



Electricity



Water



Stream

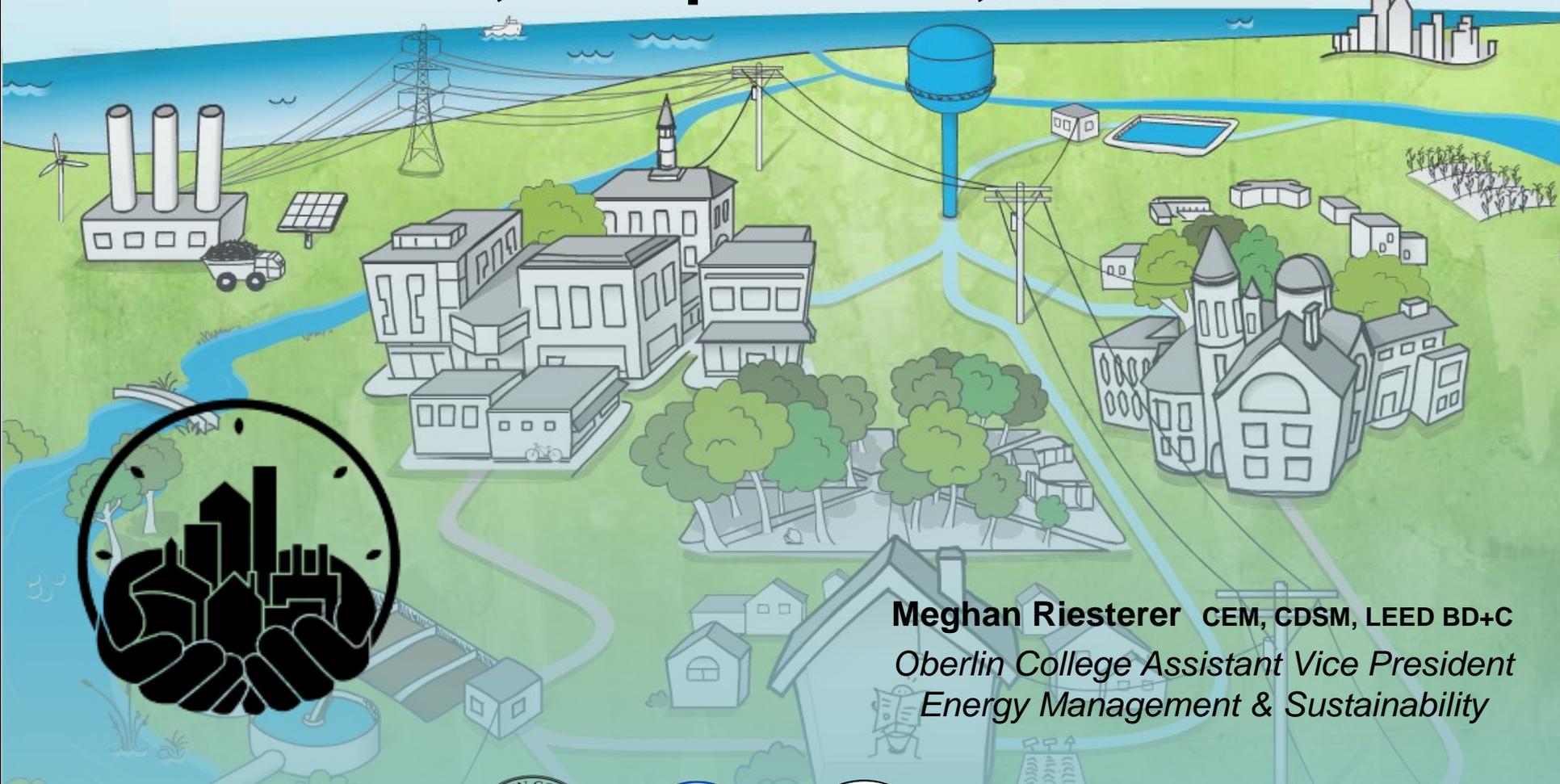


Weather



Extracting Value from Data:

Dashboards, Competitions, & Innovations

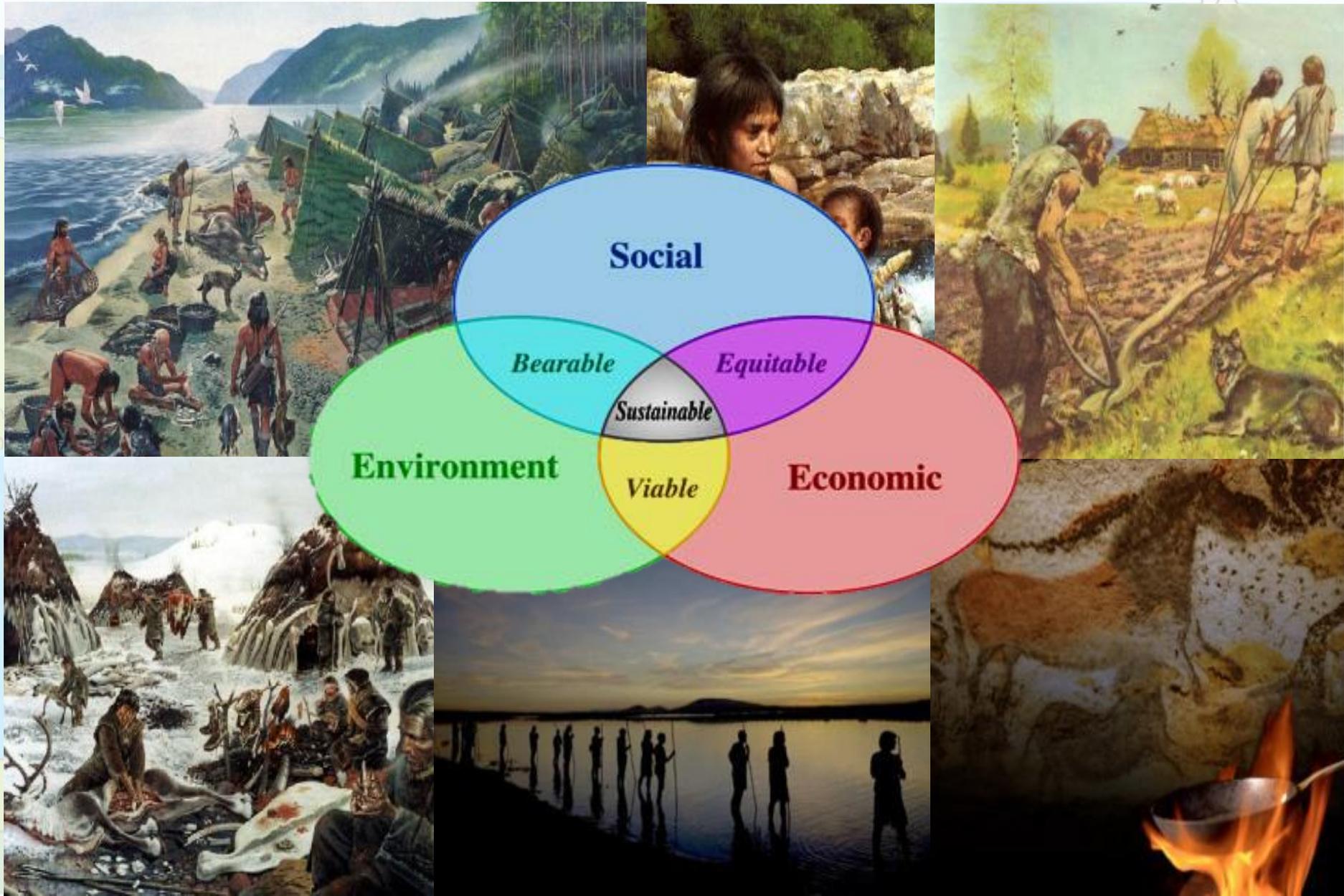


Meghan Riesterer CEM, GDSM, LEED BD+C
*Oberlin College Assistant Vice President
Energy Management & Sustainability*



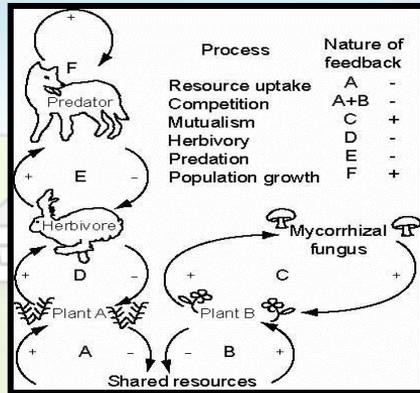
Oberlin Project

Feedback in Human Evolution

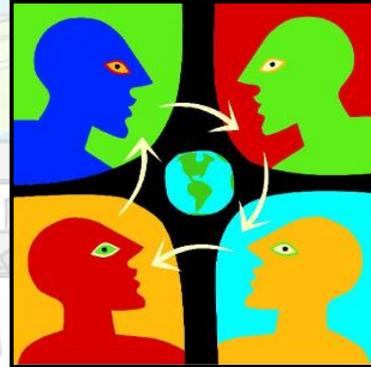


Feedback Control is Ubiquitous

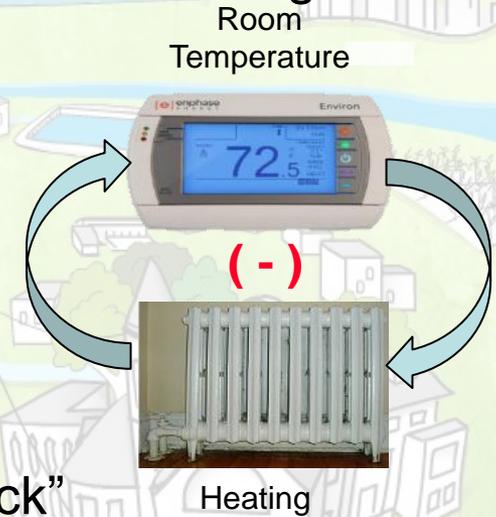
Ecological



Psycho-social



Technological

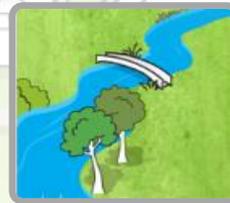


Socio-technical, "eco-feedback"

