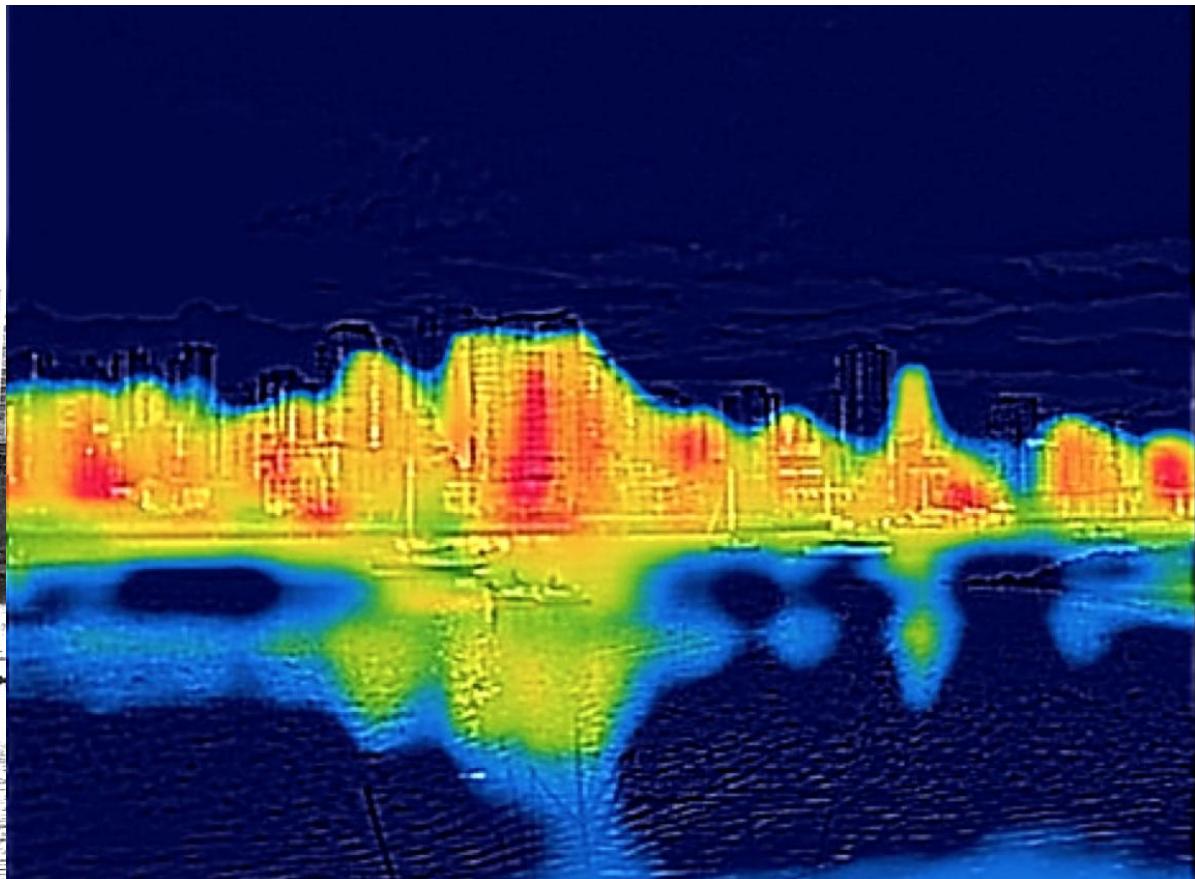


Greening Vancouver through Energy Benchmarking: a brief overview of the City's Benchmarking initiative



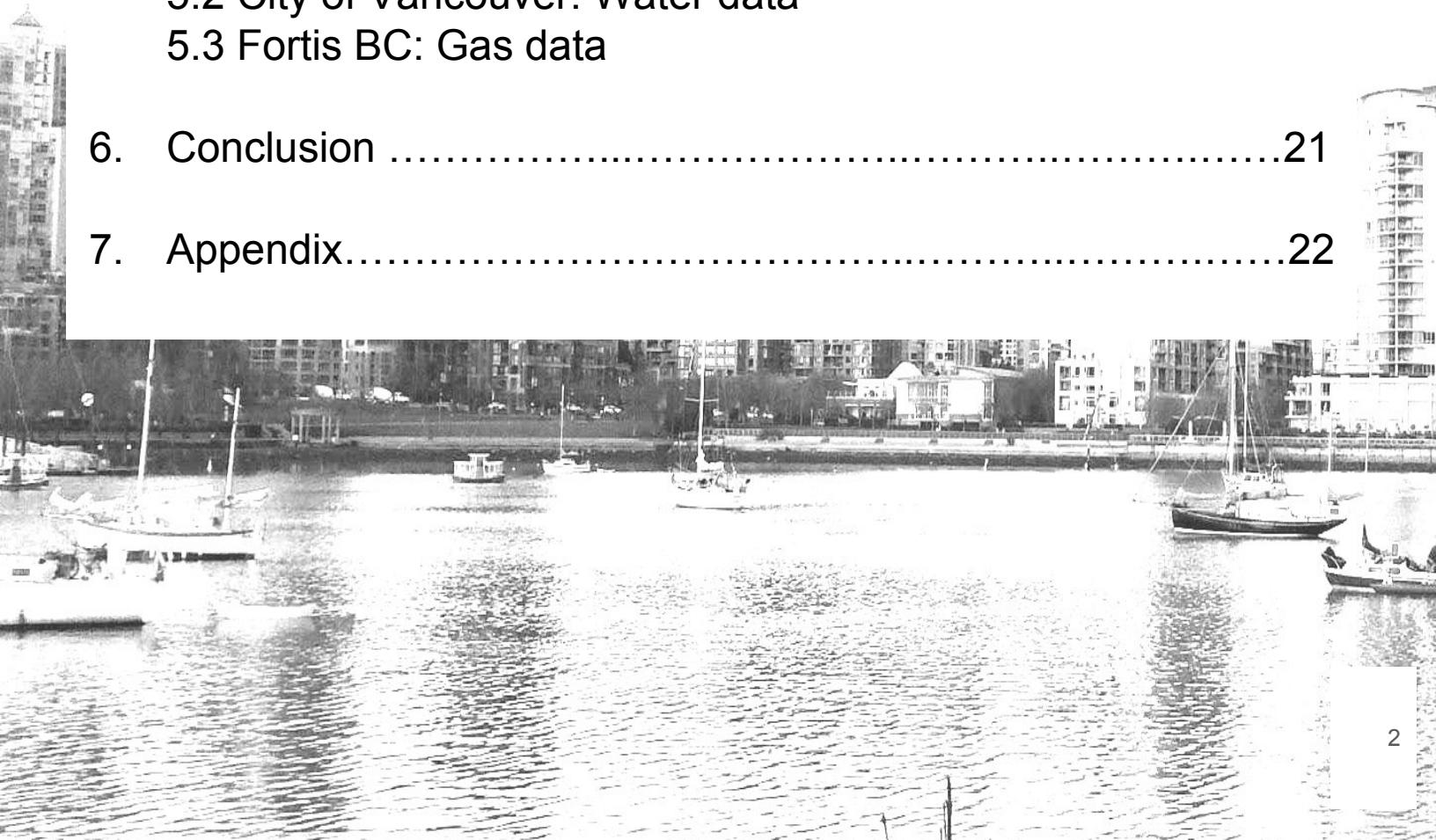
Prepared for: City of Vancouver
By: Yann Herrera, Sujin Lee & Rei Van
Tara Ivanochko
April 28, 2016



ENVR 400: Community Project in Environmental Science
University of British Columbia

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Executive Summary

This study uses multi-unit residential buildings' (MURBs) utility data collected from False Creek South residents to evaluate the initial steps of the City of Vancouver's energy benchmarking initiative. The aim of this report is to highlight some of the benefits of benchmarking, initiate an example of preliminary utility analysis on MURBs and provide feedback on the data collection process outlined by the City's draft benchmarking guide.

Aggregated electricity-use and water consumption data from 18 buildings was obtained through BC Hydro and City of Vancouver. Through benchmarking, we were able to visualize and calculate total electricity and water consumption for entire buildings and building complexes, as well as identify yearly and seasonal trends in electricity and water use respectively. Only a four-month natural gas dataset (Fortis BC) was available to us for a single building. This was used to propose an estimate of greenhouse gas emissions during summer/fall months and compare the emissions of two buildings with different heating systems. In addition, we were able to provide a preliminary analysis of heat loss in MURBs using thermal imaging. This could be incorporated in the City's benchmarking initiative as a visual reference to understanding heat loss, as well as encourage building retrofits for improved efficiency and reduced greenhouse gas emissions.

Eventually, all of the preliminary analysis of energy, water and gas consumption along with heat loss information would be beneficial as a stepping stone in updating energy policies and creating new energy efficient incentives in the City's target of reducing energy use and greenhouse gas emissions in existing buildings by 20% over 2007 levels.

For improving the benchmarking data collection and process, we recommend:

- Clarifying utility terminology
- Re-organizing the data collection steps
- Modifying data request forms
- Advising utility companies on the City's benchmarking initiative to facilitate the data collection process for building managers/owners
- Offering an Energy Star Portfolio Manager tutorial
- Incorporating thermal imaging to observe and keep track of building performances through heat loss



Introduction

*The City of Vancouver wants to reduce energy use and greenhouse gas emissions in buildings by 20% from 2007 levels
(from 1,145,000 tonnes CO₂e to 920 000 tonnes of CO₂e)*

Action plan: *Implement an energy benchmarking plan to target multi-unit residential buildings (MURBs)*

What is benchmarking?

Benchmarking tracks a building's total use of electricity, water, natural gas and other utilities.

The City's benchmarking initiative will:

- Offer building managers a free tool to assess their buildings' energy, water consumption and greenhouse gas emissions
- Create a ranking system to compare energy consumption in different buildings
- Serve as a platform to report data to the City
- Develop policies and incentives to encourage retrofitting in low-energy efficient buildings
- Help building managers and residents reduce their utility expenses



Strategic approach

1. Encourage building managers to benchmark their buildings' utility consumption.
2. Create a city-wide database for evaluating and monitoring greenhouse gas emissions, energy and water consumption in residential buildings.
3. Improve retrofit incentives and energy policies to reach the least energy efficient buildings.
4. Help building managers reduce their expenses on utilities.

