# Ontario Energy Board DSM Mid-Term Review Stakeholder Meeting

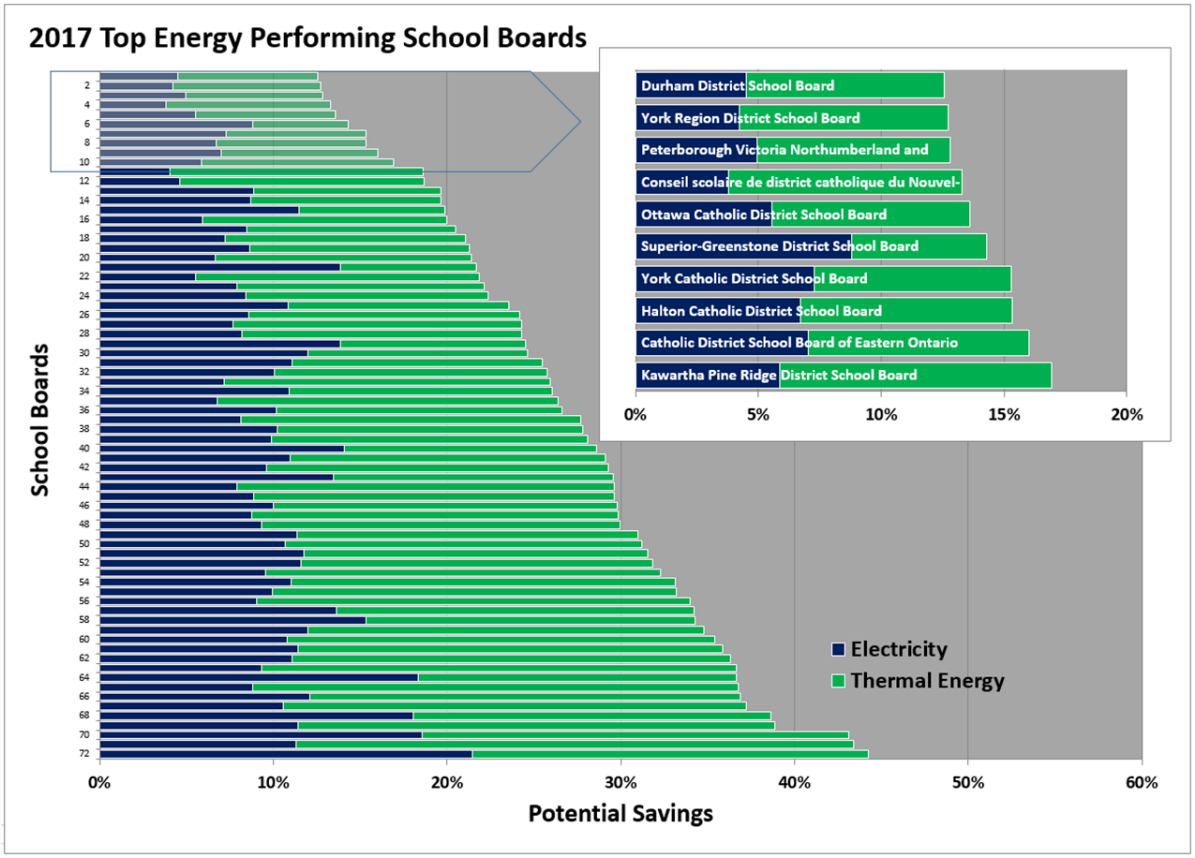
September 6, 2018

Building Towards a Sustainable Future

# Agenda

- 2017 Top Performing School Boards Report
- Achieving the Gas Savings Potential
  - Union Gas Charrettes
  - Simcoe County District School Board Project
- Maximizing Achievable Savings
- Conclusions
- Next Generation DSM Programs

# 2017 Sustainable Schools (SUS) Top Performing School Boards Report




- Since 2007 Sustainable Schools has been reporting on top performing schools across Canada, establishing the magnitude of energy savings potential and directing school boards and utility companies to where the savings are to be found
- Boards are ranked by their total energy savings potential (thermal and electrical energy)

Based on 2014-15 energy use data from Ontario Ministry of Energy's Broader Public Sector database