Humans



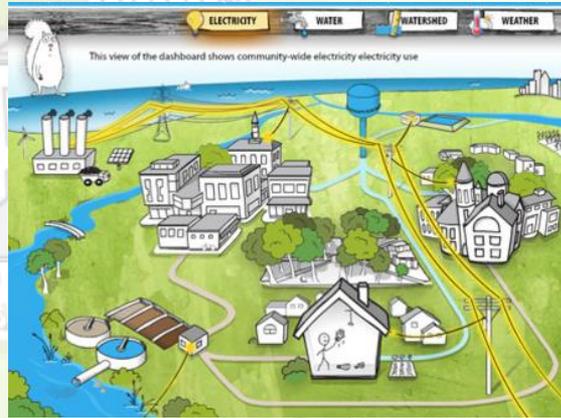
Choices



Ecological Impact



How can we leverage the power of feedback to motivate and empower social, ecological and economic transformation?



Goal: Integrated technology & approach that promotes systems thinking and action

1. Foster sense of connectedness and belonging.
2. Situate individual decision-making in a community context.
3. Share and celebrates pro-environmental thought and action.
4. Positively change behavior to advance sustainability and resilience!

Research on Campus Residential Life

- ~50% of residential electricity use of campus is discretionary (i.e. lifestyle choices)
- Addition of feedback → ~4-12% electricity savings (e.g. ACEEE 2010)



Realities

- Information alone does not change behavior
- Information plus economic incentives often does not change behavior
- Normal people don't care about things that concern us (kWh, BTU, gal water)
- Sophisticated messaging/psychological packaging is critical!

What Makes Socio-technical Feedback Effective?

1. Easily usable:

- Accessible
- Actionable information
- Tight feedback cycle

2. Leverages power of social norms:

- Socially comparative/competitive
- Within monitored entities & among social groupings

3. Generates empathetically linking:

- Emotionally connects individual and group consumption decisions to ecological and social communities



Environmental Dashboard

3 Feedback elements for public engagement

1

**Building
Dashboard**



2

**Citywide
Dashboard**



3

**Community
Voices**



Environmental Dashboard



Learn More
Thursday
Morning at
9:00AM in
Lone Star
Salon F



Environmental Dashboard

3 Feedback elements for public engagement



2 Delivery venues for the public

1

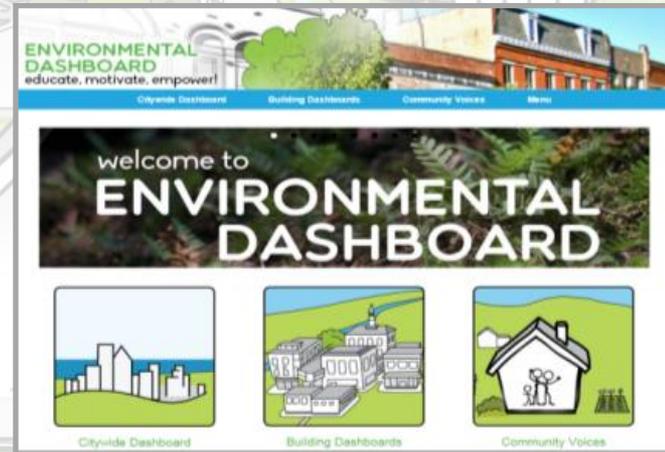
Digital Displays

2

Website



+



Environmental Dashboard

3 Feedback elements for public engagement



2 Delivery venues for the public



1 Resource Monitoring System





Bring a meter online in minutes



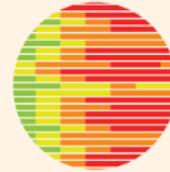
Empower diverse building teams with usable tools



Identify buildings with biggest savings opportunities



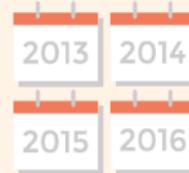
Minimize peak demand charges



Optimize scheduling



Automate bill data



Simplify portfolio-wide reporting and benchmarking



Drive behavioral efficiency through occupant engagement

• >350 Clients



• > 150 Integrations



Adam Joseph Lewis Center for Environmental Studies





Breakdown

4 end uses

LAST 12 MONTHS

TODAY

CUSTOM PERIOD

Start date:

Jan 1, 2013

12 : 00 AM

End date:

Dec 31, 2013

11 : 59 PM

GO

100,748 Kilowatt-hours from Jan 1 to Dec 31

Total



HVAC ELECTRICITY

57,795 kWh



PLUG LOAD ELECTRICITY

24,002 kWh



LIGHTING ELECTRICITY

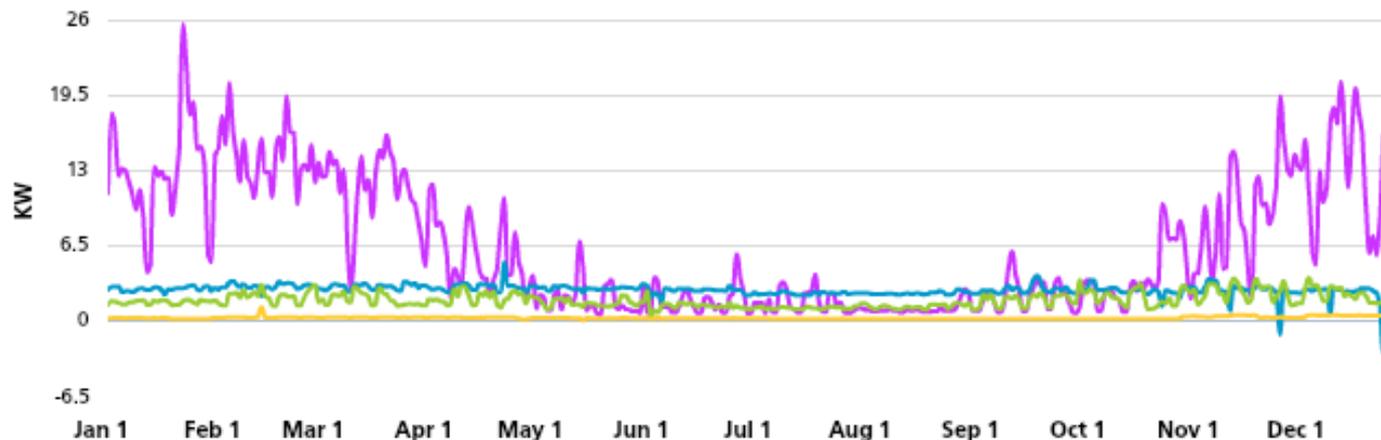
16,070 kWh



LIVING MACHINE MECHANICAL ELECTRICITY

2,882 kWh

HVAC ELECTRICITY PLUG LOAD ELECTRICITY LIGHTING ELECTRICITY LIVING MACHINE MECHANICAL ELECTRICITY





AJLC Electricity Production and Consumption

2 Energy Use

LAST 12 MONTHS

TODAY

CUSTOM PERIOD

Start date:

Jan 1, 2013

12 : 00 AM

End date:

Dec 31, 2013

11 : 59 PM

GO

247,241 Kilowatt-hours from Jan 1 to Dec 31

Total



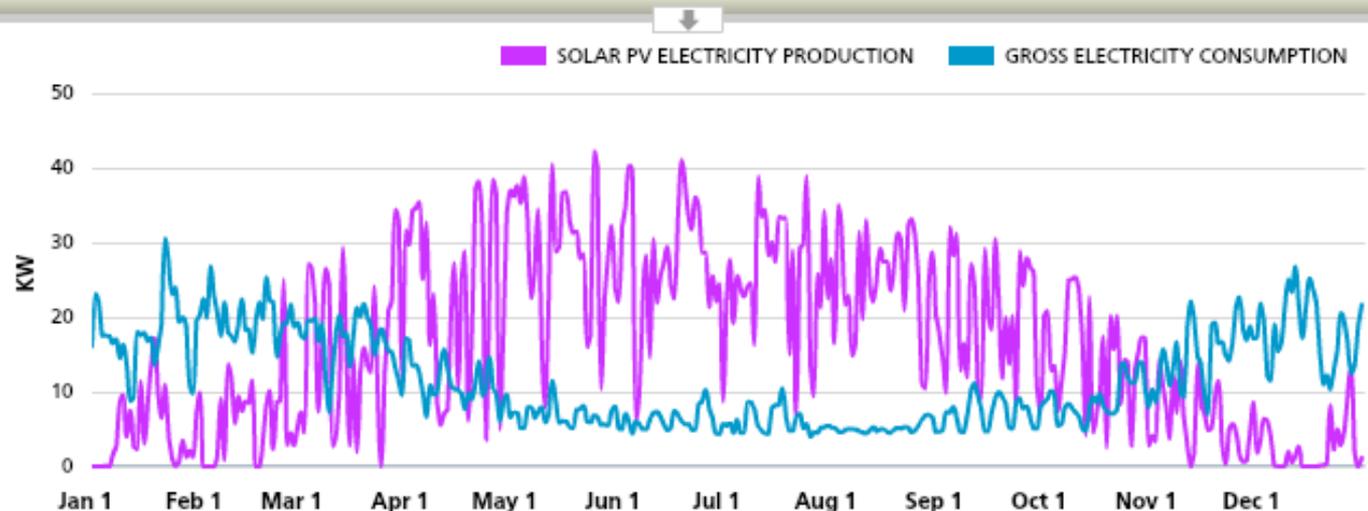
SOLAR PV ELECTRICITY PRODUCTION

145,973 kWh



GROSS ELECTRICITY CONSUMPTION

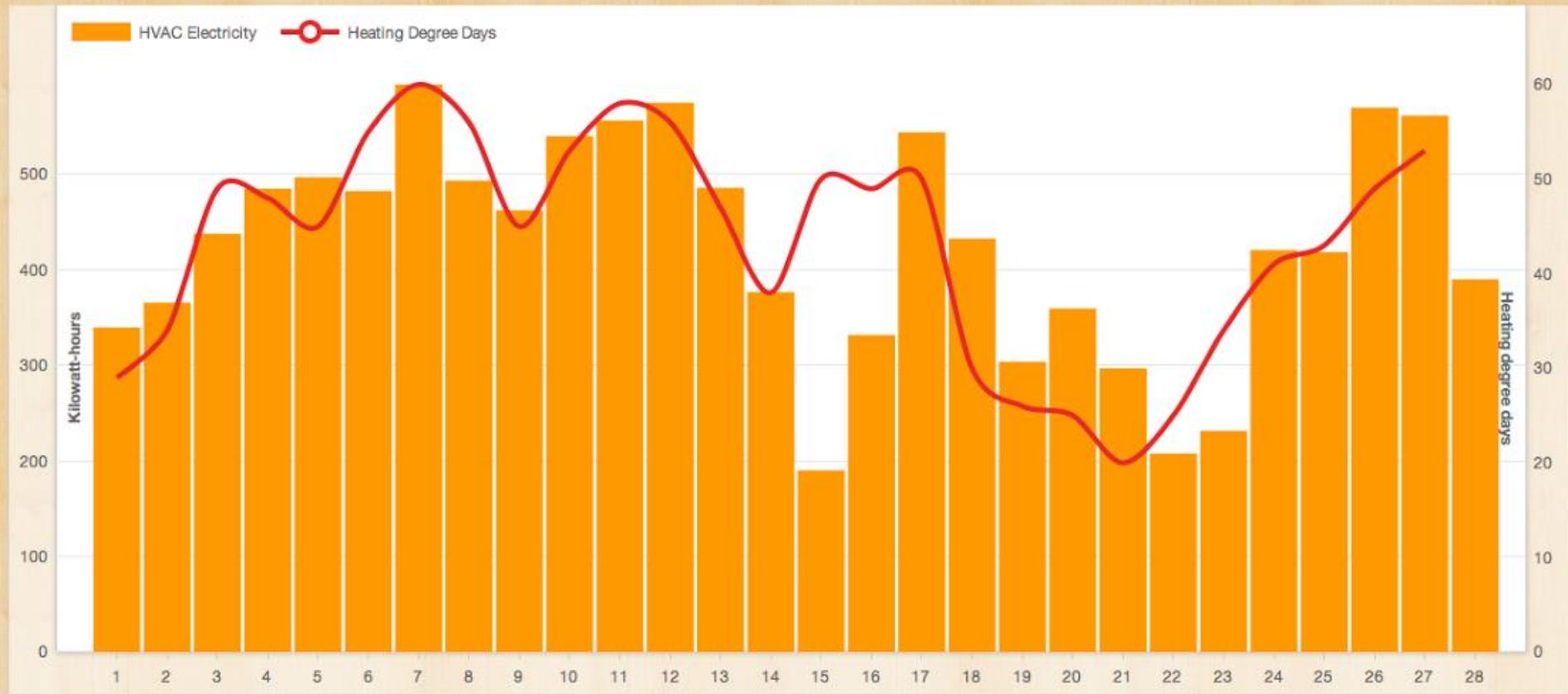
101,268 kWh



Building Trends



Adam Joseph Lewis C... ▾ hvac electricity ▾ over this month ▾ compared to heating degree days ▾



Optimize Building Scheduling



Heat Map Analysis at Oberlin College

Adam Joseph Lewis C...

gross electricity consu...

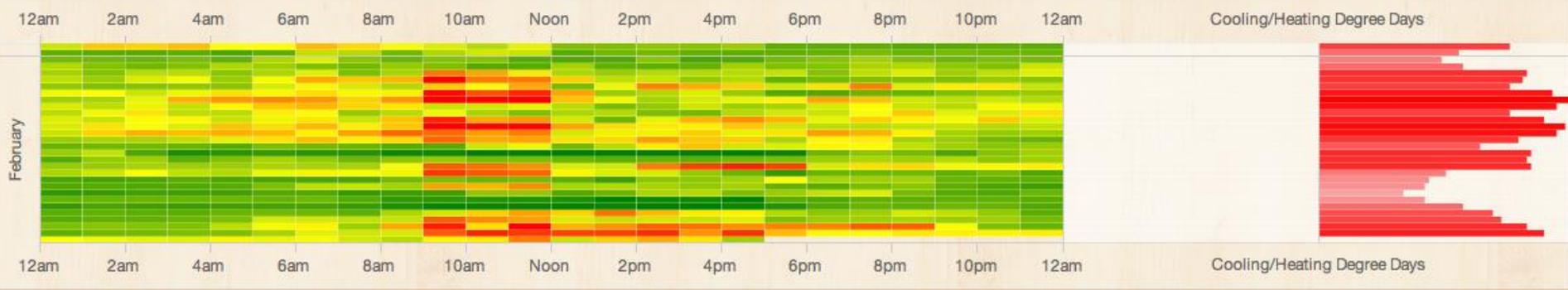
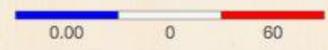
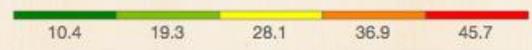
over

the last 30 days

compared to

degree days

Cell color represents usage intensity, each row represents one day.



