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MICROGRIDS.

SPRING 2022

in collabration with
POMONA COLLEGE
and
GRIDSCAPE

VOL. 001

CONTENTS.

BACKGROUND 01

POMONA COLLEGE is dependent on fossil fuels to meet its energy demands. This is not sustainable. Pomona would benefit from transitioning to clean energy, specifically, solar. Current geopolitical events motivate people to create a decentralized renewable energy production. Other factors include war and climate change. These affect the dependability of dwindling, finite fossil fuels. We wanted to find people interested in the project financially and in the environmental benefits of microgrids. Ultimately, we want to leave behind a legacy study for future students as a road map for other people interested in microgrids to implement our findings in their work.

OBJECTIVE

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STAKEHOLDER ENGAGEMENT

First, it was important to find stakeholders and decision makers involved. From the school's perspective we needed to identify the correct people to approach to learn about the institutional barriers that we may face when it came to Pomona's aesthetic requirements.

We also identified the larger Claremont Colleges community that could use this study as a pilot study to calculate larger microgrid systems across the campuses. The Pomona student community was also a major influence on our study as we wanted to look into solutions that may benefit the students directly as well.

Gridscape was a major stakeholder involved as we received inputs from them on our study's feasibility. After identifying the key players involved, we incorporated what we know about campus electricity use into the study and compared it to how we can meet those demands.

Next, we needed to create a plan for stakeholder education to convince stakeholders by considering energy offsets and garnering community support. Understanding what the thought processes of stakeholders are was also important to finding out who needs to be convinced.

OBJECTIVE

02

CHARGING POLICY:

Once we found the faculty and facilities who are willing to influence and champion the project to move forward, the next objective was to determine and create an electric vehicle (EV) charging policy, for example, finding out how many EV spots Pomona College should have in each parking lot compared to regular spots.

Pomona currently has just eight EV charging spots in the South Campus parking garage. This number is insufficient to meet growing demands of the electrification of vehicles on campus. A solar microgrid with integrated EV charging should be considered to meet these needs. However, encouraging EV charging on campus increases total electricity consumption.

METHODS

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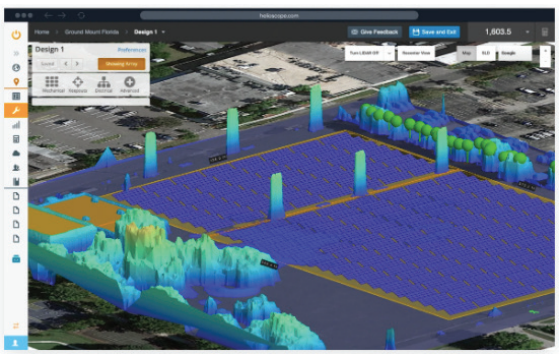
TECHNICAL ANALYSIS:

We used Helioscope for technical analysis to use the tools in the solar market, as well as to analyze past data, collect data, and demonstrate results. We illustrated a plan for transitioning to sustainable energy. We aimed to create methods on how to approach carbon neutrality. Helioscope helped us quantify the amount of energy that could be produced by our suggested microgrids plan based on Pomona's geography.

HelioScope



DATA ACQUISITION:

We analyzed data from schools with similar sizes and energy demands. We applied daily and monthly energy trends from Pomona. We also used reference studies of projects done by Gridscape that helped shape the course of our feasibility study. We looked at two studies , the Riverside Community College and Menlo Park studies. Both of these were much larger projects done by Gridscape that utilized ground and rooftop mounted solar panels as well as EV charging carports.

The Riverside Community College District study gave us an important framework to evaluate our own feasibility study through their holistic multi-purpose microgrid plan. Furthermore, a feasibility study done in Menlo Park gave us an insight into the Energy Saving Analysis and the use of carports as an option for our study. We used these studies as a starting off point to further look into implementing carports as our solution to the energy problem.

CHALLENGES 04

INSTITUTE BARRIERS:

We faced a number of challenges while undertaking this project. These included motivating people to start transitioning to solar energy. It is difficult for people to make and agree upon decisions, especially given the high financial costs of grid construction. Finding people with both interest and influence over solar energy transitions is also difficult to do. There were time restrictions present; often, it takes two to three years for decisions like these to be made.

If implemented, solar microgrids can be stressed by energy demand; finding ways to destress the grid can be complicated. The stability of microgrids is also unpredictable as a function of energy demands. Environmentally, shade changes determine feasible locations for the microgrid. There are also aesthetic concerns barring construction from taking place, such as a Not In My Backyard mindset from people who may not want nearby construction.

THEORETICAL CHALLENGES:

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ADVISORY STATEMENT:

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PROPOSAL

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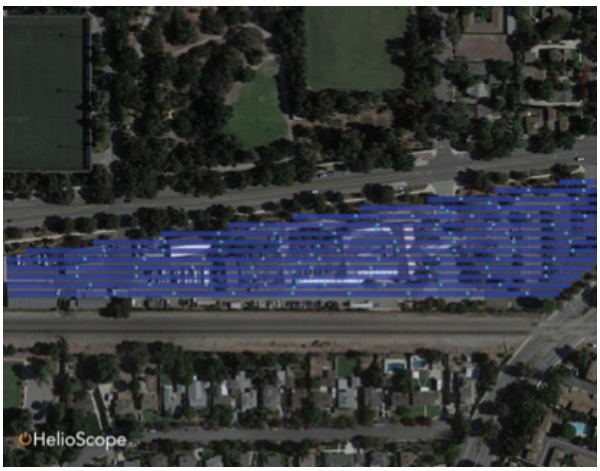
CONTEXT:

In its annual SAVE (Sustainable Action, Visible Effects) report, Pomona College outlines its goal to meet 10% of its energy needs with on-campus renewables at 1.4%. The TCCS South property is a suitable location for the biggest solar array. Though it is used by TCCS staff, this area is owned by Pomona College, and would count towards the on-campus production goal of 10% of Pomona's energy needs met by solar energy. We used Helioscope to map a carport. This could lower the albedo to mitigate Urban Heat Island effects.

