



Light/Occupancy Sensor Data Collection Project

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on behalf of Energy Club

Background: Xcel Energy Turnkey Audits

Bundle H projects: 13 Occupation Sensor projects

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Index	Building	ECO Number	Energy Conservation Opportunity (ECO)	Estimated Demand Savings (kW)	Estimated Energy Savings (kWh/yr)	Estimated Thermal Savings (Therm/yr)	Estimated Annual Cost Savings (\$)	Estimated Capital Cost (\$)	Simple Payback (Years)	Estimated Xcel Energy Incentives (\$)	Rebate Type	Quantity	Cost per Fixture	Notes	Project Bundle
2	BO-14	Boliou	14	Install wall-mounted occupancy sensors in thirteen (13) private offices	0	1,144	0	\$82	\$1,174	13.3	\$84	Prescriptive - Lighting	13	\$90		H - Occupancy / daylight sensors
3	BO-5	Boliou	5	Install ceiling-mounted occupancy sensors in restrooms	0	297	0	\$21	\$321	14.8	\$7	Prescriptive - Lighting	2	\$161		H - Occupancy / daylight sensors
4	BU-1	Burton	1	Add daylight harvesting capability to the lighting circuit on the 4th floor	0	1,025	0	\$73	\$501	6.4	\$28	Prescriptive - Lighting				H - Occupancy / daylight sensors
5	BU-2	Burton	2	Add occupancy sensors to office and laundry service lighting fixtures	0	262	0	\$19	\$294	14.9	\$14	Prescriptive - Lighting				H - Occupancy / daylight sensors
6	CM-8	CMC	8	Install ceiling occupancy sensors in labs, conference rooms and lounges	0	5,836	0	\$418	\$5,075	11.3	\$342	Prescriptive - Lighting	23	\$221		H - Occupancy / daylight sensors
7	CM-9	CMC	9	Install wall occupancy sensors in faculty and IT offices	0	4,344	0	\$311	\$4,335	13.3	\$203	Prescriptive - Lighting	48	\$90		H - Occupancy / daylight sensors
8	DV-4	Davis	4	Add occupancy sensors for lighting in resident rooms, restrooms, and offices	0	2,151	0	\$154	\$2,397	14.9	\$96	Prescriptive - Lighting				H - Occupancy / daylight sensors
9	LA-9	Laird	9	Add wall and ceiling occupancy sensors to offices and conference rooms,	0	2,939	0	\$236	\$3,115	12.2	\$240	Prescriptive - Lighting	35	\$89		H - Occupancy / daylight sensors
10	LE-10	Leighton	10	Add wall and ceiling occupancy sensors to offices and open offices/corridors, respectively	0	10,590	0	\$855	\$12,874	14.1	\$791	Prescriptive - Lighting	77	\$167		H - Occupancy / daylight sensors
11	MH-3	Music Hall	3	Add ceiling and wall occupancy sensors for offices, class and conference rooms	0	2,600	0	\$207	\$3,140	14.4	\$166	Prescriptive - Lighting	42	\$75		H - Occupancy / daylight sensors



HOBO light/occupation data logger



Round 1: Data Collection

- Bathrooms in Boliou (2) , Nourse (6) , Davis (2)
- Settings on HOBOWare:

HOBO UX90-005/6M Occupancy/Light

 Name: Davis 1F Bathroom LO-03
Serial Number: 20790960
Deployment Number: 1
Battery Level:  100 %

Status...

Sensors

Configure Sensors to Log:

	Measurement:	Label:	% or Time:
<input checked="" type="checkbox"/> 1) Light:	Runtime	Light	Davis 1F Bathroom LO-03 Light
<input checked="" type="checkbox"/> 2) Occupancy:	Runtime	Occupancy	Davis 1F Bathroom LO-03 Occ.