# 2017 SUS Top Boards Report

## All facilities (71 school boards):

- **5,000** buildings analysed
- Overall total energy savings potential: **29.8%**
  - electricity - **262,000** MWh/year (13%)
  - natural gas - **140.5** million m3/year (38.6%)
- Utility cost savings potential: **$71.7 million** per year
- GHG emissions reduction potential: **294,000 tonnes** of CO2e/year

## High savings potential buildings (>$10,000/year in savings):

- **1,987** buildings (40.7% of total)
- Savings potential:
  - electricity - **247,000** MWh/year (94% of total)
  - natural gas – **98.4** million m3/year (70% of total)
- Utility cost savings: **$59.7 million** per year (83% of total)
- GHG emissions reduction: **213,000 tonnes** of CO2e/year

# Energy Savings Charrette Pilot Project

- in July 2017, Union Gas partnered with Toronto and Region Conservation (TRCA) to undertake a pilot project with two Ontario school boards with high gas savings potential (Hamilton Wentworth DSB with 31% and Waterloo Region DSB with 33% overall achievable savings potential)

- the project developed energy conservation action plans for 10 high energy conservation potential schools for each board through in-depth energy analysis and Energy Savings Charrettes

- the plans can help the boards and their utility companies prioritize future energy conservation measures and projects, and also feed into upcoming 2019-2024 ECDM Plans

# Hamilton Wentworth DSB 2015-16 Energy Savings Potential

| | | Electricity | | | | | | Gas | | | | | | Total $ savings potential |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Consumption | | Cost | Target Savings | | | Consumption | | Cost | Target Savings | | | |
| School | School Type | Actual (kWh/sq.ft.) | Target (kWh/sq.ft.) | ($) | (%) | ($) | (kWh) | Actual (ekWh/sq. ft.) | Target (ekWh/sq. ft.) | ($) | (%) | ($) | (m3) | |
| Ancaster High | Secondary | 5.8 | 5.2 | $ 152,006 | 10.2% | $ 15,564 | 103,760 | 17.6 | 6.6 | $ 68,692 | 62.7% | $ 43,053 | 187,187 | $ 58,617 |
| Sir Winston Churchill | Secondary | 5.6 | 4.9 | $ 147,071 | 13.3% | $ 19,631 | 130,874 | 16.9 | 8.5 | $ 65,343 | 49.7% | $ 32,457 | 141,119 | $ 52,089 |
| Mary Hopkins | Elementary | 4.8 | 3.4 | $ 35,651 | 30.1% | $ 10,747 | 71,649 | 16.5 | 5.4 | $ 18,063 | 67.1% | $ 12,120 | 52,696 | $ 22,868 |
| Orchard Park | Elementary | 6.4 | 5.5 | $ 161,852 | 14.0% | $ 22,597 | 150,647 | 14.5 | 8.2 | $ 53,921 | 43.7% | $ 23,557 | 102,422 | $ 46,154 |
| Sir Wilfrid Laurier | Elementary | 8.9 | 4.4 | $ 108,635 | 50.0% | $ 54,264 | 361,761 | 11.2 | 5.4 | $ 20,281 | 51.5% | $ 10,442 | 45,400 | $ 64,706 |
| Glendale | Secondary | 6.6 | 5.6 | $ 137,564 | 15.3% | $ 21,100 | 140,665 | 12.2 | 6.6 | $ 37,699 | 46.0% | $ 17,332 | 75,358 | $ 38,432 |
| Queen Mary | Secondary | 7.8 | 4.4 | $ 113,052 | 43.8% | $ 49,536 | 330,239 | 10.5 | 5.4 | $ 22,489 | 48.4% | $ 10,894 | 47,366 | $ 60,430 |
| Westmount | Elementary | 5.2 | 4.9 | $ 119,696 | 6.0% | $ 7,232 | 48,210 | 13.0 | 6.6 | $ 44,497 | 49.5% | $ 22,007 | 95,682 | $ 29,238 |
| Waterdown | Secondary | 10.4 | 6.9 | $ 361,845 | 33.6% | $ 121,734 | 811,560 | 6.6 | 5.6 | $ 33,875 | 14.4% | $ 4,884 | 21,233 | $ 126,618 |
| Sir Allan MacNab | Secondary | 2.7 | 2.7 | $ 77,878 | 0.0% | $ - | 0 | 10.0 | 6.7 | $ 42,332 | 33.0% | $ 13,951 | 60,657 | $ 13,951 |
| | | | | $1,415,248 | 22.8% | $ 322,405 | 2,149,366 | | | $407,193 | 46.8% | $190,698 | 829,121 | $ 513,103 |

