Thermal Energy (BTU) Metering in Canada

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Agenda

30 Minutes

- Intro to QMC Metering Solutions and Presenters
- Introduction to thermal metering systems
- Measurement Canada regulations for thermal energy (BTU) metering
- Utilizing thermal meter data for billing and energy management
- Questions and Answer

Speakers

Peter Sanei, P. Eng

- Manager, QMC Instrumentation Division
- 12 years in metering industry
- Expertise in BTU, Gas, Water, Steam Metering
- Works with utilities and portfolio customers

Mike Easton, BBA, CMVP

- VP Sales, Eastern Canada
- 13 years in metering industry
- New Market Development
- commercial and institutional customers

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QMC Metering Solutions

Service Across North America
With Over 25 Years of Experience

Multi-Utility:
Electricity, Water,
Gas, Thermal and Steam
(approx. 60,000 thermal
meters deployed)

Automated Meter Reading
System; Over 250,000 Meter
Points Read Daily by
MeterConnex™

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The Market, Technology and Regulations

- Ever increasing utility costs
- Net-Zero 2030-2050 – Government and Corporate Targets
- LEED, BOMA BEST, ISO50001, ASHRAE – all require metering
- Regional Initiatives: Ontario Bill 135: building energy and water benchmarking, New York: submeter all commercial tenants 10,000sqft + by 2025
- Measurement Canada and Bill C-14 – Fairness at the Pump Act
- Measurement Canada: Terms and Conditions and framework for thermal metering released and 4 approvals granted
- Continually decreasing costs of meter hardware and software

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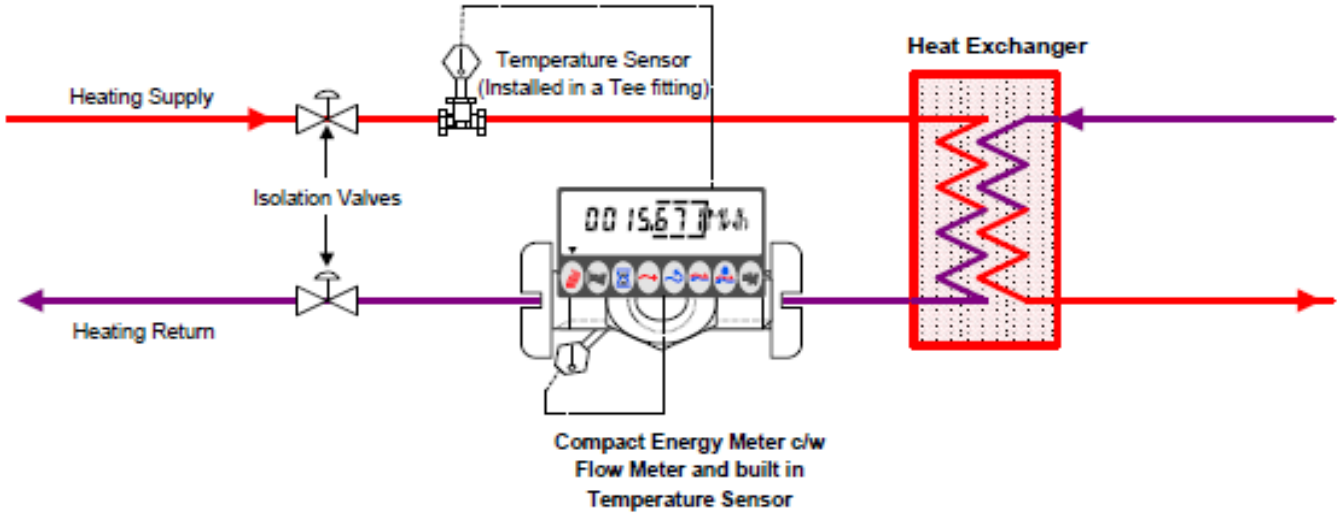
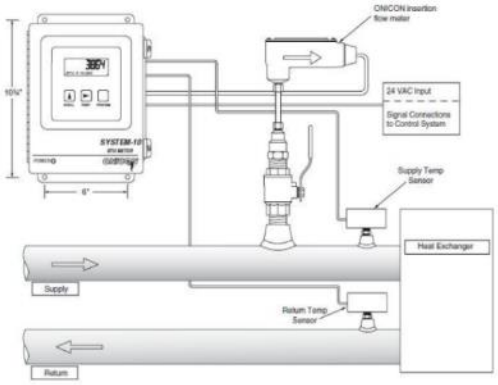
What is a Thermal Meter?

