

UC Davis Health Campus

Education Building LEED Readiness Assessment

Team Members: Scott Adler
Charles Hammond

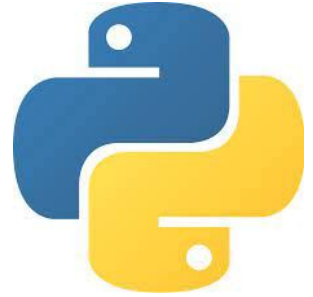
Client: Alex Malm, Green Building Supervisor,
UC Davis Energy Conservation Office

Background

- **Problem Statement:** Achieve LEED certification for Health Campus Education Building
- **Client:** Energy Conservation Office (ECO)
- **Scope of Work** - Four LEED prerequisite credits:
 1. Building-Level Energy Metering
 2. Minimum Energy Performance
 3. Minimum Indoor Air Quality Performance
 4. Energy Efficiency Best Management Practices

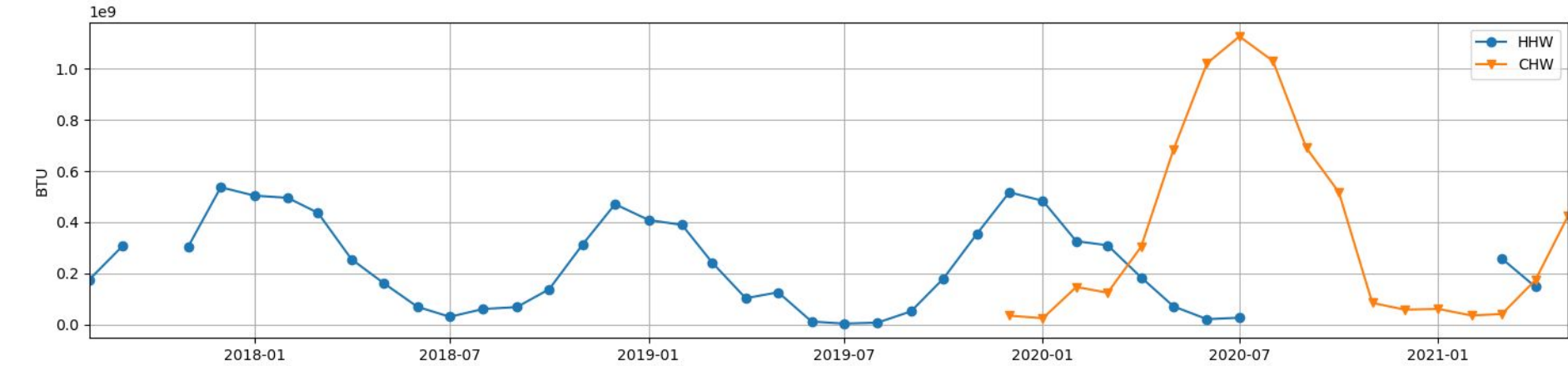


Building-Level Energy Metering - Methodology



- Building Energy Consumption:
 - Electricity
 - Hot Water (HHW)
 - Chilled Water (CHW)
- Used Python to clean, process, and further analyze time series data (2018-present)
- Missing data modeled using monthly averages
- No CHW flow data due to defective meter
 - Air handler data (supply/return temperatures and flow) used as rough estimate for CHW energy usage

Building-Level Energy Metering - Results



Building-Level Energy Metering - Recommendations

Ensure sensors required for LEED certification are online and calibrated:

- Regularly check all sensors are functioning properly
 - Write code to automate this process and flag faulty sensors

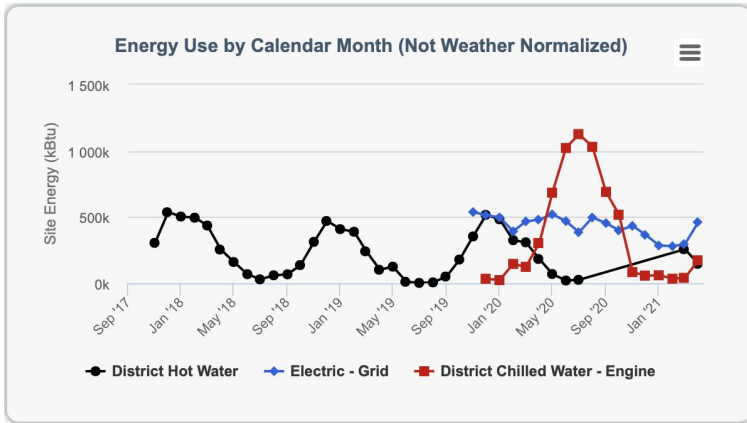
LEED credits cannot be achieved without quality data!