LCD: For State and Runtime sensors, show ☐ Time

Deployment

Logging Interval: 30 seconds

Logging Duration: 91.0 days

Start Logging: On Date/Time 02/05/20 12:00:00 AM

Stop Logging: ☒ When memory fills ☐ Never (wrap when full)
☐ Push Button
☒ After 2 weeks

Options: ☐ Turn LCD off

Cancel Delayed Start



Boliou bathroom LO-01



Boliou bathroom LO-01

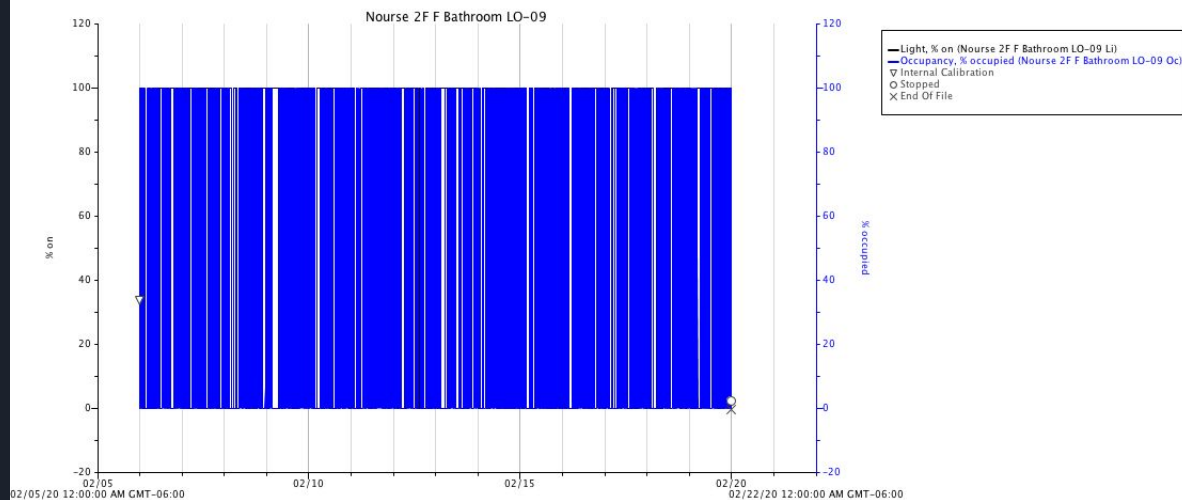


ROUND 2: Data Collection

- Davis lounges (4) , CMC conference/lab rooms (5), Burton laundry room (1)

Preliminary Data Analysis

#	Time, GMT-06:00	Light, % on (Nourse 2F F Bathroom LO-09 Li)	Occupancy, % occupied (Nourse 2F F Bathroom LO-09 Oc)
1	02/06/20, 12:00:00 AM		
2	02/06/20, 12:00:30 AM	100.00	0.00
3	02/06/20, 12:01:00 AM	100.00	0.00
4	02/06/20, 12:01:30 AM	100.00	0.00
5	02/06/20, 12:02:00 AM	100.00	0.00
6	02/06/20, 12:02:30 AM	100.00	23.33
7	02/06/20, 12:03:00 AM	76.67	100.00



2nd Nourse Bathroom

02/06/20, 03:01:30 AM	30.00	26.67
02/06/20, 03:02:00 AM	100.00	100.00
02/06/20, 03:02:30 AM	100.00	80.00
02/06/20, 03:03:00 AM	100.00	0.00
02/06/20, 03:03:30 AM	100.00	0.00
02/06/20, 03:04:00 AM	100.00	0.00
02/06/20, 03:04:30 AM	100.00	0.00
02/06/20, 03:05:00 AM	100.00	0.00
02/06/20, 03:05:30 AM	100.00	0.00
02/06/20, 03:06:00 AM	100.00	0.00
02/06/20, 03:06:30 AM	100.00	0.00
02/06/20, 03:07:00 AM	100.00	0.00
02/06/20, 03:07:30 AM	100.00	0.00
02/06/20, 03:08:00 AM	100.00	86.67
02/06/20, 03:08:30 AM	53.33	100.00
02/06/20, 03:09:00 AM	0.00	100.00
02/06/20, 03:09:30 AM	0.00	63.33