- Monitor flow of liquid and change of temperature between ‘start’ of load and ‘end’ of load
- Calculation: change in temperature x flow rate x other variables (density of liquid) = thermal energy (in BTU, Joules or kWhE)
- Uses 3 main components:
  1) Flow meter
  2) Matched temperature sensors
  3) Calculator



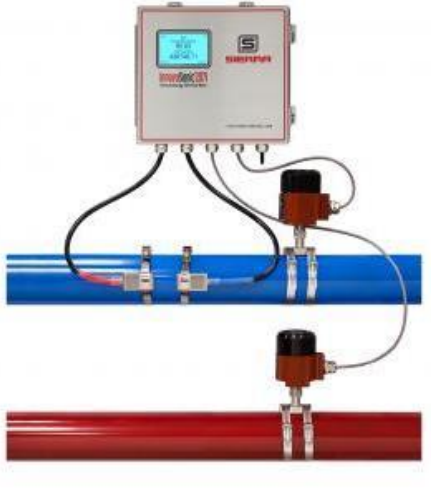
Types of Thermal Meters

In-Line Meter
- Measurement Canada Approved



Insertion Meter
- Information only

Compact In-Line Meter
- Measurement Canada Approved

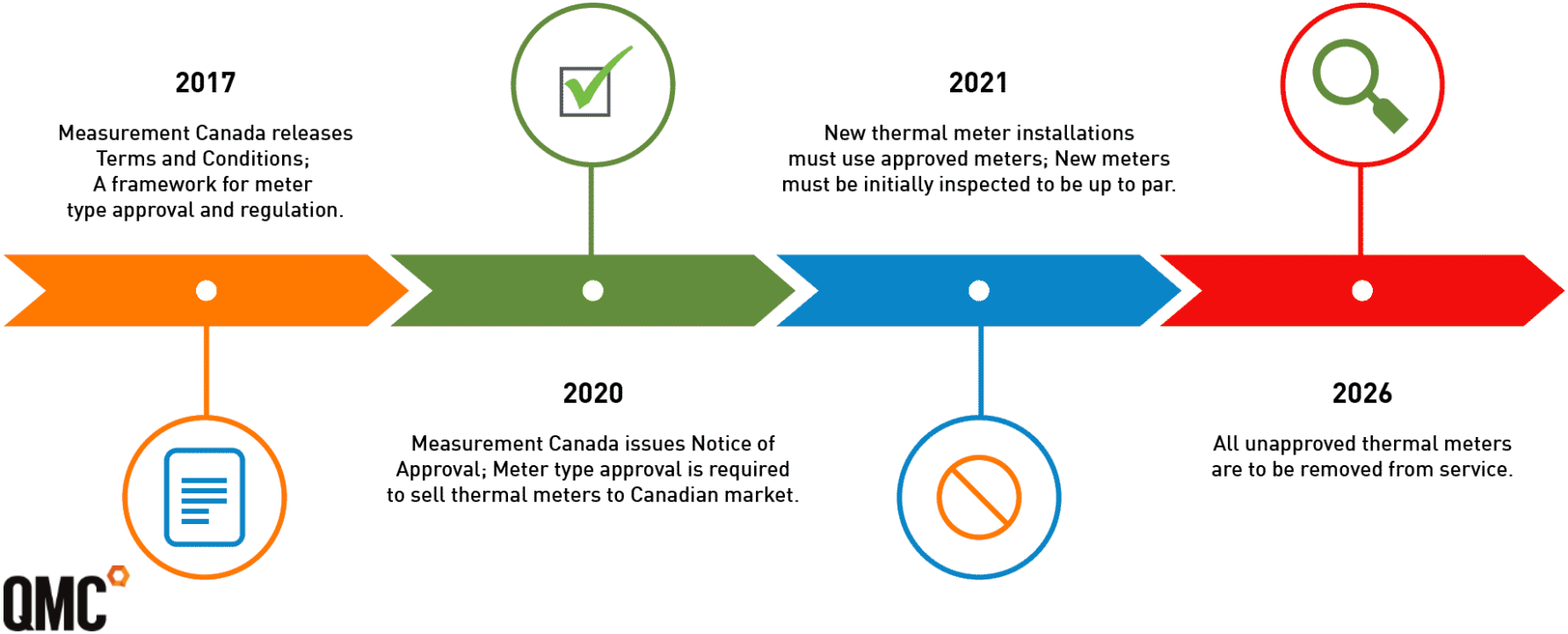


Clamp-On Meter
- Information only

Measurement Canada Regulation

As per MC Bulletin V-31 – *Implementation of Thermal Energy Meter Requirements*

Measurement Canada Thermal Metering Regulation Timeline



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As per MC Bulletin V-31 – *Implementation of Thermal Energy Meter Requirements*

Implementation timetable and important dates	
Dates / time frame	**Goal**
2017	• Terms and Conditions posted to MC website • Pilot program for type approvals begins
2018–2019	• Evaluation of devices under the type approval pilot program
2020	• First NOAs issued • Type approval applications opened to all applicants
2021	• New installations must use approved meters • New meter installations must be initially inspected
2022	• ASD program allowing ASPs to perform initial inspections begins • Withdrawal of MC initial inspection services as ASPs are accredited or registered
2023–2026	• Subsequent inspection of devices installed prior to 2021 to check for accuracy and proper installation
