

Performance Benchmarking

UCD Training

Performance Benchmarking

Definition

A performance benchmark is a numerical standard that is used to compare two or more things. The comparison allows the user to identify and prioritize action items to improve the energy performance for individual buildings.

There are two types of performance benchmarking:

- **Internal**
 - comparison of energy intensity between similar buildings within a board
 - raw data
- **External**
 - comparison of energy intensity between similar buildings across the education sector
 - weather normalized

Performance Benchmarking

Internal Performance Benchmarking

- identifies if a board is electricity or gas intensive
 - based on calculated averages
 - allows a board to measure their exposure to risk of volatile utility costs
- identifies buildings with **both** high energy intensity and high energy costs
 - prioritize these sites for implementing energy management strategies
- allows a board to assess the energy performance of similar sites

Performance Benchmarking

External Performance Benchmarking

- allows comparison of the board's energy performance against other boards
 - across the sector
 - boards of similar size
- allows comparison of energy performance between sites with similar characteristics
 - facility type
 - year of construction
 - total building area
 - with or without portables/portapak rooms

Internal Performance Benchmarking

What You Need to Do the Job - for Internal Performance Benchmarking

1. Your Board's completed **Energy Cost Analysis** workbook
 - see ***Analyzing Energy Cost Presentation*** for detailed instructions on:
 - how to generate the required report
 - how to determine for each site:
 - electricity cost per area
 - natural gas cost per area
 - total cost per area

2. ***Peer Inventory (EDUPI)***
 - Choose a comparison set
 - Your board
 - Normalization
 - Weather normalized - Toronto Pearson

Internal Performance Benchmarking

What You Need to Do the Job - for Internal Performance Benchmarking

3. The following values from your latest budget projections

- projected consumption
 - electricity [reference “I” from the electricity budget Workbook]
 - natural gas [reference “i” from the natural gas budget Workbook]
- projected unit total cost
 - electricity [reference “O” from the electricity budget Workbook]
 - natural gas [reference “p” from the natural gas budget Workbook]
- projected budget for next fiscal year
 - electricity [reference “Q” from the electricity budget Workbook]
 - natural gas [reference “r” from the natural gas budget Workbook]

Internal Performance Benchmarking

How to calculate if the board is electricity or gas intensive

- use your completed Energy Cost Analysis Workbook
 - calculation of the average site intensities for each of the following:
 - electricity intensity
 - natural gas intensity
 - energy intensity
 - calculation of the board's weighted average intensities for each of the following:
 - electricity intensity
 - natural gas intensity
 - energy intensity

Internal Performance Benchmarking

How to calculate if the board is electricity or gas intensive cont'd

The larger value is the utility that is more intensive

Example # 1 – electricity intensive

	Electricity Intensity (kWh/ft ²)	Natural Gas Intensity (ekWh/ft ²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft ²)
Calculated Average Intensity	10.48	5.71	16.19

Example # 2 – natural gas intensive

	Electricity Intensity (kWh/ft ²)	Natural Gas Intensity (ekWh/ft ²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft ²)
Calculated Average Intensity	7.71	11.94	19.65

Internal Performance Benchmarking

Calculating the exposure to risk of volatile utility costs

For each utility, use the values from your latest budget projections for:

- consumption
- unit total cost
- total budget

Example

Utility	Budget Workbook Reference	Electricity	Unit	Budget Workbook Reference	Natural Gas	Unit
projected consumption	I	57,000,000	kWh	i	5,000,000	m3
projected unit total cost	O	0.1661	\$/kWh	p	0.6772	\$/m3
projected budget	Q	9,467,700	\$	r	3,386,000	\$

Internal Performance Benchmarking

Calculating the exposure to risk of volatile utility costs cont'd

- use the “**projected budget**” value to calculate the impact of an increase at various values

Example (cont'd from previous slide)

Utility	Projected	Cost Increases							
		1%	Difference from Projection	5%	Difference from Projection	7%	Difference from Projection	10%	Difference from Projection
Electricity	9,467,700	\$9,562,377	-\$ 94,677	\$9,941,085	-\$ 473,385	\$10,130,439	-\$ 662,739	\$10,414,470	- 946,770
Natural Gas	3,386,000	\$3,419,860	-\$ 33,860	\$3,555,300	-\$ 169,300	\$ 3,623,020	-\$ 237,020	\$ 3,724,600	- 338,600

Internal Performance Benchmarking

Identifying buildings with both high energy intensity and high energy costs

- the process for identifying these buildings is outlined in the **Analyzing Energy Costs** presentation
 - use calculations of the following for each site:
 - Electricity Intensity
 - Natural Gas Intensity
 - Electricity Cost Per Area
 - Natural Gas Cost Per Area
 - Total Cost Per Area
 - use the calculation for the board's weighted averages for each of the above categories
 - identify all sites that have a value above the average

Internal Performance Benchmarking

Identifying buildings with both high energy intensity and high energy costs cont'd

Sample

	Electricity Intensity	Natural Gas Intensity	Energy Intensity (EI)	Electricity Cost Per Area	Natural Gas Cost Per Area	Total Cost Per Area
Calculated weighted average	7.54	12.26	19.80	1.21	0.44	1.65