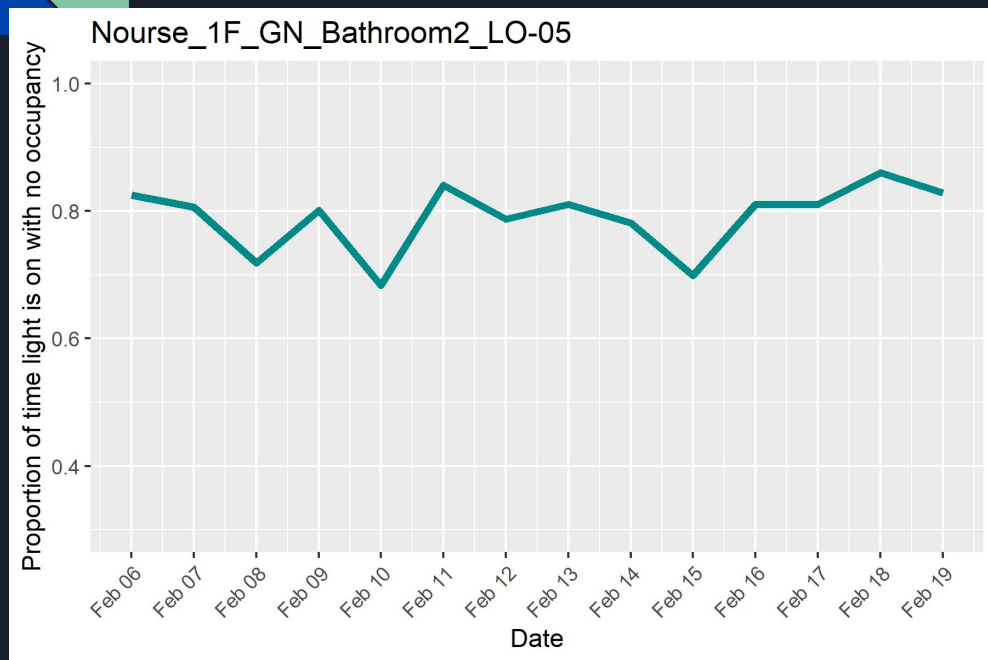
2nd Nourse Bathroom

02/06/20, 05:23:00 AM	100.00	100.00
02/06/20, 05:23:30 AM	100.00	100.00
02/06/20, 05:24:00 AM	100.00	100.00
02/06/20, 05:24:30 AM	100.00	100.00
02/06/20, 05:25:00 AM	100.00	86.67
02/06/20, 05:25:30 AM	100.00	0.00
02/06/20, 05:26:00 AM	100.00	0.00
02/06/20, 05:26:30 AM	100.00	0.00
02/06/20, 05:27:00 AM	100.00	0.00
02/06/20, 05:27:30 AM	100.00	0.00
02/06/20, 05:28:00 AM	100.00	0.00
02/06/20, 05:28:30 AM	100.00	0.00
02/06/20, 05:29:00 AM	100.00	0.00
02/06/20, 05:29:30 AM	100.00	0.00
02/06/20, 05:30:00 AM	100.00	0.00
02/06/20, 05:30:30 AM	100.00	0.00
02/06/20, 05:31:00 AM	100.00	0.00
02/06/20, 05:31:30 AM	100.00	0.00
02/06/20, 05:32:00 AM	100.00	0.00
02/06/20, 05:32:30 AM	100.00	0.00
02/06/20, 05:33:00 AM	100.00	0.00
02/06/20, 05:33:30 AM	100.00	0.00
02/06/20, 05:34:00 AM	100.00	0.00
02/06/20, 05:34:30 AM	100.00	0.00
02/06/20, 05:35:00 AM	100.00	0.00
02/06/20, 05:35:30 AM	100.00	0.00
02/06/20, 05:36:00 AM	100.00	0.00
02/06/20, 05:36:30 AM	100.00	0.00
02/06/20, 05:37:00 AM	100.00	0.00
02/06/20, 05:37:30 AM	100.00	0.00
02/06/20, 05:38:00 AM	100.00	0.00
02/06/20, 05:38:30 AM	100.00	0.00
02/06/20, 05:39:00 AM	100.00	0.00
02/06/20, 05:39:30 AM	100.00	0.00
02/06/20, 05:40:00 AM	100.00	0.00
02/06/20, 05:40:30 AM	100.00	0.00