2026	• All unapproved meters to be removed from service

Summary

- All new thermal meters used for billing must be Measurement Canada type approved
- Testing and sealing can be done at approved testing labs (outside Canada OK)
- Installation inspections should be done; field inspection procedures currently being finalized by MC and ASP (Accredited Service Providers)
- Seal periods likely to be 10 years
- No current procedures for sample testing of meter populations
- After 2026, all unapproved meters must be removed from service
- Currently no guidance on communications (AMR) requirements

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Approved Thermal Meters

List of approvals

Approval	Revision	Issued	Manufacturers	Models	Documents
AV-2458C		2020/06/08	Sontex SA	SUPERSTATIC 440 SERIES	1. ARCHIVED - Approval AV-2458C (PDF, 1270 KB)
AV-2459C		2020/06/08	Sontex SA	SUPERSTATIC 749, SUPERSTATIC 789	1. ARCHIVED - Approval AV-2459C (PDF, 974 KB)
AV-2460C		2020/06/08	Kamstrup A/S	MULTICAL 403	1. ARCHIVED - Approval AV-2460C (PDF, 1080 KB)
AV-2461C		2020/06/08	Badger Meter Inc.	UHC100	1. ARCHIVED - Approval AV-2461C (PDF, 1185 KB)
AV-2466C		2021/05/07	Landis+Gyr	ULTRACOLD T450, ULTRAHEAT T450	1. ARCHIVED - Approval AV-2466C (PDF, 748 KB)
AV-2467C		2021/05/20	WeiHai PlouMeter Co., Ltd	RC82-ICI24BTU***	1. ARCHIVED - Approval AV-2467C (PDF, 522 KB)
AV-2468C		2021/05/25	Kamstrup A/S	KAMSTRUP PT500, MULTICAL 603, TEMPERATURESENSOR 63, TEMPERATURESENSOR 83	1. ARCHIVED - Approval AV-2468C (PDF, ? KB)

