



The Importance of Energy Data Insights

How energy monitoring can help buildings become Net Zero

Presented By: Megan McCarthy, President & Co-Founder at Edge Energy
& Ben Grieder, Efficiency Projects Coordinator at the Ecology Action Centre



EDGE'S VISION: A LOW CARBON ECONOMY

Vision

Transition to a low carbon economy with haste

Value Proposition

The best asset intelligence to reduce time, cost and carbon

WHY ENERGY MONITORING?

When monitoring is added

15-25%

average reduction in energy

Of all EDGE technology installs

>60%

have less than a 1 year payback

Every single building wastes

30-50%

of the energy it consumes



THE CASE FOR CONTINUOUS MONITORING

- 1) Reduce risk through efficiency**
- 2) Reliable data, better analytics, and accurate info improves decision-making**
- 3) Predictive maintenance**
- 4) Building compliance**
- 5) Performance validation**
- 6) Increased health and safety**
- 7) Better management of resources**

CONVERSIONS FOR YOUR DATA

C02



**kWh/
\$**



CASE STUDY - 2015/2016 RENOVATIONS AT THE EAC

WHAT WAS THE GOAL?

- 56 kWh/m²/yr
- Take green building showcase to next level
- Increase office community space
- Create a space which better reflects values

WHAT DID THEY DO?

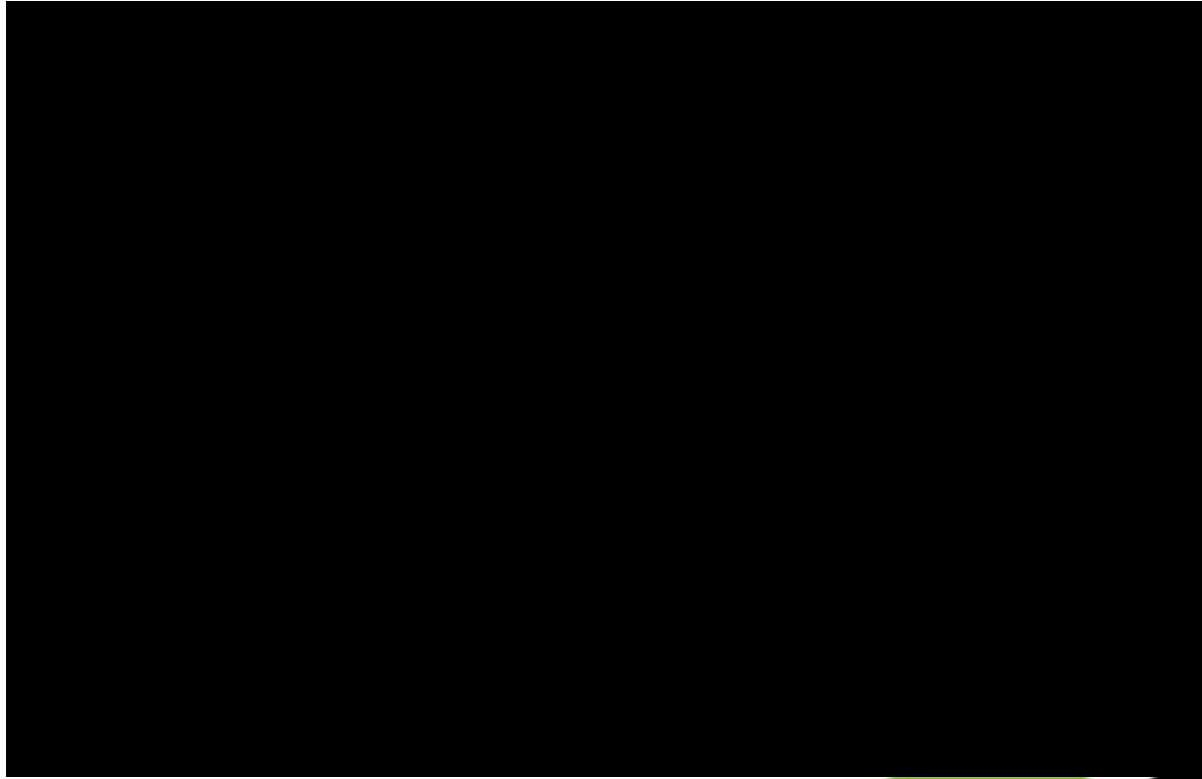
- Complete renovation of basement
- Dramatically improved building envelope
- Newly constructed third floor

PART EACH COLLABORATOR PLAYED?

- Architects: Solterre Design
- Builder: Tekton Design & Build
- Energy Model: Equilibrium Engineering
- Real-Time Energy Monitor: NSCC's AERL
- Energy Data Platform & Analysis: EDGE Energy



DEEP RETROFITS 2015/2016 WITH LOCAL EXPERTS



The predicted annual energy cost saving of the 2016 building compared to the 2015 pre-renovation space was \$1500 per year



INSULATION ON THE EXTERIOR BUILDING ENVELOPE



Photo Credit: M. Burns



Photo Credit: P. Owens



BEFORE & AFTER DEEP RETROFIT RESULTS OF THE EAC



The post-renovation blower door test showed 22% in savings after a 50% increase in space



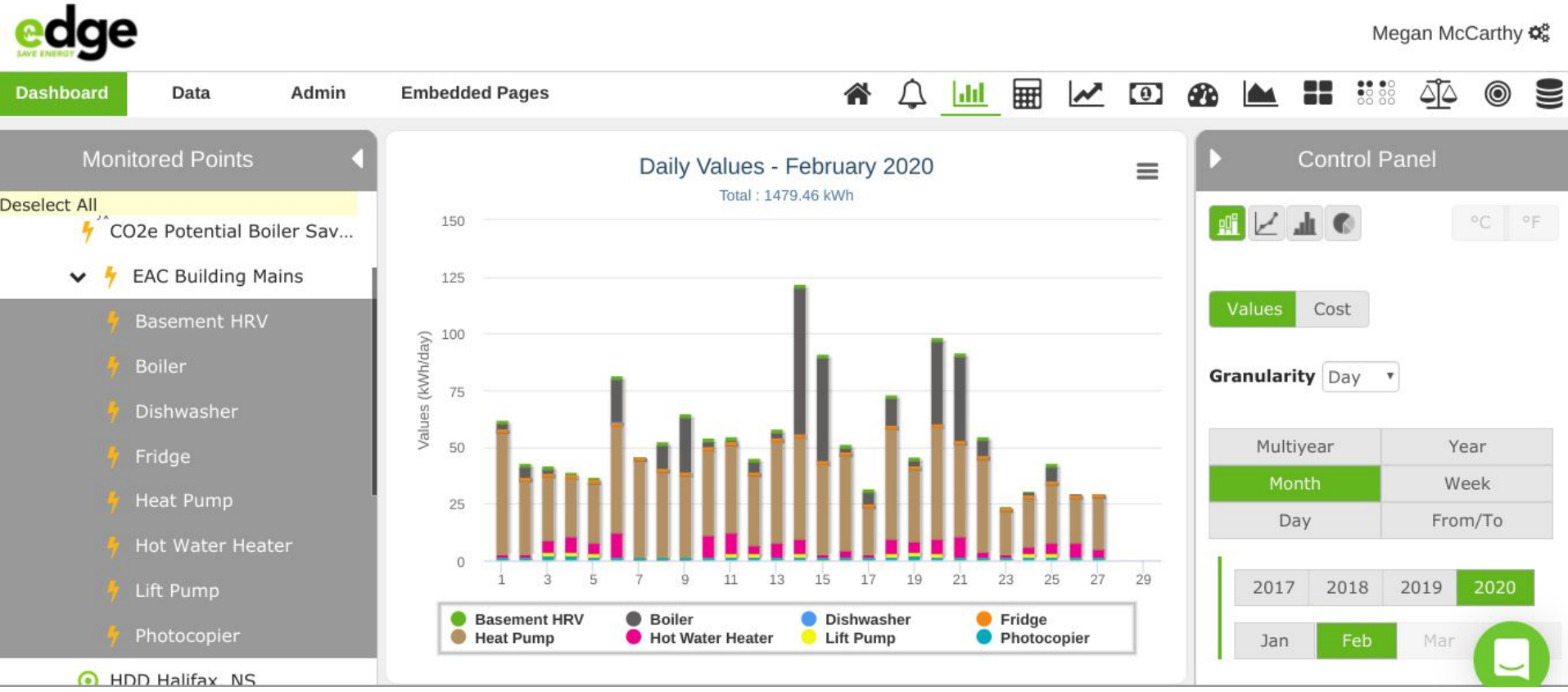
ANALYSIS ON A DECADE'S WORTH OF THE EAC'S DATA



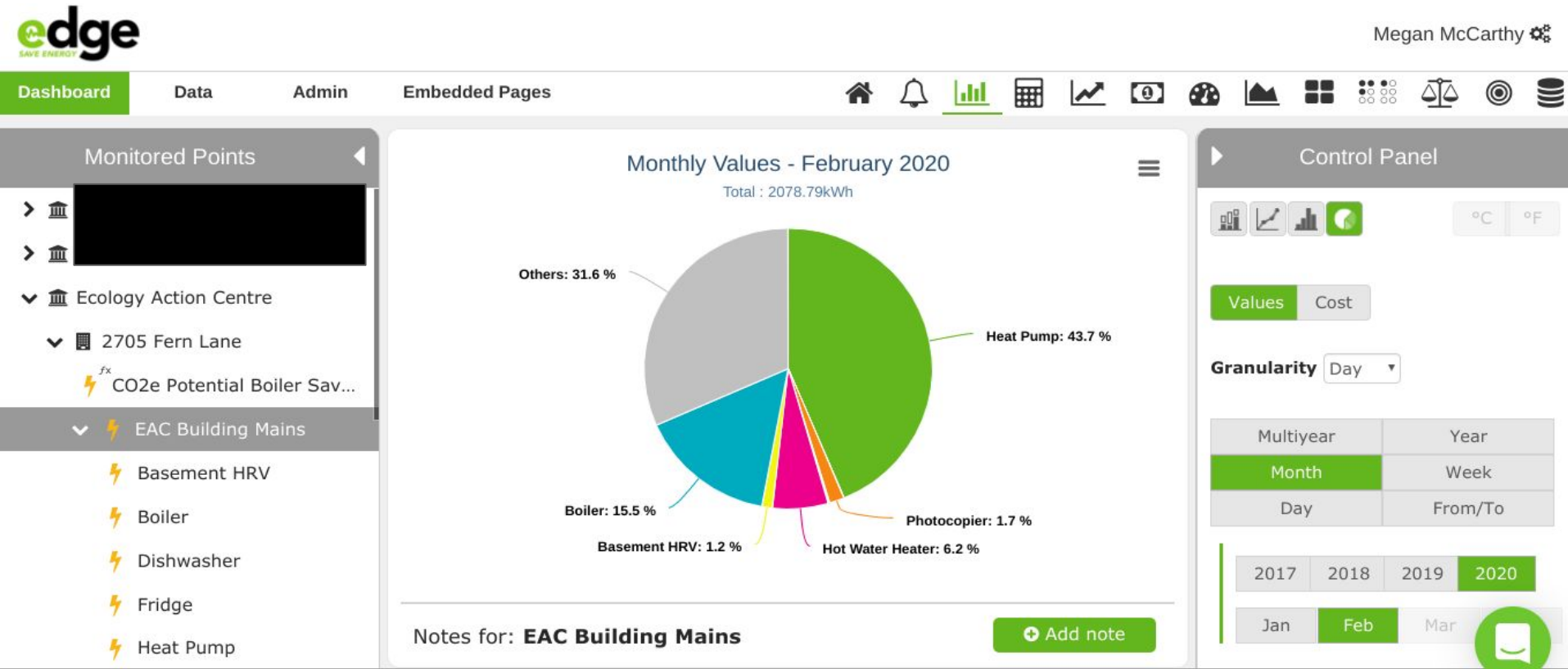
edge
SAVE ENERGY

Remember me [Forgot your password?](#)