Alectra schools in yellow; Hydro One schools in green

# Waterloo Region DSB 2016-17 Energy Savings Potential

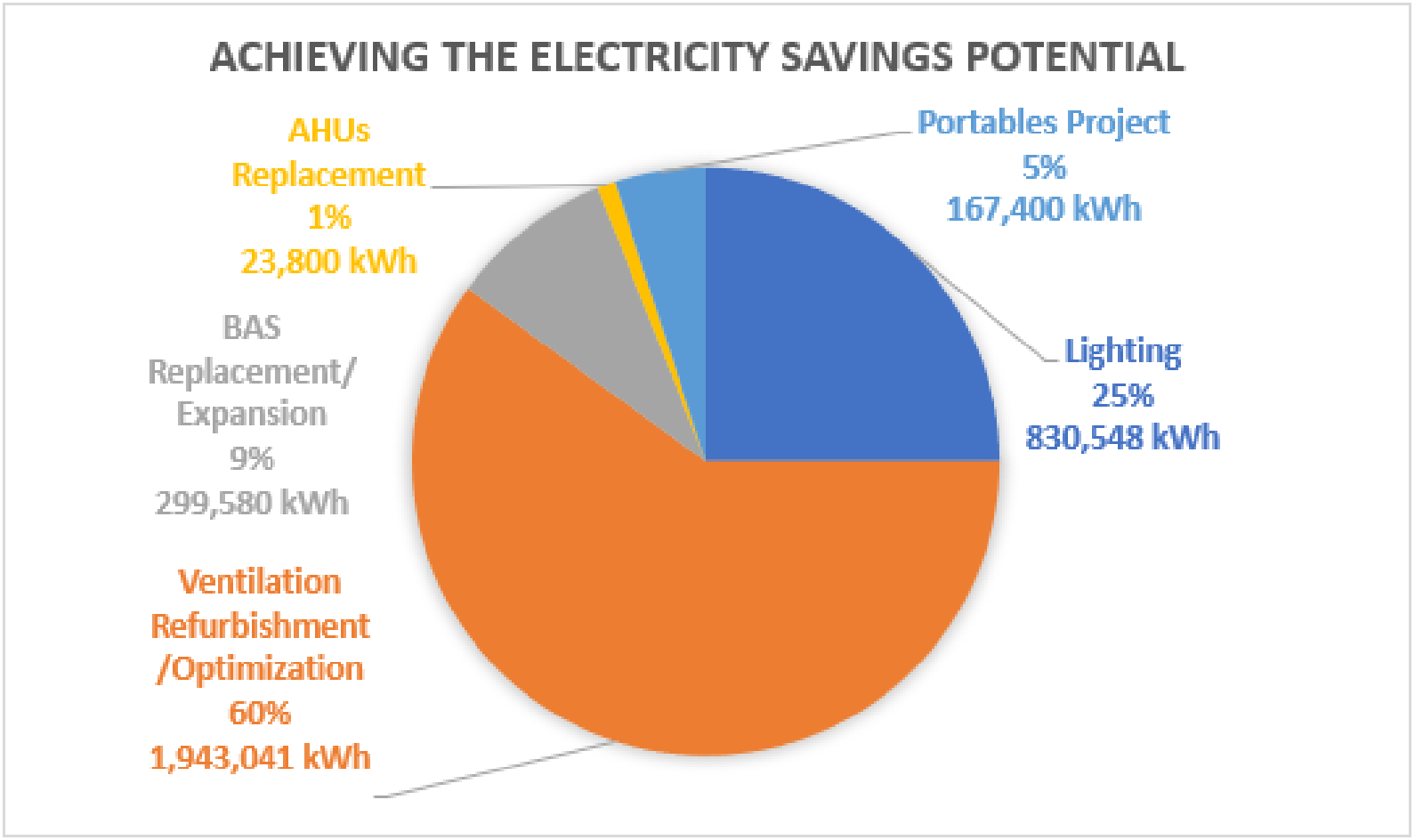
| | | Electricity | | | | | | Gas | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Consumption | | Cost | Target Savings | | | Consumption | | Cost | Target Savings | | | |
| School | School Type | Actual (kWh/sq.ft.) | Target (kWh/sq.ft.) | ($) | (%) | ($) | (kWh) | Actual (ekWh/sq. ft.) | Target (ekWh/sq. ft.) | ($) | (%) | ($) | (m3) | Total $ savings potential |
| Breslau PS | Elementary | 6.6 | 5.6 | $ 57,947 | 15.3% | $ 8,874 | 59,158 | 15.0 | 5.4 | $ 19,439 | 63.8% | $ 12,410 | 53,956 | $ 21,284 |
| William G Davis PS | Elementary | 4.2 | 4.1 | $ 34,307 | 3.2% | $ 1,094 | 7,296 | 18.3 | 5.4 | $ 22,126 | 70.4% | $ 15,582 | 67,749 | $ 16,677 |
| Waterloo Oxford DSS | Secondary | 5.9 | 5.6 | $ 158,805 | 6.2% | $ 9,900 | 65,998 | 16.2 | 6.5 | $ 64,288 | 59.8% | $ 38,463 | 167,230 | $ 48,363 |
| Galt CI | Secondary | 6.7 | 5.4 | $ 177,633 | 18.8% | $ 33,322 | 222,148 | 15.1 | 6.6 | $ 59,372 | 56.5% | $ 33,533 | 145,795 | $ 66,855 |