Approved Thermal Meters

APPROVAL No. - N° D'APPROBATION
AV-2458C

SECTION 10 - Photographs and drawings

Figure 1: Brass flow sensor with flanged connection | Compteur de débit en laiton avec connexion bridée

Figure 3: Brass flow sensor with threaded connection | Compteur de débit en laiton avec connexion filetée

PARTIE 10 – Photos et dessins

Figure 2: Stainless steel flow sensor with flanged connection | Compteur de débit en acier inoxydable avec connexion bridée

Figure 4: Calculator and temperature sensor pair | Calculateur et paires de sondes de température

Figure 5: G-Thread thermal well pockets | Puits thermométriques à filetage-G

Figure 6: NPT-Thread thermal well pockets | Puits thermométriques à filetage-NPT

Measurement Canada Approvals

List of Current Approvals

Approval	Issued	Manufacturers	Models	Service sizes	Application	Approval Number
AV-2458C	2020-06-08	Sontex SA (GWF/QMC)	SUPERSTATIC 440 SERIES	1/2" (DN15) to 20" (DN500)	Heatin/Cooling/Combined H&C	Approval AV-2458C
AV-2459C	2020-06-08	Sontex SA (GWF/QMC)	SUPERSTATIC 749, SUPERSTATIC 789	1/2" (DN15) & 3/4" (DN20)	Heatin/Cooling/Combined H&C	Approval AV-2459C
AV-2460C	2020-06-08	Kamstrup A/S	MULTICAL 403	1/2" (DN15) to 1.5" (DN40)	Heatin/Cooling/Combined H&C	Approval AV-2460C
AV-2461C	2020-06-08	Badger Meter Inc.	UHC100	1/2" (DN15) to 4" (DN100)	Heating Only	Approval AV-2461C
AV-2466C	2021-05-07	Landis+Gyr (QMC)	ULTRACOLD T450, ULTRAHEAT T450	1/2" (DN15) & 3/4" (DN20)	Heatin/Cooling/Combined H&C	Approval AV-2466C
AV-2467C	2021-05-20	WeiHai PlouMeter Co., Ltd	RC82-ICI24BTU***	1/2" (DN15) to 1.5" (DN40)	Heatin/Cooling/Combined H&C	Approval AV-2467C

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Measurement Canada Seal Examples

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Installation Verification

- Required for Measurement Canada billing applications
- Without proper verification and documentation, meter reads may be erroneous (wrong tenant), inaccurate, disputable
- Critical factors include flow meter direction, straight pipe diameters, temperature sensors swapped, incorrect calculator programming
- Communications is often not connected, so system will never report
- ***Triple-commissioning*** = verification of meter installation, communications, and software entry

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Methods for Communications

Building Level

- Cellular
- IP
- Phone Line
- Wireless – Wide Area Network

Submeter Systems

- M-Bus (Meter Bus)
- Modbus
- BACnet
- Pulse Output
- Analog Output (4-20 mA, 0-5 Vdc, 0-10 Vdc)
- Wireless – radio, LoRa, cellular

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Software and Using Thermal Meter Data

Options for Software and Reporting:

- Web-based Energy Management Software
- Remote Reading, Billing, Reporting
- BAS Front End
- Intelligent Building Master System
- PC with reporting software on-site

All have Pros and Cons. Select based on data requirements, users groups and site specific conditions

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Billing and Cost Allocation

- Use utility or district energy utility set rates
- Can calculate property-specific rates using plant-level metering systems. Requires electricity, and gas metering and other inputs

REGULAR BILL

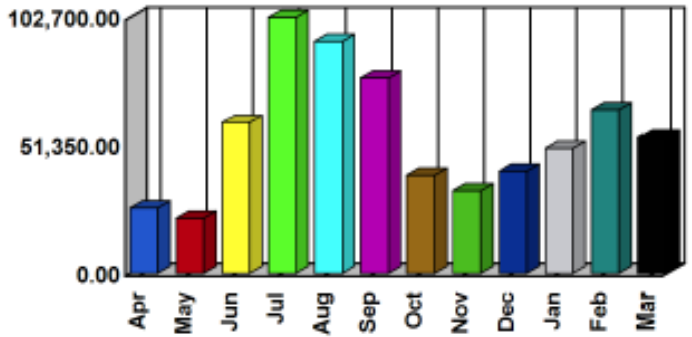
Service Addr: [redacted] Burnaby, BC

03/01/21 - 03/31/21 = 31 Days

Resident Name	Unit Number	Resident ID	Statement Date	Invoice Number
[redacted]	[redacted]	135918	05/25/21	8598820