School Name / Nom de l'école	Facility Type	Electricity Intensity	Natural Gas Intensity	Energy Intensity (EI)	Electricity Cost Per Area	Natural Gas Cost Per Area	Total Cost Per Area
YE Elementary School	E	22.38	17.75	40.13	3.58	0.64	4.22
WX Elementary School	E	11.10	22.85	33.95	1.78	0.82	2.60
ZU Elementary School	E	12.94	13.42	26.36	2.07	0.48	2.55
DC Elementary School	E	11.59	11.23	22.82	1.85	0.40	2.26
AB Elementary School	E	12.13	5.30	17.43	1.94	0.19	2.13
YD Elementary School	E	10.76	10.79	21.55	1.72	0.39	2.11
XW Elementary School	E	11.10	9.08	20.18	1.78	0.33	2.10
ZJ Elementary School	E	6.51	25.67	32.18	1.04	0.92	1.97
GH Elementary School	E	8.67	14.99	23.66	1.39	0.54	1.93
ZV Elementary School	E	6.57	21.84	28.40	1.05	0.79	1.84
PO Elementary School	E	9.66	8.06	17.71	1.55	0.29	1.84
ZX Elementary School	E	9.43	8.49	17.92	1.51	0.31	1.81
YC Elementary School	E	8.11	13.65	21.76	1.30	0.49	1.79
ZR Elementary School	E	9.07	9.02	18.09	1.45	0.32	1.78
ZS Elementary School	E	9.01	9.23	18.24	1.44	0.33	1.77
ZC Elementary School	E	10.21	3.23	13.44	1.63	0.12	1.75
ZI Elementary School	E	8.90	7.33	16.23	1.42	0.26	1.69
ZA Elementary School	E	5.03	24.14	29.17	0.80	0.87	1.67
ST Elementary School	E	9.29	4.88	14.16	1.49	0.18	1.66

Internal Performance Benchmarking

Identifying buildings with both high energy intensity and high energy costs cont'd

You now have a list of your board's worst performing sites by facility type and know which utility is the cause of the high costs

- prioritize these sites for implementing energy management strategies

Internal Performance Benchmarking

Review each of your board's worst performing sites to determine if there are any obvious reasons for why electricity or natural gas costs are high:

- review HVAC system design to identify possible energy conservation projects
- review equipment operations to identify improvements
- review where energy is being used in the building
 - IT equipment
 - domestic hot water system
 - daycares
- review how the school building is being used
 - community use of school
 - before & after school programs
 - daycares
- review energy procurement strategies
 - does your board participate in an electricity and natural gas procurement consortium?

Internal Performance Benchmarking

Assessing the energy performance of a site across multiple years

- the process for identification is outlined in the **Energy Performance Trends** presentation

Notes

- when you compare consumption for a site between two or more years, you must use **weather normalized** reports

Internal Performance Benchmarking

Assessing the energy performance of a site across multiple years cont'd
Sample

FY2012 / AF2012	FY2013 / AF2013	FY2014 / AF2014	FY2015 / AF2015	FY2016 / AF2016	Analysis of EI Value
Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft ²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft ²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft ²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft ²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft ²)	
18.82	18.44	18.60	18.79	18.59	consistent
12.81	136.42	952.88	25.08	23.83	wildly fluctuating
18.60	17.92	16.89	15.58	13.75	annual decrease
18.15	19.37	19.90	20.88	21.82	annual increase

Internal Performance Benchmarking

Assessing the energy performance of a site across multiple years cont'd

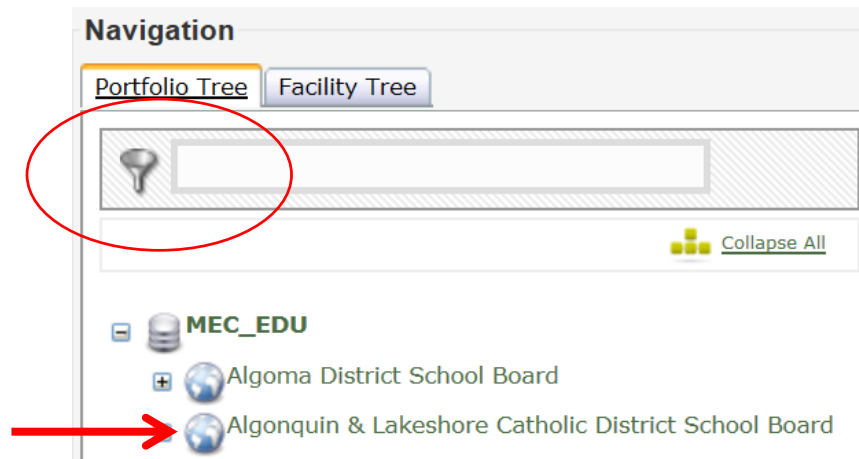
- Reference: The **Energy Performance Trends** presentation
 - Section on “How to Use the Report”

Internal Performance Benchmarking

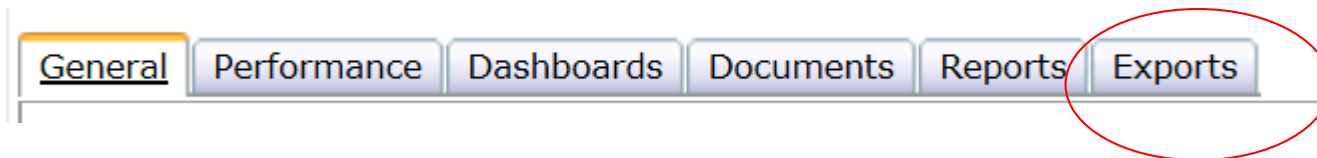
Assessing the energy performance of similar sites in the same year

