Energy Performance Trends

UCD Training

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Energy Performance Trends

What

- Review the energy intensity values of all sites within a board's portfolio
  - energy intensity = the total energy consumption of a site/total building area
  - lower energy intensity values are better because it means a site is consuming less energy per ft^2/m^2

Why

- Energy intensity is a common denominator that allows users to compare sites with similar functions (elementary, secondary, administrative) but different variables:
  - size
  - year of construction
  - locations (when weather normalized)

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How

Report: Energy Intensity Trend (EDU04)

- Date Range: FY2012 – 2016 (latest 5 year fiscal period)
- Normalization: local weather station

Energy Intensity Trend Report Profile

Purpose

to provide the energy intensity value of every site for each of the last five fiscal years

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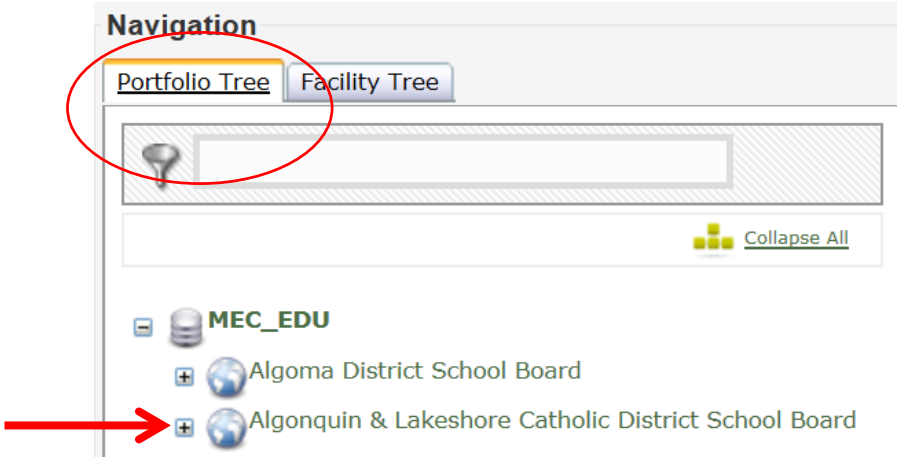
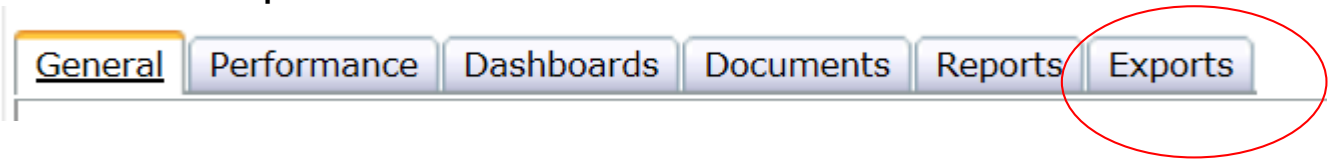
How to Generate the Report