WHAT ARE WE MONITORING IN REAL-TIME AT THE EAC



BREAKDOWN OF THE ENERGY USAGE FOR FEBRUARY 2020



VALUE OF MACHINE LEARNING PAIRED WITH MONITORING

The image shows a screenshot of a web-based energy monitoring dashboard. The dashboard has a top navigation bar with 'edge SAVE ENERGY' on the left and 'Megan McCarthy' with a settings icon on the right. Below the navigation bar are three tabs: 'Dashboard', 'Data', and 'Admin'. The main content area displays a list of notifications, each with a green checkmark icon and a text description. A 'Notification details' popup window is open in the center, showing the details for a specific notification. The popup includes a 'What:' section with a text description and a line graph showing a spike in consumption. The 'When:' section shows the date 'Thursday January 16'. The 'How long:' section shows 'For 45 minutes from 08:30 to 09:15'. The 'Where:' section shows 'Ecology Action Centre > 2705 Fern Lane > EAC Building Mains'. The 'Cost:' section shows 'This unusual event has costed you about \$1.95'. At the bottom of the popup are two buttons: 'Take Action' and 'Close'. The background dashboard shows a list of notifications with green checkmarks and text descriptions, such as 'your cost by about \$0.0.', 'First Street Mains has con your cost by about \$0.0.', 'Boiler has consumed 285% \$1.52.', 'Boiler has consumed 2483% n', 'Boiler has consumed 217% \$1.51.', 'Boiler has consumed 1300 about \$1.86.', and 'Boiler has consumed 982%'. On the right side of the dashboard, there are several icons representing different data sources or actions, and a list of notifications with dates like '6 months ago', '8 months ago', and '9 months ago'. A green chat bubble icon is visible in the bottom right corner.

edge
SAVE ENERGY

Dashboard Data Admin

Megan McCarthy

Notification details

What: Boiler has consumed **2483%** more than usual at this time

Consumption was abnormally high

NORMAL CONSUMPTION

When: Thursday January 16

How long: For **45 minutes** from **08:30** to **09:15**

Where: Ecology Action Centre > 2705 Fern Lane > EAC Building Mains

Cost: This unusual event has costed you about \$1.95

Take Action Close

your cost by about \$0.0.

First Street Mains has con your cost by about \$0.0.

First Street Mains has con has costed you about \$0.0

Boiler has consumed 285% \$1.52.

Boiler has consumed 2483% n

Boiler has consumed 217% \$1.51.

Boiler has consumed 1300 about \$1.86.

Boiler has consumed 982%

6 months ago

has reduced 6 months ago

unusual event 8 months ago

costed you about 8 months ago

\$1.95. 9 months ago

costed you about 9 months ago

s costed you 9 months ago

costed you about 9 months ago

VALUE OF MACHINE LEARNING PAIRED WITH MONITORING



Megan McCarthy

Dashboard Data Admin Embedded Pages

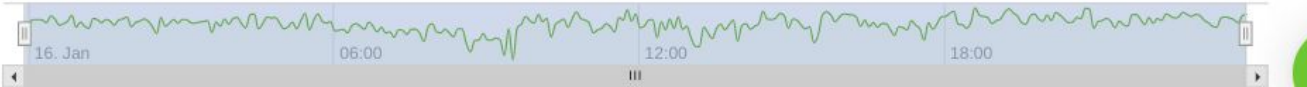
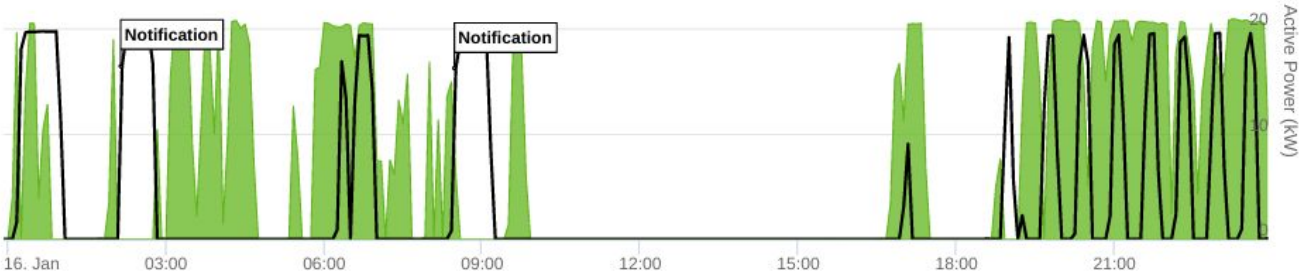


Enter 3+ characters...

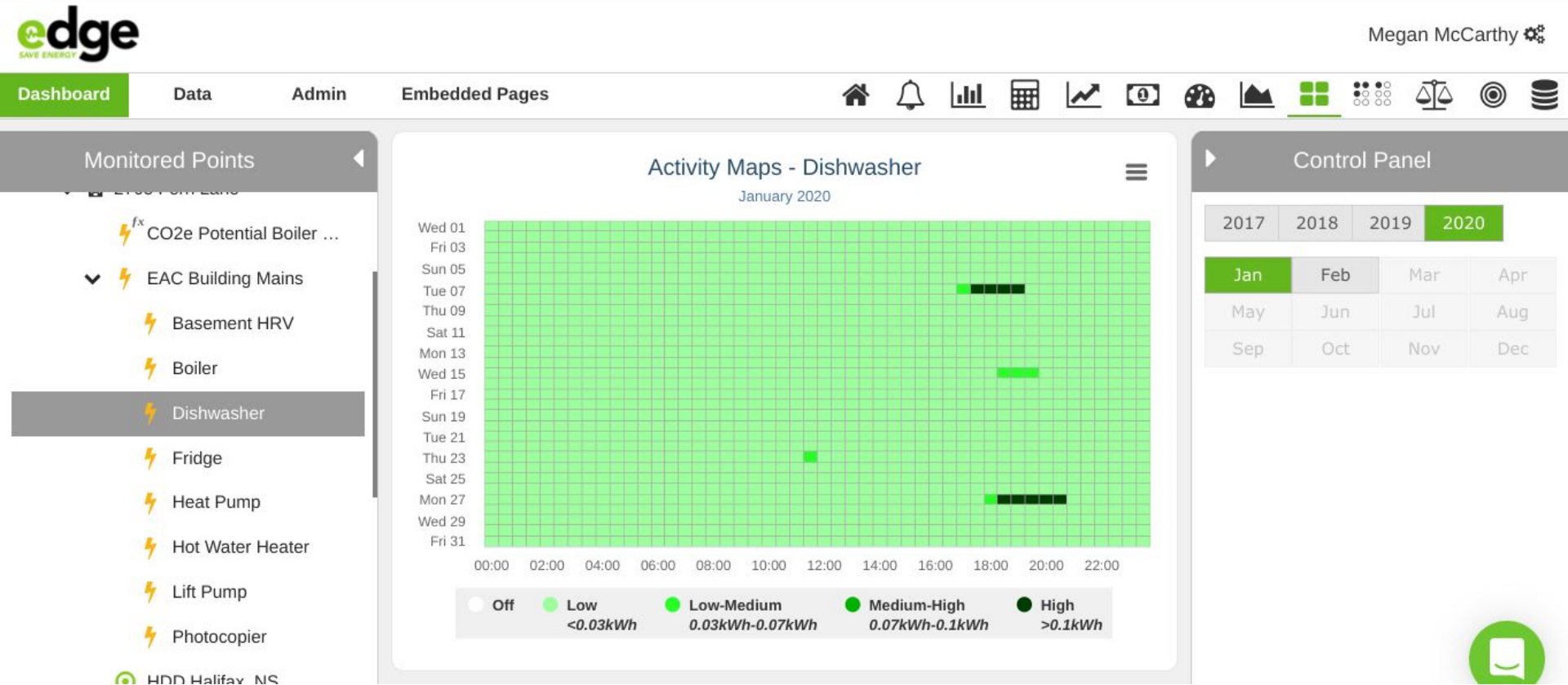
- > Best Resorts Hotels
- > Data Center Inc.
- > Ecology Action Centre
- > 2705 Fern Lane
 - CO2e Potential Boiler Sa
- > EAC Building Mains
 - Basement HRV
 - Boiler
 - Dishwasher
 - Fridge
 - Heat Pump
 - Hot Water Heater
 - Lift Pump
 - Photocopier
- HDD Halifax, NS

