policy issues throughout the planning process.

Once the champions, vision, and process are in place, it is time to turn to the technical and business case analysis and the research necessary to build a shared understanding of what is achievable and sensible.

It is important to not start with one technology solution already in mind. A pre-feasibility study can look at all the options available and they can be narrowed down for a feasibility study that goes deeper and narrower. There is an art to this process, in not eliminating options too early but also not holding on to options for too long in the process.

3.3. Enabling district energy projects: policies, incentives and plans

There are two mutually supporting approaches that local governments can take to enable renewable district energy projects. The first is synergistic planning where the local government plans for renewable district energy along with community planning and planning for utilities maintenance and upgrading. Including renewable district energy in the planning process can significantly reduce costs. For instance, putting in piping for renewable district energy while the trenches are open for other infrastructure work can be very economical.

The second approach involves bylaws, policies and incentives such as density bonusing, tax incentives and local service areas mandating connection to a district energy system. These are all proven approaches with examples in BC. For instance, the City of North Vancouver set up a local service area for Lonsdale that requires connection to the district energy system. Other examples from Europe include the 'Merton rule' from the UK mandating all new development meet 10% of their energy needs with onsite renewables. Barcelona also has a requirement for solar hot water. The European examples have yet to be tested in the BC context.

When encouraging renewable district energy projects, there are three groups that were identified as important: the local government, senior governments, and the community. The local government may find it difficult to encourage projects because of internal capacity, resource and staffing challenges. Resources are required to encourage projects in an effective way. Leadership is required at the senior staff and council level to allocate resources to these types of activities with the recognition that it is not a short-term issue. A sustained commitment is necessary. Fortunately, there may be grants available from senior government to assist with local capacity building and planning.

Senior governments have a bigger role than just providing grants. They can also initiate agreements such as the Climate Action Charter. Things such as the building code are also in their area of jurisdiction. They can remove barriers for local government such as PST on municipally-owned renewable energy equipment, refining staffing thresholds and safety requirements for boilers and other equipment. Clear consultation up front and on an ongoing basis with senior government may be required.

Clear consultation is also required with the community to capture collective wisdom, educate, and build buy-in. An approach that gained support during the day was involving everyone at the outset.

3.4. Moving to a community-wide district energy strategy

Participants at the conference recognised that the project-by-project approach alone is not enough. We need to move towards programs, rather than projects, and towards strategies to expand district energy throughout the community.

Participants considered the role of energy ‘mapping’ of the city, to identify energy hot spots or areas of concern. This process works best when clear criteria are used to determine what is important and what is not. Once a mapping exercise has been undertaken, strategies can be developed to respond to the issues identified. This might relate to the supply mechanisms, it might also relate to construction, traffic, waste or a range of other issues.

The role of leadership in the development of such a program was identified as critical, and participants highlighted the need for significant Council involvement in overall vision and direction. It is also seen as necessary to keep council apprised of program progress to maintain total council awareness and support for the venture since the final strategy might favour one area of town more than others.

Design guidelines would be needed so as to make the systems consistent and compatible throughout a jurisdiction. New construction could be made retrofit-ready with low supply temperatures and high delta-Ts. Widespread use of hydronic heating is not essential but would facilitate later expansion.

4. Conclusion

The *Renewable District Energy in Cities* conference provided a platform for learning and knowledge exchange, as well as the inspiration to turn this knowledge into action. We hope that these session notes will form the basis for a continued conversation, helping participants and others to develop their own projects, programs and ideas. For more information, please get in touch, or check out the resources on our website. We’d love to help you get your district energy system up and running.

www.communityenergy.bc.ca

Appendix – Conference Agenda

Renewable District Energy in Cities Conference

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Information Booths



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Agenda

8:30	REGISTRATION and refreshments
9:00	OPENING REMARKS
9:15	READY FOR DE Ken Church, NRCAN Mike Wilson, CEA Will McDowall, CEA
10:15	DIALOGUE 1 – getting ready
10:45	REFRESHMENT BREAK
11:00	SET UP PROJECTS Charlie Ker, Nexterra Stacey Bernier, Corix Chris Baber, Vancouver
12:15	LUNCH
1:00	GROW A COMMUNITY-WIDE STRATEGY Scott Schillereff, EBA David Johnson, Revelstoke Rick Quail, Okotoks
2:15	REFRESHMENT BREAK
2:45	DIALOGUE 2 Setting up Projects Growing a Community-wide strategy
3:45	Report-back
4:15	CLOSING REMARKS

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