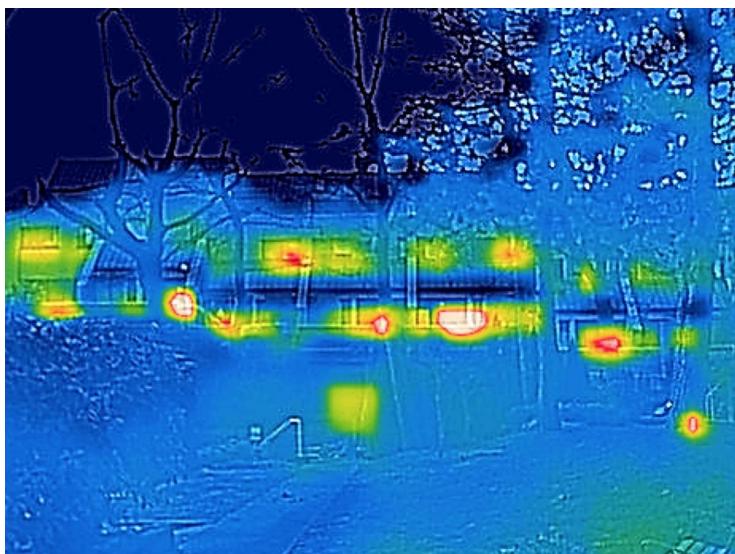


Opportunities for success

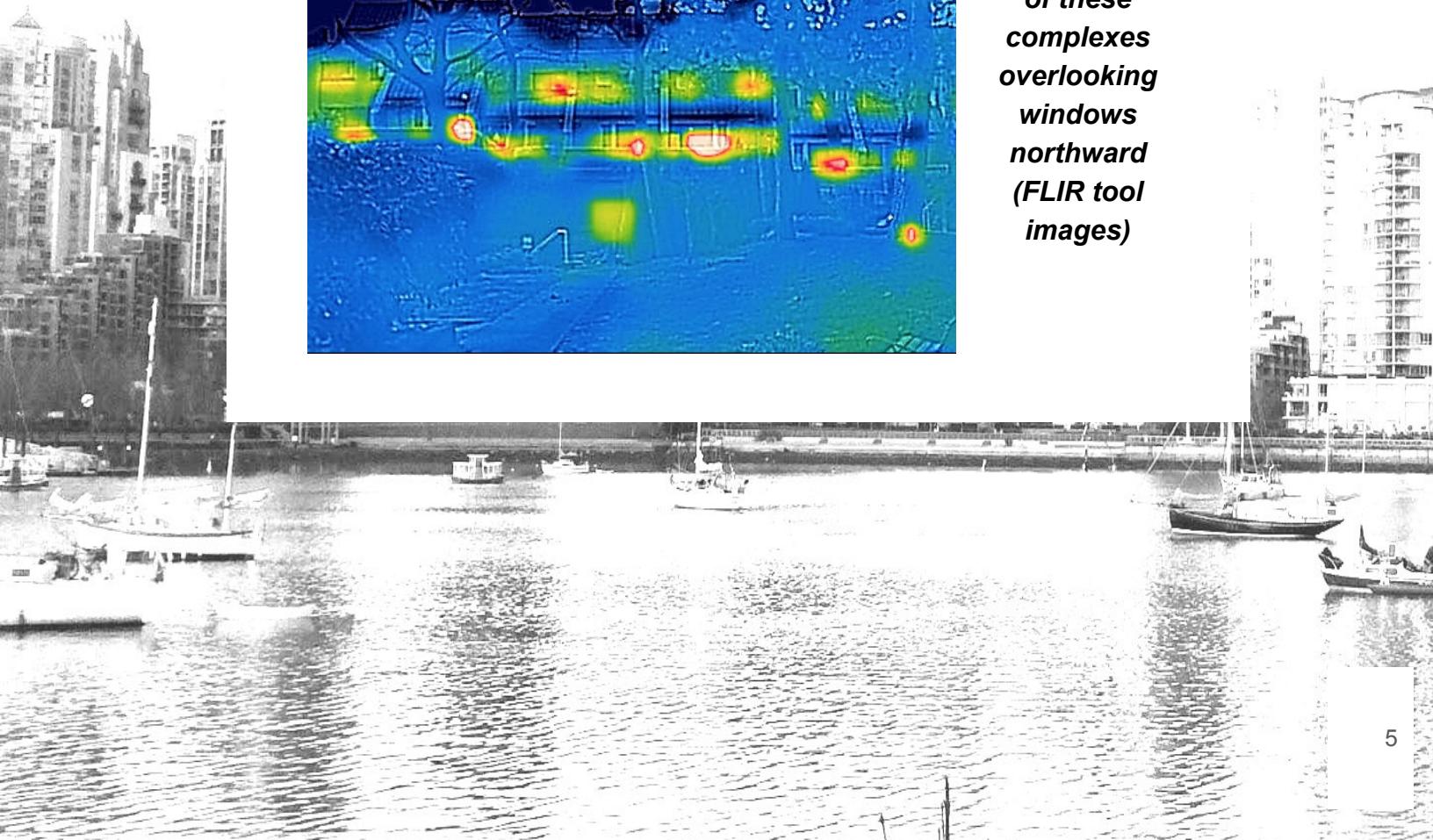
A functional benchmarking plan can help the City become a leader in urban sustainability. Other major cities have already benefitted from benchmarking, with results extending to cleaner air, better quality of life and a greater inclusion of public participation in city planning. With a proper design, benchmarking can improve customer relationships with utility companies, such as BC Hydro and Fortis BC and become a role model for other cities in the world.

Initiating the benchmarking process

This study provides examples of benchmarking products and analysis using utility data gathered from BC Hydro and City of Vancouver. We were unable to obtain natural gas data from Fortis BC, however, we used four-months worth of gas data which was available for this project. Energy and water data from 18 buildings was gathered using samples from distinct housing complexes in the False Creek South neighbourhood. We followed the steps outlined in the City's draft benchmarking guide, and simulated the data collection process for a MURB manager. In addition, we provide a preliminary analysis of thermal imaging to demonstrate its use in understanding heat loss. We believe this can be useful for improving the benchmarking process and make it 'user-friendly' to building managers. This way, we hope to encourage building managers to benchmark their buildings.



*Street view
of these
complexes
overlooking
windows
northward
(FLIR tool
images)*

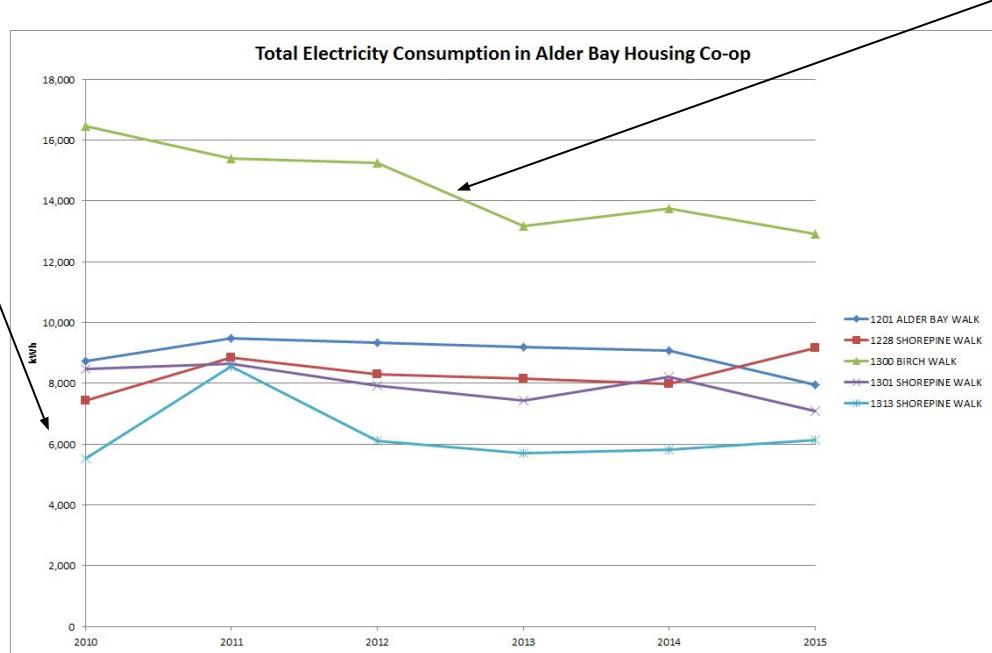


Sample Benchmarking products

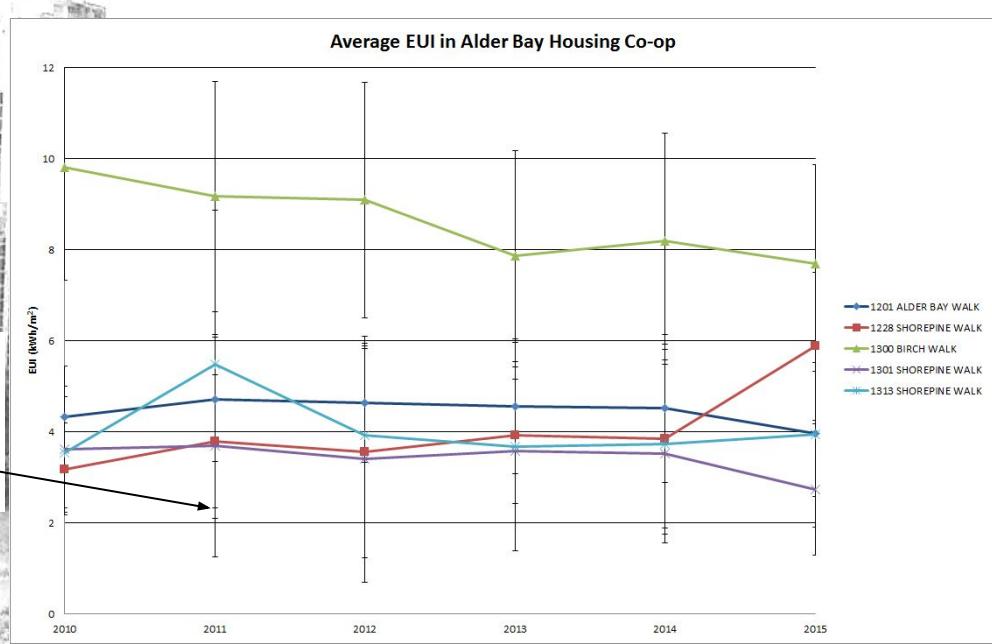
3.1 Individual building analysis

An understanding of electricity demand in individual buildings

Visual representation of temporal trends



Consumption variability for in-depth analysis



* **EUI:** Energy use intensity, calculated as electricity consumed per gross floor area (kWh/m^2)