◀ previous day **16/01/2020** next day ▶ Active Power (kW) ▼

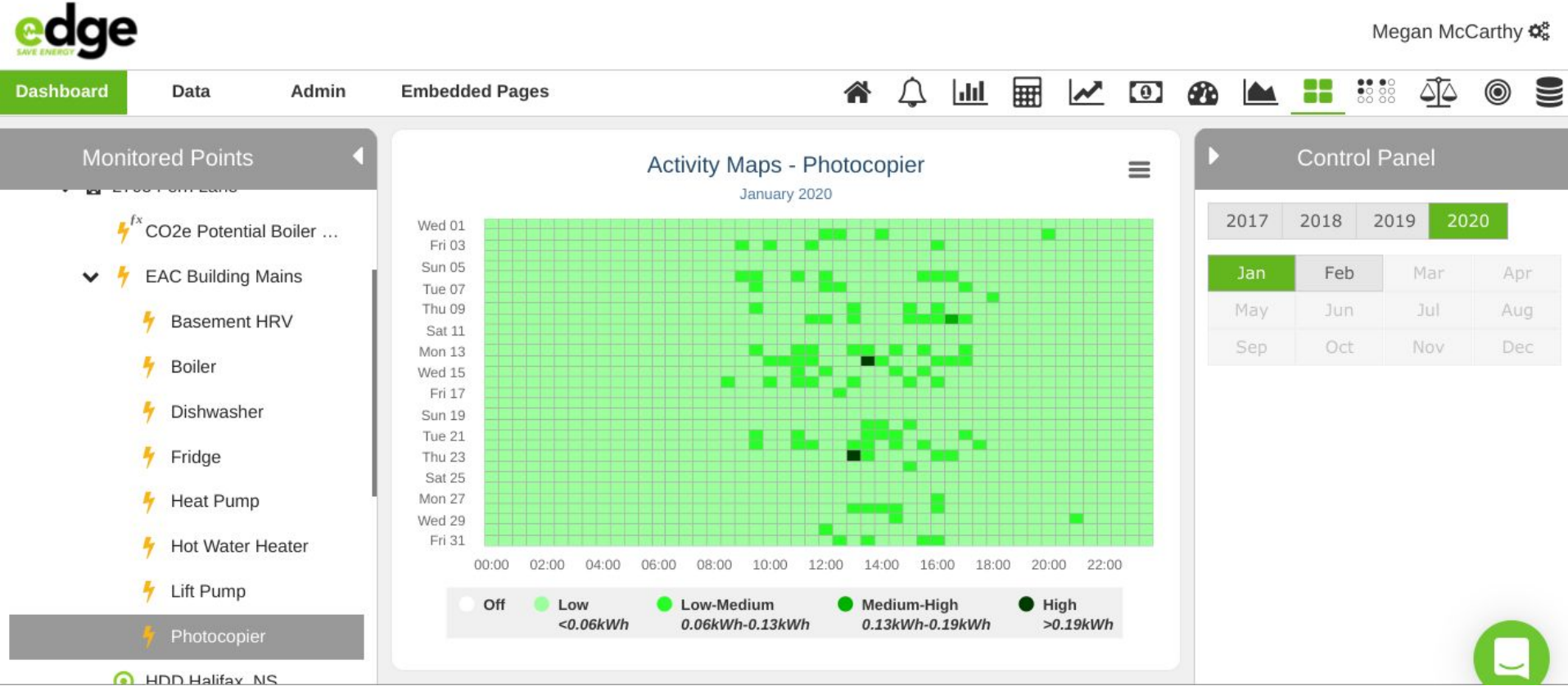
Expected vs. Actual Load for Boiler
Thursday 16 Jan 2020, 00:00 - 23:55



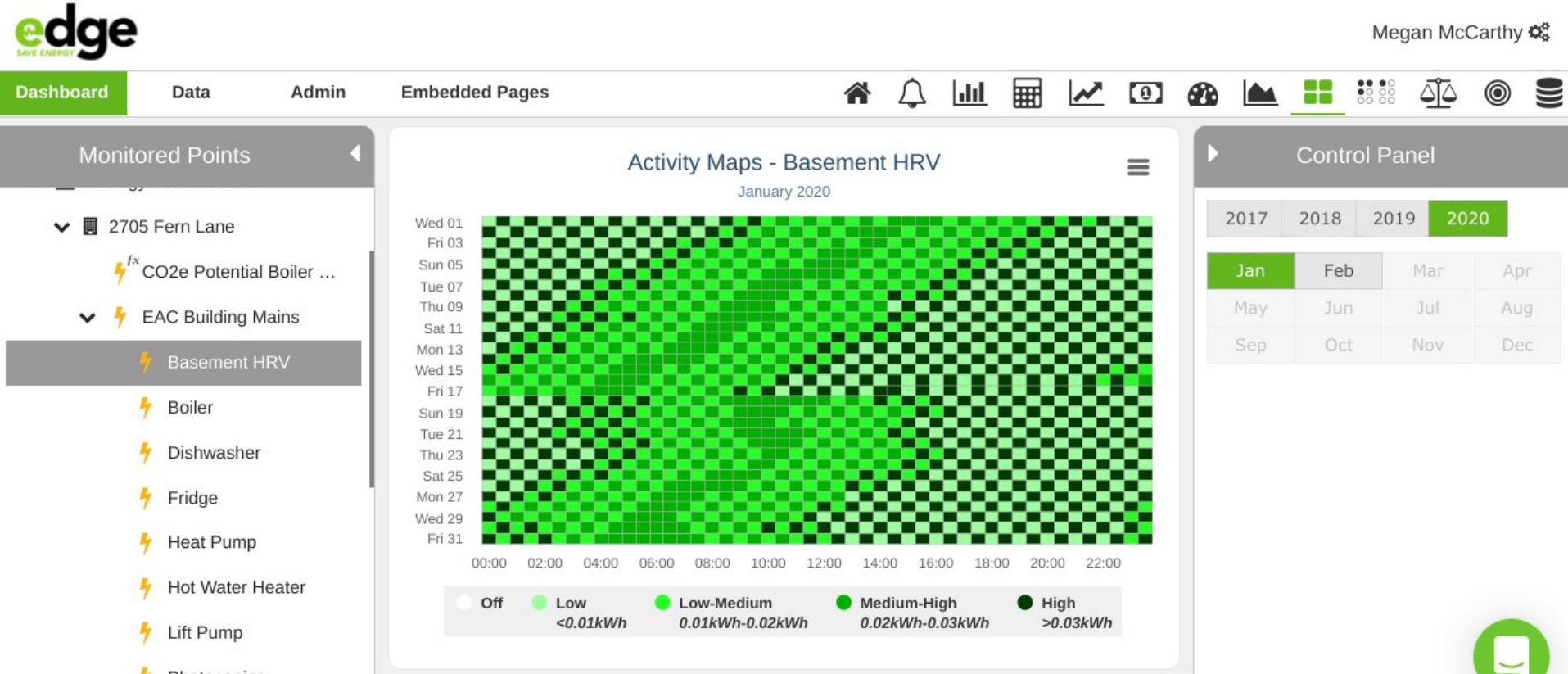
EXPECTED PATTERNS FOUND FOR THE DISHWASHER



EXPECTED PATTERNS ALSO FOUND FOR THE PHOTOCOPIER



BASEMENT HRV JANUARY 2020 ACTIVITY MAP



BASEMENT HRV FEBRUARY 2020 HEAT MAP

edge SAVE ENERGY

Megan McCarthy

Dashboard Data Admin Embedded Pages

Monitored Points

- CO2e Potential Boiler ...
- ▼ EAC Building Mains
 - Basement HRV
 - Boiler
 - Dishwasher
 - Fridge
 - Heat Pump
 - Hot Water Heater
 - Lift Pump
 - Photocopier
 - HDD Halifax NS

Activity Maps - Basement HRV

February 2020

Day	00:00	02:00	04:00	06:00	08:00	10:00	12:00	14:00	16:00	18:00	20:00	22:00
Sat 01	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Mon 03	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Wed 05	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Fri 07	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Sun 09	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Tue 11	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Thu 13	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Sat 15	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Mon 17	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Wed 19	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Fri 21	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Sun 23	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Tue 25	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Thu 27	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Sat 29	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low

0.01

Legend:

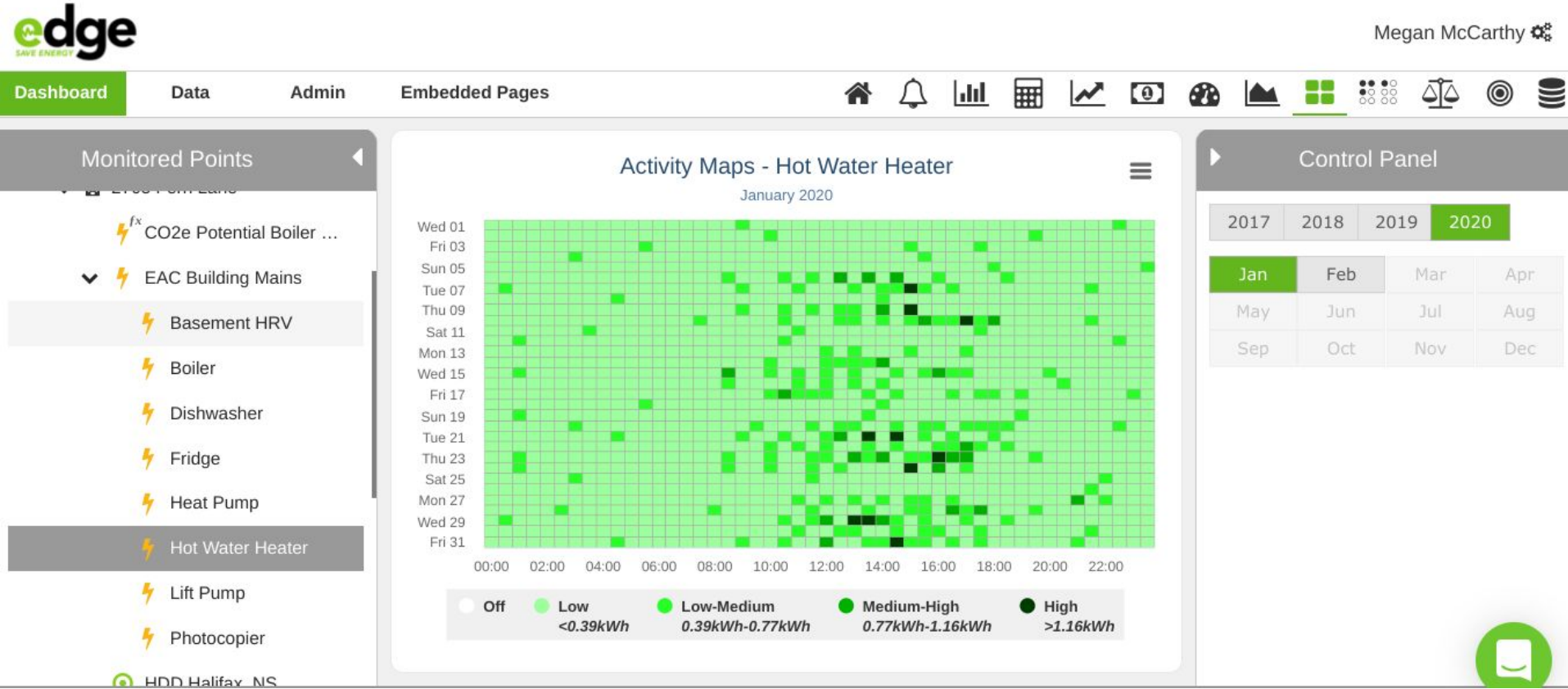
- Off
- Low (<0.01kWh)
- Low-Medium (0.01kWh-0.02kWh)
- Medium-High (0.02kWh-0.03kWh)
- High (>0.03kWh)

