

**Community Energy and Emissions Modelling (CEEM)  
CEEM Practitioners' Survey –Observations from the Field**

March 2015

With revisions to the BC *Local Government Act*, including the requirements for all BC local governments to establish greenhouse gas targets, related policies and actions, growth in a relatively new discipline at the time was nurtured across BC – Community-wide Energy and Emissions Modelling, or CEEM. Local governments across BC, not-for-profit organizations (NGOs), the private sector, academia and senior governments engaged in creating and applying community-wide models to help inform BC communities on greenhouse gas targets and the related policies and actions to undertake to meet their climate action goals.

Of the 189 local governments across B.C., approximately ½ of BC's communities have been directly supported by the work of these modelling practitioner organizations. These developments and applications generally far exceed any similar efforts undertaken across the rest of Canada.

Thanks to the following CEEM practitioners and their organizations for taking the time to be interviewed about their experiences in applying their CEEModels in support of their respective communities across BC:

<u>Practitioners</u>	<u>Practitioner Organization</u>
Alex Boston	Alex Boston Consulting
Rory Tooke	UBC (CALP and Elements Lab)
Nicole Miller	C2MP
Dale Littlejohn	Community Energy Association
Mike Wilson	Enerficiency Consulting
Annie Li	MMM Group
Michael Wolinetz	Navius Research
Tom-Pierre Frappe-S	Pembina
Yuill Herbert	Sustainability Solutions Group
Daniel Hegg	Stantec Consulting
Dan Wilson	Whistler Centre for Sustainability

The following categories were identified based on the survey responses. They capture some of the rich experiences that the above community modelling practitioners had to share.

**Key CEEM lessons learned**

Transformational change, particularly in a regulatory-laden ('business-as-usual') environment with well-established and sometimes conflicting priorities is a challenge that requires key political, staff and public champions and a clear rationale for longer-term change (multiple co-benefits that support greenhouse gas reduction efforts).

The BC community-wide energy and emissions modelling (CEEM) experience has both helped to advance as well as draw on a large number of sector-specific areas and modelling sub-disciplines. A shortlist of these include those offered during the interviews:

Climate Action (and associated) Sectors

Modelling Sub-discipline

- Renewable energy
- District energy feasibility
- Solid, liquid waste and bio-solids
- Biomass availability
- Waste heat potential
- Solar hot water (heat) and photovoltaic (power)
- Land-use planning
- Archetype modelling
- Transportation modelling
- Locational (GIS) orientation
- Energy supply and demand mapping
- Energy costs and financing mechanisms
- Human, environmental health and social dimensions

Some of the key lessons learned from community-wide energy and emissions modelling include:

- Transformational change starts with successful mainstreaming into local government management and coordinated operations.
- Political will, 'business-as-usual' and other competing priorities can be substantive impediments to climate action.
- The estimated impact of different measures can vary substantially across communities and by their underlying assumptions. Assumptions can be as unique as the model itself, and the communities to which it is applied.
- The effort to make the community energy and emissions model more precise needs to be balanced with efforts towards making the model understandable (e.g., 80-20 rule; user-friendly), with straightforward communications required that engage all major parties – political, staff and the broader public.
- The emerging field of community and neighbourhood-scale visualization is becoming a key component of both local government and public understanding.
- Even prior to community energy and emissions inventorying (CEEI) and modelling (CEEM), many local governments and practitioners alike already had a reasonable understanding of key climate action measures required to reduce greenhouse gas emissions.

### **Most Useful Aspects of CEEM**

In addition to assisting local governments in establishing greenhouse gas emissions reduction targets, CEEM has proven useful in a number of associated, as well as unexpected, ways:

- Modelling practitioners working directly with staff and Council are important prerequisites to meaningful modelling and planning, and increases the likelihood for successful implementation.
- Community energy and emissions modelling:
  - is based on consistent, accurate energy and emission inventories;
  - provides a volume of aggregated data collected to enable a good prioritization process;
  - can clearly and systematically outline the basis for a GHG target, setting achievable policies and actions, and setting the stage for meaningful implementation;
  - can provide useful scenario analysis that show the impacts of policies on emissions reductions;
  - provides a ghg reduction roadmap to the future, though it can be unclear to what extent these parameters and actions can be achieved;
  - can enable real-time trade-offs;
  - can demonstrate the importance and impact of infill;

- can be instrumental in helping to identify community co-benefits, including the employment and economic impacts (including household and public costs of energy); and
- particularly more advanced models, can provide visualization maps, dashboards and interactivity.
- Community energy and emissions modelling is important, but the aim is to focus on developing plans and implementing climate action.

