

# Opening remarks

## TODAY



Mainly cloudy with scattered flurries.

Freezing level: 1,600m.

High -1 °C

Ridge wind easing to southeast 40 gusting to 60 km/h increasing again in the late evening.

Accumulation: 2-4cm.

## TONIGHT



Periods of snow developing.

Freezing level: 1,200m.

Low -3 °C

Ridge wind increasing to southeast 50 gusting 80-100 km/h.

Accumulation: 10-20cm.

## MONDAY



Cloudy with flurries.

Freezing level: 1,500m.

High -1 °C

Ridge wind southeast 20-40 km/h.

Accumulation: 5-15cm.

## TUESDAY



Periods of snow.

Freezing level: 1,800m.

Low -3 °C, High 0 °C

Ridge wind southwest 40 gusting 70-90 km/h.

Accumulation: 15-25cm.

## WEDNESDAY



Cloudy with scattered flurries. Sunny periods developing.

Freezing level: 1,200m.

Low -4 °C, High -1 °C

Ridge wind southwest: 20-40 km/h gusting northwest to 80 in the afternoon.

Accumulation: 4-8cm.



# **Thermal Energy Submetering: Sustainability Through Accountability**

Dustin Ingram - QMC

- Multi-utility submetering and billing company
- Vancouver, Calgary, Toronto, Montreal
- 20 years in sub-metering industry
- Collecting data from 50,000+ meter points daily (10k thermal)



# Agenda

- Objectives
- Introduction – Thermal Submetering
  - Background, where are we currently in Canadian Market
- Sustainability Through Accountability
- Need for thermal submetering
- Challenges for Stakeholders
- Thermal Submetering Review –
  - High Level Review of technology options
  - Legal/Regulatory Considerations
- Case Study – Heat Meters in Alberta
- Conclusions



# Objectives of Presentation

Thermal  
Submetering is  
needed

- Tenant invoicing – equitable billing practices
- Contribute to conservation targets. Example – Vancouver Greenest City 2020 targets.
- Reduce GHG by 33% from 2007 Levels.

Best Practices  
and standards  
are available

- Proven Technology
- EN1434, OIML R75, Measurement Canada, Provincial Legislation
- Policy Makers Attention

Engagement is  
required for all  
stakeholders

- Utility Transparency and Traceability
- Accurate Measurement
- Gain Trust of Consumer for a new energy Source



# Introduction

“Community utility consumption in energy conscious markets is transforming to more sustainable heating and cooling options.”

Bruce Ander, Vancouver is the most notable in driving change in expanding to thermal energy systems. – we are leading the way. *District Energy Magazine* – 4<sup>th</sup> Qtr, 2015