How to Generate the Report

1. Under “Portfolio Tree”, click on “your board’s name”



2. Select “Exports” tab



Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Generate the Report cont'd

3. Select "Peer Inventory (EDUPI)"

General Performance Dashboards Documents Reports **Exports**

Ontario Ministry of Education

- [Peer Inventory - Unventaire des pairs \(EDUPI\)](#)
- [Board Profil\(e\) du Conseil \(EDU01\)](#)
- [Energy Intensity Comparison / Comparaison de l'intensité énergétique \(EDU02\)](#)
- [Energy Intensity per Student / Intensité énergétique par étudiant \(EDU03\)](#)
- [Energy Intensity Trend / Tendances liées à l'intensité énergétique \(EDU04\)](#)
- [Overview of Boards' Energy Use / Aperçu de la consommation d'énergie du conseil \(EDU05\)](#)
- [Board Water / Eau du Conseil \(EDU07\)](#)

Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Generate the Report cont'd

1. Select "Create New" button


Group Templates

- PCF18 No filters, raw data (no location normalization)
- PCF25 Year of construction later than 1975, bigger than 15,000 sq.ft. total area
- PCF56 Energy Intensity by Build Date for Secondary Schools
- PCF7 Small schools with more than 1 portables

My Templates

- PCF1 Small schools
- PCF2 Big schools
- PCF3 small schools with portables

Selected Template Description



Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Generate the Report cont'd


1. Make the following appropriate selections from the menu below:

1. Choose Fiscal Year

2. Choose Comparison Set

MEC_EDU

 ABC District School Board

3. Choose Weather Normalization

 Raw

Weather Normalized to TORONTO PEARSON

4. Specify Who Can Use It

Group Templates

My Templates

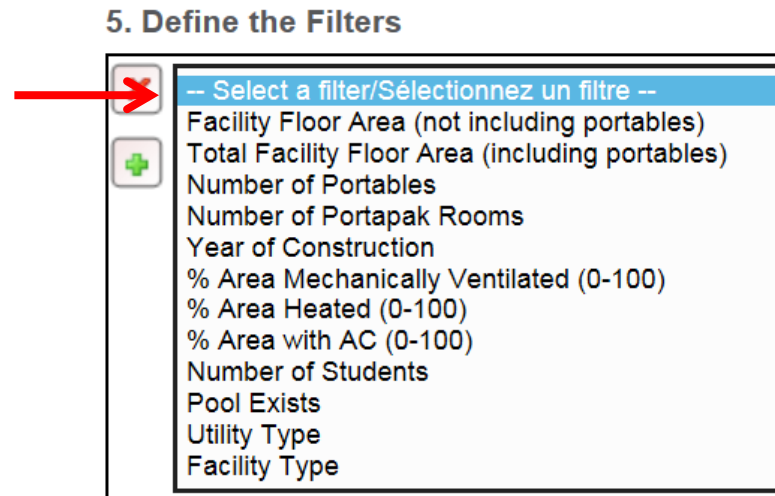
Notes

- “Raw” should be selected when:
 - comparison is within a board
 - comparison is within a single fiscal year
- “Weather normalized” should be selected when:
 - comparison is between multiple boards
 - comparison is between multiple years

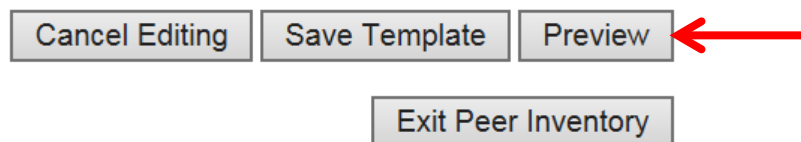
Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd How to Generate the Report cont'd

2. Complete the “**Define filters**” section with as many parameters as you require



2. Click “**Preview**” to determine the number of sites that will be included in the report



Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Generate the Report cont'd

Sample of “defined” filters

5. Define the Filters

<input type="checkbox"/>	Year of Construction	▼	>=	▼	1965	
<input type="checkbox"/>	Year of Construction	▼	<=	▼	1975	
<input type="checkbox"/>	Total Facility Floor Area (including portables)	▼	>=	▼	10000	ft ²
<input type="checkbox"/>	Total Facility Floor Area (including portables)	▼	<=	▼	25000	ft ²
<input type="checkbox"/>	Facility Type	▼	is / est	▼	Elementary School/École élémentaire	▼

Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Generate the Report cont'd

Out of x facilities in ABC District School Board

x facilities meet these filter criteria

Total Facility Floor Area (including portables)	>=	10,000.00 ft ²
Total Facility Floor Area (including portables)	<=	25,000.00 ft ²
Year of Construction	>=	1965
Year of Construction	<=	1975
Facility Type	is / est	Elementary School/École élémentaire

Select Output Fields

Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Generate the Report cont'd

4. Review number of sites

- if too small, expand filters
 - example
 - increase “floor area”
 - increase the period of time for “year of construction”
- if too large, narrow filters
 - example
 - decrease the “floor area”
 - decrease the period of time for “year of construction”

5. Click **“Select Output Fields”**

Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Generate the Report cont'd

6. Select **all** the fields that you want generated in the report

The screenshot shows a list of energy metrics with checkboxes. The following metrics are checked:

- Average Daily Enrolment / Effectif quotidien moyen
- Total Natural Gas Consumed / Consommation totale de gaz naturel (ekWh)
- Total Electricity Consumed / Consommation totale d'électricité (kWh)
- Total Energy Consumed / Consommation totale d'énergie (ekWh)

The following metrics are not checked:

- Total Fuel Oil (Type 2) Consumed / Consommation totale de mazout (type 2) (ekWh)
- Total Fuel Oil (Type 1) Consumed / Consommation totale de mazout (type 1) (ekWh)
- Total Propane Consumed / Consommation totale de propane (ekWh)
- Total Wood Consumed / Consommation totale de bois (ekWh)
- Total District Heat Consumed / Consommation totale du réseau de chauffage communautaire (ekWh)
- Total District Cool Consumed / Consommation totale du réseau de refroidissement communautaire (ekWh)

A red arrow points to the "Generate the Report" button.