Minimum Energy Performance

ENERGY STAR portfolio manager tool:

- Function: “Office”
- Energy Star Score: 76
 - LEED eligible (75th percentile cutoff)
- Recommendations:
 - Better metering & modeling



Health Campus Education Building

4610 X St, Sacramento, CA 95817 | [Map It](#)

Portfolio Manager Property ID: 15935985

Year Built: 2006

[Edit](#)



ENERGY STAR Score (1-100)

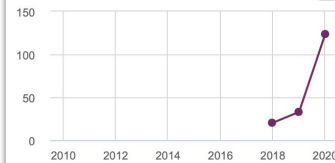
Current Score: 76

Baseline Score: 100

Summary Details Energy Water Waste & Materials Goals Design

Source EUI Trend (kBtu/ft²)

[Change Metric](#)



(Chart current as of 05/29/2021 11:55 PM PDT)

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

Metrics Summary

Metric	Oct 2018 (Energy Baseline)	Apr 2021 (Energy Current)	Change
ENERGY STAR Score (1-100)	100	76	-24.00 (-24.00%)
Source EUI (kBtu/ft²)	20.6	108.0	87.40 (424.30%)
Site EUI (kBtu/ft²)	17.2	61.2	44.00 (255.80%)
Energy Cost (\$)	Not Available	Not Available	N/A
Total GHG Emissions Intensity (kgCO2e/ft²)	1.1	3.5	2.40 (218.20%)
Water Use (All Water Sources) (kgal)	Not Available	Not Available	N/A
Total Waste (Disposed and Diverted) (Tons)	Not Available	Not Available	N/A

Minimum Indoor Air Quality Performance

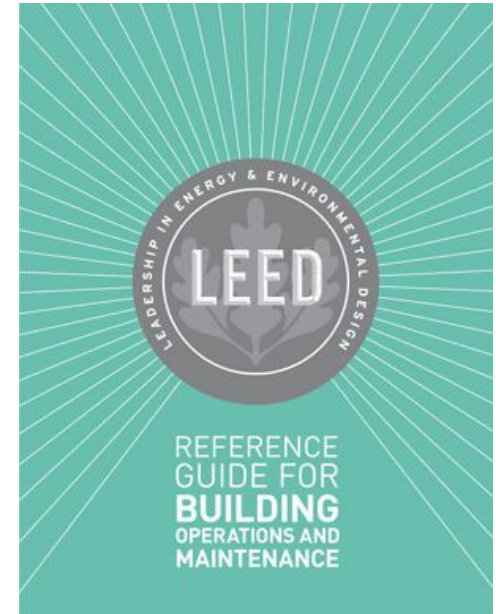
U.S. Green Building Council Air Quality Calculator:

- Based on ASHRAE 62.1 ventilation requirements
- Some zones did not pass the “conservative” calculation
- Recommendation:
 - Check questionable zones and increase ventilation rate to ensure adequate fresh air