Transformation Requires Engagement

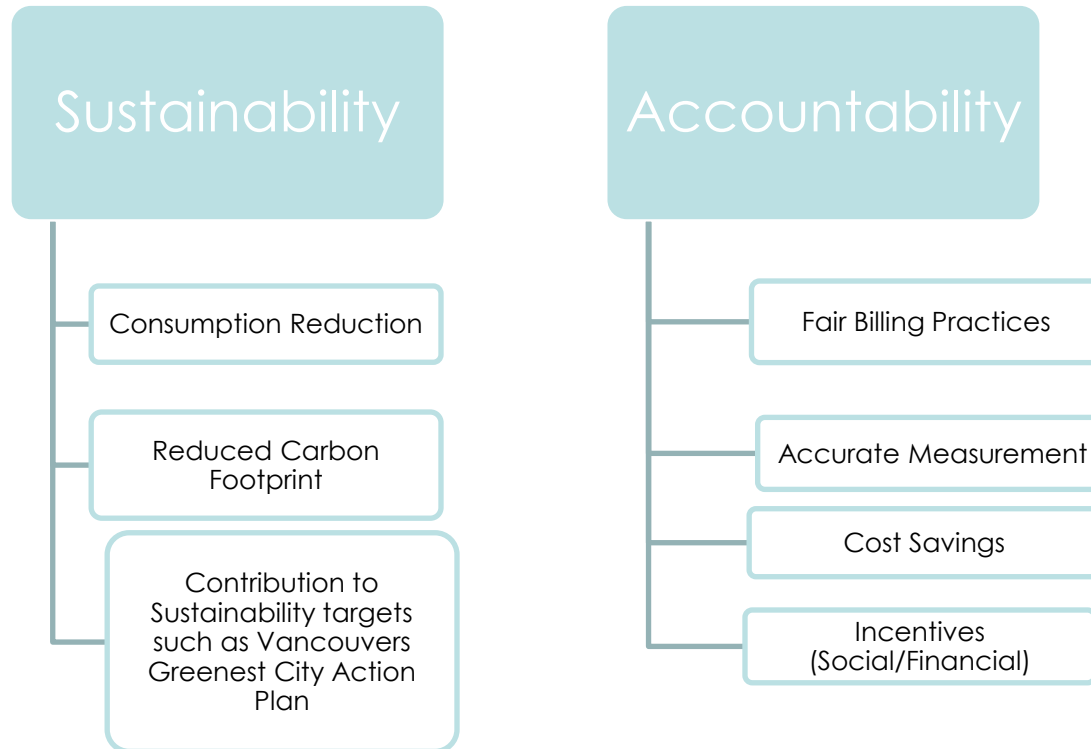


# Thermal Submetering Background in Canada

- Thermal Submetering is not required
- Thermal Submetering is not Regulated
- Technology and methodologies for billing and cost allocation are inconsistent and vary in type and effectiveness
- Available Standards are often not used
- Regulation is on the horizon but not known when
- Thermal Submetering is growing in use for tenant billing, energy management and consumer engagement.
- Demand for quality thermal submetering solutions rapidly increasing.



# Sustainability Through Accountability





# Sustainability Through Accountability

## Transformation Requires Engagement

- Utility to consumer
- Strata to owner
- Landlord to tenant
- Consumer to community
- Engagement is critical for success and longevity in thermal energy systems
- Protecting investments in thermal energy systems is critical for the growth and viability of the industry.



# Need for Thermal Submetering?

650 West 41st Avenue (Oakridge Centre)  
FORM OF DEVELOPMENT



REVISED REZONING 20 SEPTEMBER 2013

*Building Intelligence With Submetering Solutions*

# Why sub-meter



## Summary

### Operations

- Green buildings tend to be **more intensively managed**, have stronger occupancies & lower utility costs (including lower experience of much higher expenses)
- Separate metering has more impact on energy savings **(21% savings)** than almost any other factor
- Each point higher in ENERGY STAR **saves .8-1%** in electricity

### Productivity

- Green buildings observe **high** in comfort, air, light
- Higher repd = nearly \$25 (nearly the a

**Studies like this by the US Real Estate Board, Oakville Hydro, Ontario Government, and State of New York find 18-25% energy savings with sub-metering**



# Challenges

- What are the recognized challenges to thermal submetering
  - Educating consumers and stakeholders (engineers, contractors, service providers, policy makers, etc).
  - Financial costs
    - Meter cost
    - Installation
    - Present Utility costs are low
    - Service and maintenance TOTAL COST OF OWNERSHIP
  - Regulatory or lack of regulatory requirements
  - Industry awareness and understanding. Identify and apply proven best practices.
  - Technology
    - Choosing and implementing technology
    - Analysis criteria for new technology



# Submetering Methodology and Technology

## Fixed Fee

- SQ foot allocation – Fixed Fee
- Ratio Utility Billing Systems – RUBS – Fixed Fee

