



**GREENING HEALTH CARE**  
working together for healthier communities

# Making Energy Efficiency Happen

*November 29<sup>th</sup>, 2017*

Sponsored by:

Program partners:





# Agenda

## 9:00 Welcome and Introductions

## 9:10 Member Update

- GHG and infrastructure funding

## 9:20 Market Update

- IESO Energy Manager Program
- Ryerson Co-op Program
- Toronto Hydro
- Enbridge
- Toronto/Other Regional Water Utilities

## 9:30 Energy and Water Savings Update

- 2017 energy, water, utility cost and emissions savings
- Savings targets for 2017

## 10:15 Where the Big Gas Savings Are

- Base and heating thermal analysis
- Boiler controls research results

## 11:00 Networking Break

## 11:15 Base Electricity

- End-use profiles of hospitals
- Where the savings come from

## 12:00 Ventilation Systems

- Technical review and energy components
- Case Studies

## 12:30 Closing Remarks and Lunch



# 2016 Savings - Recognizing Success

***In 2016 we (you) passed \$4,000,000 in annual utility cost savings!***

*Annual 2016 savings (2015 baseline):*

***39 hospitals with electricity cost savings of \$2,998,000***

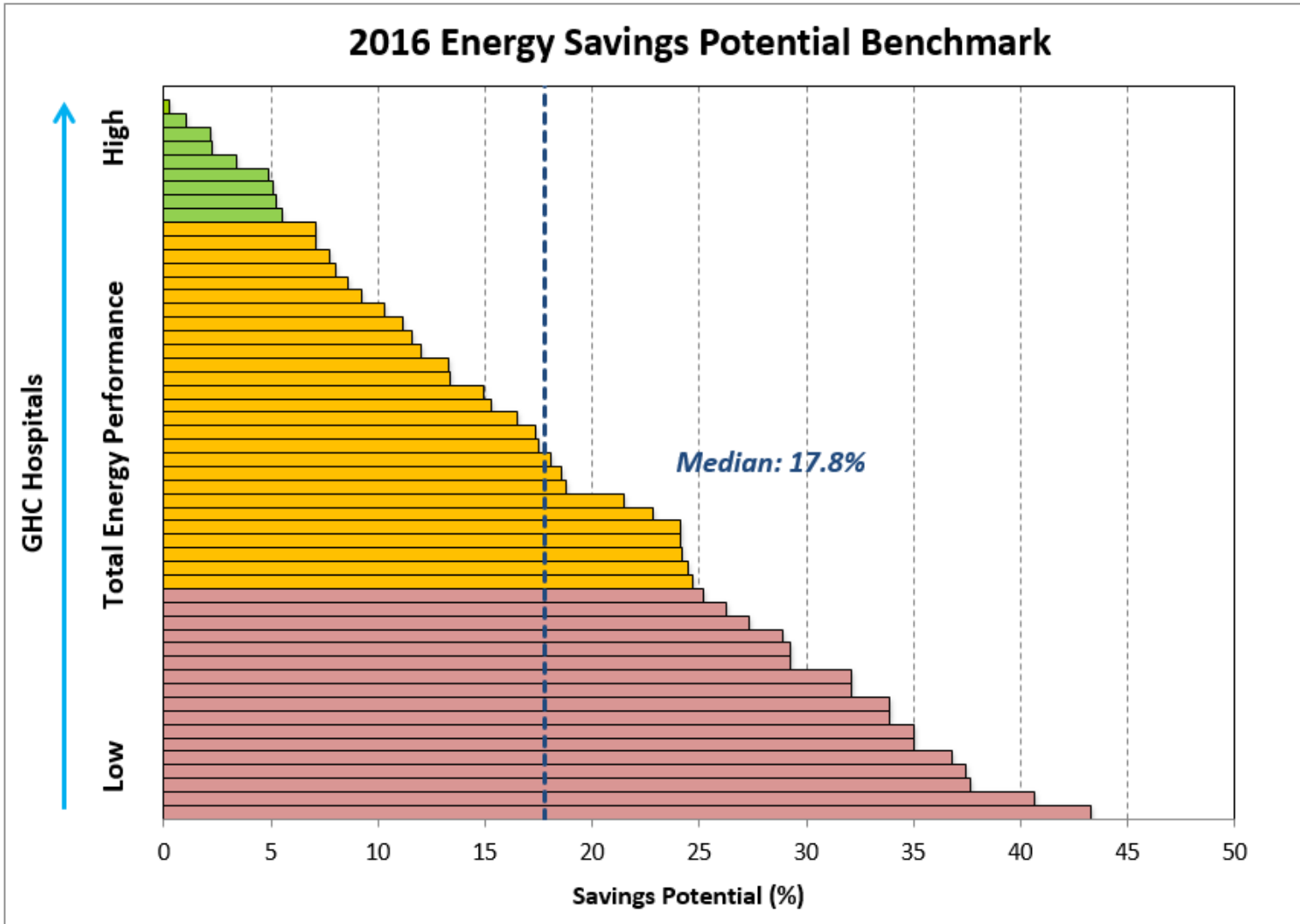
***24 hospitals with thermal cost savings of \$783,000***