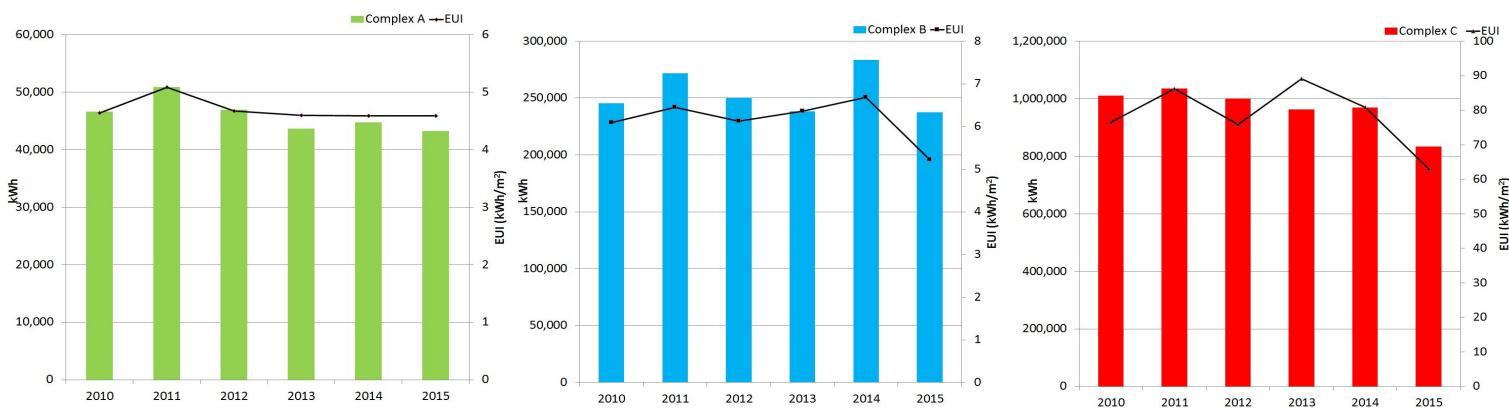
Normalized data for better building-to-building comparisons

3.2 Extrapolating to communities

For managers responsible for more than 1 building, benchmarking can be useful for assessing entire building complexes, such as a condominium or a housing co-op. This enables a more thorough analysis of how different factors affect energy consumption, such as:

- building size
- tenure type
- heating systems
- others

One particular advantage is that the City can effectively understand the consumption patterns in different neighbourhoods and create more personalized incentive opportunities and reduction strategies.



| Complex A | Complex B | Complex C |
|--|---|---|
| 5 buildings, 4 storeys, 98 units | 11 buildings, 2 storeys, 170 units | 1 building, 6 storeys, 55 units |
| Heating system: Gas | Heating system: Gas | Heating system: Electricity |
| Co-op housing | Co-op housing | Condominium |
| Average electricity consumption: 46 017 kWh/yr | Average electricity consumption: 254 322 kWh/yr | Average electricity consumption: 968 861 kWh/yr |
| Average EUI: 4.7 kWh/m ² | Average EUI: 6.2 kWh/m ² | Average EUI: 78.6 kWh/m ² |
| Average electricity use per household: 470 kWh | Average electricity use per household: 1496 kWh | Average electricity use per household: 17 616 kWh |

3.3 Estimating greenhouse gas (GHG) emissions

As a part of the City's plan to implement a program to reduce greenhouse gas emissions, the benchmarking process will be useful in terms of:

- Calculating and creating greenhouse gas emission standards
- Comparing emissions between MURBs

The advantage of tracking electricity and gas consumption is that both variables are able to calculate current greenhouse gas emissions with the help of conversion rates from BC Hydro (for electricity) and Fortis BC (for gas).

Assumptions made in the Preliminary Analysis:

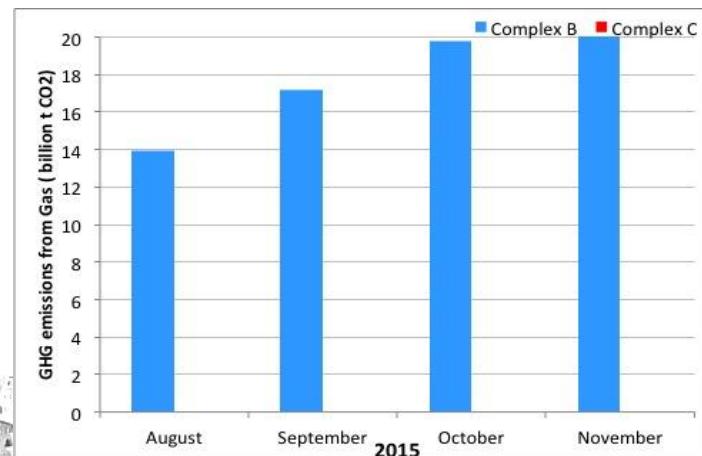
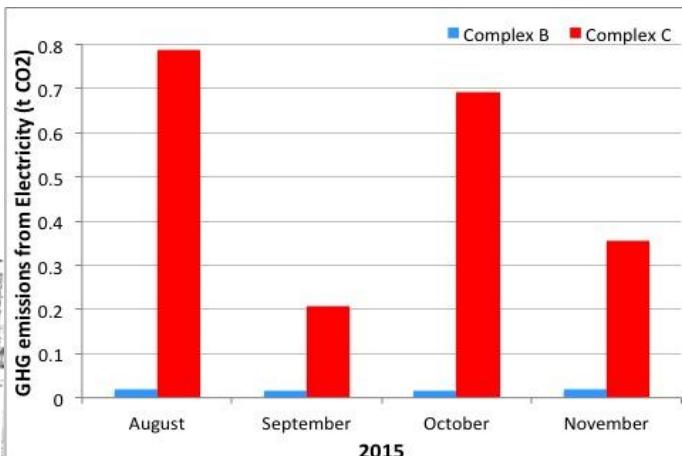
GHG emissions from Electricity (tCO₂)

- Complex B: electricity consumption from a single building represents the building complex
- Complex C: 1 building, 6 storeys, 55 units represents the building complex

GHG emissions from Gas (billions tCO₂)

- Complex B: gas consumption from a single building represents the building complex

**Note: four months of data were analyzed due to lack of gas data*

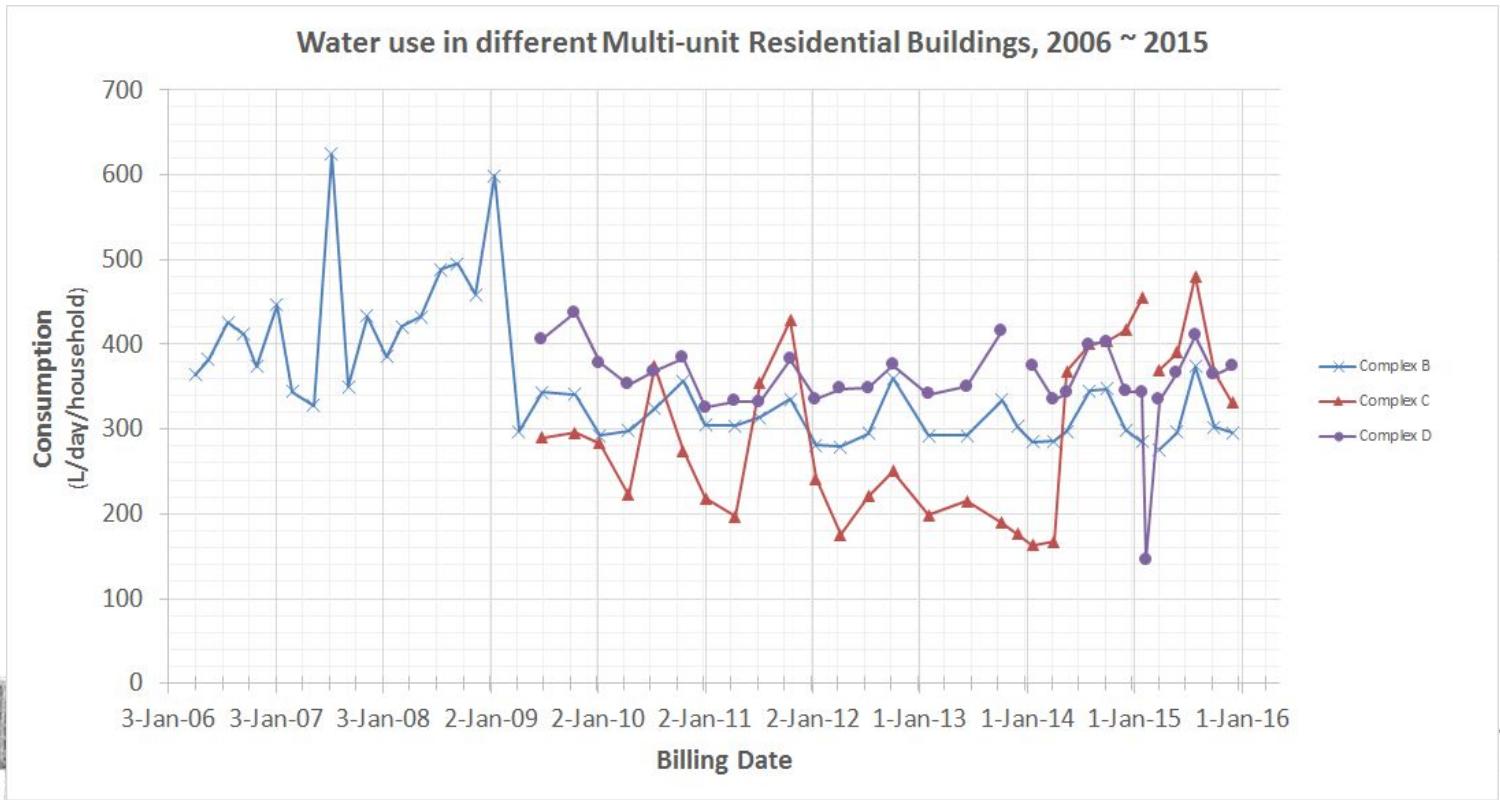


| Complex B | Complex C |
|---|---|
| Heating system: Gas | Heating system: Electricity |
| Co-op housing | Condominium |
| Average GHG (electricity): 0.02 tCO ₂ | Average GHG (Electricity): 2.04 tCO ₂ |
| Average GHG (Gas): 18 billion tCO ₂ | Average GHG (Gas): 0 tCO ₂ |
| Total GHG (electricity and gas): 72.2 billion tCO ₂ | Total GHG (electricity and gas): 2.04 tCO ₂ |