Comparison to Last Year

Building  Dashboard

CAMPUS
Oberlin

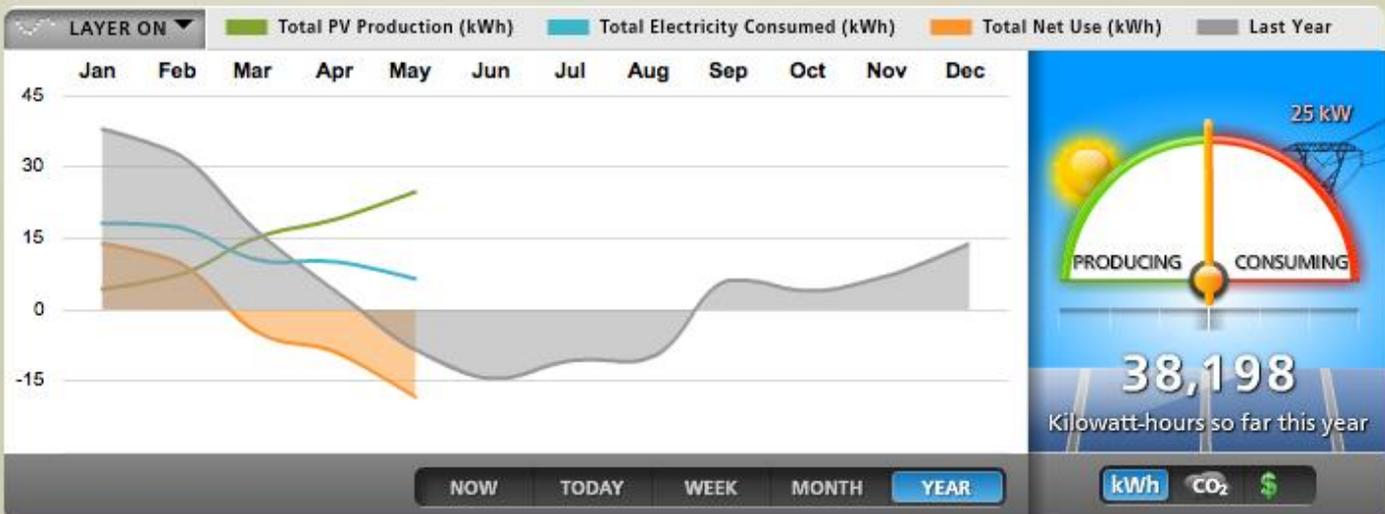


ACADEMIC
Adam Joseph Lewis Center

Find buildings 



 Net Energy  Water  Geothermal



Comparison to Other Campus Buildings



Jump to ▾

All Buildings ▾ Electricity ▾ mean ▾ over this year ▾ compared to last year ▾

Cell size represents average use this year. Cell color represents drift from average use last year.



Occupant Engagement through Competitions

buildingOS_ Home / Apps



Trend Analysis



Heat Map Analysis



Load Profile Analysis



Data Table

Sustainability & Engagement



Competitions



Building Blocks



Dashboard Content

ECOLYMPICS
2015
APRIL 9TH-30TH

DORM vs. DORM - SCHOOL vs. SCHOOL
Water and Electricity Conservation
Competition & Community Events