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



2. Select “Exports” tab



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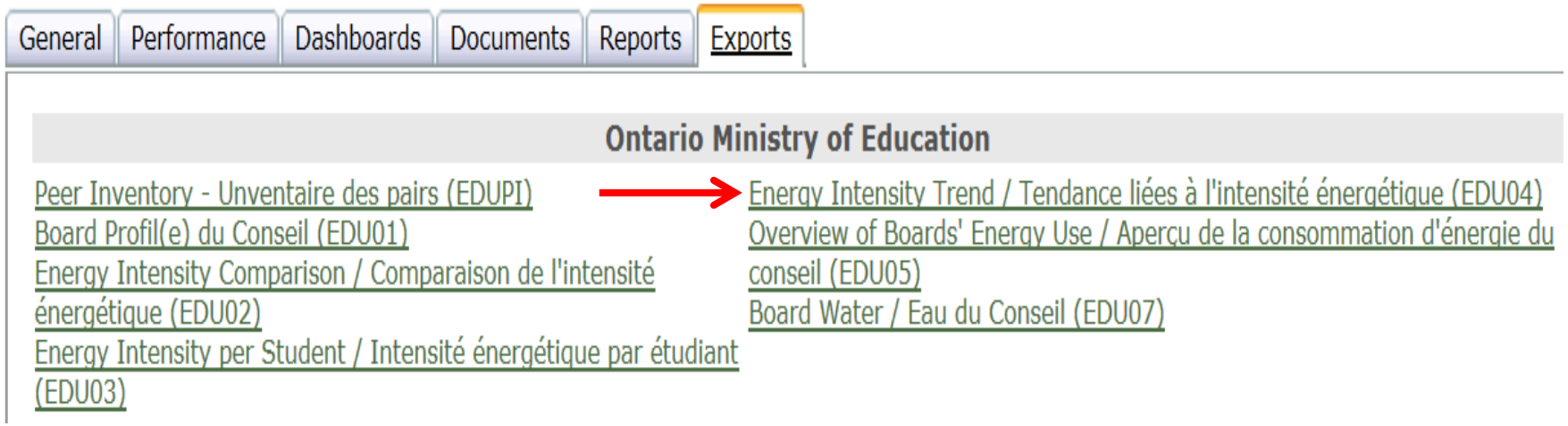
How to Generate the Report cont'd

3. Select "Energy Intensity Trend EDU04"



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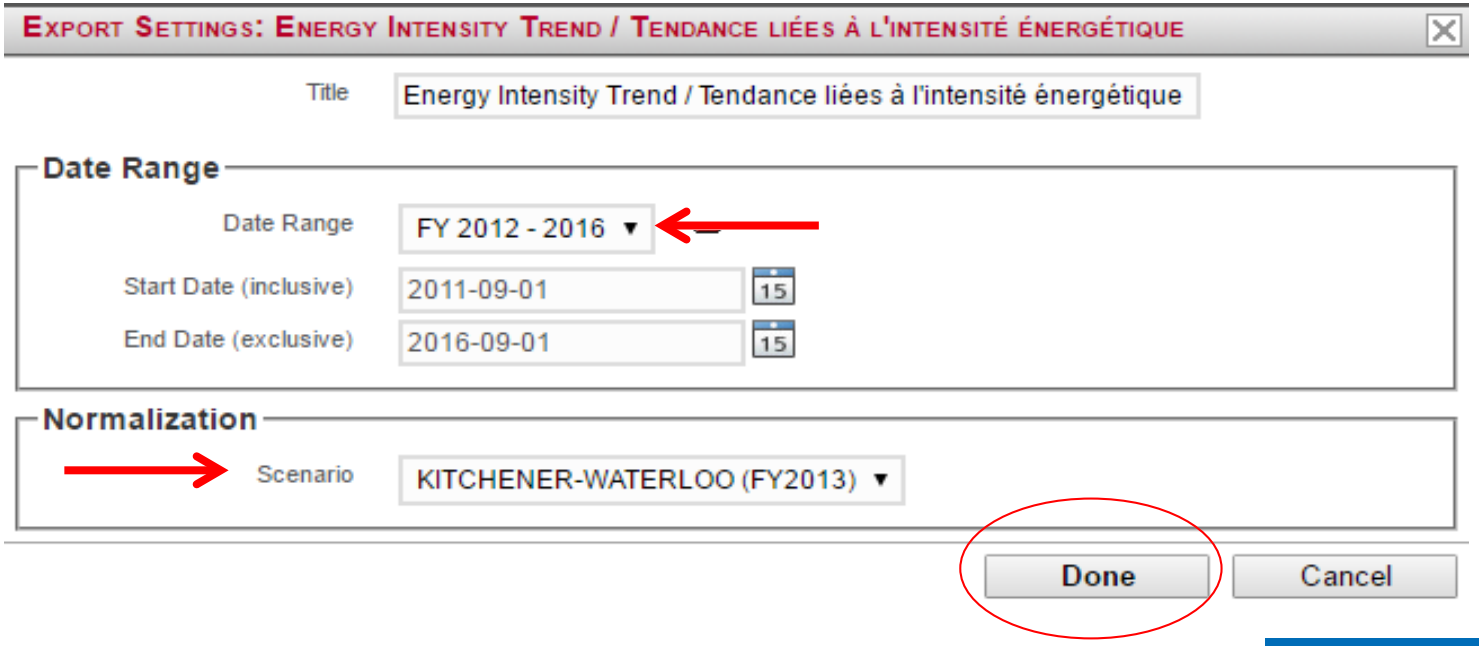
How to Generate the Report cont'd