Control Panel

2017 2018 2019 2020

Jan	Feb	Mar	Apr
May	Jun	Jul	Aug
Sep	Oct	Nov	Dec

HOT WATER HEATER JANUARY 2020 ACTIVITY MAP



BOILER ACTIVITY FOR FEBRUARY 2020



Megan McCarthy

Dashboard Data Admin Embedded Pages

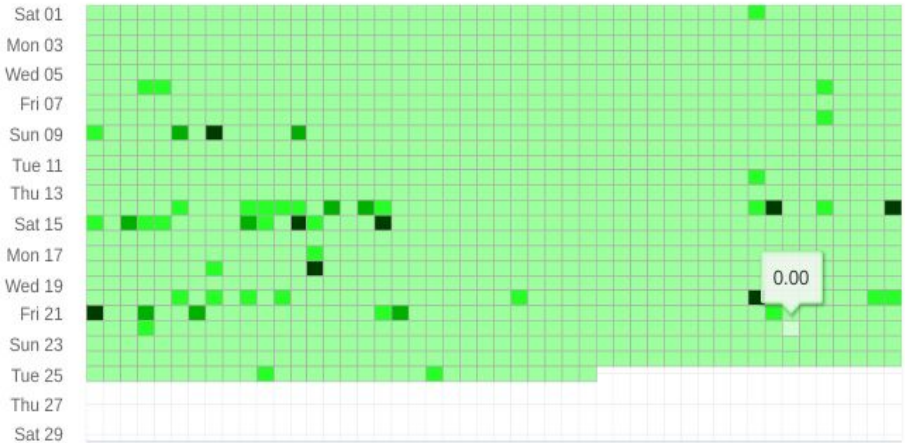


Monitored Points

- > [Redacted]
- > [Redacted]
- ▼ Ecology Action Centre
 - ▼ 2705 Fern Lane
 - CO2e Potential Boiler ...
 - ▼ EAC Building Mains
 - Basement HRV
 - Boiler
 - Dishwasher
 - Fridge
 - Heat Pump

Activity Maps - Boiler

February 2020



Control Panel

2017 2018 2019 2020

Jan	Feb	Mar	Apr
May	Jun	Jul	Aug
Sep	Oct	Nov	Dec



BOILER ACTIVITY FOR JANUARY 2020



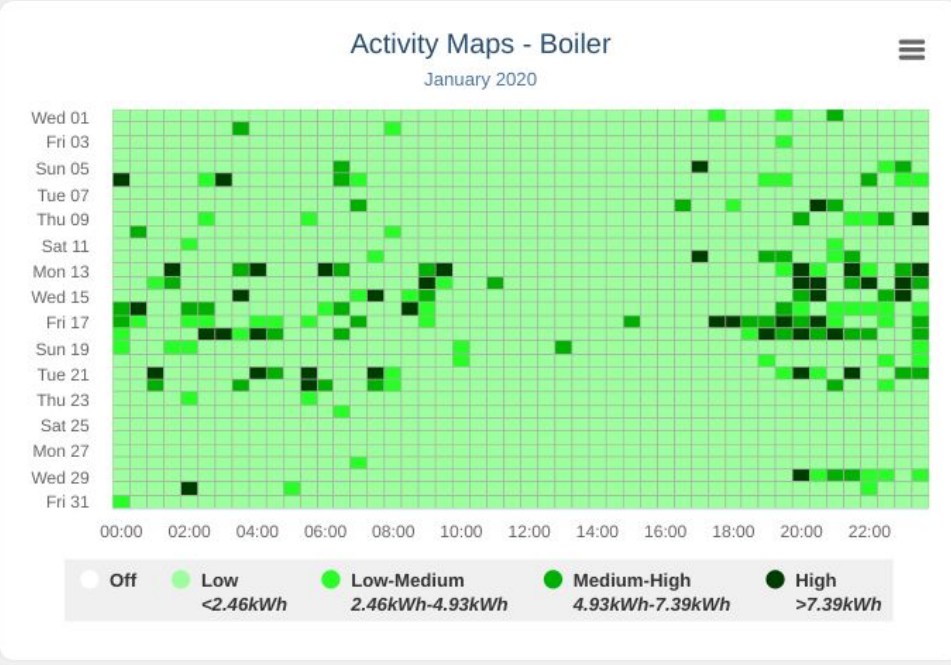
Megan McCarthy

Dashboard Data Admin Embedded Pages



Monitored Points

- CO2e Potential Boiler ...
- EAC Building Mains
- Basement HRV
- Boiler
- Dishwasher
- Fridge
- Heat Pump
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- HDD Halifax, NS



Control Panel

2017	2018	2019	2020
Jan	Feb	Mar	Apr
May	Jun	Jul	Aug
Sep	Oct	Nov	Dec



BOILER ACTIVITY FOR FEBRUARY 2019



Megan McCarthy

Dashboard Data Admin Embedded Pages

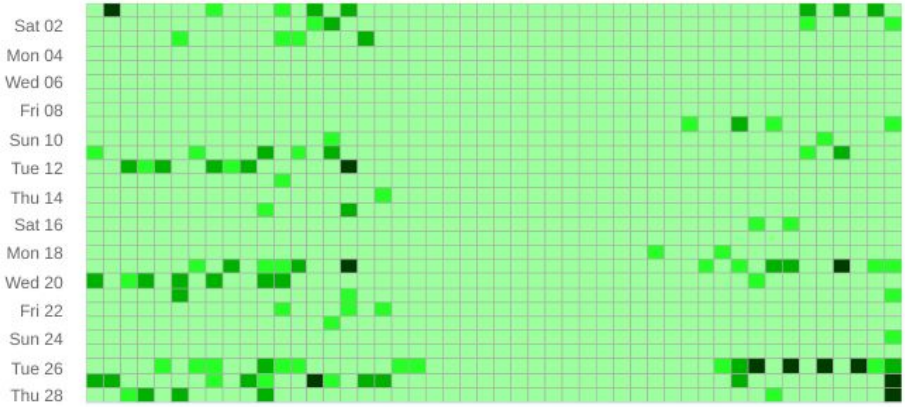


Monitored Points

- CO2e Potential Boiler ...
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Activity Maps - Boiler

February 2019



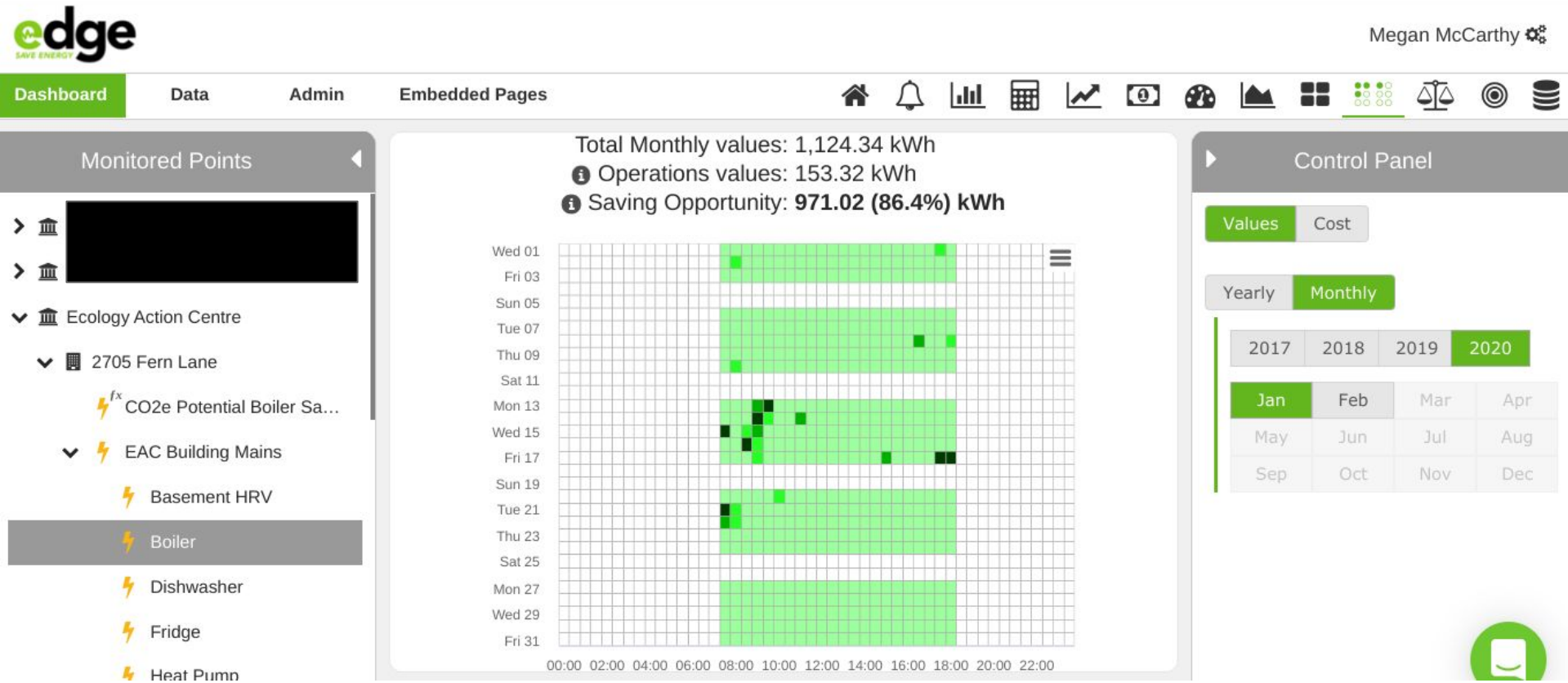
Control Panel

2017 2018 2019 2020

Jan	Feb	Mar	Apr
May	Jun	Jul	Aug
Sep	Oct	Nov	Dec



POTENTIAL BOILER SAVINGS FOR JANUARY 2020



HEAT PUMP ACTIVITY FOR JANUARY 2020



Megan McCarthy

Dashboard

Data

Admin

Embedded Pages

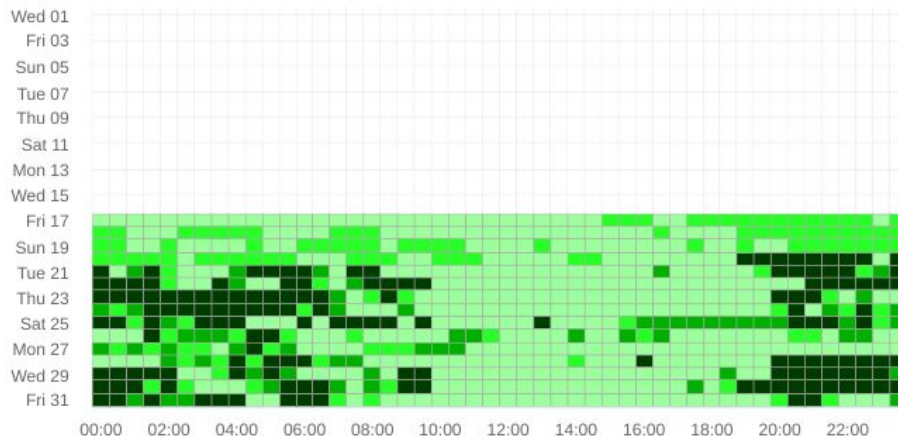


Monitored Points

- > [Redacted]
- > [Redacted]
- ▼ Ecology Action Centre
 - ▼ 2705 Fern Lane
 - CO2e Potential Boiler ...
 - ▼ EAC Building Mains
 - Basement HRV
 - Boiler
 - Dishwasher
 - Fridge
 - Heat Pump