***16 hospitals with water cost savings of \$310,000***

***Greenhouse gas emissions reduction: 7,033 tonnes***



# Benchmarking Savings Potential





# From Energy Benchmarking to Savings Potential

- 54 Sites; 28.9 million square feet
- 2017 annual savings potential (based on 2016 energy use):
  - 93.4 GWh electricity
  - 6.9 MW electrical demand
  - 21.7 M m<sup>3</sup> natural gas
  - 482,520 m<sup>3</sup> water (42 sites reporting)
  - \$19,900,000 utility costs
  - 54,200 tons GHG emissions



# 2017 - Boiler Plant Operation and Controls

*Sponsored by:*



**uniongas**

An Enbridge Company



**Klenzoid**  
The Water Specialists

**Yorkland  
Controls**  
+  
**ENVIRONMENTAL  
SOLUTIONS**



**THERMOGENICS**



# Boiler Plant Operation and Controls

## Background

- The GHC database shows a wide range of thermal energy performance between hospitals, in large part attributed to boiler plant performance
- Case studies demonstrate big savings through improved plant operation and controls

## 2017 Research Project

- A collaboration among member hospitals, gas companies and industry experts
- Analysis of performance data from interval meters, boiler testing and trend logs
- Three webinar update meetings
- Results presented in final workshop and webinar of 2017
- Best Practices Guide to be completed in 2018



# Initial Best Practices

- Plant options (retrofit or new):
  - heat exchanger surface area, economizer
  - summer boiler
  - combination hot water and steam boiler plant
  - linkage-less controls
  - modulating burner control
  - VFD FD fan
  - VFD feedwater pump
  - back-pressure valves
- Pressure/temperature control:
  - reduce/reset steam pressure, primary HW temperature





# Initial Best Practices

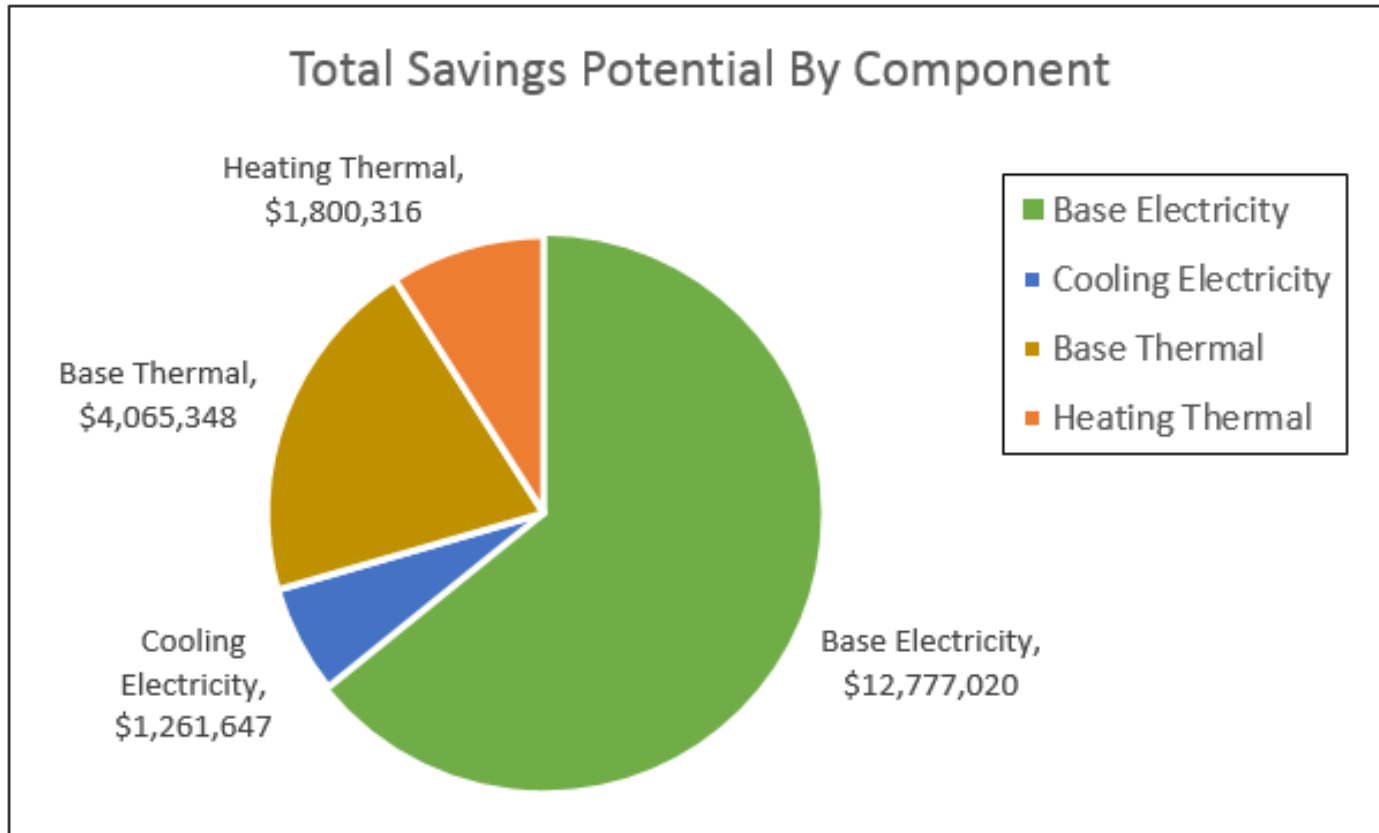
- Boiler testing:
  - test upstream and downstream of economizers
  - tune burners, refurbish boilers to increase efficiency
  - sequence boilers to maximize plant efficiency
- Water treatment:
  - increase condensate return
  - optimize water makeup
  - monitor and maximize percent in control
- Operating logs:
  - implement electronic recording and reporting
  - monitor and respond to trends
- Systems' control:
  - implement demand-based heating pump control, ventilation supply air temperature reset