3.4 Setting water standards

City of Vancouver currently lacks a standard for the average water consumption in multi-unit residential buildings. Benchmarking can:

- Capture residents' water usage patterns
- Create a standard for comparing different buildings, complexes and neighbourhoods
- Keep track of overall water consumption in different areas of the city



Preliminary Analysis:

- The average water consumption of three complexes from June 2009 to November 2015 is calculated to be 322.3 L/day/household.
- The seasonal pattern of water consumption is similar in three different MURBs
- Buildings have highest water consumption during summer seasons.
- An unusual consumption pattern in 2015 is shown with decreased water consumption from August to September which was the period of water restriction stage 3 in Vancouver.
- For better representation of the graph, each complex has different billing cycles, and so, billing dates that are close to 20 days apart are presented in the same date format

* Note: Missing data points in billing date are due to different billing cycles for each building.

Understanding heat loss through Thermal Imaging

As the City plans to implement the benchmarking program to reduce energy use and greenhouse gas emissions, thermal imaging will be beneficial in both social and political aspects. At a social scale, these visual representations followed by information of heat loss of buildings will gain interest from the public and building managers/owners to participate and support the benchmarking process. On a political platform, detecting, tracking and calculating heat loss through MURBs will help the City and the public in gaining a better understanding of building performances. This can further lead to improving and creating new incentives and policies for retrofitting such as the City's building By-law to reduce energy use and greenhouse gas emissions.

Thermal Imaging will be useful in terms of:

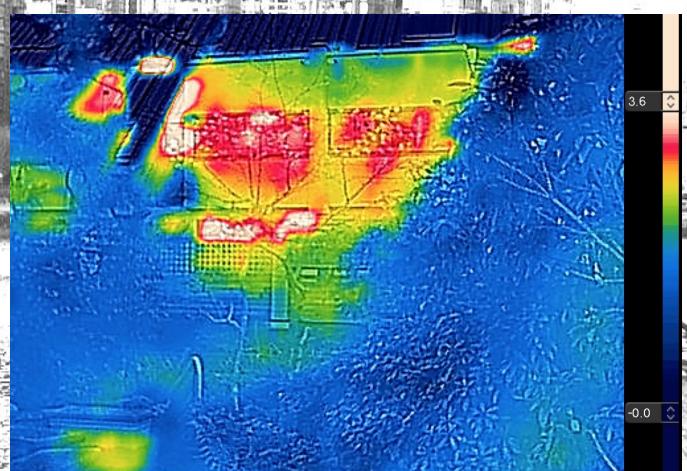
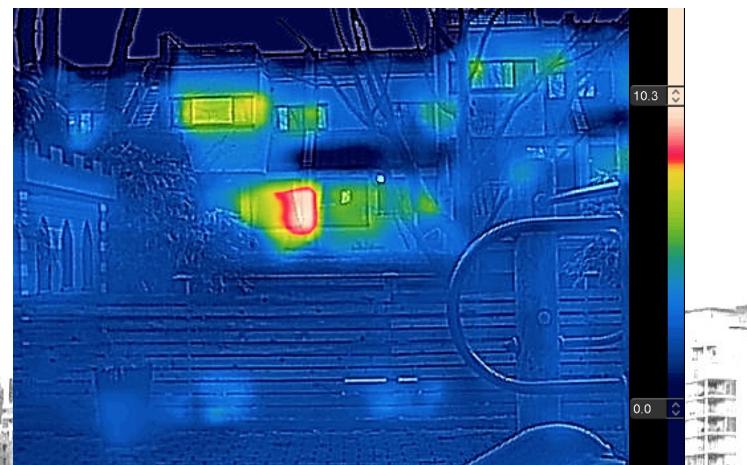
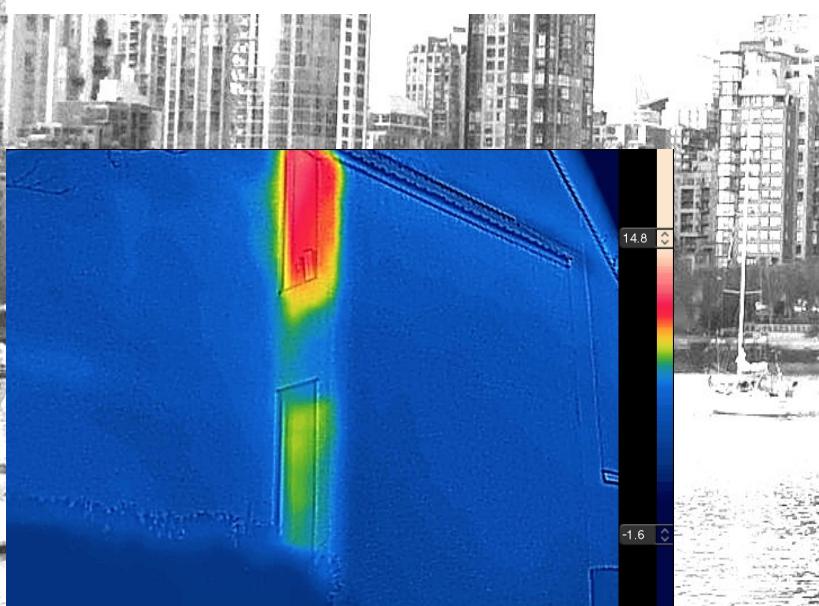
- Calculating and tracking current heat loss from MURBs
- Tracking heat loss of MURBs for ongoing years
- Comparing heat loss emissions between buildings
- Information pertaining to help update retrofit requirements

Preliminary Analysis: (January 26, 2016)

- Temperature is calculated based on distance from the building
- Outdoor temperature: 10°C
- Assuming Indoor temperature: 20°C

Current building performances of Complex B

- Average heat loss temperature: 3.6°C
- Heat loss coming from windows: approx. ~20%



Street views of Complex B overlooking windows northward (FLIR tool images)

Assessing the Benchmarking guide: feedback on the data collection process

5.1 BC Hydro: Electricity data

The draft benchmarking guide provides two options for obtaining aggregated electricity-use data from residential units with multiple units (see A.1). However, the instructions could benefit from some revision.

Option 1 (directed to non-key account customers):

- It might be useful here to include who a non-key account customer is. BC Hydro first refers to key-accounts as “residential and business customers”. However, it later describes them as “an assortment of B.C.’s largest companies, including large institutions such as hospitals and universities, large commercial companies such as big retailers and restaurant chains, and industrial facilities.”
- Despite residential units being included in the broad definition, they are not included in the specifics. This can be misleading when considering whether or not non-key account holders apply to multi-unit residential units.

The instruction says to either call BC Hydro or mail a Business Account Information Request Form (BAIR).

- Calling BC Hydro: There were various attempts at communicating with BC Hydro via telephone. For all cases, the calling process was tedious and did not produce any results. Once one is able to get across the automated answering machine, the attendants are not able to provide any information on the process for collecting aggregated electricity-use data. There were several instances in which the caller had to be re-directed to a different attendant, who again was either unfamiliar of the benchmarking process or unable to disclose any information.
- Mailing a Business Account Information Request Form (BAIR): This method was successful in providing aggregated electricity-use data. However, the original form had to be modified in order to transmit the type of information being requested (see A.2 for a comparison of the original and modified forms)



Option 2 (directed to non-BC Hydro account holders)

It would be beneficial to provide further steps here as to how to access account histories as a property owner/manager listed as “%”, even if it is similar to account holders. Otherwise one is required to fill out a CAIR (we weren’t able to access data as a property manager/owner so we followed the latter). However, this process can also be misleading due to the following:

- Under the instructions of aggregating data for 3rd parties it is mentioned that MURB’s with less than 20 units must have all account holders fill out the CAIR form, and for those with more than 20 units an approval of the strata council is required instead of the CAIR form. However, later on there is a tip that states that the easiest way to obtain energy-use data for residential buildings over 20 units is actually to fill out the CAIR form (see A.3 for a copy of the CAIR form partially filled by us).
- For the first page of the form, in the “Details of requested information”, it is unclear who the account holder should be and exactly what information to provide to represent more than 20 units from a single building. The major complaints and worries when asking the residents helping us fill out the forms were 1) that they did not want to spend time having every unit fill out a form and 2) that their private information would be disclosed to the public.

Using Portfolio Manager

The steps outlined in the draft benchmarking guide are quite clear with regards to the portfolio manager usage. These are the comments we have:

- The easiest way to upload data to the portfolio manager is by using the provided templates. In order to successfully upload the data, the exact start and end dates for every monthly input (for at least 12 months) are required. This is not provided with the raw data, so we had to assume that each reading started and ended on the first and last day of each month (See A.4 for an example entry).