Activity Maps - Heat Pump

January 2020



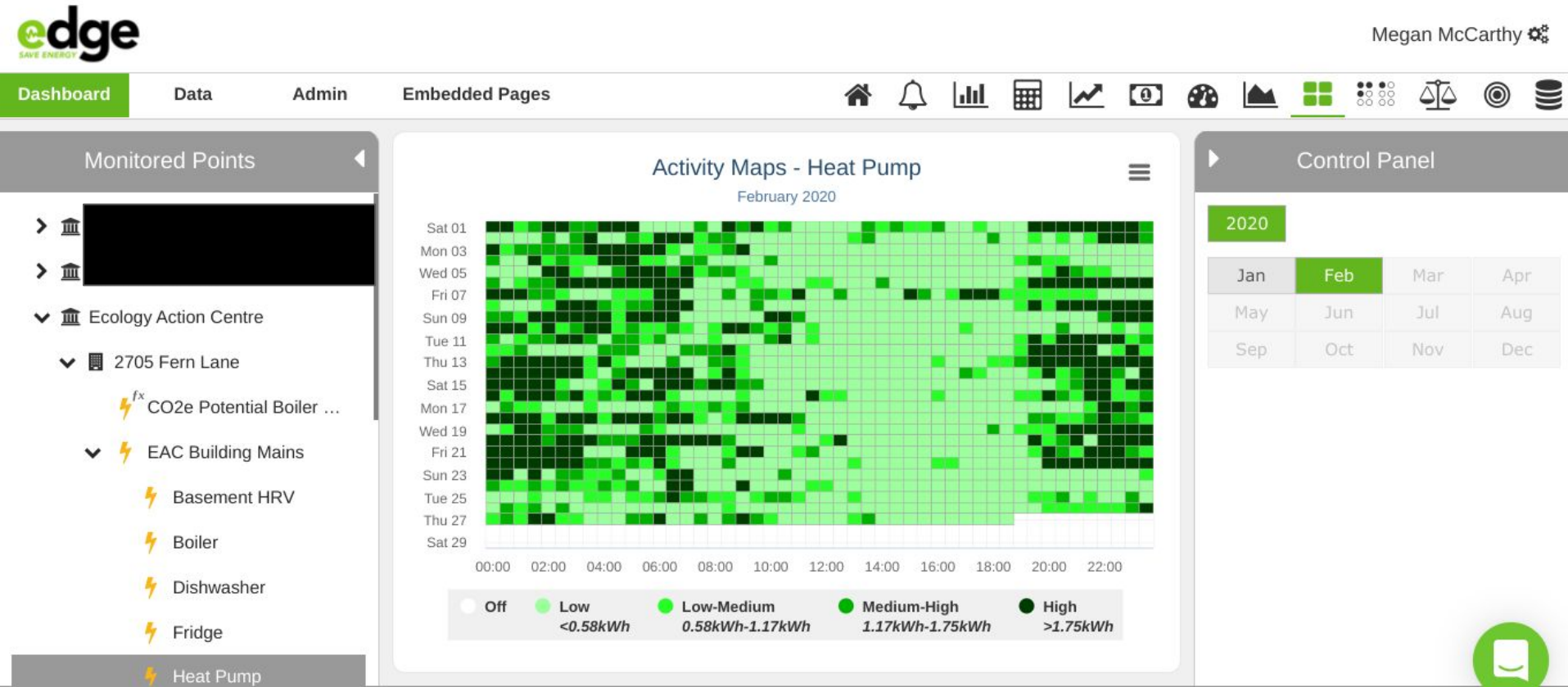
Control Panel

2020

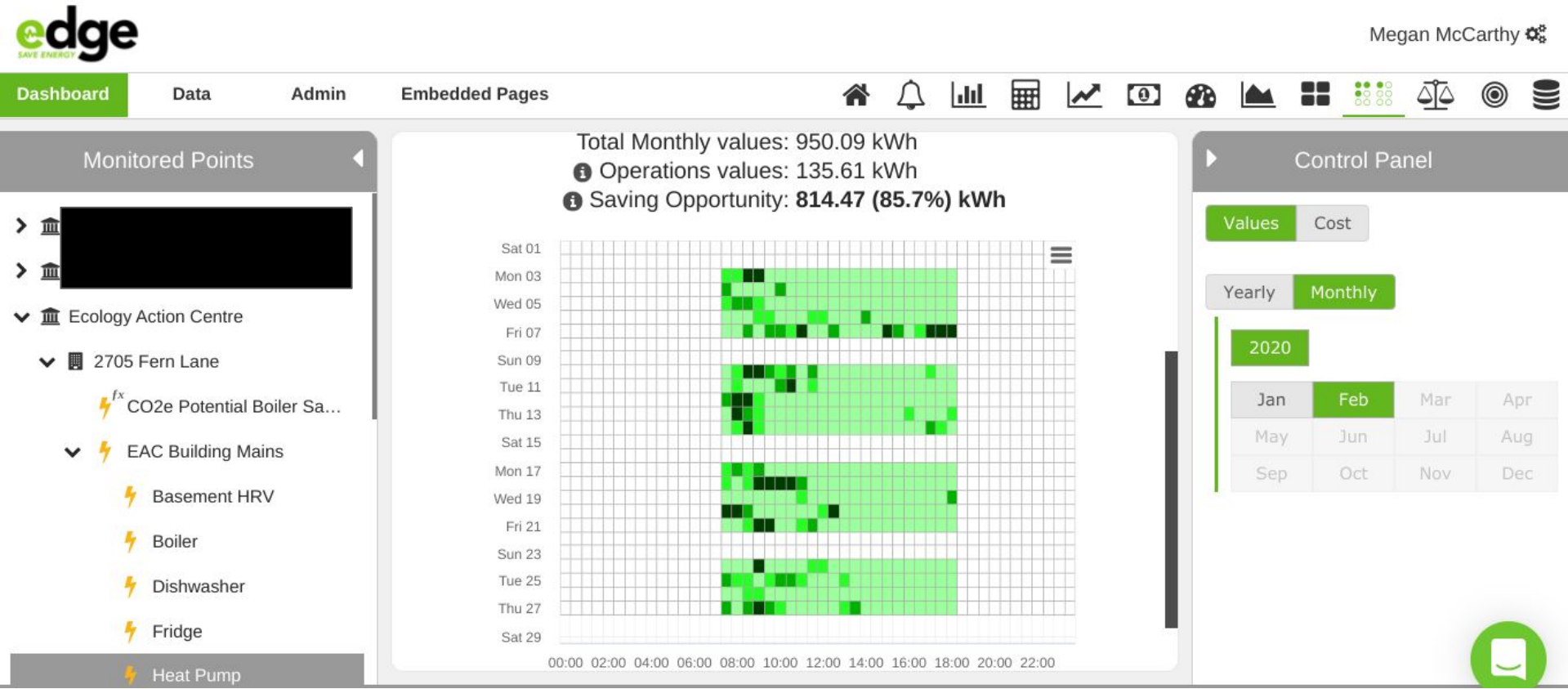
Jan	Feb	Mar	Apr
May	Jun	Jul	Aug
Sep	Oct	Nov	Dec



HEAT PUMP ACTIVITY FOR FEBRUARY 2020



HEAT PUMP POTENTIAL SAVINGS FOR FEBRUARY 2020



TEMPERATURE COMPARED TO HEAT PUMP USAGE DATA



Megan McCarthy

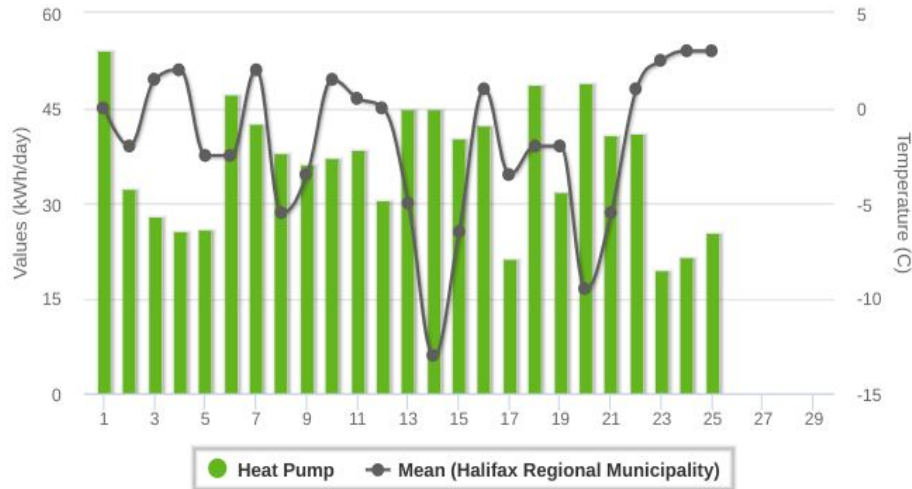
Dashboard Data Admin Embedded Pages



Monitored Points

- > [Redacted]
- > [Redacted]
- ✓ Ecology Action Centre
 - ✓ 2705 Fern Lane
 - ⚡ CO2e Potential Boiler Sav...
 - ✓ EAC Building Mains
 - ⚡ Basement HRV
 - ⚡ Boiler
 - ⚡ Dishwasher
 - ⚡ Fridge
 - ⚡ Heat Pump