4. Select:
   - "Date Range": latest 5 Fiscal Years (FY 2012 – 2016)
   - Normalization: local weather station (for your board)
5. Click "Done"



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The Energy Intensity Trends EDO04 Report

Energy Intensity Trend / Tendance liées à l'intensité énergétique ABC District School Board Schools / Écoles	Year Built / Année de construction	FY2012 / AF2012 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	FY2013 / AF2013 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft	FY2014 / AF2014 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²	FY2015 / AF2015 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	FY2016 / AF2016 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)
AB Elementary School	1992	19.91	18.28	18.26	20.21	17.75
CD Elementary School	1988	10.76	19.15	18.80	12.37	11.74
EF Elementary School	1967	22.87	25.03	23.77	19.40	24.77
HI Elementary School	1978	25.79	28.45	28.16	24.15	25.40
LM Board Office	1961	20.29	20.58	20.62	21.33	19.85
NO Facility Services	1979	22.28	20.69	20.86	19.97	20.62
PQ Elementary School	1959	19.52	18.44	18.60	18.79	18.09
RS Elementary School	1989	22.74	16.41	16.03	16.12	17.06
TU Elementary School	2003	20.60	19.92	16.89	17.58	13.75
VW Secondary School	1976	18.15	17.77	17.90	20.88	21.82
XY Elementary School	1971	29.85	29.11	31.32	24.46	35.70
ZZ Centre	1957	12.81	136.42	952.88	25.08	23.83

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Preparing the Report for Analysis

Step 1 – Insert a column and assign a value indicating the type of facility

A = Administrative Building

E = Elementary School

S = Secondary School

A	B	C	D	E	F	G	H
			FY2012 / AF2012	FY2013 / AF2013	FY2014 / AF2014	FY2015 / AF2015	FY2016 / AF2016
Energy Intensity Trend / Tendance liées à l'intensité énergétique ABC District School Board Schools / Écoles		Year Built / Année de construction	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)
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EF Elementary School	E	1967	22.87	25.03	23.77	19.40	24.77
HI Secondary School	S	1990	19.96	22.15	24.25	20.20	18.33
LM Board Office	A	1961	20.29	20.58	20.62	21.33	19.85
NO Facility Services	A	1979	22.28	20.69	20.86	19.97	20.62
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ZZ Centre	A	1957	12.81	136.42	952.88	25.08	23.83

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Preparing the Report for Analysis cont'd

2. Highlight all sites

A	B	C	D	E	F	G	H
Energy Intensity Trend / Tendance liées à l'intensité énergétique ABC District School Board Schools / Écoles		Year Built / Année de construction	FY2012 / AF2012 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	FY2013 / AF2013 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft	FY2014 / AF2014 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²	FY2015 / AF2015 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	FY2016 / AF2016 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)
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NO Facility Services	A	1979	22.28	20.69	20.86	19.97	20.62