Meter Number	Start Read	End Read	Usage	UOM
[redacted]	0	0	54,600	KWH

Thermal Consumption Chart



Summary of Charges

Description	Start Date	End Date	Days	Amount
Administration Fee	03/01/21	03/31/21	31	$9.50
Thermal Charges - .167 x 54,600 = $9,118.20	03/01/21	03/31/21	31	$9,118.20
GST (#86840 4815 RT0002) - 9.5 x 0.05 = $0.48 - 9118.2 x 0.05 = $455.91	03/01/21	03/31/21	31	$456.39
PST - 9118.2 x 0.07 = $638.27	03/01/21	03/31/21	31	$638.27
	CURRENT CHARGES			$10,222.36
	Previous Balance			$12,305.99
	Resident Payment			($12,305.99)
	AMOUNT DUE			**$10,222.36**

Load Profiling and Alarming

SELECTED PERIOD

Consumption

THIS PERIOD
257,756 kWh

Demand

MAX
162.00 kW

MIN
0.00 kW

REAL-TIME

Last update May 25, 2021 12:00:00 AM

Readings

CONSUMPTION
549,427.00 kWh

DEMAND
17.00 kW / hour

Parameters

FLOW RATE
12.96 m3/h

RETURN TEMP
48.23 Deg C

SUPPLY TEMP
47.54 Deg C

VOLUME
174616.90 m3

All timestamps are in local standard time for the meter location. No daylight savings time adjustments have been applied.

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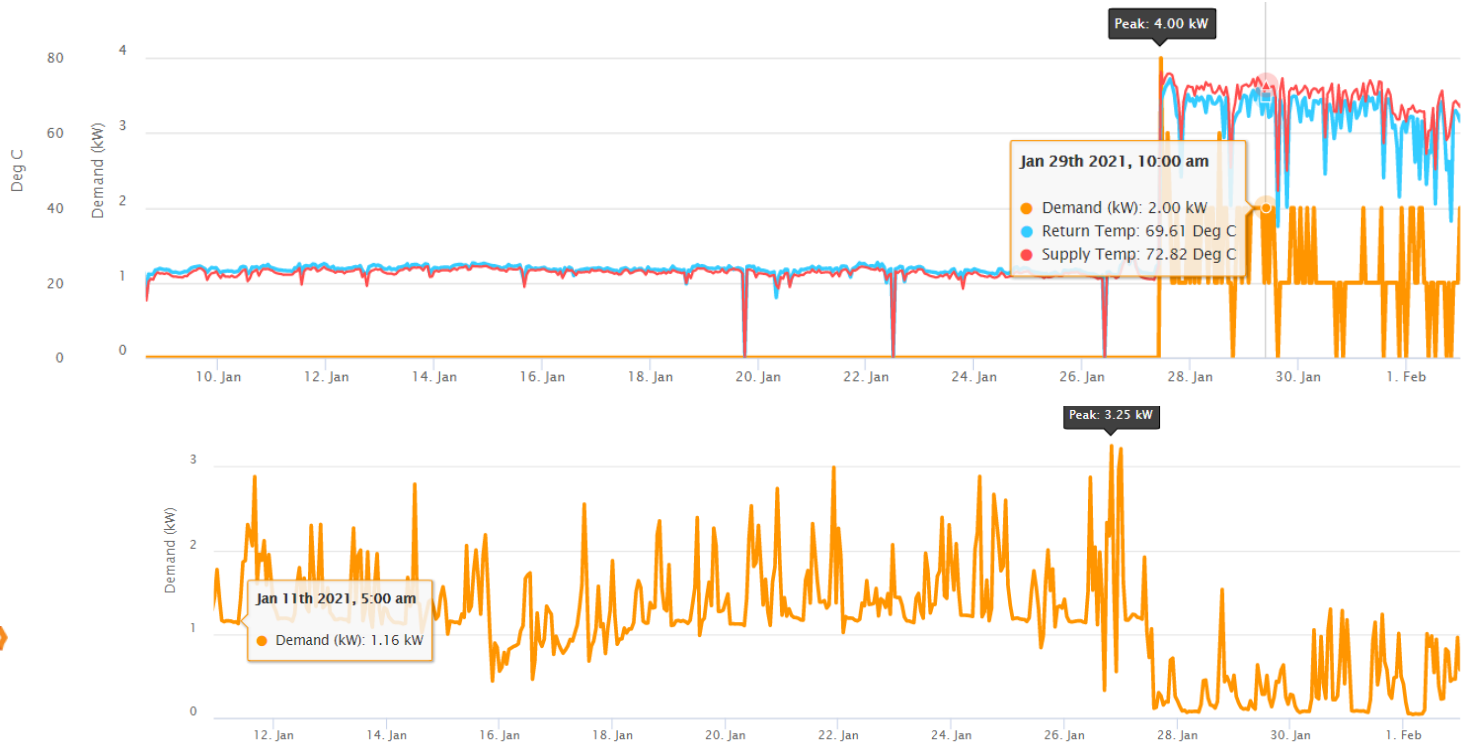
Data: Analytics and Troubleshooting