Daily Values - February 2020



Notes for: **Heat Pump**

Add note

Control Panel

°C °F

Values Cost

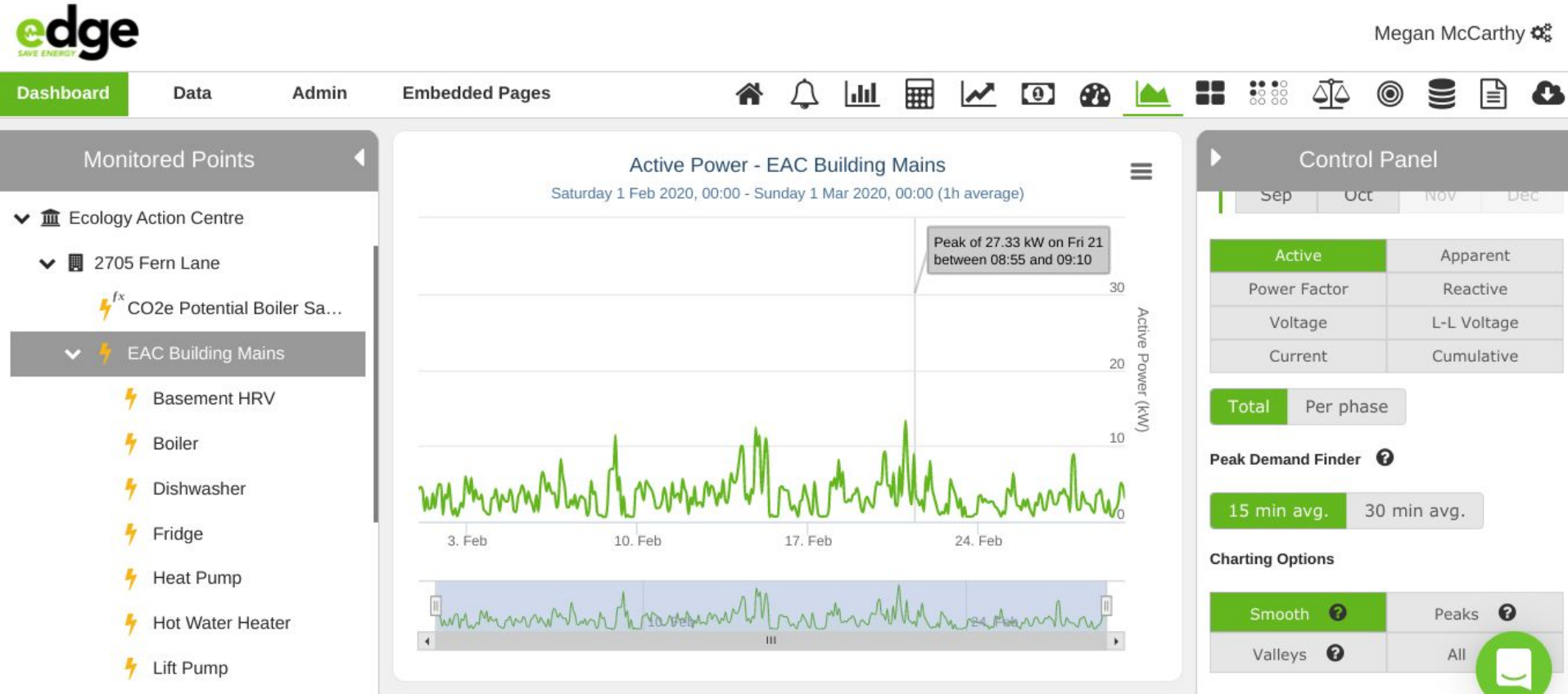
Granularity Day

Multiyear	Year
Month	Week
Day	From/To

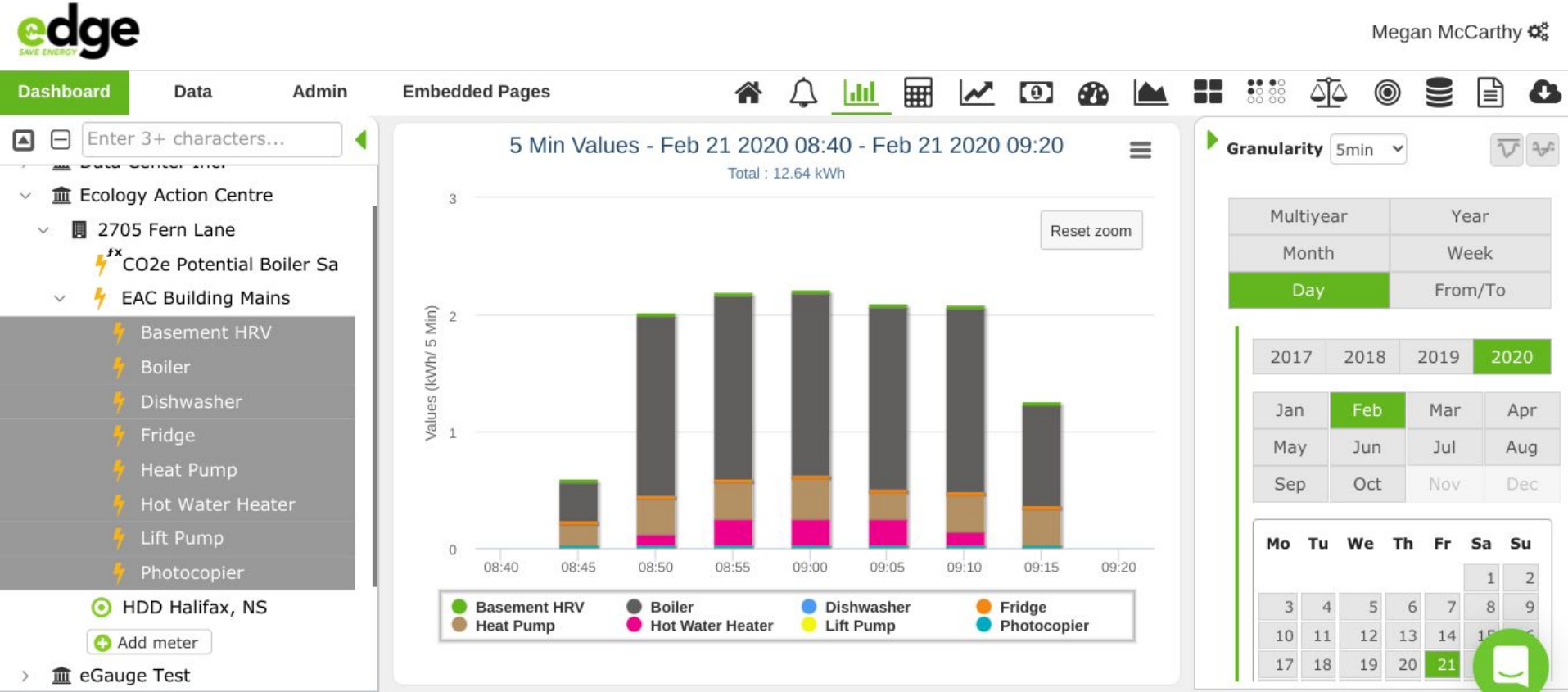
2020

Jan	Feb	Mar
-----	------------	-----

THE LOWEST HANGING FRUIT: PEAK DEMAND ADJUSTMENTS



THE LOWEST HANGING FRUIT: PEAK DEMAND ADJUSTMENTS



INTERPRETING YOUR DATA: VIRTUAL ENERGY ANALYSTS

The screenshot displays the Edge Energy Management dashboard. The main feature is a pie chart titled "Monthly Cost - February 2020" with a total of 367.19\$. The chart is broken down into the following categories:

Category	Percentage
Heat Pump	43.3 %
Others	32.4 %
Boiler	14.7 %
Hot Water Heater	6.4 %
Photocopier	1.8 %
Basement HRV	1.2 %

The dashboard includes a navigation menu on the left with a filter box and a list of building assets. A video feed of a presenter is visible in the bottom-left corner. The right sidebar contains controls for "Values" (set to Cost), "Granularity" (set to Day), and a calendar for selecting the time period (Month of February 2020).

IPMVP MEASUREMENT & VERIFICATION REPORT

8 - Savings

See the relevant values and graphs for the whole project life-cycle and provide an executive summary.

Consumption before and after ECM

Period **All** 1m 1w 1d



Baseline Period
1 November 2017 - 1 March 2018

Reporting Period
1 November 2018 - 1 March 2019

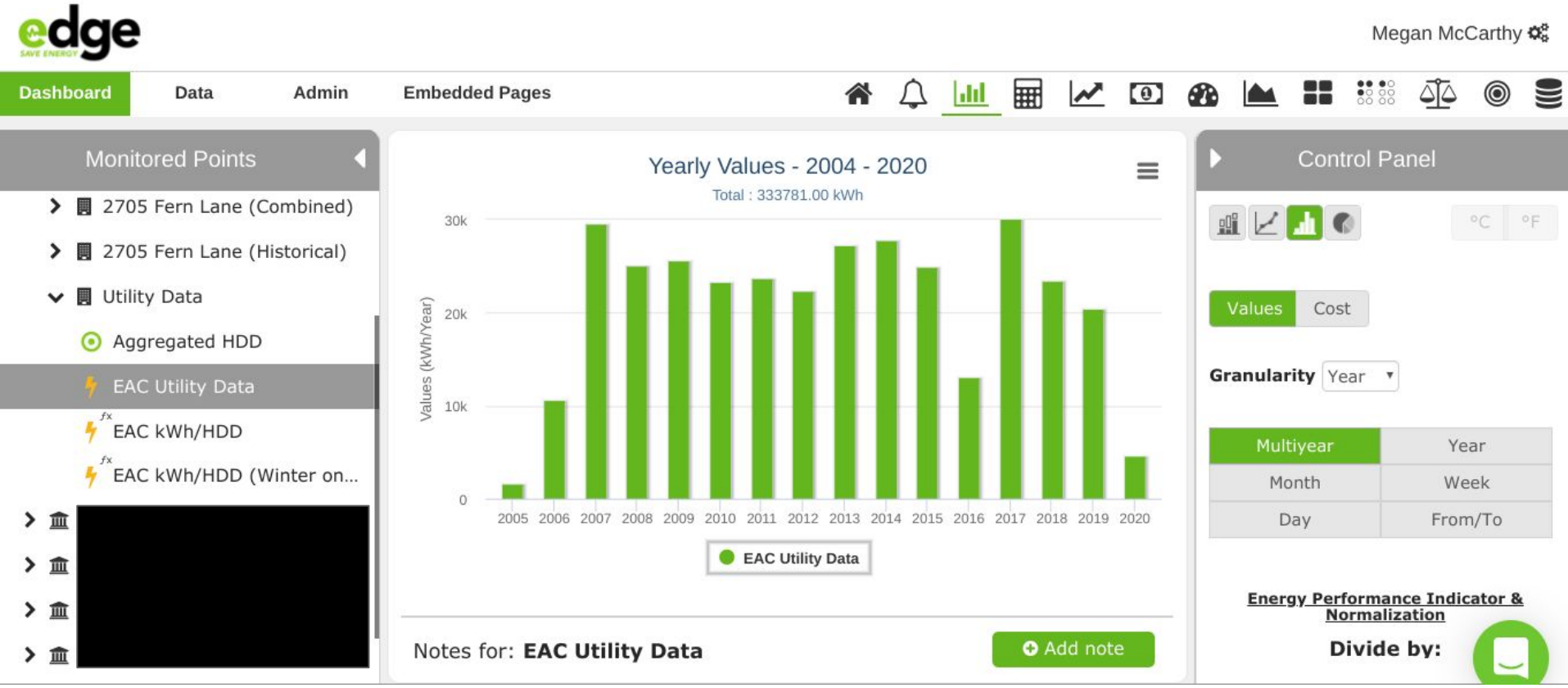
Estimated annualized consumption without ECM: **5,219.63 kWh**
Annualized actual consumption: **2,188.03 kWh**

EAC heat pump implemen...