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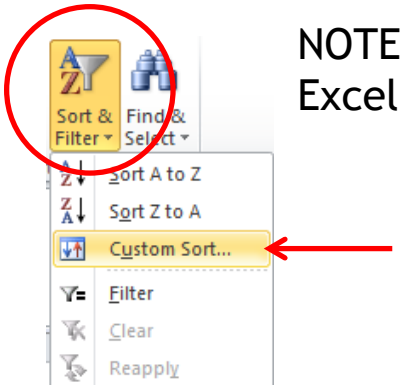
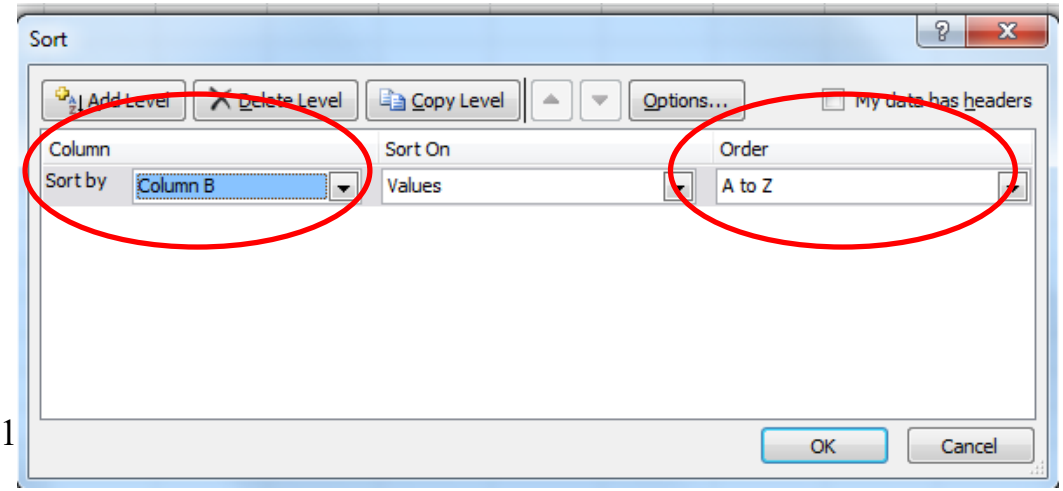
Preparing the Report for Analysis cont'd

3. Select the "Sort & Filter" tool from the toolbar; select "Custom Sort" function



NOTE: the screen shots on this page are representative of one version of Excel and may differ from what you see on your computer

4. Under "Sort by" select "Column B"; under "Order" select "A to Z"



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Energy Performance Trends

Preparing the Report for Analysis cont'd

5. Now all your sites are segregated by facility type

Energy Intensity Trend / Tendance liées à l'intensité énergétique ABC District School Board Schools / Écoles		Year Built / Année de construction	FY2012 / AF2012 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	FY2013 / AF2013 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft	FY2014 / AF2014 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²	FY2015 / AF2015 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	FY2016 / AF2016 Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)
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VW Secondary School	S	1976	18.15	17.77	17.90	20.88	21.82

Energy Performance Trends

How to Use the Report

1. What is the energy intensity (EI) trend for each individual site?

Option #1 - The value stays consistent across all 5 years

FY2012 / AF2012	FY2013 / AF2013	FY2014 / AF2014	FY2015 / AF2015	FY2016 / AF2016
Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)
18.82	18.44	18.60	18.79	18.59

What this may mean

- the building has not implemented any energy management strategies during the 5 fiscal year
- if a strategy was implemented at a building –
  - example - new energy efficient equipment, BAS, occupant conservation program – it has not made an impact on consumption
- check for changes/usage at the facility
  - example - additional high energy intense portables/portapac installed, more community use of school, B&A programs, summer use of school etc.