### **Biggest Barriers and Solutions**

As part of the process of supporting local governments with modelling and planning for climate action, practitioners identified a sampling of the kinds of barriers, and some solutions, to what lay in the path of progress towards greenhouse gas emissions reduction:

- In an urban centre, the biggest challenge is integration between municipal authority and the interests or authorities of other stakeholders.
- There is a lack of alignment between provincial and local government priorities on carbon and climate action. As one example, transportation (e.g., bridge building and road construction) in the Lower Mainland hasn't matched personal and commercial transportation need. By contrast, Ontario's economic development is part of the energy agenda and has been integrated with local government policies. There is need for provincial interdepartmental coordination with local governments.
- At the local government level and for the kinds of changes required, there needs to be a stronger connection between politicians and staff, and between departments within each municipality. In particular, municipalities need to undertake better coordination between both land use and transportation.
- It remains easier for developers to build on greenfields than infill, and better tools than regional growth strategies are needed for local governments to focus growth (e.g., DCCs).
- Stronger provincial leadership will make a big impact; money for pilots and grant funding will be a catalyst for change.
- Staff time, other resources, and funding are in short supply to implement proposed climate actions.
- While the existing building stock needs to be improved, the biggest challenge is that the transaction costs for energy efficiency retrofits are high compared to other policies. There are a number of small wins across the province, but not at the scale required. Point-of-sale energy labelling could help the transformation.
- Local governments need to strengthen their capacity (e.g., building inspectors) to keep up with Building Code improvements, including enhancing enforcement regimes to better monitor and improve compliance.
- Generally, B.C. is weak on innovative financial policies, though pilots have been undertaken (e.g., on-bill financing, local improvement charges).
- Communication campaigns across a community can be difficult.
- Landfill gas is challenging, requiring substantial investments in collection systems; local governments have commitments in place, but need money to make it happen.
- A significant challenge remains to make many renewable and district energy projects financially viable, particularly within the existing building stock; one of the substantial challenges is how to fairly regulate the cost of energy, at least for the short-term.

## Most Cost-Effective Policies

Modelling practitioners have been involved with most B.C. municipalities. Their experience with these communities have showcased a number of successful policies that have been developed, either in support of or as a result of recommendations from the modelling exercise. Some cost-effective policies viewed by modelling interviewees include:

- Land use changes (density, completeness, etc), infill. For example, in the case of North Cowichan, they have operationalized their Energy and Climate Action Plan into local area plans, taking local climate action to heart. Land use is critical and the most significant ‘long-term’ effort for local governments.
- New construction:
  - Policies pertaining to new development areas and re-zonings have proven effective.
  - City of North Vancouver’s new construction building bylaw is another of CNV’s successful strategies, largely a function of a municipality’s longstanding reputation for being ambitious, with strong Council support, and complementary with real estate demand and supply dynamics (proximity to transit and many other co-benefits).
  - Detailed development permit area (DPA) guidelines successful (e.g., Carvolth Neighbourhood in the Township of Langley; Harbourside Development in the City of Vancouver), also providing sustainable transportation and energy conservation opportunities.
  - A significant number of local governments (40+) have already signed onto the Solar Ready regulation.
  - While good success in BC Building Code advancement, compliance levels through inspections remain substantially behind.
  - Pasiv Haus is an example of lowering barriers to transformationally better buildings.
- Retrofitting:
  - Nelson’s retrofit agenda was very successful. The community was able to pilot an on-bill financing system with Nelson Hydro’s support, enabling cost-efficient retrofits.
  - Future success will involve learning from recent, as well as location-specific, efforts (e.g., LiveSmart BC, building benchmarking and labelling, the Energy Diet, electric vehicle charging installations).
  - Municipal building assets and operational costs are demonstrating the value of retrofitting; good payback or strong foundation for future improvement.
  - Retrofits in the commercial sectors; businesses recognizing the investment potential for these projects.
- Transportation:
  - Significant financing from the provincial government addressing provincial-scale issues can significantly shape local government planning and resulting impacts. For example:
    - the Evergreen Line enabled substantial GHG reductions for the City of Coquitlam; and
    - the City of Surrey may similarly benefit from LRT and/or transit commitments.
  - Electric vehicle infrastructure planning in Metro Vancouver only took less than two months, deploying 65 Level 2 EV chargers, and providing a solid framework for municipalities to optimize future locations for new charging stations.
  - Ladysmith Active Transportation Plan.
  - Fleet planning (2-tier stacked incentives).
- Fiscal/economic – tax, rebates, incentives (e.g., behavioural interventions)

- Local composting and organics diversion policies supported by Green Communities Committee
- Landfill policies by an increasing number of local governments. For example, the Resort Municipality of Whistler (RMoW): flaring methane at the landfill was considered most cost-effective, in concert with shifting its waste stream to Rebanco in Washington State (which has an energy recovery system).