- 1 - Project Definition
- 2 - ECM
- 3 - Baseline Period
- 4 - Reporting Period
- 5 - Routine Adjustments
- 6 - Non-Routine Adjustments
- 7 - Model
- 8 - Savings**
- 9 - Executive Summary

[Download Report](#)

UTILITY DATA ANALYSIS TO SEE DEEP RETROFIT IMPACT



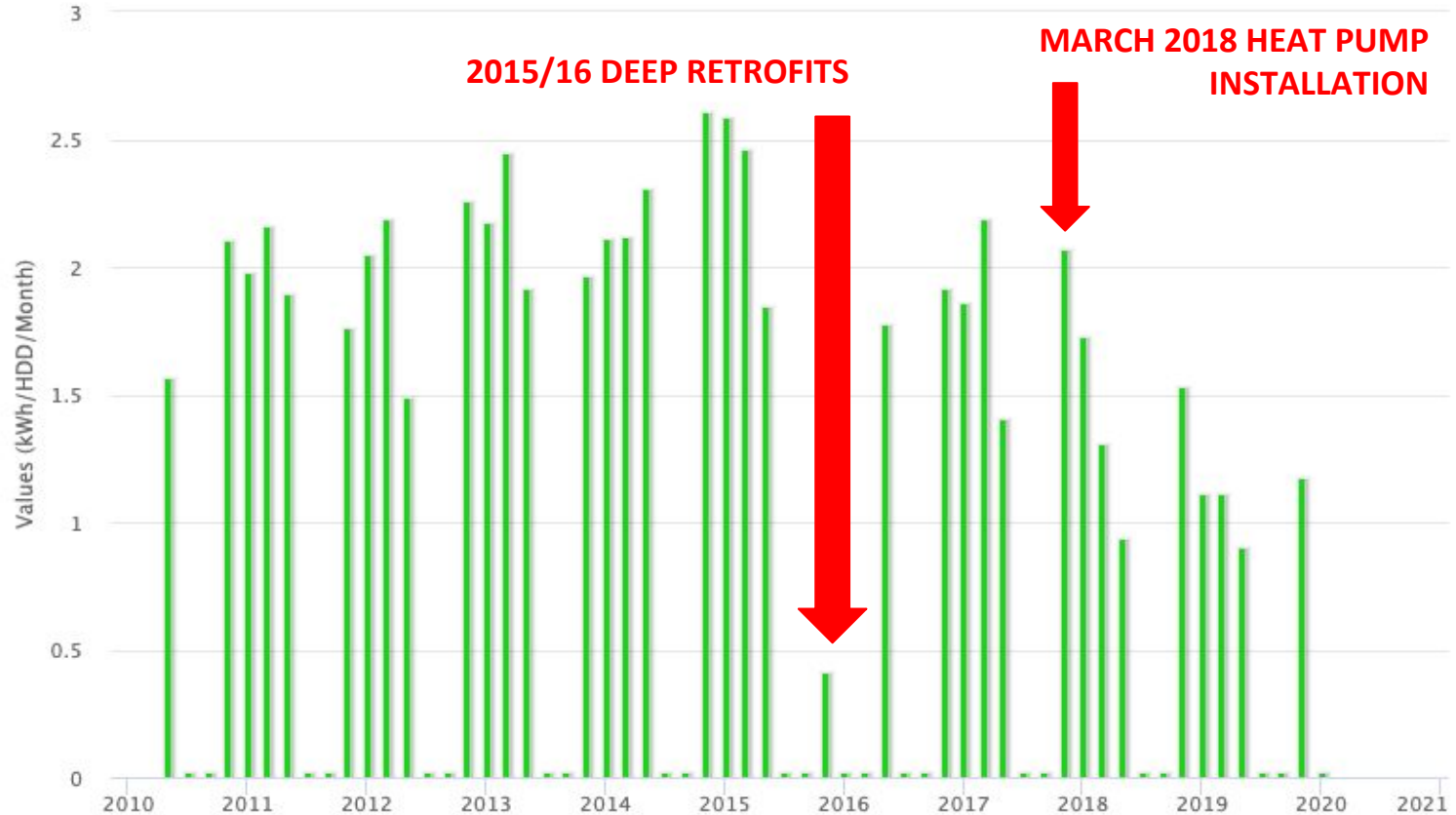
VISUAL IMPACT OF CONTINUOUS IMPROVEMENTS



Monthly Values per Thousand Square Feet – 2009 – 2020



Total : 65.44 kWh/HDD/Month



HDD & SQUARE FOOTAGE NORMALIZED - kWh/HDD/Month

Post 2015/16 Renos	Before	After	Reduction
September - November	2.14	1.49	30.37%
November - January	2.18	1.29	40.83%
January - March	2.27	1.37	39.65%
March - May	1.89	1.12	40.74%
Whole Cooling Seasons	2.12	1.34	36.79%



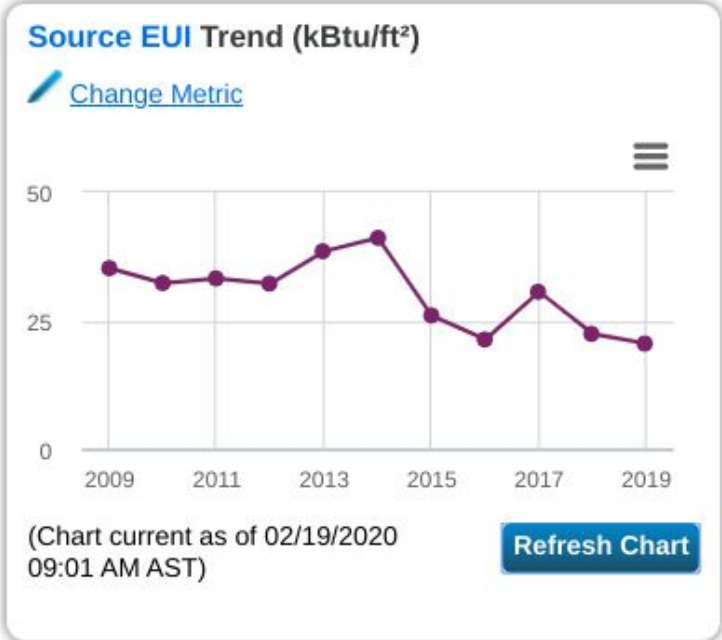
HDD & SQUARE FOOTAGE NORMALIZED - kWh/HDD/Month

Post 2018 Heat Pump	Before	After	Reduction
September - November	2.03	1.2	40.89%
November - January	2.09	1.16	44.50%
January - March	2.22	1.08	51.35%
March - May	1.89	0.82	56.61%
Whole Cooling Seasons	2.06	1.06	48.54%



ENERGY STAR PORTFOLIO MANAGER 2019 DATA

[Change Metrics](#)
[Change Time Periods](#)



Metrics Summary

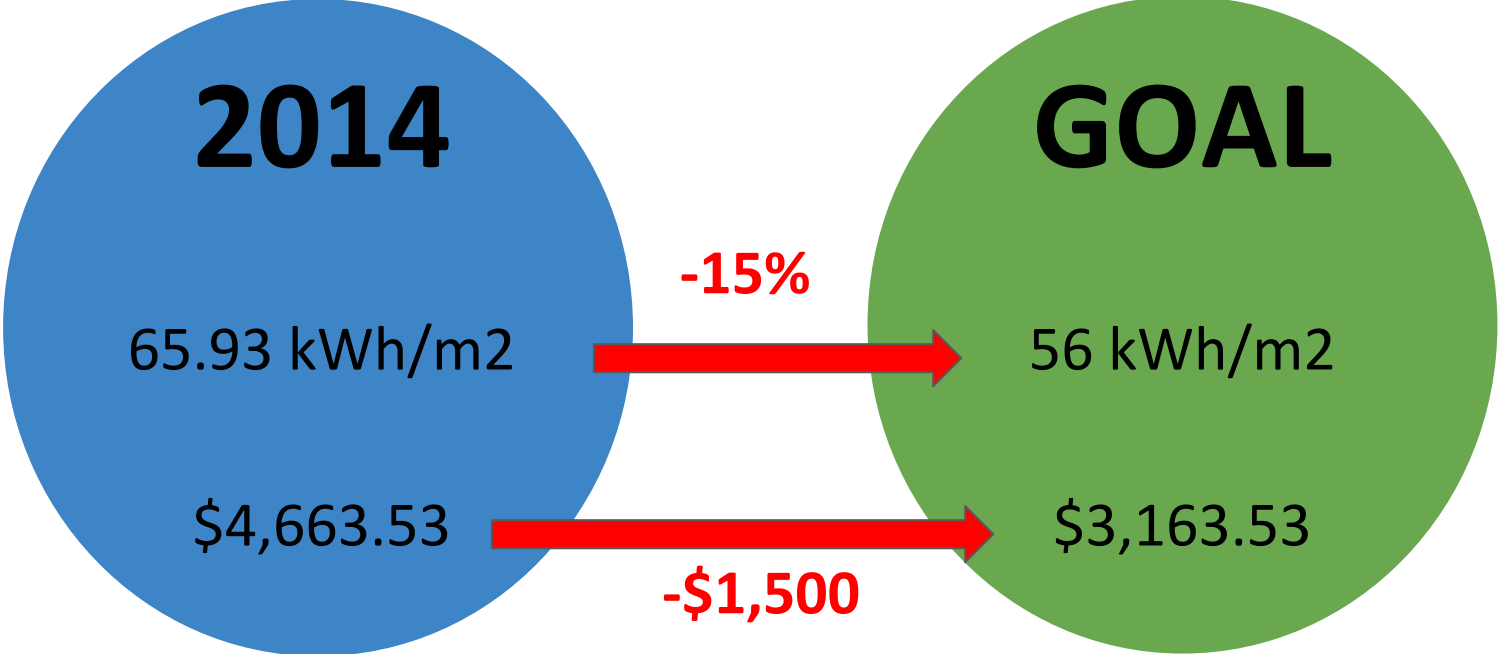
Metric	Dec 2014 (Other)	Dec 2019 (Other)	Change
ENERGY STAR Score (1-100)	100	100	0.00 (0.00%)
Site EUI (kBtu/ft ²)	20.9	10.4	-10.50 (-50.20%)
Energy Cost (\$)	4,663.53	3,296.67	-1366.86 (-29.30%)
Total GHG Emissions Intensity (kgCO ₂ e/ft ²)	4.6	2.3	-2.30 (-50.00%)
National Median Site EUI (kBtu/ft ²)	60.2	55.5	-4.70 (-7.80%)
Weather Normalized Site EUI (kBtu/ft ²)	21.4	10.5	-10.90 (-50.90%)
Weather Normalized Site Electricity (kWh)	29,891.1	20,077.4	-9813.70 (-32.80%)

Source EUI appears low.