| Preston HS | Secondary | 5.2 | 4.8 | $ 130,998 | 8.4% | $ 10,983 | 73,221 | 15.8 | 6.6 | $ 58,703 | 58.4% | $ 34,302 | 149,139 | $ 45,285 |
| Elmira District SS | Secondary | 6.1 | 5.7 | $ 139,266 | 6.9% | $ 9,654 | 64,361 | 14.4 | 6.6 | $ 48,632 | 54.3% | $ 26,385 | 114,716 | $ 36,039 |
| Clemens Mill PS | Elementary | 9.2 | 5.0 | $ 77,364 | 45.8% | $ 35,399 | 235,990 | 11.0 | 5.4 | $ 13,691 | 50.6% | $ 6,931 | 30,134 | $ 42,329 |
| Waterloo Collegiate | Secondary | 5.6 | 5.3 | $ 151,542 | 6.5% | $ 9,789 | 65,258 | 14.3 | 6.6 | $ 56,997 | 54.2% | $ 30,881 | 134,265 | $ 40,670 |
| Saginaw PS | Elementary | 7.9 | 4.4 | $ 54,756 | 44.5% | $ 24,385 | 162,570 | 11.4 | 5.4 | $ 11,772 | 52.5% | $ 6,180 | 26,867 | $ 30,565 |
| Sandowne PS | Elementary | 6.6 | 4.3 | $ 44,257 | 34.2% | $ 15,116 | 100,772 | 12.6 | 5.4 | $ 12,574 | 57.1% | $ 7,177 | 31,205 | $ 22,293 |
| | | | | **$1,026,874** | **15.4%** | **$ 158,516** | **1,056,772** | | | **$367,594** | **57.6%** | **$211,843** | **921,056** | **$ 370,359** |