www.oberlindashboard.org/ecolympics



**READY,
SET,
REDUCE!**

CAMPUS
CONSERVATION
NATIONALS 2013



**KEEP
CALM
AND
KILL THE
VAMPIRE
(LOADS)**

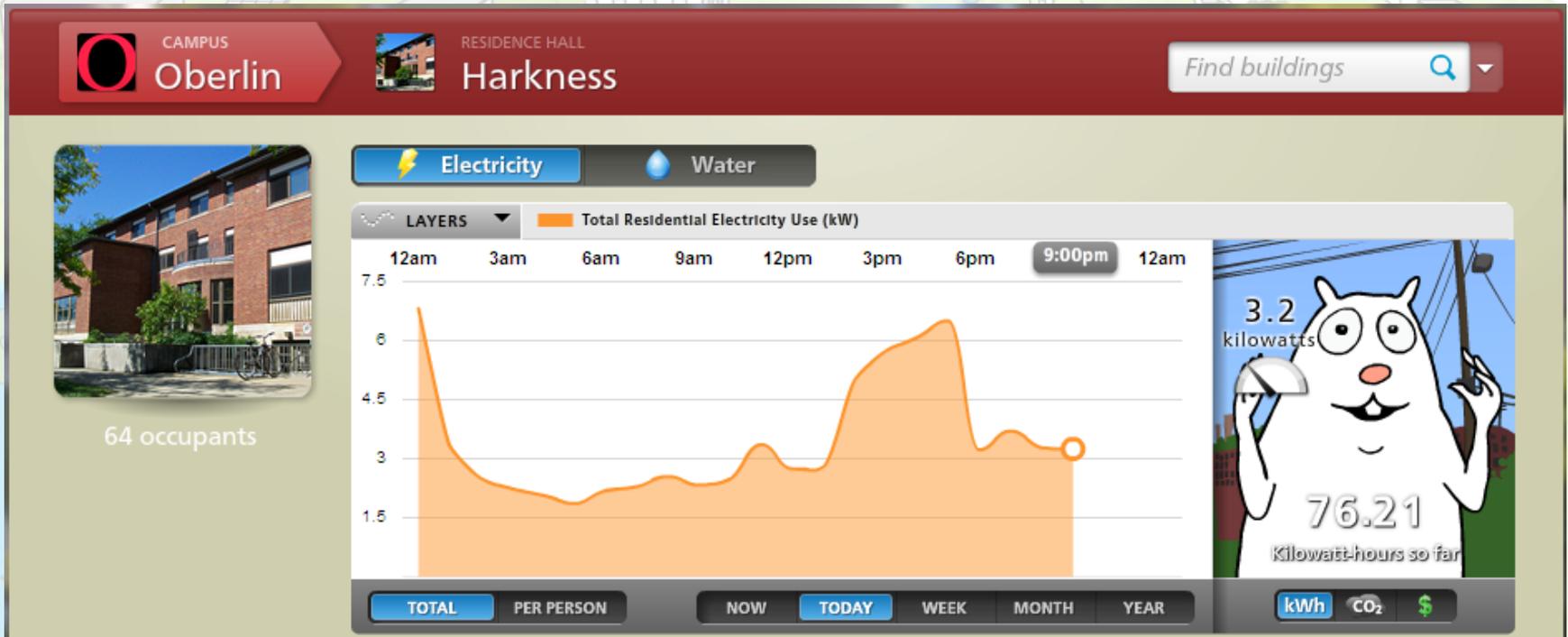
CAMPUS
CONSERVATION
NATIONALS 2013

ECOLYMPICS
april 5-26, 2013
dorm water & electricity competition
& campus events

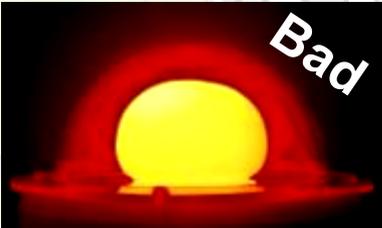


Building Dashboard

Technology to monitor and display electricity and water use in dorms



Ambient feedback with “Environmental Orbs”



50%

100%

200%

Dorm Competitions



Competitions at Oberlin College



Home



Buildings



Meters



Utility Accounts



Apps



Help

17 competitions

Name	Participants	Start	End	Total savings
 Ecolympics 2015 Electricity	26	 Apr 09, 2015	 Apr 30, 2015	9,744.5 kWh
 Ecolympics 2015 Water	17	 Apr 09, 2015	 Apr 30, 2015	322,890.8 gal
 Ecolympics 2015 Co-ops	8	 Apr 09, 2015	 Apr 30, 2015	1,353.5 kWh
 test	1	 Apr 01, 2015	 Apr 06, 2015	4.2 kWh
 Electricity Comparison for Digital Signage	27	 Sep 02, 2014	 Sep 30, 2014	3,206.4 kWh
 Ecolympics 2014 Electricity	26	 Apr 04, 2014	 Apr 25, 2014	13,182.6 kWh
 Ecolympics 2014 Water	19	 Apr 04, 2014	 Apr 25, 2014	55,889.5 gal
 Ecolympics 2014 Co-op kitchens	8	 Apr 04, 2014	 Apr 25, 2014	1,230.6 kWh
 CCN 2014 - All buildings	34	 Apr 04, 2014	 Apr 25, 2014	14,413.2 kWh
 Oberlin Ecolympics 2013 (Co-ops)	8	 Apr 05, 2013	 Apr 27, 2013	1,073.5 kWh



Ecolympics 2015 Water

 at Oberlin College in CCN 2015[Overview](#)[Participants](#)[Results](#)[Audit Trail](#)

322,890.8 gal saved by all participants
19.8% overall reduction

	Participant	Reduction 	Baseline use 	Competition use 	Total savings 
1st	Johnson House	 56.9%	6.32 gal/hour	2.73 gal/hour	1,899.2 gal
2nd	East	 32.6%	1,048.05 gal/hour	705.88 gal/hour	180,663.5 gal
3rd	South	 30.2%	540.80 gal/hour	377.27 gal/hour	86,342.5 gal
4th	Noah	 29.8%	114.51 gal/hour	80.42 gal/hour	18,003.9 gal
5th	Kahn	 14.6%	76.54 gal/hour	65.36 gal/hour	5,900.6 gal
6th	Burton	 11.5%	229.18 gal/hour	202.88 gal/hour	13,887.0 gal
7th	Tank	 9.5%	87.27 gal/hour	78.94 gal/hour	4,399.3 gal
8th	Talcott	 8.7%	112.45 gal/hour	102.64 gal/hour	5,183.1 gal
9th	Barnard	 8.3%	30.19 gal/hour	27.69 gal/hour	1,319.1 gal