### **Data Availability and Future Needs**

Data is the backbone of community energy and emissions modelling, and communities' ability to monitor their progress towards greater energy conservation and greenhouse gas emissions reduction. While some data issues have been resolved over the past five or so years (i.e., since the 2007 CEEI baseline), a number of data issues remain. Among the data-related issues identified by respondents were the following:

#### **Buildings**

- There is need for more effective sharing and integration of building energy data. Also, this energy data is more useful to utilities than they might suggest.
- Actual building energy use by parcel would be helpful for benchmarking (Part 3 Buildings) and labelling (EnerGuide ratings).
- Accurate heat information from woodstoves would be particularly helpful in filling some significant building energy gaps in many of our rural communities.
- Floorspace data would add an important new dimension, particularly at a neighbourhood scale.

#### **Transportation**

- Vehicle kilometres travelled (VKT) by neighbourhood or postal code (more useful than at community-wide level).
- There is a need for much better travel behaviour data, and some kind of enabling ability for regional governments and transportation authorities to gather that data. Also, present origin and destination survey data tends to focus on work commutes and daily peaks, but recreation and leisure travel represents a significant number of trips going a longer distance.

#### **General**

- While the modelling assumptions documents (developed by the Province, and by SSG) were helpful, more published research data is needed to develop listings of estimated energy and greenhouse gas reductions from various actions (e.g., impacts of densification on a community; the impact of better transit service in rural or small communities).
- Emissions factors should be revisited in some cases, particularly emissions factors for the North East that get much of their electricity from Alberta or from remote diesel.
- Packaging the CEEI and CARIP reporting together would help local governments see a more complete picture.
- BC should consider a similar accountability framework to California's original legislation (e.g., the Auditor General can sue where insufficient community progress is made).
- Consider opening up SMARTtool public sector data for local governments.

## Future Focus of Community Energy and Emissions Modelling Community of Practice?

- Most B.C. local governments are beyond modelling and planning, and into implementation (examples provided include Nelson, Surrey, Vancouver, Burnaby, Sunshine Coast RD, Dawson Creek, Township of Langley, City of North Vancouver, West Vancouver, Whistler, and many others).
- B.C. is getting recognized (e.g., Climate Dialogue) for a number of best practices, including CEEI and BC Hydro's Community Energy Managers.
- In BC, there is no 'third party verification' of the models like there is in California; many of the models in B.C. wouldn't stand up to that test, but then Armstrong doesn't necessarily need that rigour.
- The Climate Action Charter is a commitment document by the Province to continue to work together in partnership with local governments.
- The community energy and emissions modelling community of practice has been valued for:
  - setting people in one room and learning what is happening (examples).
  - invaluable networking – hearing about different projects and exploring the opportunities to collaborate, though little time to-date to 'dive into detail'.
  - useful presentations and Decision Theatre workshops, particularly with opportunity to discuss, learn lots from academic thought-leaders, and feed off of each other on delivery to local governments.
  - its webinars, though other webinars (e.g., RMoW supporting BC Hydro webinars) have showcased more detailed local government experiences (e.g., implementation sharing residential energy assessment projects, communications, uptake by the community).
- The community energy and emissions modelling community of practice 'next steps' could include:
  - ensuring CEEI continues and Tract and Neighbourhood Data Modelling (TaNDM) is completed, and encouraging open access to energy and emissions data (e.g. utility data, VKTs).
  - the province putting more effort into communicating the value of CEEI to other provinces, Natural Resources Canada and internationally.
  - bringing groups of practitioners together periodically, though this depends on focus:
    - get-togethers were helpful, though should be shorter and more frequent;
    - one area needs to be on provincial policy and programs to enable local governments to fulfill their Climate Action Charter commitments. BC needs to 'up the anti' on GHG emissions. A Climate Action Charter version 2.0 could push here;
    - gathering of research into more, and more precise, assumptions; data on impacts.
    - sharing and keeping the community of practice abreast of who is doing what in local government (e.g., who has made significant implementation steps forward and who is expecting to renew their CEEPs). Modelling by practitioners and their communities may return in 5-10 years.
    - considering the option of working together more formally as a collaborative 'pilot project' – bringing NGOs, academia, private sector, governments, and students together to work collectively on major modelling-related issues (with shared distribution of costs and recognition of intellectual property). One part of this could be to bring international best practices, though customized, to B.C.
    - no need for additional CEEM community of practice support; more support from local government supporters are now needed in other places (i.e., implementation).