Zone Name and Number	Occupancy Category	Zone Floor Area Az (sq ft)	Are you using default value for zone population?	Zone Population Pz (people)	Zone Air Distribution Effectiveness Ez	Zone Outdoor Airflow Voz (cfm)	Zone Discharge Airflow Vdz (cfm)	Zone Primary Airflow Vpz (cfm)	Zone Secondary Recirculation Fraction Er	Zone Primary Air Fraction Ep
VAV 1-1 (1206, 1208B)	Office space	291	Yes	1.45	0.80	30.86	150	150	1.00	1.00
VAV 1-2 (1208A, 1208C)	Office space	415	Yes	2.08	0.80	44.09	80	80	1.00	1.00
VAV 1-3 (1208, 1208A)	Office space	418	Yes	2.09	0.80	44.41	300	300	1.00	1.00
VAV 1-4 (1204)	Classrooms (age 9 plus)	804	Yes	28.14	0.80	472.35	400	400	1.00	1.00
VAV 1-5 (1200F, 1209)	Lobbies	269	Yes	40.35	0.80	272.36	220	220	1.00	1.00
VAV 1-6 (1222)	Lecture hall (fixed seats)	1,055	Yes	158.30	0.80	1563.21	1,000	1,000	1.00	1.00
VAV 1-7 (1222)	Lecture hall (fixed seats)	1,055	Yes	158.30	0.80	1563.21	1,000	1,000	1.00	1.00
VAV 1-8 (1222)	Lecture hall (fixed seats)	1,055	Yes	158.30	0.80	1563.21	1,000	1,000	1.00	1.00
VAV 1-9 (1206, 1200)	Office space	456	Yes	2.28	0.80	48.41	100	100	1.00	1.00
VAV 1-10 (1204)	Classrooms (age 9 plus)	804	Yes	28.14	0.80	472.35	400	400	1.00	1.00
VAV 1-11 (1202, 1202E)	Office space	255	Yes	1.27	0.80	27.04	150	150	1.00	1.00
VAV 1-12 (1202D)	Office space	105	Yes	0.53	0.80	11.15	80	80	1.00	1.00
VAV 1-13 (1202, 1202A, 1202B)	Office space	737	Yes	3.69	0.80	78.34	180	180	1.00	1.00
VAV 1-14 (1200D)	Lobbies	162	Yes	24.30	0.80	164.03	580	580	1.00	1.00
VAV 1-16 (1210A)	Cafeteria / fast food dining	734	Yes	73.40	0.80	853.28	1,000	1,000	1.00	1.00
VAV 1-30 (1210C)	Office space	63	Yes	0.32	0.80	6.69	90	90	1.00	1.00
VAV 1-36 (1200, 1200E, 1220)	Corridors	3,643	Yes	0.00	0.80	273.20	450	450	1.00	1.00
VAV 1-37 (1210B)	Kitchen (cooking)	326	Yes	6.52	0.80	110.03	210	210	1.00	1.00

Energy Efficiency Best Management Practices - Methodology

- Review LEED reference manual
- Coordinate with ECO staff to obtain all necessary documents and data
- Develop interactive checklist to help UC Davis Green Building Team complete credit



Energy Efficiency Best Management Practices - Results

- Generated Excel checklist tool based on LEED reference guide (v4)
- UC Davis Green Building Team hope to use for this and future LEED projects

	A	B	C	D	E
1	Step	Requirement	Complete	If not, actions to be taken	Notes
2	1	Review current facility requirements (cfr) and available operations and			
3	1.1	<i>Current facility requirements (cfr)</i>	No		
4	1.1.1	<i>Functional Space Requirements</i>	No		
5	1.1.1.1	Building functions by space type	Yes		
6	1.1.1.2	Occupancy schedules	No	requested	
7	1.1.1.3	Cleaning schedules	No	requested	
8	1.1.2	<i>Operational Space Requirements</i>	No	requested	
9	1.1.2.1	Required temperature setpoints for occupied spaces	No	requested	
10	1.1.2.2	Required temperature setpoints for process spaces	No	requested	
11	1.1.2.3	Lighting levels	No	requested	
12	1.1.2.3	Humidity setpoints	No	requested	
13	1.1.3	<i>Building drawings, where available</i>	No		
14	1.1.3.1	As-built drawings	No		

Energy Efficiency Best Management Practices - Recommendations

- Use checklist to complete credit
- Continue to organize files systematically, including a folder hierarchy that matches the numbering in the Excel checklist, e.g.,

Name

- 📁 Step 1 - current facility requirements and operations and maintenance plans
- 📁 Step 2 - review ASHRAE procedures for level 1 audit
- 📁 Step 3 - identify audit team
- 📁 Step 4 - implementation plan for audit
- 📁 Step 5 - ASHRAE energy use analysis
- 📁 Step 6 - perform audit
- 📁 Step 7 - audit report
- 📁 Step 8 - modify building plans

Name

- 📁 1.1.3.3 Mechanical Schedules
- 📄 1.1.1.1 Building functions by space type

Client Takeaways

- Key Recommendations:
 - Ensure all necessary LEED data is being metered and routinely check meters are working and calibrated
 - Ensure ventilation rates meet ASHRAE and LEED requirements
 - Organize files in a systematic manner for smooth credit completion
- Deliverables to ECO
 - Energy Star portfolio manager tool (energy baseline)
 - Completed IAQ calculator (ventilation adequacy)
 - Energy Efficiency Best Management Practices checklist tool
 - Organized and cleaned data
 - Python scripts for data analysis
 - Final report (with recommendations)