Ecolympics 2015 Electricity

 at Oberlin College in CCN 2015[Overview](#)[Participants](#)[Results](#)[Audit Trail](#)

9,744.5 kWh saved by all participants
5.8% overall reduction

	Participant	Reduction 	Baseline use 	Competition use 	Total savings 
1st	Harkness	 30.4%	4.23 kW	2.95 kW	678.9 kWh
2nd	Baldwin	 20.4%	5.13 kW	4.08 kW	553.1 kWh
3rd	Asia House	 16.9%	14.03 kW	11.65 kW	1,255.4 kWh
4th	Allencroft	 14.9%	3.15 kW	2.68 kW	247.4 kWh
5th	Price	 13.9%	10.54 kW	9.07 kW	775.8 kWh
6th	Kahn	 13.3%	11.75 kW	10.18 kW	825.2 kWh
7th	Dascomb	 10.3%	25.75 kW	23.10 kW	1,401.2 kWh
8th	Barnard	 9.3%	7.49 kW	6.80 kW	369.3 kWh
9th	Kade	 6.8%	9.31 kW	8.67 kW	336.3 kWh

K-12 Education: Competition Engagement



PROSPECT ELEMENTARY

36.7% reduction



OBERLIN HIGH SCHOOL

23.2%



EASTWOOD ELEMENTARY SCHOOL

22.3%



LANGSTON MIDDLE SCHOOL

12.5%



Value from Data is Maximized with Feedback

1. Monitor electricity & water use in schools, homes, businesses
2. Provide real-time feedback display
3. Monitor flows & impacts in watershed and electrical grid
4. Empower sharing of pro-environmental thought and action

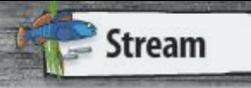




Electricity



Water



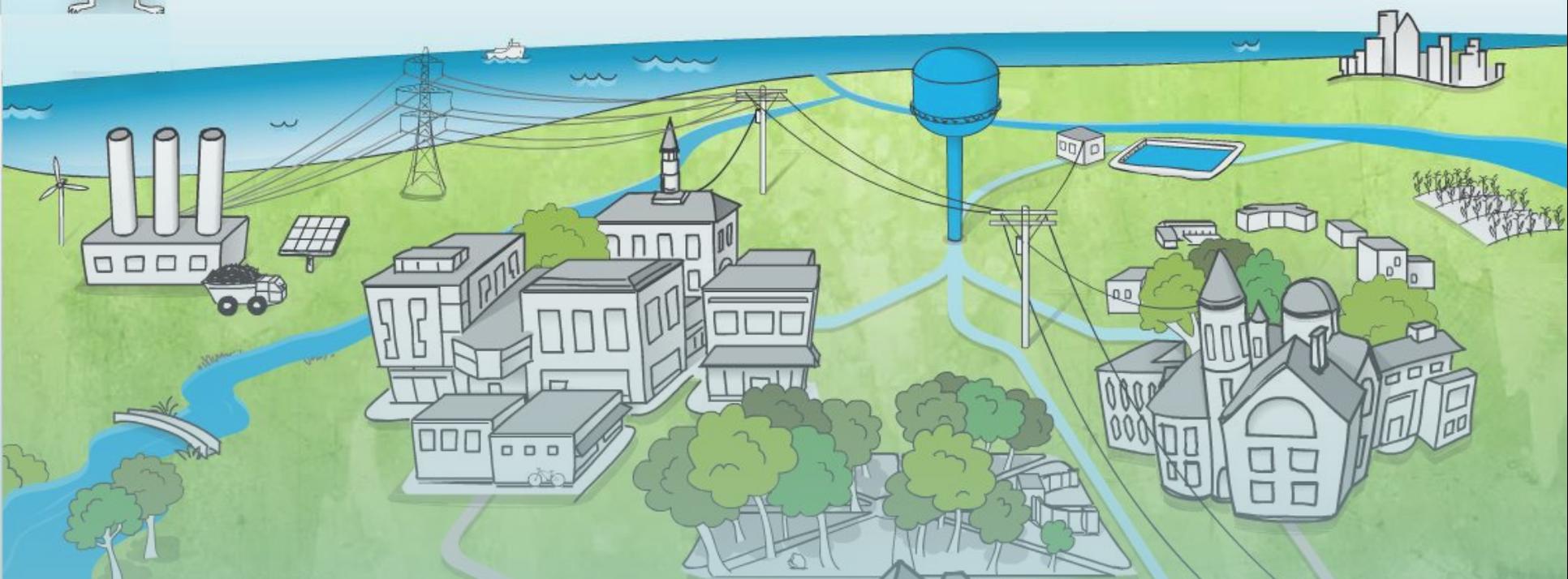
Stream



Weather



Thank you!



Meghan Riesterer CEM, CDSM, LEED BD+C
Oberlin College Assistant Vice President
Energy Management & Sustainability



meghan.riesterer@oberlin.edu
www.oberlin.edu/sustainability
www.environmentaldashboard.org