7. Click **“Generate the report”**

Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Generate the Report cont'd

Notes

- to do performance benchmarking, you must click the following (minimal) fields:
 - Total Building Area (includes portables/portapaks)
 - Total Electricity Consumed
 - Total Natural Gas Consumed
 - Energy Intensity
 - Data Gaps
 - electricity
 - natural gas

Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Use the Report

1. Rank the buildings by energy Intensity
 - lowest value = most energy efficient
 - highest value = consumes the most energy

Total Building Area (includes portables) / Superficie totale du bâtiment (comprend les salles de classe préfabriquées) (ft ²)	Total Electricity Consumed / Consommation totale d'électricité (kWh)	Total Natural Gas Consumed / Consommation totale de gaz naturel (ekWh)	Total Energy Consumed / Consommation totale d'énergie (ekWh)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft ²)	Rank by Energy Intensity / Classement par intensité énergétique (IE)	Data Gaps - Electricity / Lacunes relatives aux données – électricité (%)	Data Gaps - Natural Gas Lacunes relatives aux données – gaz naturel (%)
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Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Use the Report

2. Review each building's electricity and natural gas columns to determine if
 - data for one or both utilities is missing
 - The cell in the consumption column will be blank
 - it means that the board has not provided the UCD with a meter for the site
 - if a site does not have natural gas data
 - the facility does not use natural gas
 - The facility may use an alternative utility (fuel oil, propane etc.)
 - If yes, determine whether you should delete the building from the spreadsheet for comparison purposes

Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Use the Report

3. Review each building's **Data Gap** columns – electricity and natural gas - to determine if there are significant gaps in consumption data that would skew the analysis
 - If yes, determine whether you should delete the building from the spreadsheet for comparison purposes

Notes

- data gaps are expressed as a percentage of total consumption data for a site
- the following chart translates the percentage into the number of days of missing data

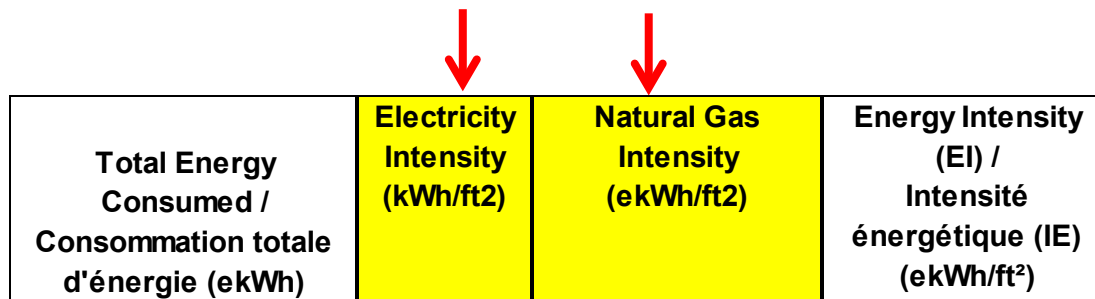
Number of Days Data is Missing	Data Gap (%)
7	0.019
14	0.038
30	0.082
45	0.123

Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Use the Report cont'd

4. Insert two new columns into the spreadsheet to calculate
 - Electricity intensity (kWh/ft²)
 - = Electricity consumed/Total Building Area (includes portables/portapaks)
 - Natural gas intensity (ekWh/ft²)
 - = Natural gas consumed/Total Building Area (includes portables/portapaks)



Total Energy Consumed / Consommation totale d'énergie (ekWh)	Electricity Intensity (kWh/ft ²)	Natural Gas Intensity (ekWh/ft ²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft ²)
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Note

31 For simplicity, the graphic only shows the relevant columns

Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Use the Report cont'd

5. Calculate the **Weighted Average Intensity** for the following columns:

- Electricity intensity (kWh/ft²)
- Natural Gas intensity (ekWh/ft²)
- Energy Intensity (ekWh/ft²)

	Electricity Intensity (kWh/ft²)	Natural Gas Intensity (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)
Calculated Weighted Average Intensity	8.72	10.66	19.38

Internal Performance Benchmarking

Assessing the energy performance of similar sites in the same year cont'd

How to Use the Report cont'd

6. Review the sites to determine which are exceeding the Calculated Weighted Average

	Electricity Intensity (kWh/ft²)	Natural Gas Intensity (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)
	6.96	7.55	14.51
	12.87	2.11	14.98
	8.05	9.64	17.70
	4.16	13.70	17.86
	3.01	15.24	18.25
	6.48	11.86	18.34
	10.33	9.70	20.03
	9.59	21.64	31.23
	14.80	20.84	35.64
	22.13	14.96	37.09
Calculated Weighted Average Intensity	8.72	10.66	19.38

Internal Performance Benchmarking

Review each of your board's worst performing sites to determine if there are any obvious reasons for why electricity or natural gas costs are high:

- review HVAC system design to identify possible energy conservation projects
- review equipment operations to identify improvements
- review where energy is being used in the building
 - IT equipment
 - domestic hot water system
 - daycares
- review how the school building is being used
 - community use of school
 - before & after school programs
 - daycares
- review energy procurement strategies
 - does your board participate in an electricity and natural gas procurement consortium?