Our recommendation

In order to make the steps easier for building owners/managers to follow, we would suggest the following:

- Define who would fall under a non-key holder account category
- Arrange a closer connection with BC Hydro employees so that they are aware of the benchmarking process and people calling to ask information on requesting aggregated energy-use
- Provide a single form that is specific to the purpose of requesting aggregated energy-use data, as well as an example of a filled-out form.

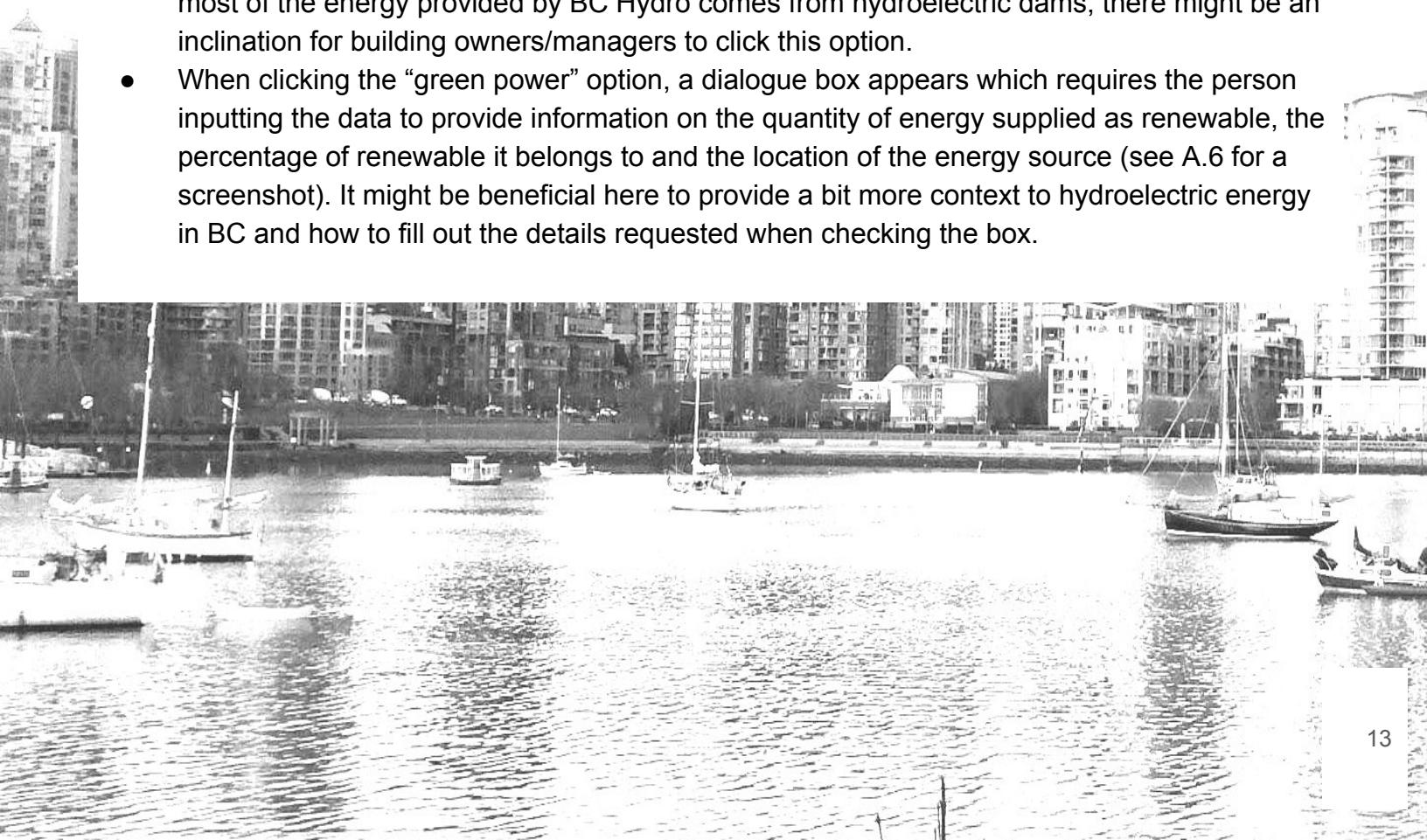
Extra comments and notes

Requesting raw data and processing

- In our case, we were successful in obtaining energy-use data because we had guidance from the City, and we had a specific BC Hydro liaison who was able to process our request personally. Many building owners/managers would not have access to these resources.
- It took 8 weeks (43 business days) for us to obtain the aggregated electricity-use data from the day we requested it to the day we received it. A shorter wait-time period may encourage the process of benchmarking.
- The data received does not include units and had to be processed in order to function on a spreadsheet and for analysis purposes (see A.5 for an example of the BC Hydro raw data)
- There is also an option for uploading ‘bulk’ data. We attempted to use this option to upload data for multiple properties, using the building coop/strata as the owner and the various buildings as different properties. This process requires the use of a template, which is provided by Portfolio Manager. However, the template only allows for basic building information to be submitted and it is not entirely clear how to upload consumption data for several buildings at the same time.

Green power

- There is an option to register energy source as “green power” on Portfolio Manager but the benchmarking guide only mentions this option and is not completely explained. Given that most of the energy provided by BC Hydro comes from hydroelectric dams, there might be an inclination for building owners/managers to click this option.
- When clicking the “green power” option, a dialogue box appears which requires the person inputting the data to provide information on the quantity of energy supplied as renewable, the percentage of renewable it belongs to and the location of the energy source (see A.6 for a screenshot). It might be beneficial here to provide a bit more context to hydroelectric energy in BC and how to fill out the details requested when checking the box.



5.2 City of Vancouver: Water data

The step by step procedures are shown in the draft benchmarking guide to retrieve water data from the City of Vancouver. It would be much instructive to revise steps in detail with screenshots for option A (Obtain data online using “Property Services” account) as A.7.

- 1) Log in > Click on account number or register a new one > Go to ‘readings’ tab on the top > Collect the consumption data from each reading meter

Is this your first time logging in? Register first

Please create an online account first. You need:

1. A valid email address
2. The access code printed on your tax notice or utility bill

[Register now](#)

Already registered? Log in here

Email Address:

Password:

[Login](#)

Don't have a profile? [Register now](#).

Forgot your password? Fill in your email address and [Reset it](#).

[Read the Terms of Use](#)

- 2) Log in > Click on account number or register a new account > Go to ‘readings’ tab on the top > Collect the consumption data from each reading meter

[Accounts](#)

[Register Accounts](#)

 [Log Out](#)  [Profile](#)

Accounts

Here are the accounts you have registered.

Select any account number from this list to view details of that account, or to sign up to receive your bill by email. If you register a Tax account for ebilling after May 6 you will receive your first ebill for the advance tax levy in November.

| <u>Account Type</u> | <u>Account</u> | <u>Address</u> | Actions | <u>Note</u> | Billing Delivery Method |
|---------------------|----------------|----------------|------------------------|-------------|-------------------------|
| UTILITY | [REDACTED] | [REDACTED] | Remove | Historical | |

- 3) Log in > Click on account number or register a new one > Go to 'readings' tab on the top > Collect the consumption data from each reading meter

| eBills | Account Balances | Readings | Billing History |
|-------------------------|----------------------------------|----------|-----------------|
| Utility Account Details | | | |
| Utility Account Number | [REDACTED] | | |
| Name | OWNERS OF STRATA PLAN [REDACTED] | | |
| For Service At | [REDACTED] | | |
| Account Type | RESIDENTIAL | | |
| Status | Active | | |

eBills

Be sure your email address is up to date. You are still required to make your utility payment on time, even if you did not receive your utility bill.

Recent Statements

| Date | Description |
|--------------|--------------|
| Jun 30, 2015 | UTILITY BILL |
| Mar 4, 2015 | UTILITY BILL |
| Nov 4, 2014 | UTILITY BILL |
| Jul 4, 2014 | UTILITY BILL |

- 4) Log in > Click on account number or register a new one > Go to 'readings' tab on the top > **Collect the consumption data from each reading meter**

| eBills | Account Balances | Readings | Billing History |
|-------------------------|----------------------------------|----------|-----------------|
| Utility Account Details | | | |
| Utility Account Number | [REDACTED] | | |
| Name | OWNERS OF STRATA PLAN [REDACTED] | | |
| For Service At | [REDACTED] | | |
| Account Type | RESIDENTIAL | | |
| Status | Active | | |

Total Consumption

Readings for account 5009065 Show/hide details

| Billing Period | Last Read | Consump UNITS | Total Days | Daily Average UNITS/day |
|----------------|--------------|------------------|------------|----------------------------|
| 2015 - 2 | May 25, 2015 | 1233 | 103 | 11.97 |
| 2015 - 1 | Feb 11, 2015 | 1479 | 135 | 10.96 |

Readings

One unit of water equals 100 cubic feet. This is about seven hundred 4 litre jugs of water.