## Variable Fee

- Run Time and Inferred Measurement
- Submetering





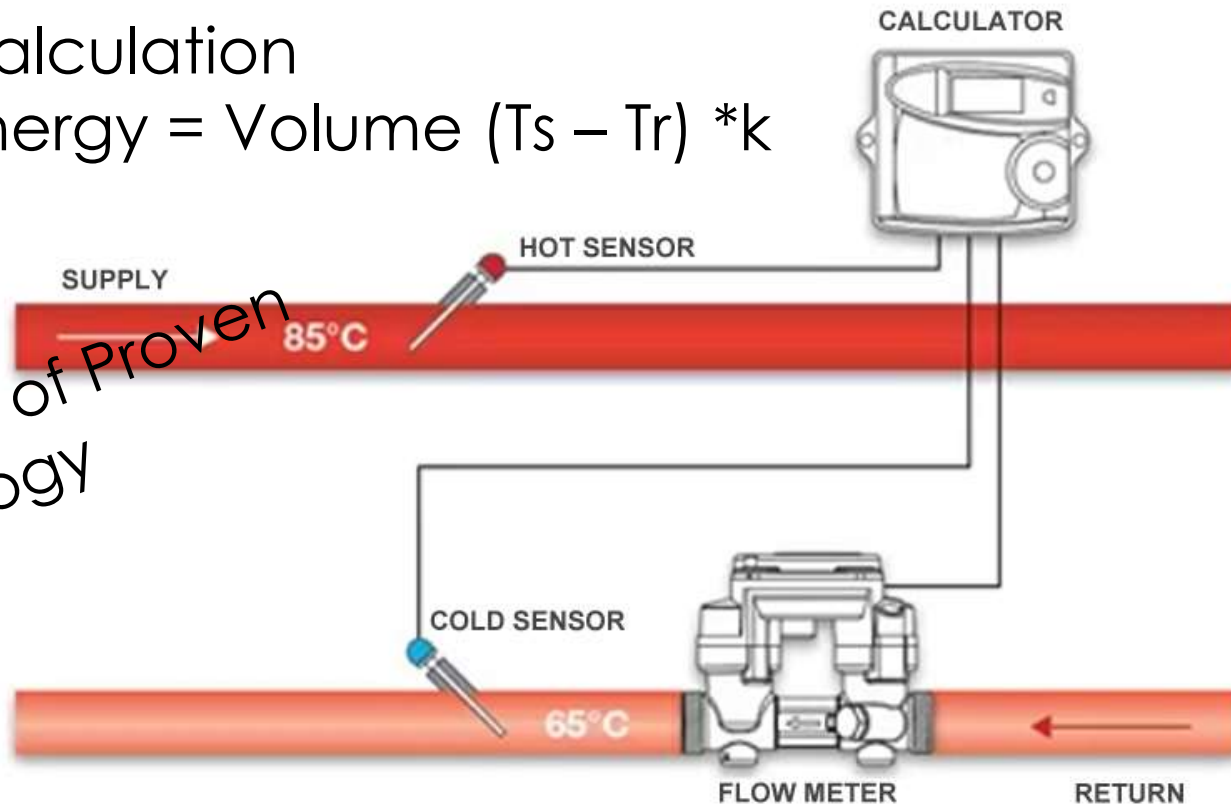
# Meter Hardware

## Thermal (BTU) Meters

Calculation

$$\text{Energy} = \text{Volume} (T_s - T_r) * k$$

Decades of Proven  
Technology

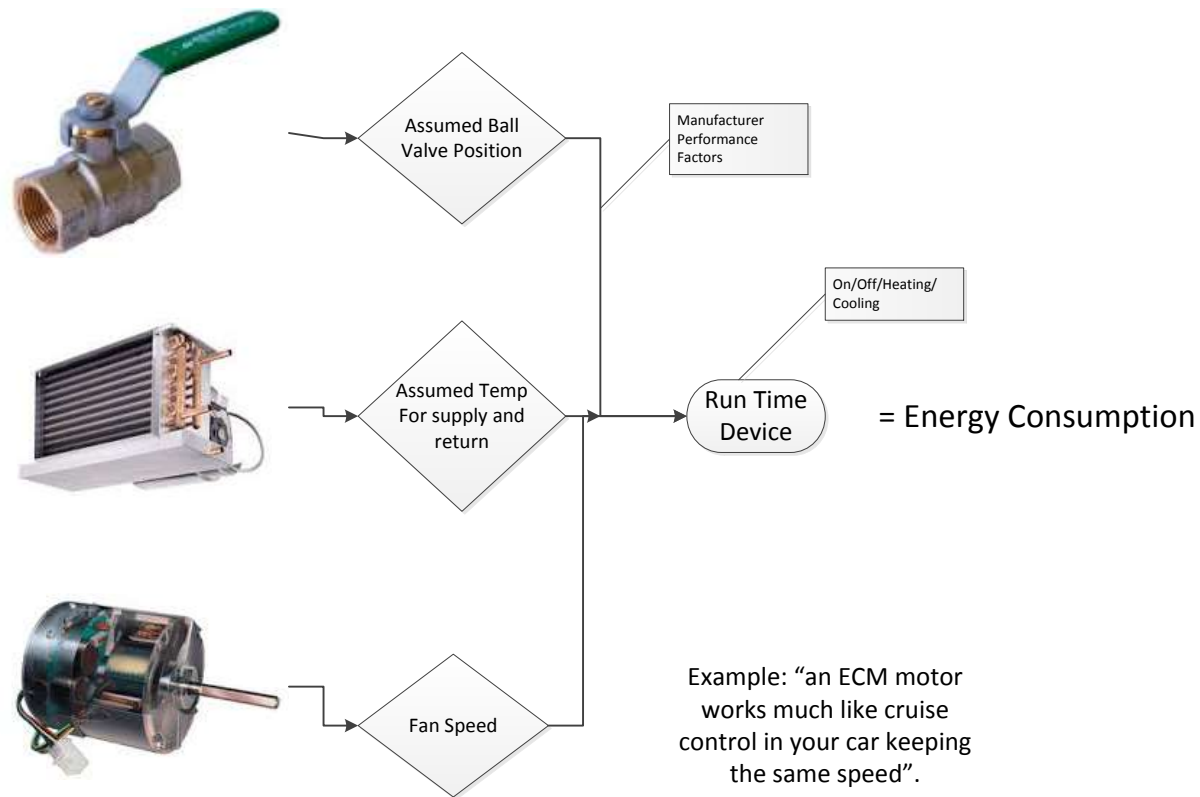




# Meter Hardware

## Run Time Measurement

Variable Inputs to Run Time  
Measurement - Example





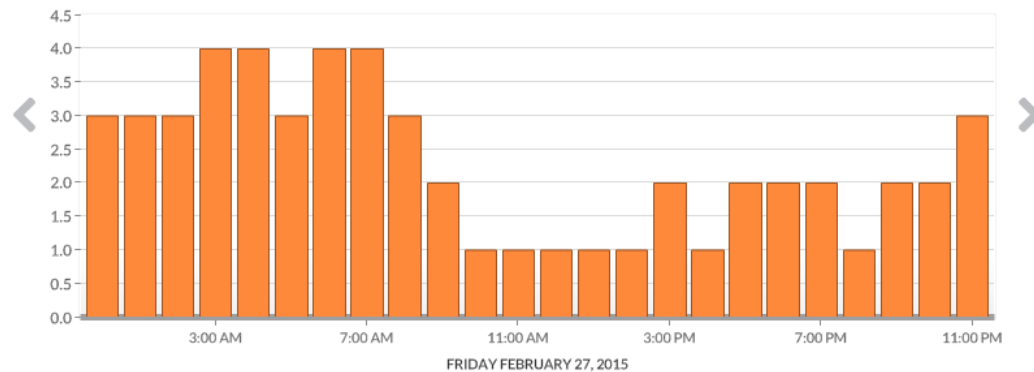
# Risks and Benefits of Technologies –

Tenant Billing Option	Method	Benefits	Risks
Thermal Energy Submetering	Install heating/cooling submeters, which measure the incoming and outgoing temperature as well as the volume of heating/cooling fluid. Heating and Cooling is measured precisely.	<ul style="list-style-type: none"><li>• Measurement of an actual medium</li><li>• Data traceability</li><li>• Hardware traceability</li><li>• Tenant engagement with utility consumption data and visible meter hardware</li><li>• Conformity to Regulations and Standards</li></ul>	<ul style="list-style-type: none"><li>• Typically more expensive; market may have assumptions that the solution is too expensive</li><li>• Requires coordination of engineers, contractors, and fan coil/heat pump manufacturers to install</li></ul>