External Performance Benchmarking

External Benchmarking - What You Need to Do the Job

From the UCD

A. Overview of Boards' Energy Use Report (EDU05)

- Date Range: FY 2012- FY 2016
- Normalization:
 - Weather normalized - Toronto Pearson
 - Found on Tab: Energy Trends

B. Peer Inventory (EDUPI)

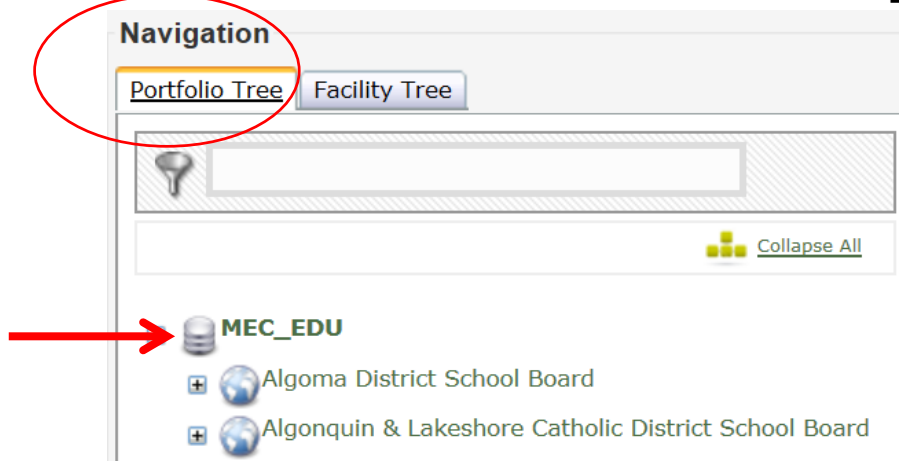
- Choose a comparison set
 - MEC_EDU (this is all sites in the education sector)
- Normalization
 - Weather normalized - Toronto Pearson

External Performance Benchmarking

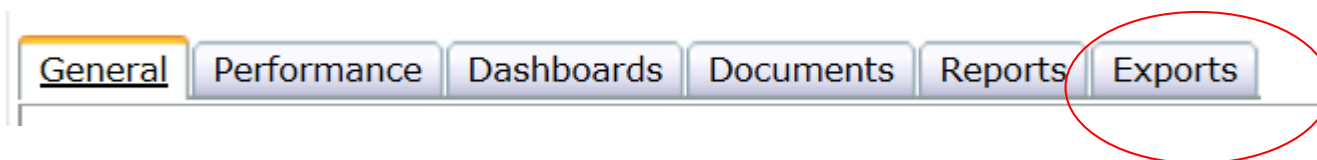
Comparing energy performance with other boards in Ontario

How to Generate the Report – Overview of Boards' Energy Use (EDU05)

1. Under “Portfolio Tree”, click on “**MEC_EDU**”



2. Select “Exports” tab



External Performance Benchmarking

Comparing energy performance with other boards in Ontario cont'd

How to Generate the Report cont'd

MEC_EDU

General Performance Dashboards Documents Reports **Exports**

Energy Usage	Utility Usage
Energy Consumption Year vs. Year (EEC02) Typical Energy Consumption (EEC03)	Detailed Meter Reading Coverage (EMC01) Utility Consumption Year vs. Year (EUC02) Typical Utility Consumption (EUC03)
Ontario Ministry of Education	
Overview of Boards' Energy Use / Aperçu de la consommation d'énergie du conseil (EDU05) Sector Asset Inventory / Inventaire des actifs du secteur (EDU06) Overview of Boards' Water Use / Aperçu de la consommation d'eau des conseils (EDU08)	

External Performance Benchmarking

Comparing energy performance with other boards in Ontario cont'd

How to Generate the Report cont'd

4. Select:

- “Date Range”: last 5 Fiscal Years (FY 2012 – 2016)
- Normalization: Toronto Pearson

5. Click “Done”

EXPORT SETTINGS: OVERVIEW OF BOARDS' ENERGY USE / APERÇU DE LA CONSOMMATION D'ÉNERGIE DU CONSEIL

Title: Overview of Boards' Energy Use / Aperçu de la consommation d'énergie

Date Range

Date Range: FY / AF 2012 - 2016

Start Date (inclusive): 2011-09-01

End Date (exclusive): 2016-09-01

Normalization

Scenario: Toronto Pearson (FY2013)

Buttons: Done, Cancel

External Performance Benchmarking

Comparing energy performance with other boards in Ontario cont'd

How to Generate the Report cont'd

Notes

- the **Overview of Boards' Energy Use Report** covers the latest five full fiscal years
- partial fiscal years are not included in the report as they will skew the data comparison
- due to the lag time between when a meter is read and when the consumption data is entered into the UCD, reports with the latest fiscal year are typically posted sometime between the end of November and early December of the same year
- The accuracy of all data is based on the:
 - completeness of the meter numbers that a board provides to the UCD
 - data provided by the LDCs