Select meter: ▾

| Meter | Status | Share % | Note |
|----------|--------|---------|------|
| 72812076 | ON | 100.00 | |

Readings for meter 72812076

Show/hide details

| Billing Period | Reading Date | Days | Reading | Consump | UNITS Billed | UNITS / Day | Type | Customer Message |
|----------------|--------------|------|---------|-----------|--------------|-------------|------|------------------|
| 2015 - 2 | May 25, 2015 | 59 | 1233 | 734 units | 734.00 | 12.44 | auto | |
| 2015 - 2 | Mar 27, 2015 | 44 | 499 | 499 units | 499.00 | 11.34 | auto | |

Our recommendation

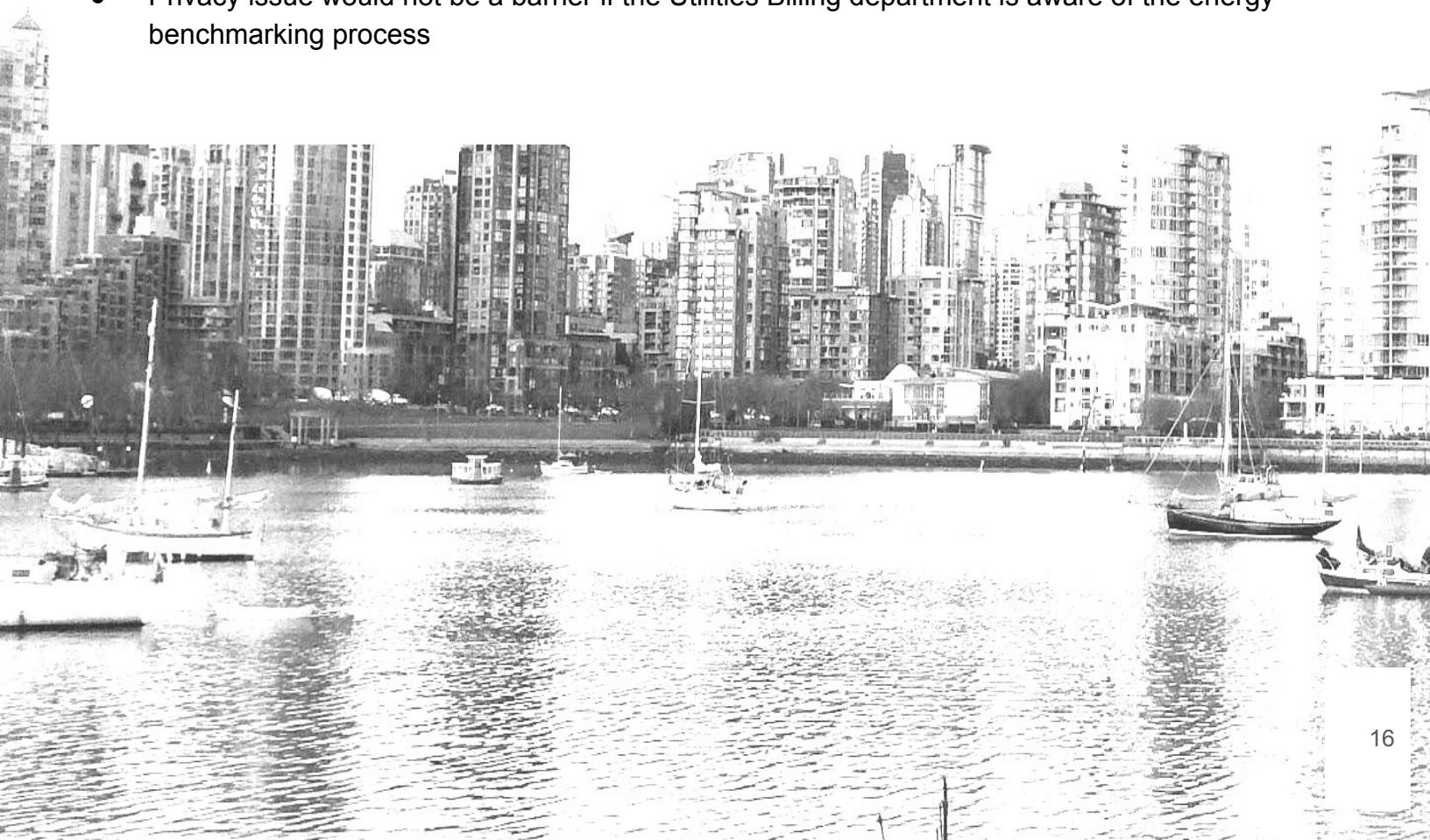
In order to make the steps easier for building owners/managers to follow, we would suggest the following:

- Arrange a closer connection with other departments in the City of Vancouver so that they are aware of the benchmarking process and people calling to ask information could easily obtain the information
- Indicate utilities@vancouver.ca in the benchmarking guide so that one would know where to make a request

Extra comments and notes

Requesting raw data and processing

- Since there is no instruction for a third party in the benchmarking guide, we had to proceed in different routes.
 - We had to first call 3-1-1 → explain the situation → email utilities@vancouver.ca with all the addresses of the interested buildings and the time frame that we are interested in.
 - Due to privacy issues, the Utilities Billing department requested an approval of our community partner, the City of Vancouver. With this approval, the Utilities Billing department provided us with water consumption data and the billing costs according to the requested account numbers. The privacy issue was resolved well in this case because we had access to a specific community partner in the City of Vancouver to help us gain water consumption history.
- Privacy issue would not be a barrier if the Utilities Billing department is aware of the energy benchmarking process



5.3 Fortis BC: Gas data

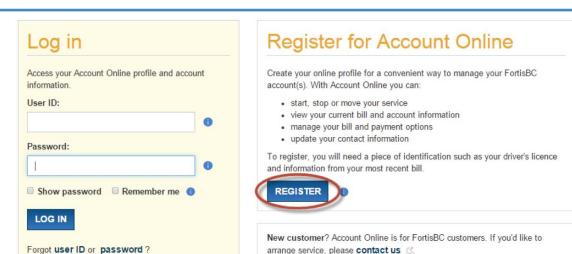
There is an indirect link provided from the draft benchmarking guide (See A.7 screenshot) that mentions detailed steps in obtaining gas data. However, the following steps could be incorporated into the benchmarking guide to facilitate instructions with clear visuals in creating accounts and gaining access to past gas consumption data.

As a first step, an online account will need to be created in order to gain access to past gas consumption data.

- 1) Access the following link, which would direct to the registration page if the account holder doesn't have an online account.

<https://accounts.fortisbc.com/hcl-axon.com~iem~cssweb/login.xhtml>

Access Your Billing and Consumption History

| | |
|--|---|
| <p>1 Navigate to the FortisBC Account Online log in screen https://accounts.fortisbc.com/hcl-axon.com~iem~cssweb/login.xhtml</p> <p>Enter the User ID and Password you created for Account Online.</p> <p>Click on the <i>LOG IN</i> button.</p> |  FORTIS BC Account Online |
| |  |

- 2) During the registration process, an account number will be required. This can be obtained from the current bill's left hand corner indicated "account number".

 Account Online

Register for Account Online - step 1 of 4

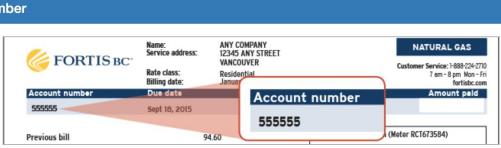
Step 1: Provide your FortisBC account number

Choose your service
Choose the service you receive from FortisBC. If you receive both gas and electricity from FortisBC, first, you will need to choose one service. Then you will be able to link other accounts. [?](#)

Gas Electricity

Enter your account number:

CONTINUE **Cancel**



- 3) This is a verification process where either a balance from the last statement, or a phone number linked to the account holder can proceed with this.

Register for Account Online - step 2 of 4

✓ Step 1: Provide your FortisBC account number

Step 2: Verify your FortisBC account information

To verify your account, please enter any one of the following:

Phone number: _____ - _____ - _____

Phone number: _____ - _____ - _____

BACK CONTINUE Cancel

Register for Account Online - step 2 of 4

✓ Step 1: Provide your FortisBC account number

Step 2: Verify your FortisBC account information

To verify your account, please enter any one of the following:

Balance from your last statement: _____

Enter the balance from your statement dated: Mar 3, 2016 \$ 0.00

BACK CONTINUE Cancel

- 4) Both sections require additional information to gain access to the online account.

Step 3: Set up your Account Online access

Step 4: Confirm your access information

- 5) Once an account has been created, the summary page will show gas consumption for the past 3 months along with the past year's consumption month with all in units of GJ.

| <p>2 Your account summary page will be displayed showing your last bill amount, last payment and current balance.</p> <p>Note: If you have more than one account with FortisBC you will be brought to an Accounts summary page where you will need to select the Account you are interested in before seeing the Summary page.</p> | <p>Summary</p> <p>Current amount due: \$56.41 Last bill: \$56.41 Last payment: \$76.00</p> <p>Due on Nov 18, 2015 On Oct 5, 2015</p> <p>Bill & payment history View current bill Payment methods</p> <p>My energy use, last 3 billing periods (Gigajoules (GJ))</p> <table border="1"> <thead> <tr> <th>Month</th> <th>Consumption (GJ)</th> </tr> </thead> <tbody> <tr> <td>Aug</td> <td>1.5</td> </tr> <tr> <td>Sep</td> <td>2.7</td> </tr> <tr> <td>Oct</td> <td>4.3</td> </tr> </tbody> </table> <p>Recent period: Last year: Last year: 5.5</p> <p>View additional consumption history</p> <p>ACCOUNT TOOLS OPEN</p> <p>Contact information Phone: 778-879-9056 Email: pam.beaudin@fortisbc.com</p> <p>Update your contact information Move your service</p> <p>Products & services Renewable Natural Gas - Off</p> <p>Rate: Residential</p> <p>Payment & billing options Paperless billing - On Equal Payment Plan - On Pre-authorized Payment Plan - On</p> <p>Find a contractor</p> | Month | Consumption (GJ) | Aug | 1.5 | Sep | 2.7 | Oct | 4.3 |
|--|--|-------|------------------|-----|-----|-----|-----|-----|-----|
| Month | Consumption (GJ) | | | | | | | | |
| Aug | 1.5 | | | | | | | | |
| Sep | 2.7 | | | | | | | | |
| Oct | 4.3 | | | | | | | | |

6) With this, under the “billing” tab, one will be able to export billing information as an excel file.

| | |
|---|--|
| <p>3 Click on the <i>Billing</i> menu item and select <i>Export billing information</i> from the drop down menu.</p> | |
|---|--|

7) There will be an option of either choosing 6 months, 1 year, 2 years and custom settings for the duration of the consumption data.

| | |
|--|--|
| <p>4 Click the <i>text file or spreadsheet</i> radio button to select the file format to export to.</p> <p><i>These file formats can be viewed with most spreadsheet programs or text editor programs.</i></p> <p>Select the time period you want to export your billing history for and click on the <i>DOWNLOAD</i> button.</p> <p>The file will download to your computer or device.</p> | <p>Export billing information</p> <p>To export your billing information, select a billing period from the menu or set a custom date range, choose a file type and then click the download button.</p> |
|--|--|

8) With this information, values can be inputted into the online Portfolio Manager to calculate GHG emissions.

