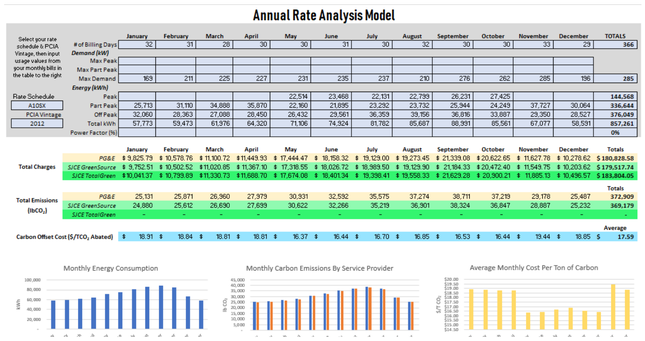
CLIMATE CORPS

Energy Analysis: Establishing a Baseline

San Jose City College

Climate Corps 18-19

Completed and Ongoing Projects



Annual Rate Analysis Model

Select your rate schedule & PCIA Vintage, then input usage values from your monthly bills in the table to the right		January	February	March	April	May	June	July	August	September	October	November	December	TOTALS
	# of Billing Days	32	31	28	30	30	31	30	32	30	30	33	29	366
	Demand (kW)													
	Max Peak													
	Max Part Peak													
	Max Demand	169	211	225	227	231	235	237	210	276	262	285	196	285
	Energy (kWh)													
Rate Schedule	Peak					22,574	23,468	22,131	22,789	26,231	27,425			144,568
A10SX	Part Peak	25,713	31,110	34,888	35,870	22,160	21,895	23,292	23,732	25,944	24,249	37,727	30,064	336,644
PCIA Vintage	Off Peak	32,060	28,363	27,088	28,450	26,432	29,561	36,353	33,156	36,816	33,887	29,350	28,527	376,049
2012	Total kWh	57,773	59,473	61,976	64,320	71,106	74,924	81,782	85,687	88,991	85,561	67,077	58,591	857,261
	Power Factor (%)													0%

		January	February	March	April	May	June	July	August	September	October	November	December	Totals
Total Charges	PG&E	$ 9,825.79	$ 10,578.76	$ 11,100.72	$ 11,443.93	$ 17,444.47	$ 19,158.32	$ 19,123.00	$ 19,273.45	$ 21,339.08	$ 20,622.65	$ 11,627.78	$ 10,278.62	$ 180,828.58
	SJCE GreenSource	$ 9,752.51	$ 10,502.52	$ 11,020.85	$ 11,367.10	$ 17,318.55	$ 19,026.72	$ 18,983.50	$ 19,123.30	$ 21,194.33	$ 20,472.40	$ 11,549.75	$ 10,203.62	$ 179,517.74
	SJCE TotalGreen	$ 10,041.07	$ 10,799.83	$ 11,330.72	$ 11,688.70	$ 17,674.08	$ 19,401.34	$ 19,398.41	$ 19,556.33	$ 21,629.28	$ 20,900.21	$ 11,885.13	$ 10,496.57	$ 183,804.06
														Totals
Total Emissions ($lbCO_2$)	PG&E	25,131	25,871	26,360	27,979	30,931	32,592	35,575	37,274	38,711	37,219	29,178	25,487	372,909
	SJCE GreenSource	24,880	25,612	26,630	27,829	30,622	32,266	35,219	36,901	38,324	36,847	28,887	25,232	369,179
	SJCE TotalGreen	-	-	-	-	-	-	-	-	-	-	-	-	-
														Average
Carbon Offset Cost ($/TCO$_2$ Abated)		$ 18.91	$ 18.84	$ 18.81	$ 18.81	$ 16.37	$ 16.44	$ 16.70	$ 16.85	$ 16.53	$ 16.44	$ 13.44	$ 18.65	$ 17.59

Building the Rate Analysis Model (RAM)

- Model for comprehensive, user-friendly, transparent rate analysis for electrical accounts in San Jose.
- Calculates and breaks down charges and CO_2 emissions for PG&E and SJCE *GreenSource* and *TotalGreen* services.
- Calculates Carbon Offset Cost ($/TCO2 Abated) & compares it to CA Cap & Trade.

Figure 1: The Rate Analysis Model (RAM) calculates and breaks down electricity charges and emissions. User selects from the "Rate Schedule" & "PCIA Vintage" dropdown menus, then inputs billing data for the year (by month) to get results. Current version limited to A10SX and E20P, with room for several more schedules.