External Performance Benchmarking

Comparing energy performance with other boards in Ontario cont'd

How to Use the Report

- Users can compare their board's energy performance to any other board in the province using the Energy Intensity value
 - can quickly determine your board's ranking in terms of energy performance
 - identify boards within your region that have lower energy intensity values
 - network

Rationale

- Energy Intensity = total energy consumed/total building area
- Weather normalization (Toronto Pearson) removes the impact of weather on energy consumption
- Boards can compare to their Regional Energy Intensity or the Provincial Energy Intensity

External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

Rationale

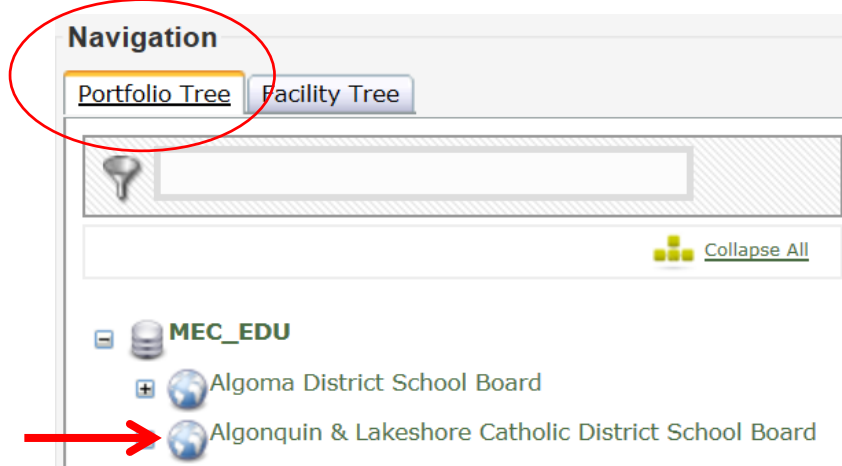
- With energy consumption data on over 5,500 building in the sector, the UCD is a valuable resource
- You can identify specific building characteristics and view their weather normalized energy performance to determine if you have a site that is a high- or low-energy performer

External Performance Benchmarking

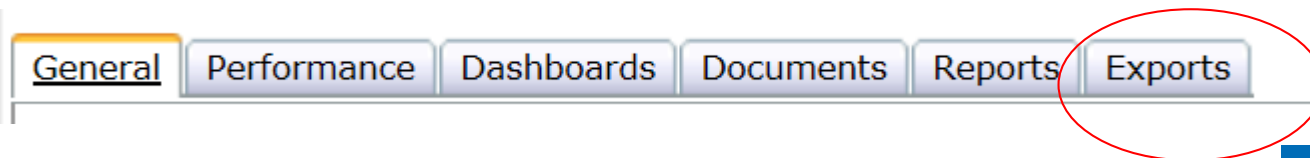
Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Generate the Report

1. Under “Portfolio Tree”, click on “your board’s name”



2. Select “Exports” tab

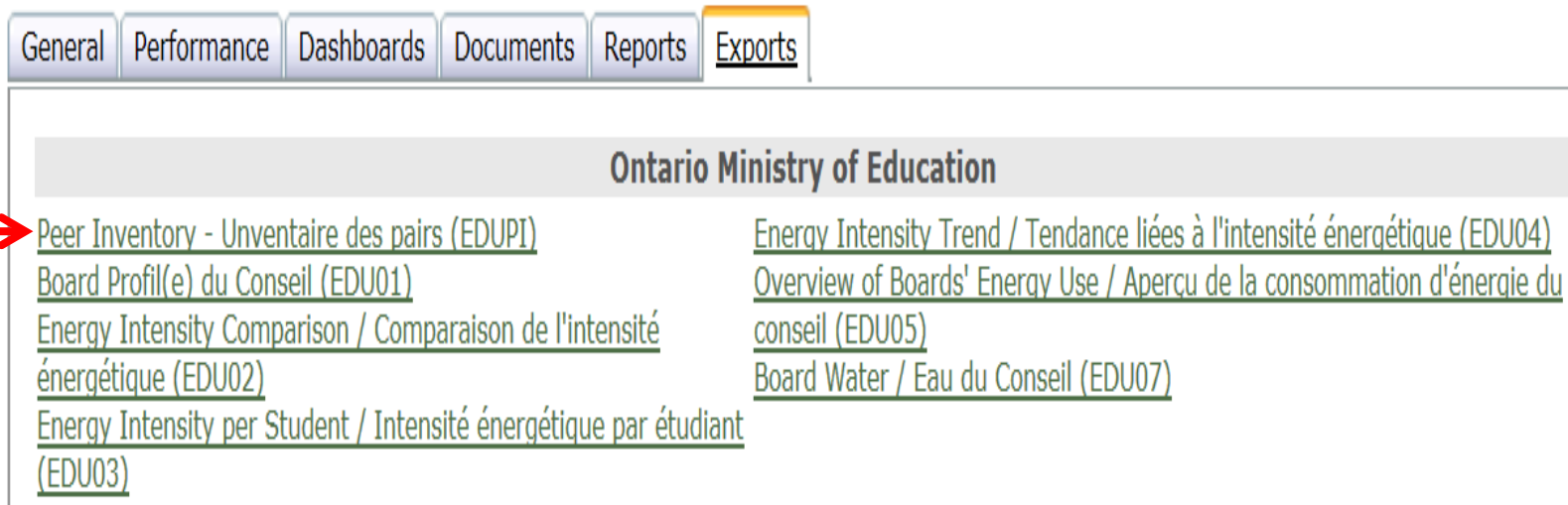


External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Generate the Report cont'd