Energy + Inc. schools in yellow; Waterloo North Hydro Inc. schools in orange; Kitchener Wilmot Hydro Inc. schools in green

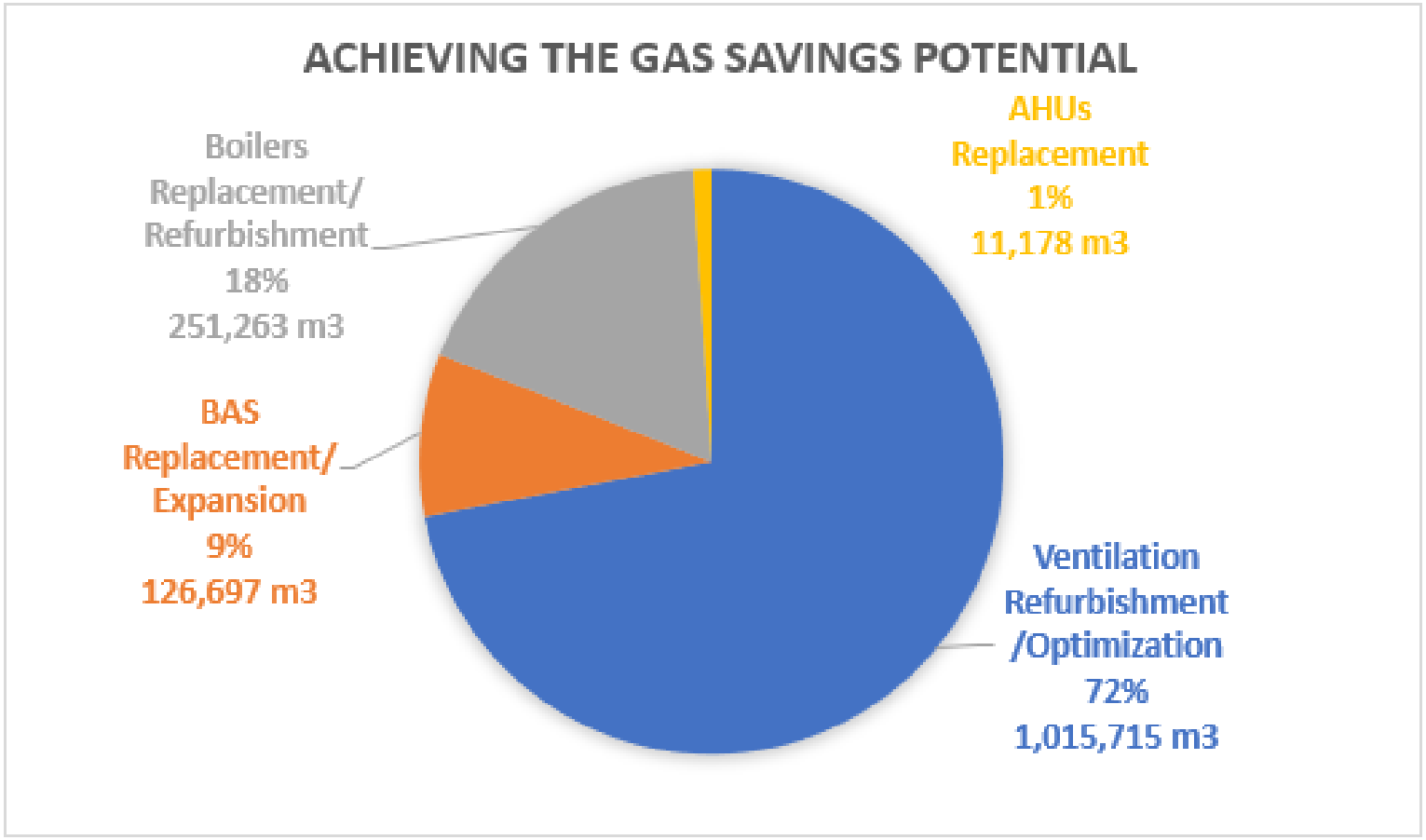
# Summary of Projects Identified Through the Charrettes (20 schools)

| Measure | Description | Total | Payback | % of Overall Total | # out of 20 |
|---|---|---|---|---|---|
| Lighting | Budget | $697,286 | 5.7 | 4% | 8 |
| | Electricity Savings | $116,277 | | 25% | 8 |
| Ventilation Refurbishment/Optimization | Budget | $2,596,066 | 3.8 | 15% | 20 |
| | Electricity Savings | $272,026 | | 60% | 16 |
| | Gas Savings | $304,715 | | 72% | 20 |
| BAS Replacement/ Expansion | Budget | $2,670,643 | 32.7 | 15% | 9 |
| | Electricity Savings | $41,941 | | 9% | 7 |
| | Gas Savings | $38,009 | | 9% | 6 |
| Boilers Replacement/Refurbishment | Budget | $8,932,937 | 117.7 | 52% | 10 |
| | Gas Savings | $75,379 | | 18% | 10 |
| AHUs Replacement | Budget | $2,260,637 | 337.4 | 13% | 5 |
| | Electricity Savings | $3,332 | | 1% | 1 |
| | Gas Savings | $3,353 | | 1% | 1 |
| Portables Project | Budget | $140,000 | 5.3 | 1% | 5 |
| | Electricity Savings | $23,436 | | 5% | 5 |
| | | | | | |
| Total Capital Cost | | $17,297,568 | - | - | - |
| | | | | | |
| Savings | Electricity | $457,012 | - | - | - |
| | Gas | $421,456 | - | - | - |
| | Total | $1,492,564 | - | - | - |
| Overall Simple Payback (years) | | 11.59 | - | - | - |