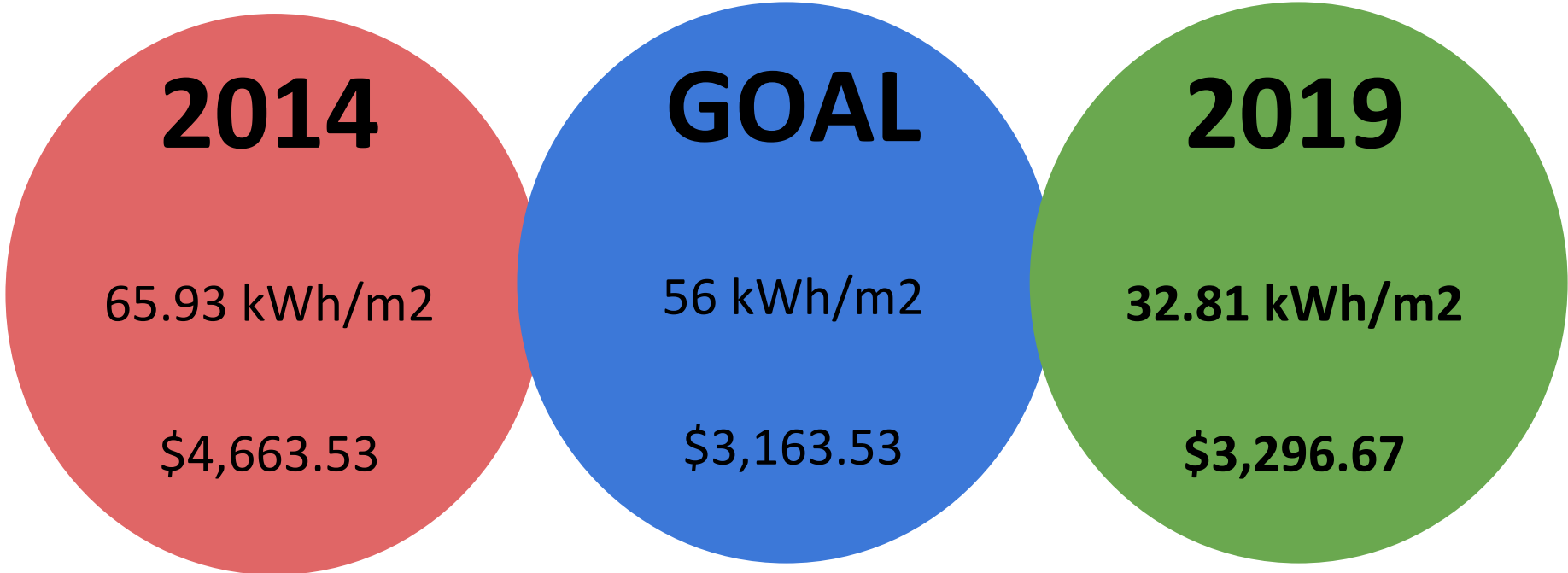
Problem: Your property reports extremely low energy use, even when compared with other top performing properties. Your building has a Source EUI of 20.5 kBtu/ft² while a typical Office has a Source EUI of approximately 136.7 kBtu/ft².



ECOLOGY ACTION CENTRE GOALS VS ACTUAL OUTCOMES



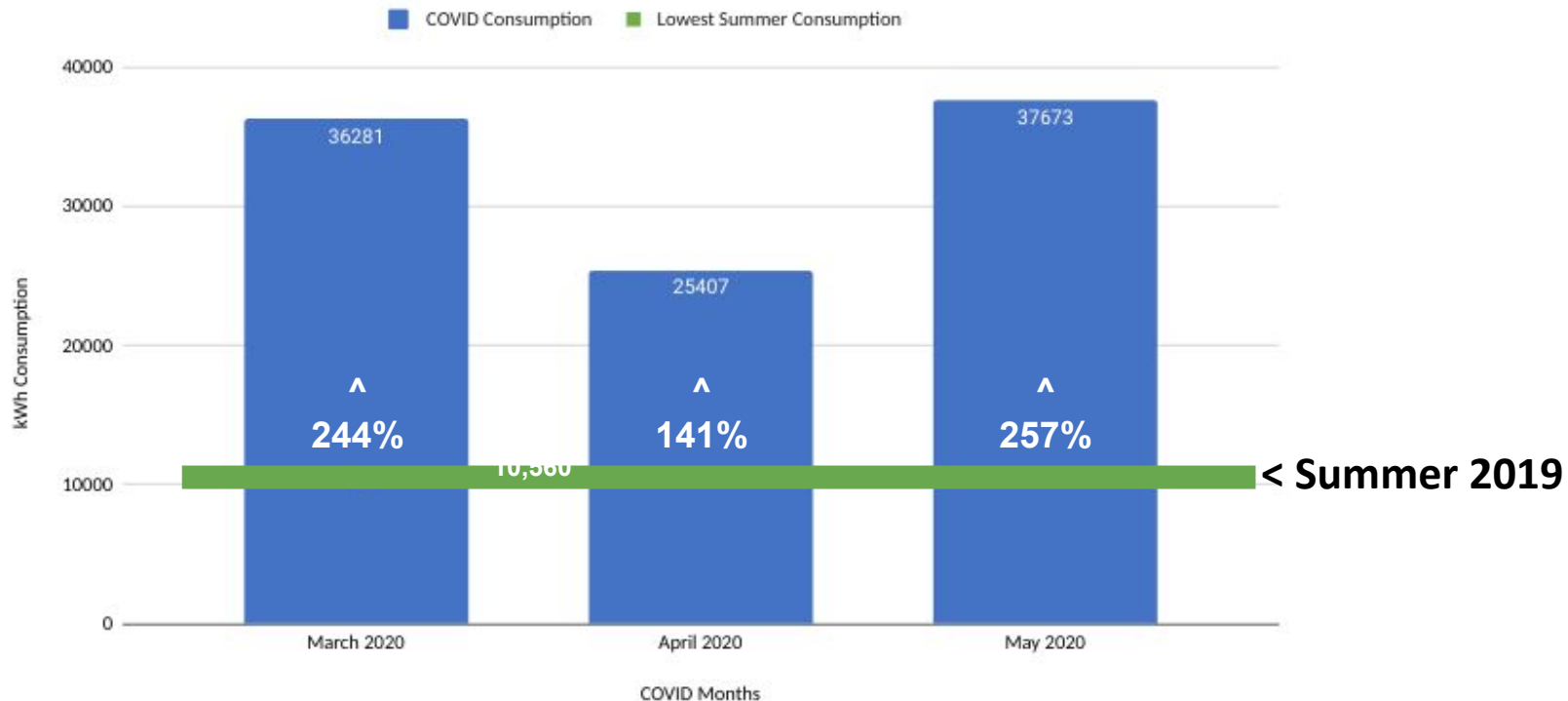
ECOLOGY ACTION CENTRE GOALS VS ACTUAL OUTCOMES



50% REDUCTION!



CASE STUDY - COMMERCIAL BUILDING + DATA PRIVACY

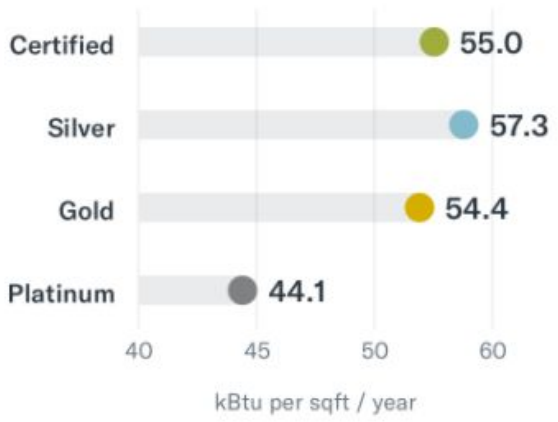


88,000 square foot public building



LEED & ARC SKORU INTEGRATION

Portfolio Energy use intensity



Arc Scores

Total Energy Water Waste Transportation Human Experience

— Last 12 months average

71/100



Current Arc Scores

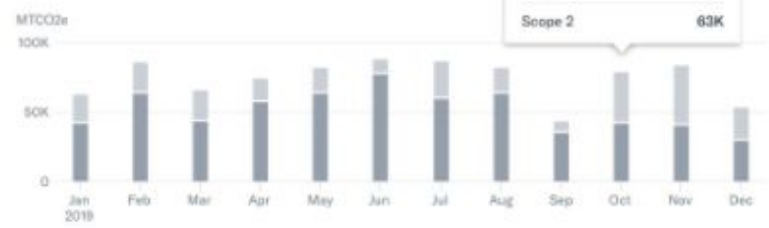


Energy emissions breakdown

— Scope 1 — Scope 2

5.8M MTCO2e

Breakdown (MTCO2e)	
Scope 1	20K
Scope 2	63K

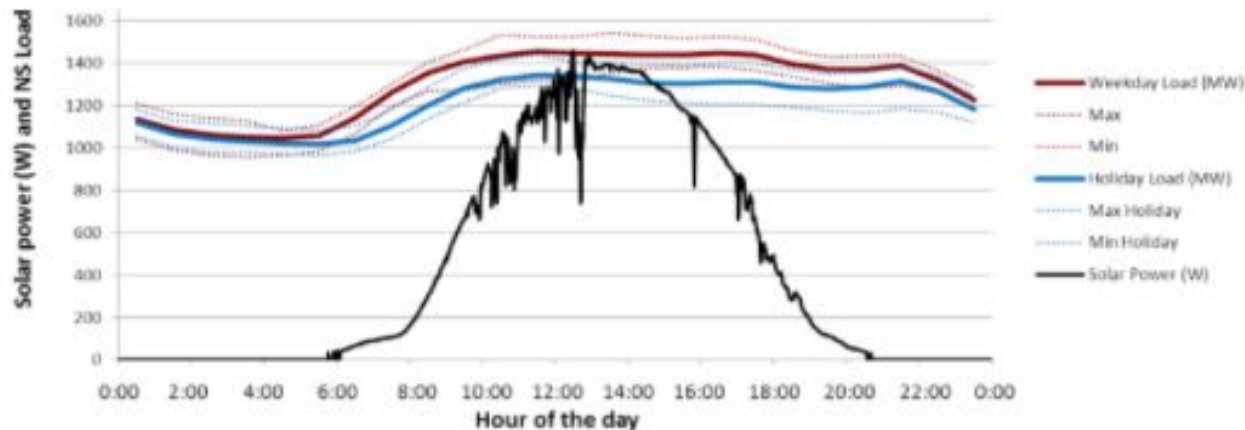


Arc Improvement Scores

Last 12 months average

Energy	49/100
Water	34/100
Waste	56/100
Transportation	56/100
Human Experience	0/100

**HOURLY SOLAR
POWER OUTPUT
(W) FOR NOVA
SCOTIA
VS.
PUBLIC
COMMERCIAL
BUILDING LOAD**





Conclusions on energy data and monitoring:

- Energy data gives your Operations Team superpowers & removes guesswork
- Reduce the 30-50% of energy your building is wasting
- Know exactly what projects and funding are available and impactful
- Independently verify your projects for compliance and maximum ROI

We offer free proposals that include a thorough analysis of your site and existing systems to leverage what data you already have

Questions or Want a Free Quote? Contact Me → megan@edgesaveenergy.ca