3. Select "Peer Inventory (EDUPI)"



General Performance Dashboards Documents Reports **Exports**

Ontario Ministry of Education

Peer Inventory - Unventaire des pairs (EDUPI)	Energy Intensity Trend / Tendence liées à l'intensité énergétique (EDU04)
Board Profil(e) du Conseil (EDU01)	Overview of Boards' Energy Use / Aperçu de la consommation d'énergie du conseil (EDU05)
Energy Intensity Comparison / Comparaison de l'intensité énergétique (EDU02)	Board Water / Eau du Conseil (EDU07)
Energy Intensity per Student / Intensité énergétique par étudiant (EDU03)	

External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Generate the Report cont'd

1. Select **“Create New”** button


Group Templates

- PCF18 No filters, raw data (no location normalization)
- PCF25 Year of construction later than 1975, bigger than 15,000 sq.ft. total area
- PCF56 Energy Intensity by Build Date for Secondary Schools
- PCF7 Small schools with more than 1 portables

My Templates

- PCF1 Small schools
- PCF2 Big schools
- PCF3 small schools with portables

Selected Template Description



External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd


How to Generate the Report cont'd

1. Make the following appropriate selections from the menu below:


1. Choose Fiscal Year

FY/AF 2016

2. Choose Comparison Set

-  MEC_EDU
 ABC District School Board

3. Choose Weather Normalization

- Raw
 Weather Normalized to TORONTO PEARSON

4. Specify Who Can Use It

- Group Templates
 My Templates

Notes

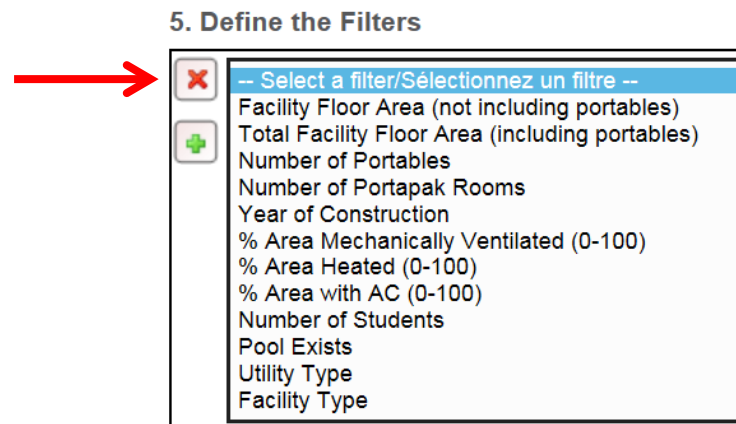
- “MEC_EDU = all sites of the 72 district school boards
- “Weather normalized” must be selected when:
 - comparison is between multiple boards
 - Strips out the impact of weather on energy consumption

External Performance Benchmarking

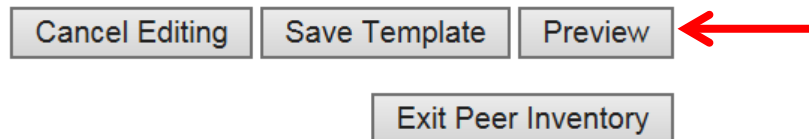
Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Generate the Report cont'd

2. Complete the “**Define filters**” section with as many parameters as you require



3. Click “**Preview**” to determine the number of sites that will be included in the report



External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Generate the Report cont'd

Sample of “defined” filters

5. Define the Filters

<input type="checkbox"/>	Year of Construction	▼	>=	▼	1965	
<input type="checkbox"/>	Year of Construction	▼	<=	▼	1975	
<input type="checkbox"/>	Total Facility Floor Area (including portables)	▼	>=	▼	10000	ft ²
<input type="checkbox"/>	Total Facility Floor Area (including portables)	▼	<=	▼	25000	ft ²
<input type="checkbox"/>	Facility Type	▼	is / est	▼	Elementary School/École élémentaire	▼

External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Generate the Report cont'd

Out of 5539 facilities in MEC_EDU
145 facilities meet these filter criteria

Total Facility Floor Area (including portables)	>=	10,000.00 ft ²
Total Facility Floor Area (including portables)	<=	25,000.00 ft ²
Year of Construction	>=	1965
Year of Construction	<=	1975
Facility Type	is / est	Elementary School/École élémentaire

Select Output Fields

External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Generate the Report cont'd

4. Review number of sites

- if too small, expand filters
 - example:
 - increase “floor area”
 - increase the period of time for “year of construction”
 - if too large, narrow filters
 - example:
 - decrease the “floor area”
 - decrease the period of time for “year of construction”

5. Click **“Select Output Fields”**


External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Generate the Report cont'd