SJCC Campus (Site) Energy Use intensity

- The lack of building submetering and access to data made it important to establish a baseline estimate of campus-wide energy consumption.
- Total of four electrical services and three gas services (mix of PG&E and Constellation DA).
- Analysis based on 7 to 8 months of utility bills across 4 electrical services and 3 natural gas services (data forecasted ahead to account for missing months).

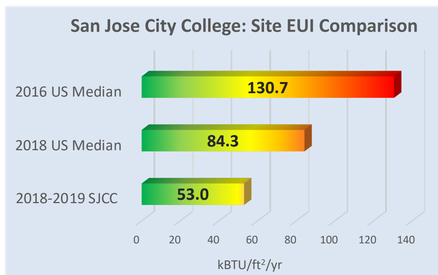


Figure 2: A comparison of site Energy Use Intensities. US median values taken from Energy Star technical documents. SJCC EUI calculated from partial utility data, estimates, and actual ft² values.

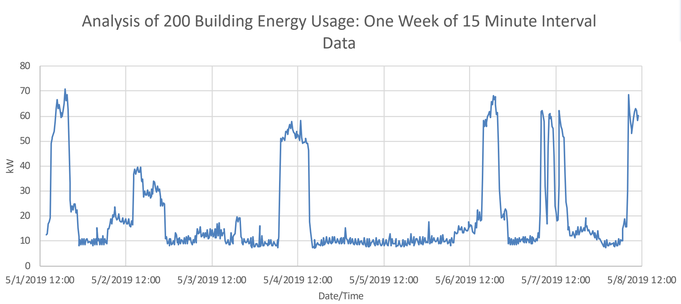


Figure 3: One week of 15-minute interval data, logged at the building main, using the Fluke 1738 Three Phase Power Logger. Analysis is still ongoing,

200 Building Electrical Audit

- One week of data logged and analyzed from the 200 building at SJCC.
- Goal of understanding load profile of building, teasing out electrical loads/demand associated with both the HVAC/Refrigeration, and the Ironworkers Apprenticeship programs

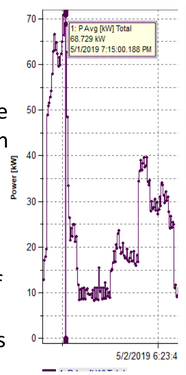
Achievements, Results, and Outcomes

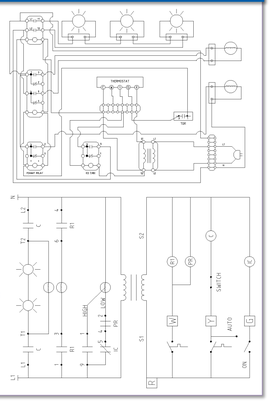
Built an adaptable & comprehensive Rate Analysis Modeling tool (RAM)

Established a baseline of energy usage on campus with an estimated campus-wide EUI of 53 kBTU/ft²

Transcribed various hand-drawn single-line diagrams using CAD software. Drawings will be used in the SJCC electrician certification program (uploaded to a shared file with other educational facilities)

Assisted with installation of a high-end three-phase power logger to a building's main service panel.





Lessons Learned & Future Recommendations

Public Sector:

- Working through the bureaucracy and internal politics is an uphill battle – it can be very difficult to enact change.

Recommendations for Improvement / Program Expansion:

- Hire a dedicated Energy/Emissions Analyst on site to consult on energy efficiency projects and lay out a decarbonization roadmap.
- Submeter buildings.
- Continue to incorporate more energy efficiency/renewable energy concepts into programs (HVAC/R, Electrician, Construction).
- Transition all non-DA accounts to *TotalGreen* (100% renewable electricity from San Jose Clean Energy).
  - Largest account (E20P) would cost an estimated $54,000/year
  - Would offset an estimated 2.3 million lb CO_2 (approximately $52/T CO_2)
  - Offsetting will be cheaper for the smaller accounts (E20 premium is $0.01/kWh, A10 premium is $0.005/kWh)
- Transition the DA account to Constellation's 100% carbon-free electrical service.

Wyatt Kozelka

BS Environmental Science and Management: Energy & Climate

Driven to electrify and decarbonize California. I will accomplish this by working on innovative solutions in energy efficiency, fuel switching, sustainable design, and education/outreach. While my passion lies in energy, I will also incorporate environmental stewardship into elements of my work wherever possible. I will support sustainable natural resource management while expanding my technical skills in energy analysis, and sharing my respect and intimate knowledge of the natural world.

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