| | |
|---|--|
| <p>5 Open the downloaded file; you will see the information related to each of your bills for the dates you have selected.</p> | |
|---|--|

Our recommendation

In order to make the steps easier for building owners/managers to follow, we would suggest the following:

- Arrange a closer connection with Fortis BC employees so that they are aware of the benchmarking process and people calling to ask information on requested past gas consumption data would be readily available
- The data received should include units, labelled months, and billing cycles
- Direct steps with visuals should be showcased onto the benchmarking guide rather than a screenshot of an indirect link to the Fortis BC website on benchmarking

Extra comments and notes

- In our case, when creating an online account as a third party, the Fortis BC website identification required a recent bill to gain access to past billing data. However, the bill that we had obtained from our community partner was outdated for more than 4 months ago.
- Fortis BC did not respond to any phone calls nor email communication so we were not able to obtain gas consumption data for this project

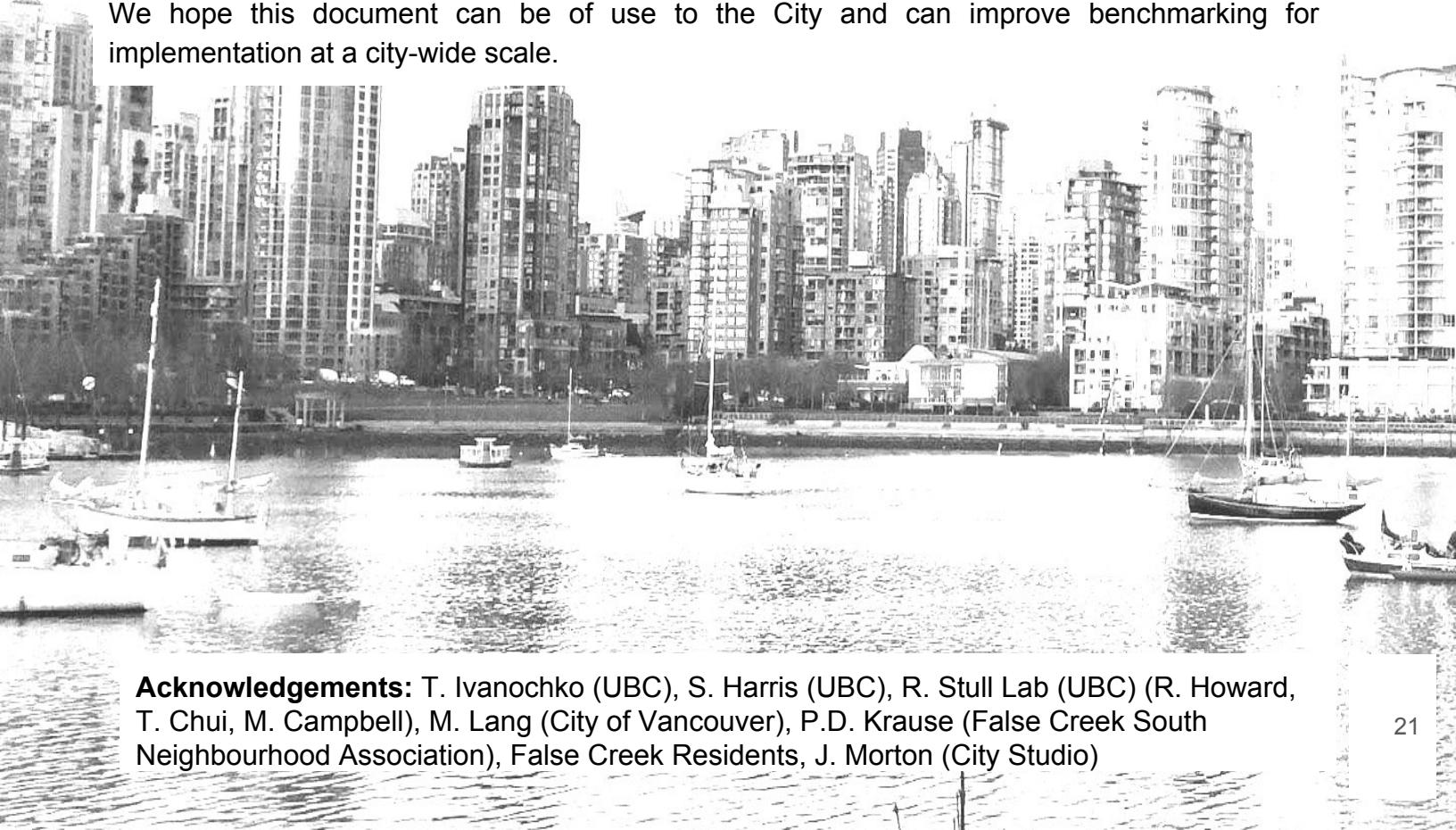


Conclusion

The City's benchmarking initiative is promising and will hopefully enable part of the goal to reduce greenhouse gas emissions by 20% from 2007 levels. Aside from being a useful monitoring tool, benchmarking allows building managers to see how much energy and water their buildings are consuming, while at the same time providing useful information to the City for the purpose of creating better energy policies and emission-reduction incentives. Our preliminary analysis of electricity, water and gas consumption along with heat loss information will be a useful stepping stone in developing and launching zero-emission building strategies, Green building re-zoning policies, introducing new mandatory GHG emissions targets and further incentives and regulations to meet the City's Green building initiative. With proper implementation, City of Vancouver can utilize benchmarking and become a role model in urban sustainability and public engagement in city planning.

Our recommendation is to make the data collection process more accessible to third parties. One way to do this is by advising utility companies on the benchmarking initiative in order to facilitate data requests from building managers. Another idea could be to produce a tutorial for uploading data onto Energy Star Portfolio Manager to facilitate the process for third parties. Additionally, the use of thermal imaging as part of the benchmarking process could increase the public's understanding of heat loss in buildings and act as a visual reference to attract the public's interest. We believe gaining support from the public along with active participation is important for the future of benchmarking.

We hope this document can be of use to the City and can improve benchmarking for implementation at a city-wide scale.



Acknowledgements: T. Ivanochko (UBC), S. Harris (UBC), R. Stull Lab (UBC) (R. Howard, T. Chui, M. Campbell), M. Lang (City of Vancouver), P.D. Krause (False Creek South Neighbourhood Association), False Creek Residents, J. Morton (City Studio)

Appendix

A.1 Excerpt from City of Vancouver Draft Benchmarking Guide displaying steps to obtain aggregated energy-use data from BC Hydro for MURB's.

Option 1

BC Hydro account holders can obtain Account History Reports for their own account(s) in the following ways:

- **Preferred method:** BC Hydro customers can export data for each individual account as well as allow 3rd parties to download their monthly consumption via [My Hydro at bchydro.com](#). – Procedure follows on pages 9 and 10.
 - **Key account customers:** Key Account customers can call BC Hydro call centre 604-224-7376 or contact the Customer Care team by email customer.care.kam@bchydro.com.
 - **Multi-unit residential buildings :** Non-key account customers can call the BC Hydro call centre 604-224-9376 or mail or fax a Business Account Information Request Form (Appendix 1) to BC Hydro.
- If you have less than 20 individual accounts you can expect the data in 3-5 business days. For 20-500 individual accounts, 5-8 business days. For more than 500 sites or accounts, 8-10 business days.

Non-BC Hydro Account Holders

- Property Managers or Property Owners listed as "c/o" on the BC Hydro account can access Account History reports just as the BC Hydro Account Holder does.
- Non-BC Hydro account holders who are not listed as "c/o" on the BC Hydro account must complete the 3rd Party Account Authorization portion of the Customer Account Information Request Form (CAIR or KA-CAIR).

Aggregation of 3rd Party Data

Monthly and yearly aggregated consumption data can be provided to 3rd parties who require data on properties with multiple residential account holders. Only the building consumption total for each month or year is provided (i.e. no billing/payment details).

To obtain aggregated consumption data for a residential building with less than 20 residential accounts, all account holders must complete the 3rd Party Account Authorization.

To obtain aggregated consumption data for a residential or mixed use building with 20 or more residential accounts, an approval from Strata Council or Building Owner (for a rental building) is required instead of the 3rd Party Account Authorization Form for each residential account holder. All commercial account holders need to provide Business Account Authorization Form, see Appendix 1. You should indicate the reason for aggregation request is for energy benchmarking the building.
Data requests can take up to 30 days.

Tip: If you don't hold all the accounts in your building, the easiest way to get electrical consumption data for **commercial accounts** is to have the account holder sign into their BC Hydro Account, download the data as an .xls file, and email the Excel file to you. The easiest way for **residential buildings** with over 20 units is the Customer Account Information Request Form, see Appendix 1.

Option 2

A.2 Comparison of the original BAIR form (left) and the modified form submitted (right)

BChydro

Page 1 of 2

Business Account Information Request Form

Complete and return to: BC Hydro Customer Care Key Account Management
333 Dunsmuir St, 4th Floor
Vancouver, BC V6B 5R3 or Email customer.care.kam@bchydro.com

If you require assistance completing this form, please call 604 453-6400 (Toll Free: 1-866-453-6400).
NOTE: Responses to requests for Business Account Information may take up to 10 days to process. All Account History Reports are extracted in a standard excel format and BC Hydro does not provide customized reports.

APPLICATION INFORMATION (please print)

Company Name

Authorized Personnel

| Last Name | First Name | Title of Occupation |
|-----------|------------|---------------------|
|-----------|------------|---------------------|

| Telephone (work) | Fax Number | Email address |
|------------------|------------|---------------|
|------------------|------------|---------------|

DETAILS OF REQUESTED INFORMATION (please print)

NOTE: The more information you provide regarding the details of your request, the faster we can locate your information and provide a response.