6. Select **all** the fields that you want generated in the report

<input checked="" type="checkbox"/> Average Daily Enrolment / Effectif quotidien moyen	<input checked="" type="checkbox"/> Total Electricity Consumed / Consommation totale d'électricité (kWh)
<input checked="" type="checkbox"/> Total Natural Gas Consumed / Consommation totale de gaz naturel (ekWh)	<input type="checkbox"/> Total Fuel Oil (Type 1) Consumed / Consommation totale de mazout (type 1) (ekWh)
<input type="checkbox"/> Total Fuel Oil (Type 2) Consumed / Consommation totale de mazout (type 2) (ekWh)	<input type="checkbox"/> Total Propane Consumed / Consommation totale de propane (ekWh)
<input type="checkbox"/> Total Wood Consumed / Consommation totale de bois (ekWh)	<input type="checkbox"/> Total District Heat Consumed / Consommation totale du réseau de chauffage communautaire (ekWh)
<input type="checkbox"/> Total District Cool Consumed / Consommation totale du réseau de refroidissement communautaire (ekWh)	<input checked="" type="checkbox"/> Total Energy Consumed / Consommation totale d'énergie (ekWh)

 **Generate the Report**

7. Click **“Generate the report”**

External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Use the Report

1. Identify all the buildings with missing data and delete them from the spreadsheet

Total Building Area (includes portables) / Superficie totale du bâtiment (comprend les salles de classe préfabriquées) (ft²)	Total Electricity Consumed / Consommation totale d'électricité (kWh)	Total Natural Gas Consumed / Consommation totale de gaz naturel (ekWh)	Total Energy Consumed / Consommation totale d'énergie (ekWh)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Rank by Energy Intensity / Classement par intensité énergétique (IE)	Data Gaps - Electricity / Lacunes relatives aux données – électricité (%)	Data Gaps - Natural Gas / Lacunes relatives aux données – gaz naturel (%)
15,909	7,268.64		7,268.64	0.46	1 of 145 sites	0.00	
24,815	290,348.13	168,819.59	459,167.72	18.50	100 of 145 sites	0.00	0.00
20,731	161,323.73	225,535.97	386,859.69	18.66	101 of 145 sites	0.00	0.00
18,936	102,531.81	257,085.64	359,617.47	18.99	102 of 145 sites	0.00	0.00
20,842	401,075.25		401,075.25	19.24	103 of 145 sites	0.00	
17,893	81,334.27	264,366.19	345,700.44	19.32	104 of 145 sites	0.00	0.00
12,670	248,914.13		248,914.13	19.65	105 of 145 sites	0.00	
22,120	123,842.14	312,317.47	436,159.59	19.72	106 of 145 sites	5.11	0.00
16,339	80,830.79	243,386.66	324,217.44	19.84	107 of 145 sites	0.00	0.00
16,361	106,674.05	220,951.39	327,625.44	20.02	108 of 145 sites	0.00	0.00
22,324	174,871.09	277,778.78	452,649.88	20.28	109 of 145 sites	0.00	0.00
24,657	140,184.34	360,266.19	500,450.53	20.30	110 of 145 sites	0.00	0.00
14,976	87,315.01	221,433.97	308,748.97	20.62	111 of 145 sites	1.72	0.00
21,672	162,871.42	294,975.03	457,846.44	21.13	112 of 145 sites	0.00	0.00
20,752	114,794.54	334,433.66	449,228.22	21.65	113 of 145 sites	0.00	0.00

External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Use the Report

2. Calculate the **Average Value** for the following columns:

- Total Electricity Consumed
- Total Natural Gas Consumed
- Total Energy Consumed
- Weighted Energy Intensity

External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Use the Report

Sample

	Total Building Area (includes portables and portapaks) / Superficie totale du bâtiment (comprend les salles de classe préfabriquées et ajout modulaire) (ft ²)	Total Electricity Consumed / Consommation totale d'électricité (kWh)	Total Natural Gas Consumed / Consommation totale de gaz naturel (ekWh)	Electricity Intensity (kWh/ft ²)	Natural Gas Intensity (ekWh/ft ²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft ²)
	34,063	762,425.81	604,490.44	22.38	17.75	40.13
	23,296	258,518.00	532,408.81	11.10	22.85	33.95
	45,099	583,596.44	605,200.81	12.94	13.42	26.36
	44,015	509,953.53	494,287.59	11.59	11.23	22.82
	44,049	534,202.00	233,369.70	12.13	5.30	17.43
	25,101	270,136.06	270,912.91	10.76	10.79	21.55
	23,670	262,658.44	215,028.66	11.10	9.08	20.18
	28,650	186,553.55	735,375.31	6.51	25.67	32.18
	26,237	227,411.61	393,247.19	8.67	14.99	23.66
	30,391	199,645.16	663,605.94	6.57	21.84	28.40
	47,165	455,528.72	379,996.66	9.66	8.06	17.71
56 Calculated Weighted Average	33,794	386,421	466,175	7.60	12.24	19.83

External Performance Benchmarking

Comparing energy performance of buildings with similar characteristics across Ontario cont'd

How to Use the Report –

- compare your building(s) values with the calculated average energy intensity value
 - if the value is lower than the average, the building is consuming less energy
 - if the value is higher than the average, the building is consuming more energy
 - review the electricity and natural gas average values
 - review options for the utility with the higher values

External Performance Benchmarking

Review each of your board's worst performing sites to determine if there are any obvious reasons for why electricity or natural gas costs are high:

- review HVAC system design to identify possible energy conservation projects
- review equipment operations to identify improvements
- review where energy is being used in the building
 - IT equipment
 - domestic hot water system
 - daycares
- review how the school building is being used
 - community use of school
 - before & after school programs
 - daycares
- review energy procurement strategies
 - does your board participate in an electricity and natural gas procurement consortium?

Performance Benchmarking

Questions can be answered via the UCD Helpdesk

Email: ucdb@aagent.ca

Phone: (416) 622-9449 ext. 115