Energy Performance Trends

How to Use the Report cont'd

Option #2 - The EI value fluctuates wildly from one year to another

FY2012 / AF2012	FY2013 / AF2013	FY2014 / AF2014	FY2015 / AF2015	FY2016 / AF2016
Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)
12.81	136.42	952.88	25.08	23.83

What this may mean

- FY 2012 has a very low value – likely due to missing data or wrong units
- FY 2013 and FY 2014 – are extraordinarily high values –
  - likely due to data error, such as
    - wrong units entered for area of building (ex: entered ft^2 data but unit of preference was m^2)
    - energy data for more than one year
    - addition built onto the school and existing utility service used
    - billing adjustment from LDC

Energy Performance Trends

How to Use the Report cont'd

Option #3 - The EI value increases annually from one year to the next

FY2012 / AF2012	FY2013 / AF2013	FY2014 / AF2014	FY2015 / AF2015	FY2016 / AF2016
Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)
18.15	19.37	19.90	20.88	21.82

What this may mean

- the building's energy consumption is increasing every year
  - need to assess if there is a rationale to justify increases
    - portables/portapak rooms added
    - new additions, such as FDK
    - new programs, such as B&A, CUS, summer school
    - new equipment added for comfort/code
      - such as new/added ventilation
    - equipment runs for a longer time period - review BAS schedule
- if energy management strategies implemented, why weren't they successful?

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How to Use the Report cont'd

Option #4

The EI value consistently decreases annually from FY 2012 to FY 2016

FY2012 / AF2012	FY2013 / AF2013	FY2014 / AF2014	FY2015 / AF2015	FY2016 / AF2016
Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)	Energy Intensity (EI) / Intensité énergétique (IE) (ekWh/ft²)
18.60	17.92	16.89	15.58	13.75

What this may mean

- the building has implemented annual energy management strategies that have resulted in incremental reduction of energy consumption year-over-year
  - want to note which energy management strategy was implement in each year and its impact on reducing consumption
    - identify projects that worked well that could be implemented at other sites
    - update the board's energy plan

Energy Performance Trends

How to Use the Report cont'd

2. **Are the sites at or above the recognized energy benchmark for the education sector?**
    - the Toronto Region Conservation Authority (TRCA) has set the following weather normalized energy benchmarks for the education sector

Building type	Targets		
	Electricity	Natural Gas	Total Energy
Elementary	5.5 kWh/ft²	6.5 ekWh/ft²	12 ekWh/ft²
Secondary	7.5 kWh/ft²	7.5 ekWh/ft²	15 ekWh/ft²
Administrative	12.5 kWh/ft²	7.5 ekWh/ft²	20 ekWh/ft²

Notes

- the above benchmark values are normalized to Toronto International Airport weather station
- reference - Sustainable Schools White Paper - http://sustainableschools.ca/wp-content/uploads/2016/05/Top-Boards-Report-White-Paper-May-2016-final.pdf
    - Section 3.2 - *Weather-Normalization and Target-Setting*
    - Appendix A – *Weather Stations*

Energy Performance Trends

How to Use the Report cont'd

Review all buildings against their sector energy benchmark

Identify sites that are **significantly** over the benchmark for each type of building

- which utility is most intense for the building
  - electricity, natural gas or alternative fuel
- use the UCD's Peer Inventory to compare your school with other similar schools
  - at your board
  - across the province
- review operational procedures with other departments within your board to identify opportunities in:
  - scheduling, maintenance, energy, capital, etc.
- review the best practices from the OMC Energy Management Sub-Committee
  - identify any that could be implemented
- contact your peers at other school boards to discuss

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Next Steps

- the analysis of the energy performance trends should identify
  - worst performing buildings (in terms of energy and costs)
    - analyze the electricity and natural gas intensities for each site (see Cost Analysis presentation)
      - determine which utility is more intense at each site
    - analyze the electricity and natural gas costs per building area
      - prioritize capital investments between sites based on sites with both high intensity and high costs
  - best performing buildings (in terms of energy and costs)
    - identify successful energy management strategies that were implemented
      - assess the opportunity to implement these strategies at low-performing buildings
      - assess risk tolerance
        - if costs for one utility is low due to current market conditions (commodity prices may not be sustainable)

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Questions can be answered via the UCD Helpdesk

Email: ucdb@aegent.ca

Phone: (416) 622-9449 ext. 115

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