# Union Gas Charrettes - Achieving the Electricity Savings Potential



# Union Gas Charrettes - Achieving the Gas Savings Potential



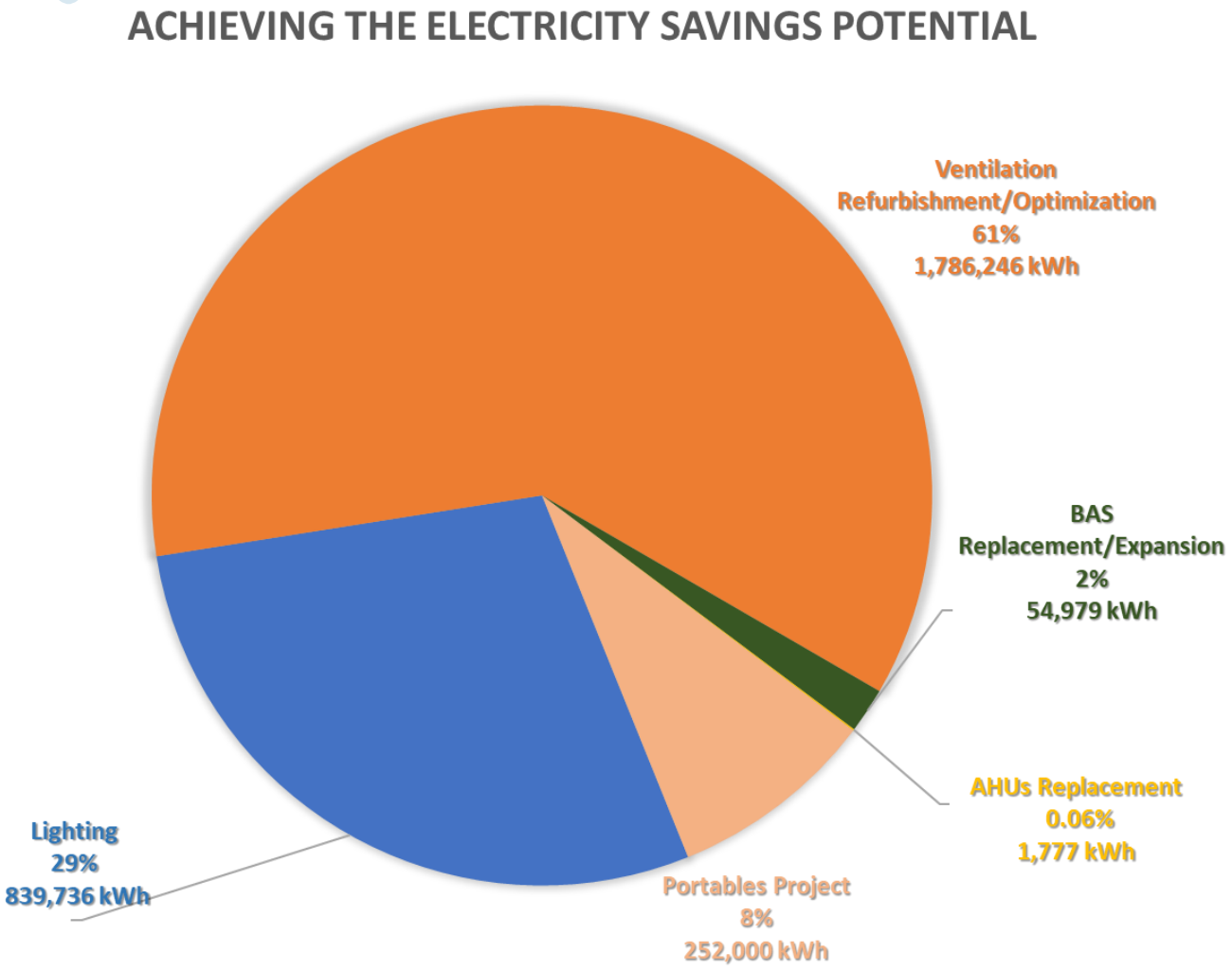
# Simcoe County DSB Project

- 29 schools
- Total savings potential of $721,00/year
- 11% electricity savings potential