1st Davis Bathroom

02/05/20, 08:05:00 AM	0.00	0.00
02/05/20, 08:05:30 AM	0.00	0.00
02/05/20, 08:06:00 AM	0.00	0.00
02/05/20, 08:06:30 AM	0.00	0.00
02/05/20, 08:07:00 AM	0.00	0.00
02/05/20, 08:07:30 AM	0.00	0.00
02/05/20, 08:08:00 AM	0.00	0.00
02/05/20, 08:08:30 AM	0.00	0.00
02/05/20, 08:09:00 AM	0.00	0.00
02/05/20, 08:09:30 AM	80.00	83.33
02/05/20, 08:10:00 AM	100.00	100.00
02/05/20, 08:10:30 AM	100.00	100.00
02/05/20, 08:11:00 AM	100.00	100.00
02/05/20, 08:11:30 AM	100.00	100.00
02/05/20, 08:12:00 AM	100.00	100.00
02/05/20, 08:12:30 AM	100.00	100.00
02/05/20, 08:13:00 AM	100.00	100.00
02/05/20, 08:13:30 AM	100.00	100.00
02/05/20, 08:14:00 AM	100.00	100.00
02/05/20, 08:14:30 AM	100.00	100.00
02/05/20, 08:15:00 AM	100.00	100.00
02/05/20, 08:15:30 AM	100.00	100.00
02/05/20, 08:16:00 AM	53.33	100.00
02/05/20, 08:16:30 AM	0.00	100.00
02/05/20, 08:17:00 AM	0.00	56.67
02/05/20, 08:17:30 AM	0.00	0.00
02/05/20, 08:18:00 AM	0.00	0.00
02/05/20, 08:18:30 AM	0.00	0.00
02/05/20, 08:19:00 AM	0.00	0.00
02/05/20, 08:19:30 AM	0.00	0.00
02/05/20, 08:20:00 AM	0.00	0.00
02/05/20, 08:20:30 AM	0.00	0.00

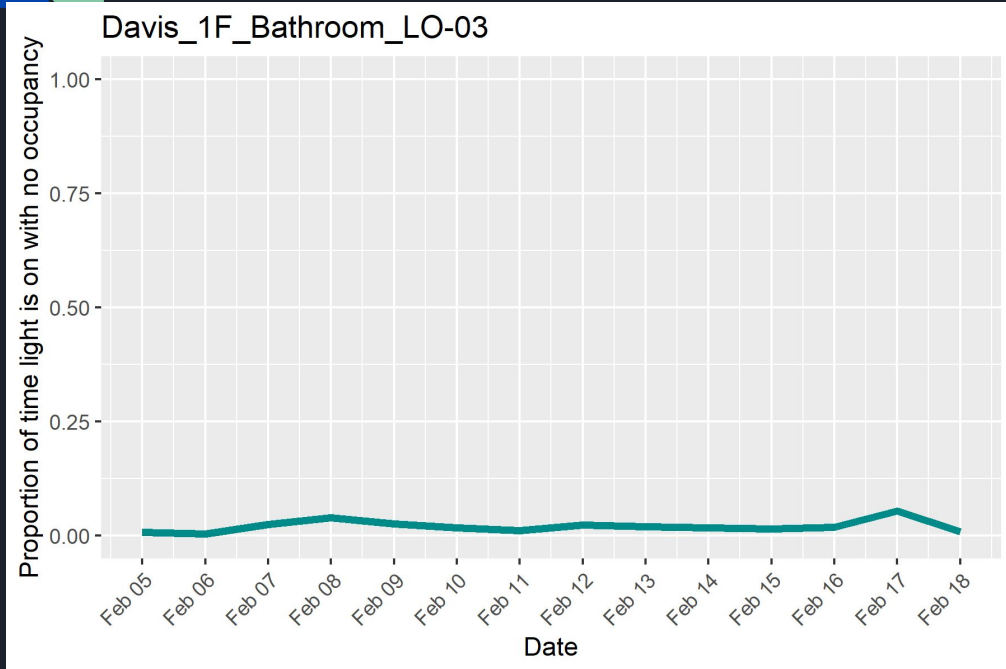
Initial Results - Nourse



In audited Nourse bathrooms, lights are on with no occupant between 55-88% of the time