# ***Base Electricity***

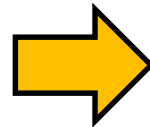
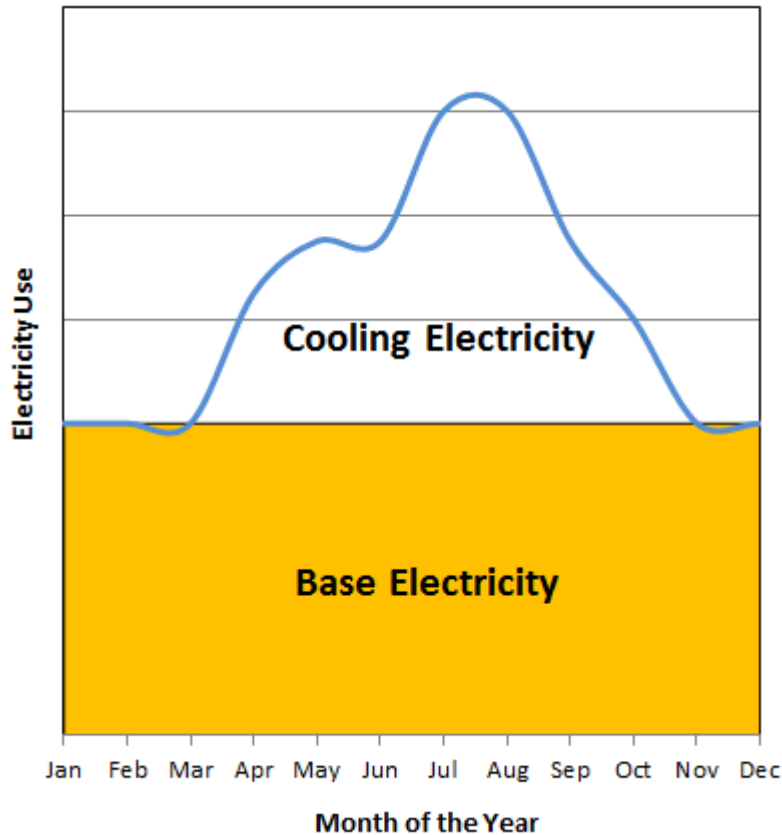


# Base Electricity - Where the Big Savings Are





# Energy Targets – Base Electricity



## Winter Cooling Plant Operation

### Equipment

- Base building, medical, IT and office equipment

### Ventilation Systems

- Supply, return and exhaust fans

### Lighting

- Interior, parking and outdoor lighting

### Heating Pumps



# End Use Profile – Acute Care Hospital

System	% total Day kW	Day Period			Night Period			Total Annual kWh		
		Use kW	Savings %	Target kW	Use kW	Savings %	Target kW	Use kWh	Savings %	Savings kWh
Ventilation	44%	936	20%	749	815	40%	489	8,860,499	35%	3,101,175
Lighting	13%	271	10%	244	176	20%	141	1,830,416	15%	274,562
Equipment	28%	601	12%	527	387	21%	306	3,828,005	16%	631,158
Pumps	7%	155	20%	124	155	25%	116	1,355,080	22%	298,118
Missing	8%	148	0%	148	130	0%	130	1,102,495	0%	0
<b>Total Base</b>	<b>100%</b>	<b>2,111</b>	<b>15%</b>	<b>1,791</b>	<b>1,663</b>	<b>29%</b>	<b>1,182</b>	<b>16,976,495</b>	<b>25%</b>	<b>4,305,012</b>



# Base Electricity Savings Measures

## Ventilation Systems

- Peak – rebalancing, VFD control, fixing system effects
- Unoccupied – scheduling, occupancy control

## Lighting

- Peak – LED replacement, fixture retrofits
- Unoccupied – scheduling, occupancy and photo-controls

## Pumps

- Peak – right-sizing, VFD control
- Unoccupied - scheduling

## Equipment

- Peak – replacement, removal
- Unoccupied – scheduling, controls, behavioural change



# Lunch and staying in touch

## *Membership/sponsorship:*

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