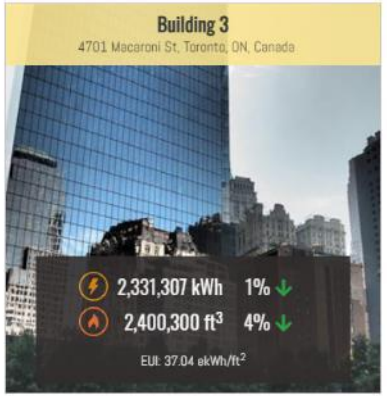
Case Study

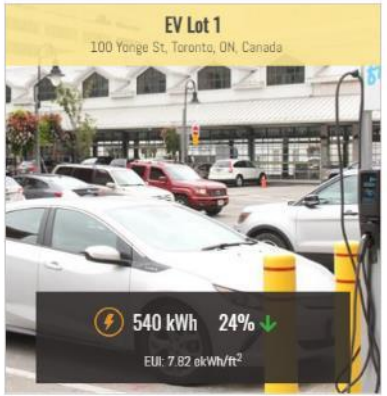
- no heat in new condo unit
- Thermal meter data shows no thermal kWhE consumption or temperature change
- Electrical meter shows high electricity consumption
- 0.8 kW wasted for over a month ($80-$100) trying to heat a unit with stuck value

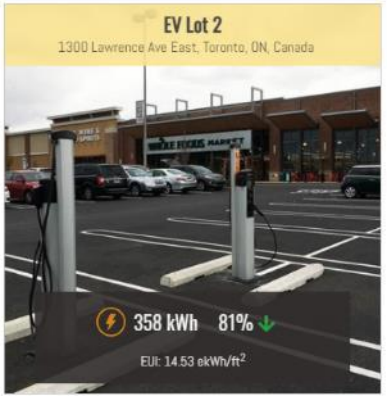


Portfolio Benchamarking and ESG Submissions

- View building level data across your entire portfolio
- Rank by EUI with optional Energy STAR score







Keys to a Successful Meter System

- Include all users/stakeholders in design
- Ensure equipment is Measurement Canada certified; meets required standards
- Include all 3 levels of a system (hardware, communications and software)
- Ensure open protocols and non-proprietary equipment
- Verification and training essential
- Use the data for energy management and/or billing to provide a financial incentive to conserve

Q&A

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