Inferred Measurement/ Run Time Measurement/ Cost Allocation	Infer heating/cooling energy usage from a meter or temperature. Use a sensor and engineering coefficient to calculate the expected energy output from the heating/cooling source.	<ul style="list-style-type: none"><li>• Lower cost</li><li>• May be more equitable than square footage allocation</li></ul>	<ul style="list-style-type: none"><li>• Accuracy inconsistent &amp; dependent on assumptions</li><li>• No available standards or industry best practices</li><li>• Does not conform to already established standards EN1434 and OIML R75</li><li>• Assumes all equipment is operating efficiently and in an identical manner</li><li>• No traceability - no way to confirm measurement devices are accurate</li><li>• Tenant cannot view their meter and determine how much energy they are consuming</li><li>• Difficult to explain and justify energy usage calculations to tenant</li><li>• Data subject to manipulation by billing company</li><li>• Proprietary solution will tie property manager to the service provider indefinitely</li><li>• Risk to loss of investment if inferred measurement banned, as in Alberta example</li></ul>

# Tenant Engagement Opportunities

## TRACK AND SAVE

GRAPHING CONSUMPTION FOR	TOTAL HEATING THIS DAY	COMPARED TO PREVIOUS DAY	CARBON FOOTPRINT
Suite 101 (Heating)	kWh 55	INCREASED 2%	Kg CO <sub>2</sub> 14.5
PERIOD Day			<small>* what is a carbon footprint?</small>



Even the smallest changes can lead to big savings for your wallet and the environment...