Account Number(s) – please separate accounts by (,)

Time period for information being requested:

| From: | To: |
|------------|------------|
| Month/Year | Month/Year |

For the purpose of (Example: audit, energy analysis)

THIRD PARTY INFORMATION (please print)

I, _____ authorize BC Hydro to disclose the following information to:
(name or person authorizing release or their personal information)

Page 2 of 2

Third Party Company Name

Third Party Contact Information

| Last Name | First Name | Title of Occupation |
|-----------|------------|---------------------|
|-----------|------------|---------------------|

| Telephone (work) | Fax Number | Email address |
|------------------|------------|---------------|
|------------------|------------|---------------|

Signature of Authorized Personnel: _____ Date of Signature: _____

Day/Month/Year

Signature of Third Party Contact: _____ Date of Signature: _____

Day/Month/Year

ADDITIONAL DOCUMENTATION

If the request is for a business entity:

- You are required to provide
- A copy of an old bill, and
 - Your business card or a letter requesting the information (on company letterhead, signed by a person of authority, i.e., CEO, President, CFO)

BChydro

Page 1 of 2

Business Account Information Request Form

Complete and return to: BC Hydro Customer Care Key Account Management
333 Dunsmuir St, 4th Floor
Vancouver, BC V6B 5R3 or Email customer.care.kam@bchydro.com

If you require assistance completing this form, please call 604 453-6400 (Toll Free: 1-866-453-6400).
NOTE: Responses to requests for Business Account Information may take up to 10 days to process. All Account History Reports are extracted in a standard excel format and BC Hydro does not provide customized reports.

APPLICATION INFORMATION (please print)

Company Name
Benchmarking Company

Authorized Personnel

| Last Name | First Name | Title of Occupation |
|-----------|------------|---------------------|
|-----------|------------|---------------------|

| Telephone (work) | Fax Number | Email address |
|------------------|------------|---------------|
|------------------|------------|---------------|

DETAILS OF REQUESTED INFORMATION (please print)

NOTE: The more information you provide regarding the details of your request, the faster we can locate your information and provide a response.

Account Number(s) – please separate accounts by (,) Common area account numbers:

XXX XXXX XXX, YYY YYYY YYY, ZZZ ZZZZ ZZZZ

Please also aggregate all energy use data for accounts associated with the address:

Time period for information being requested: Monthly energy use data aggregated for the whole building
From: 01/2010 To: 01/2015
Month/Year Month/Year

For the purpose of (Example: audit, energy analysis)
Energy benchmarking study

THIRD PARTY INFORMATION (please print)

I, _____ Jane Doe _____ authorize BC Hydro to disclose the following information to:
(name or person authorizing release or their personal information)

Page 2 of 2

Third Party Company Name

University of British Columbia

Third Party Contact Information

| Last Name | First Name | Title of Occupation |
|---------------|------------|---------------------|
| Smith | Kim | Student |
| (604)123-4567 | | |

| Telephone (work) | Fax Number | Email address |
|------------------|------------|---------------|
|------------------|------------|---------------|

Signature of Authorized Personnel: _____ Date of Signature: _____

JD

Day/Month/Year

Signature of Third Party Contact: _____ Date of Signature: _____

Yann Herrera

Day/Month/Year

ADDITIONAL DOCUMENTATION

If the request is for a business entity:

- You are required to provide
- A copy of an old bill, and
 - Your business card or a letter requesting the information (on company letterhead, signed by a person of authority, i.e., CEO, President, CFO)

A.3 CAIR form, partially filled.

| | |
|---|--|
| <p>BChydro</p> <p>Customer Account Information Request Form</p> <p>Complete and return to: BC Hydro, CASC Support 6911 Southpoint Drive, C01 Burnaby, BC V3N 4X8</p> <p>If you require assistance completing this form, please call 604 224-9376 (Toll Free: 1-800-224-9376). NOTE: Responses to requests for customer account information may take up to 30 days to process.</p> <p>APPLICATION INFORMATION (please print)</p> <p>Name of applicant</p> <p>Last name _____ First name _____ Middle name _____</p> <p>Current mailing address</p> <p>Address _____ City/town _____ Province _____ Postal code _____</p> <p>Contact Information</p> <p>Telephone (work) _____ Telephone (home) _____ Fax _____ Email address _____</p> <p>DETAILS OF REQUESTED INFORMATION (please print)</p> <p>NOTE: The more information you provide regarding the details of your request, the faster we can locate your information and provide a response.</p> <p>Name of account holder</p> <p>Last name _____ First name _____ Middle name _____</p> <p>Account address(es)</p> <p>Address _____ City/town _____ Province _____ Postal code _____</p> <p>Account number(s) Time period for information being requested From: 01/2010 To: 01/2015 Monthly/year Monthly/year</p> <p>Exact nature of the information you require: (Example: billed amounts, consumption amounts, payment amounts) <u>Billed amounts, consumption amounts</u></p> <p>Requester's signature _____ Date _____</p> <p>ca-cairinfoq.doc Page 1 Last revised: 16 July, 2003</p> | <p>Page 1 of 2</p> <p>Day/month/year Page 2 of 2</p> <p>If this request is for an account other than your own, have the third party complete the following section:</p> <p>THIRD PARTY INFORMATION (please print)</p> <p>I, _____ (name or person authorizing release of their personal information) authorize BC Hydro to disclose the following information to: _____ (name and address or person to whom BC Hydro may disclose the specific information indicated below)</p> <p>Yann Herrera 928 Homer Street Apt. 2110, Vancouver B.C., V6B 1T7</p> <p>Exact time period for disclosure From: 01/2010 To: 01/2015</p> <p>Exact type of information to be disclosed (Example: billed amounts, consumption amounts, payment amounts) Billed amounts, consumption amounts</p> <p>For the purpose of (Example: audit, energy analysis) Energy audit and analysis</p> <p>Signature of authorizing person _____ Date of signature _____</p> <p>Day/month/year</p> <p>ADDITIONAL DOCUMENTATION</p> <p>If the request is not for your current account: You are required to provide proof of residency, such as an old bill or a post-marked letter from legal or government source, linking you with your old address during the period of interest to you.</p> <p>If the request is for a business entity: You are required to provide <ul style="list-style-type: none"> • A copy of an old bill, and • Your business card or a letter requesting the information (on company letterhead, signed by a person of authority, i.e., CEO, President, CFO) </p> <p>If the account holder is deceased or lacks legal capacity: You are required to provide proof of designation as an executor, an administrator or a guardian. This documentation must indicate that you have the authority to access the account holder's records.</p> <p>If your name has changed since you were responsible for the account: You are required to provide legal documents substantiating the name change.</p> <p>ca-cairinfoq.doc Page 2 Last revised: 16 July, 2003</p> |
|---|--|

A.4 Sample Portfolio Manager electricity-data entry



Hypothetical start and end dates

▼ Monthly Entries

| Start Date | End Date | Usage kWh (thousand Watt-hours) | Cost (\$) | Estimation | Green Power | Last Updated |
|--------------------------|-----------|---------------------------------|-----------|------------|--------------------------|--------------------------|
| <input type="checkbox"/> | 1/1/2015 | 1/31/2015 | 148,033 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | 2/1/2015 | 2/28/2015 | 865 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | 3/1/2015 | 3/31/2015 | 58,340 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | 4/1/2015 | 4/30/2015 | 112,613 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | 5/1/2015 | 5/31/2015 | 44,993 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | 6/1/2015 | 6/30/2015 | 81,929 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | 7/1/2015 | 8/31/2015 | 78,672 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | 9/1/2015 | 9/30/2015 | 20,748 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | 10/1/2015 | 10/31/2015 | 69,080 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | 11/1/2015 | 11/30/2015 | 35,710 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | 12/1/2015 | 12/31/2015 | 182,266 | 0.00 | <input type="checkbox"/> | <input type="checkbox"/> |

✖ [Delete Selected Entries](#)
 ✚ [Add Another Entry](#)

↻ [Download to Green Button XML](#)
 ⤓ [Download to Excel](#)

A.5 BC Hydro raw data

| Address | Yr | Month | Consumption |
|------------------|------|-------|-------------|
| BUILDING ADDRESS | 2010 | 1 | 33763.00 |
| BUILDING ADDRESS | 2010 | 2 | 191011.00 |
| BUILDING ADDRESS | 2010 | 3 | 201130.00 |
| BUILDING ADDRESS | 2010 | 4 | 33704.00 |
| BUILDING ADDRESS | 2010 | 5 | 16881.00 |
| BUILDING ADDRESS | 2010 | 6 | 112394.00 |
| BUILDING ADDRESS | 2010 | 7 | 100663.00 |
| BUILDING ADDRESS | 2010 | 8 | 1709.00 |
| BUILDING ADDRESS | 2010 | 9 | 103974.00 |
| BUILDING ADDRESS | 2010 | 11 | 46558.00 |
| BUILDING ADDRESS | 2010 | 12 | 169361.00 |
| BUILDING ADDRESS | 2011 | 1 | 31477.00 |
| BUILDING ADDRESS | 2011 | 2 | 187414.00 |
| BUILDING ADDRESS | 2011 | 3 | 225683.00 |
| BUILDING ADDRESS | 2011 | 5 | 51983.00 |
| BUILDING ADDRESS | 2011 | 6 | 130155.00 |
| BUILDING ADDRESS | 2011 | 7 | 10780.00 |
| BUILDING ADDRESS | 2011 | 8 | 82502.00 |
| BUILDING ADDRESS | 2011 | 9 | 77130.00 |
| BUILDING ADDRESS | 2011 | 11 | 200368.00 |
| BUILDING ADDRESS | 2011 | 12 | 37800.00 |

No units

Improper
spreadsheet
formatting

A.6 Green power input box

About the Green Power for this Entry: 01/01/2015 through 01/31/2015

Quantity: * kWh (thousand Watt-hours) The quantity of green power must be entered in the same units as your energy usage for this time period.

Fuel Source(s): Biogas Biomass Geothermal Small Hydropower How Much? %

Solar Wind Unknown

Generation Location: * I know the specific plant where the energy was generated. I don't know the specific plant, but I know the eGRID Subregion (US) or Province (Canada) where the energy was generated. I don't know anything about where the energy was generated. Save

A.7 Instructions on obtaining gas data from the City's Draft Benchmarking Guide

Obtain Natural Gas Data – Fortis BC

For detailed instructions on how to access your natural gas consumption data from Fortis BC, visit fortisbc.com/benchmarking.