- 38% gas savings potential
- Measures included: Lighting, Ventilation Refurbishment/Optimization, BAS Replacement/Expansion, Boilers Replacement/Refurbishment, AHUs Replacement and Portables HVAC Controls

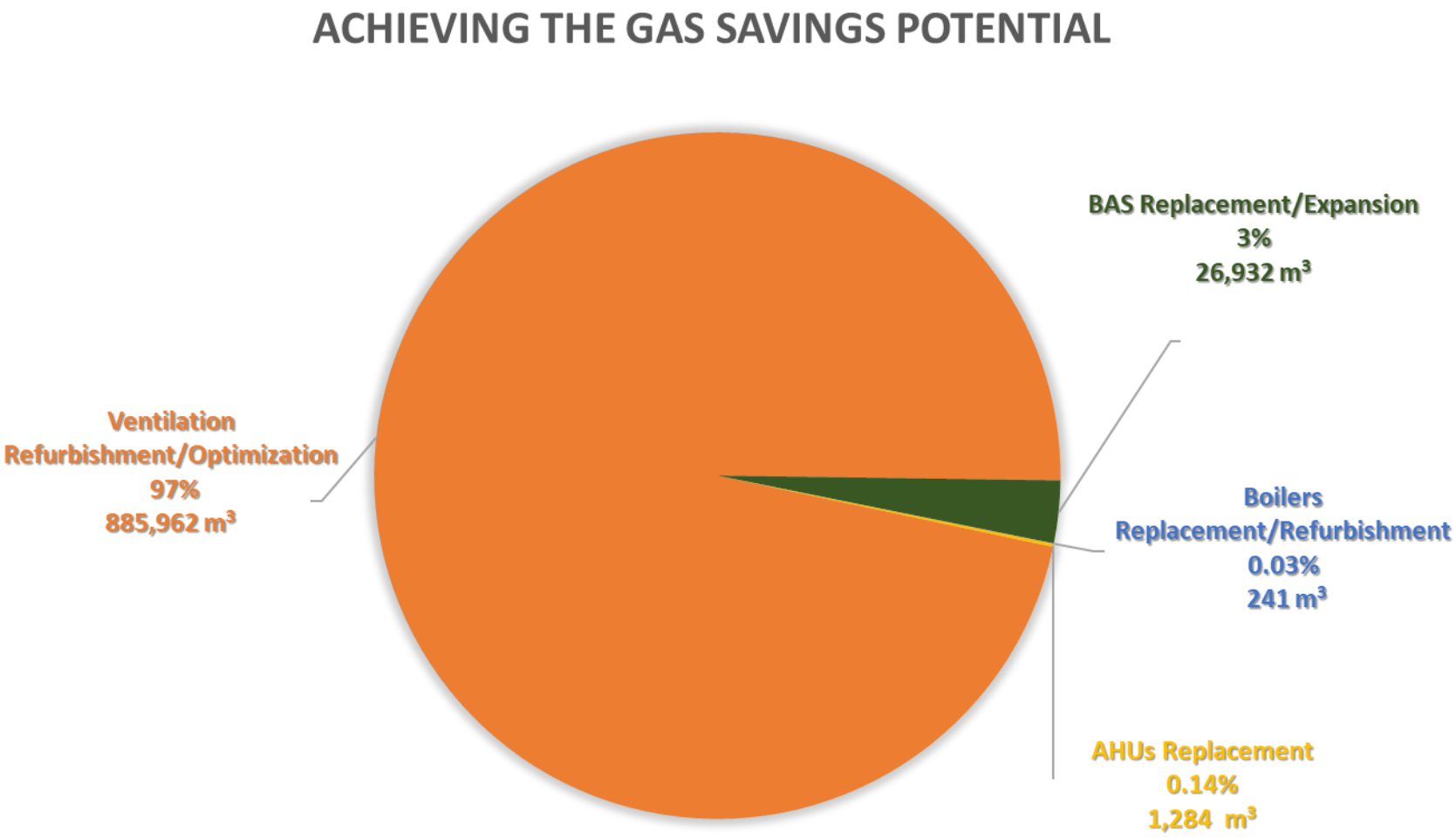
# Summary of Simcoe County DSB Projects (29 schools)