Example shown: 1st floor gender neutral bathroom, February 6-19

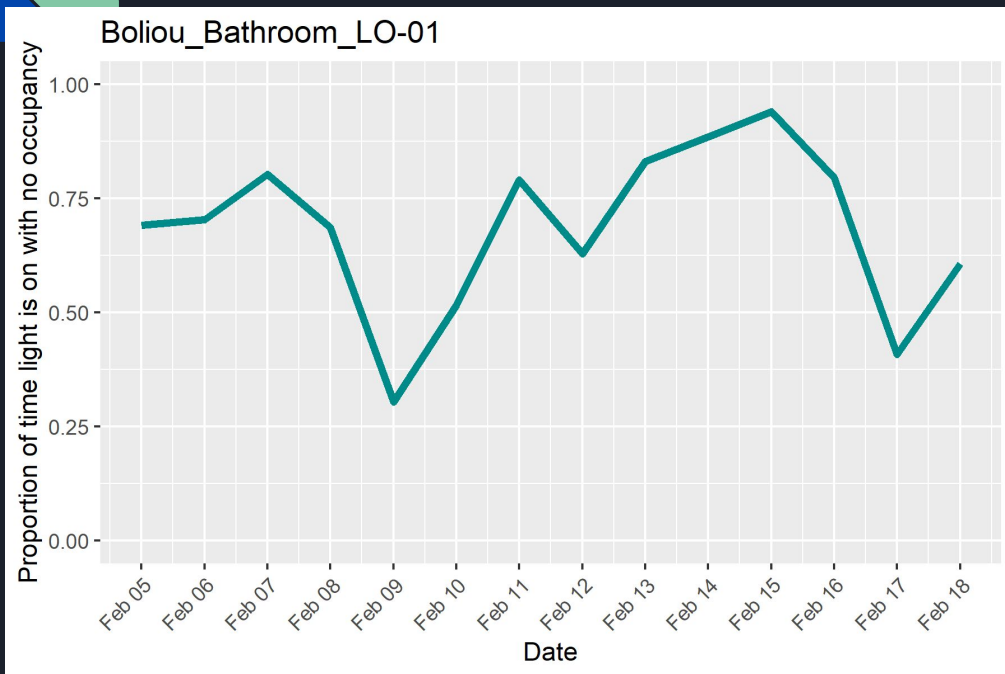
Initial Results - Davis



In the two audited Davis bathrooms, lights were on with no occupant between 2.0% and 8.3% of the time

Example shown: 1st floor bathroom, February 5-18

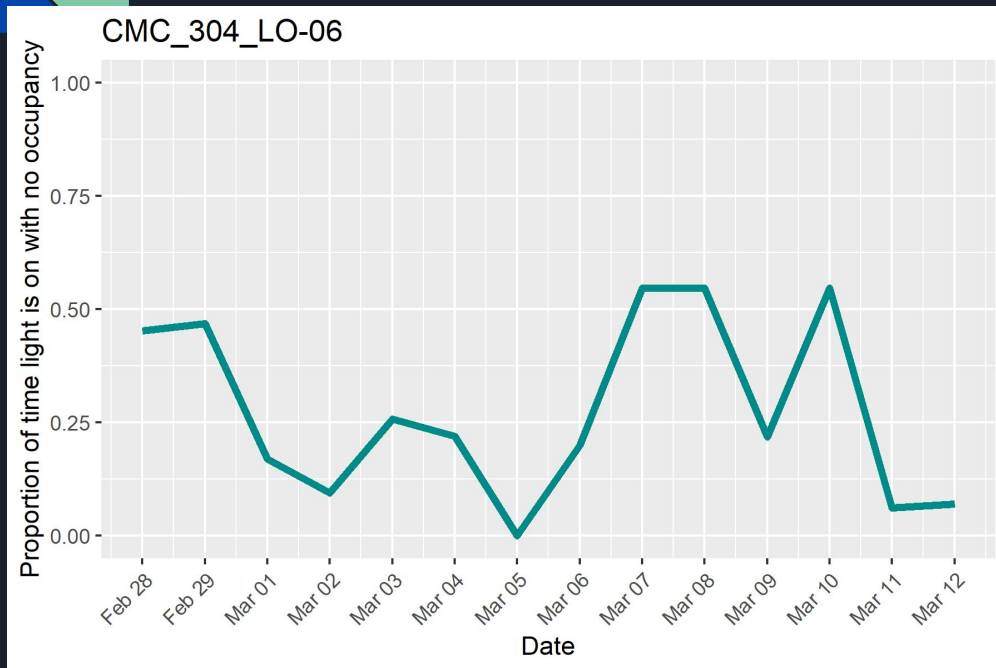
Initial Results - Boliou



In the two audited Boliou bathrooms, lights were on with no occupant 68.5% and 59.8% of the time

Example shown: 1st floor bathroom, February 5-18

Initial Results - CMC



In audited CMC conference/lab rooms, lights are on with no occupant 26-48% of the time, though there tends to be more variation across days

Example shown: CMC 304, February 28-March 12



Next Steps!

- Continue with data analysis
- Compare findings with Xcel predictions
- Sustainability Revolving Fund proposal for motion-detector lights
- Audit more rooms on campus
- Take “control” data from rooms which already have motion-detector lights

THANK YOU EAC!!