- A few degree difference on your thermostat can save you on your heating or cooling costs. Try lowering the thermostat at night or when you are away from the home.
- In the summer, keep your blinds closed when possible to keep your home cooler. In the winter, the sunlight can help heat your home.
- If you are billed on "time of use", consider running your laundry dryer at night or on weekends.
- Upgrade to LED lights. LEDs last longer and are much more efficient than incandescent bulbs. As an added bonus, they do not produce any heat.
- Switch to the "cold" cycle on your laundry machine. Most of the energy used in washing clothes is from heating water.
- Avoid running the laundry machine unless you have a full load.
- For more energy saving tips, visit [www.saveonenergy.ca](http://www.saveonenergy.ca)





# Regulatory/Standard Considerations



**EN1434.** European Heat Meter Standard  
Under Measuring Instruments Directive MID



International Organization of Legal Metrology  
- **OIML R75.** International Heat Meter



**CSA C900.** Canadian Standards Association.  
Adoption of EN1434.



**Measurement Canada** – Federal Regulator for Weights and Measures Act.

Measurement Canada should harmonize approval requirements for thermal energy devices with international Standards such as OIML R75 – (Steam and Thermal Energy Trade Sector Review, 2009).

‘Measurement Canada remains committed to implementing the recommendations of the Steam and Thermal Energy Trade Sector Review’. (Implementation Update, Measurement Canada, 2013)



ASTM 44.25 Heat Metering Sub Committee - American Society for Testing and Materials. US Environmental Protection Agency EPA.



# Regulatory/Standard Considerations



British Columbia Utilities Commission BCUC. Regulatory body for Public Utilities such as River District, Creative Energy, Fortis Alternative Energy.



Consumer Advocate and Alberta Utilities Commission. Similar Role to that of BCUC



# Thermal Submetering – Recommendations

1. Design HVAC system with submetering as a requirement
2. Involve submetering professional at the design stage
3. Educate installing contractors
4. Identify metering methodology
5. Use meters that meet existing and recognized standards
6. Keep future regulations in mind
7. Think of the Meter as a **Cash Register**



# Case Study - Heat Submetering in Alberta

- 2007-2009 – 5000 'Heat Meters' were installed across one large property portfolio
- Landlords and submetering company received excessive complaints. Complaints were made directly to Consumer Advocate.
- Why: Occupants received invoices with extreme disparity from normal consumption and average.
- Consumer Advocate Study revealed several faults with the technology
  - Lack of a flow sensor
  - Assumed variables – delta temp and flow rates
  - Primary variable was run time
  - Assumed consistent and constant temperatures
- Multiple articles from the Edmonton Journal have documented the journey from heat metering to dissolution of the industry.





# Heat Submetering Regulation - Alberta

Alberta Government introduced new rules for Residential Heat Submeters. Energy Marketing and Residential Heat Submetering Regulation (72/2012)

- Regulation was retroactive.
- Maximum Penalty: \$100,000, up to 2 years in prison or both.
- "It is an offence to charge a tenant for heat using readings from an uncertified heat submeter".
- "The Act does not allow anyone to charge for heat based on readings taken from a heat submeter unless it is approved for use under the Weights and Measures Act" (Measurement Canada).
- To date, heat meters are approved by Measurement Canada.
- Dissolution of Heat Submetering
  - \$400,000 loss of investment. Unknown opportunity cost.



## Summary

- Consumer Engagement is key to improved measurement of Thermal Energy
- Sustainability Through Accountability.
  - Heat Metering in Alberta - great example of what not to do.
- Future Commercial, mixed use and residential development will grow rapidly in urban areas.
  - Opportunity to engage now
- Best practices and Standards are available today
- Industry Stakeholders should continue to move toward greater involvement in utility submetering (policy makers, developers, municipalities, etc.)



## Conclusion

- Energy is “Evolving” our Accountability must keep pace.



*Building Intelligence With Submetering Solutions*