| Measure | Description | Total | Payback | % of Overall Total | # out of 29 |
|---|---|---|---|---|---|
| Lighting | Budget | $ 769,408 | 5.55 | 18% | 15 |
| | Elec. Savings | $ 118,936 | | 29% | 15 |
| Ventilation Refurbishment/Optimization | Budget | $ 2,904,995 | 4.77 | 68% | 29 |
| | Elec. Savings | $ 250,074 | | 61% | 25 |
| | Gas Savings | $ 265,789 | | 86% | 27 |
| BAS Replacement/Expansion | Budget | $ 240,500 | 15.12 | 6% | 2 |
| | Elec. Savings | $ 7,953 | | 2% | 2 |
| | Gas Savings | $ 7,305 | | 2% | 2 |
| Boilers Replacement/Refurbishment | Budget | $ 20,017 | 331.68 | 0% | 1 |
| | Gas Savings | $ 60 | | 0% | 1 |
| AHUs Replacement | Budget | $ 85,787 | 145.29 | 2% | 1 |
| | Elec. Savings | $ 267 | | 0% | 1 |
| | Gas Savings | $ 321 | | 0% | 1 |
| Portables Project | Budget | $ 220,500 | 5.54 | 5% | 5 |
| | Elec. Savings | $ 35,280 | | 9% | 5 |
| **Total Capital Cost** | | **$ 4,241,207** | | | |
| Savings | Elec. Savings | $ 412,510 | | | |
| | Gas Savings | $ 308,434 | | | |
| | Total Savings | $ 720,944 | | | |
| **Simple Payback (yr)** | | **5.07** | | | |

# Simcoe County DSB - Achieving the Electricity Savings Potential



# Simcoe County DSB - Achieving the Gas Savings Potential



# Maximizing Achievable Savings

- Ventilation Refurbishment and Optimization Projects: More than 70% of the total gas savings potential and approximately 60% of the electricity savings potential is found in Ventilation Refurbishment and Optimization projects. These projects applied to the majority of schools across all 3 boards and provide the best paybacks of all.
- Capital Projects: All 3 boards included schools requiring major capital replacements of obsolete/end-of-life boilers, air handling units and/or building automation systems. Design and performance standards are necessary to deliver the full savings potential of these projects.
- Lighting Projects: Power density as well as light level standards are required for lighting conversions to LED to deliver the full savings potential.
- Portables Projects: Equipment and controls upgrades of HVAC units in portables make up approximately 10% of the total electricity savings potential in the schools and provide a good payback.

# Conclusions

- The natural gas savings potential in the schools' sector as a whole is far greater than is currently thought. The Sustainable Schools analysis for the 2014-15 school year determined the achievable potential to approximately 140 million m3/year or 38% of total annual consumption.
- Some boards have greater gas savings potential than others, ranging between 6% to 32% board-wide
- Some individual schools within the boards have far greater potential than others. 8 of the 20 schools taking part in the Union Gas Charrette have potential greater than 100,000 m3/year as opposed to only 2 of the 29 schools in the Simcoe County DSB project
- High-potential boards, and high-potential schools within each board, are readily identified through the Sustainable Schools analysis and should be the focus of DSM efforts aimed at maximizing savings.

# Suggested Principles for Next Generation DSM

- Focus on high-potential owners, high potential buildings and high-potential measures
- Multi-year agreements
- Savings measured at the meter
- Graduated incentives based on approaching targets
- Utility company roles of:
  - account manager
  - technical consultant
  - portfolio responsibility

# Questions?

Ian Jarvis
President, Enerlife Consulting Inc.
416-915-1530 x 203
ian.jarvis@enerlife.com