The TCCS building roof is suitable for rooftop PV panels, unlike many of the campus roofs, because it is not consistent with the current architecture style, the aesthetics of which are valued by the Pomona College administration. As TCCS staff are involved in the decision-making process for infrastructural projects, we hope the visibility of the benefits of this project may spur further efforts to meet Pomona's energy goals.

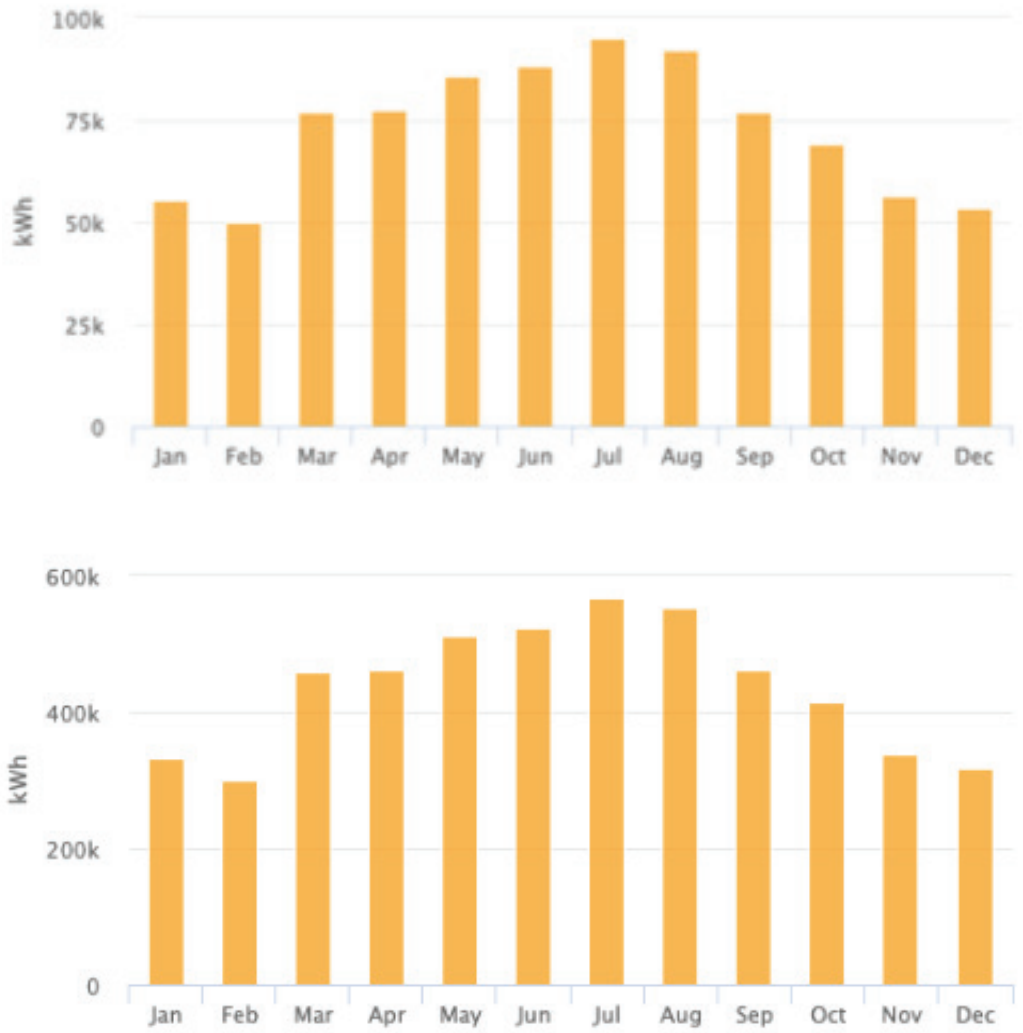


IMPACTS

06

IMPACTS:

As pictured in the first design, this proposed carport array would be capable of producing 875.7 MWh annually after accounting for system losses. The monthly production breakdown can be seen below.



EXECUTIVE SUMMARY

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RECOMMENDATIONS INCLUDE:

7.1 Providing more resources and consideration to create energy independence at Pomona and expand clean energy goals on campus.

7.2 A solar microgrid system would be well suited to meet these needs. In terms of progressing towards Pomona's current energy goals, we propose a solar carport installation at the TCCS parking lot.

7.3 Additionally, the Claremont Colleges should consider buying electricity from the Clean Power Alliance of SCE, which may be a financially efficient way to decrease the campus' carbon footprint.

7.4 Encouraging a joint 7C effort to make the campuses self-sufficient for clean energy and streamline energy decisions would also be beneficial.

CONCLUSION 08

WE CONCLUDE:

While microgrids can be a feasible way to achieve sustainable energy, efforts to reach Pomona's 2030 goal of 10% on-campus renewable energy generation do not require the implementation of a full microgrid system with energy storage. If and when Pomona or the 7Cs set more ambitious goals or determine that energy independence and reliability should be higher priorities, microgrids become more feasible. Development of a streamlined decision process for sustainability would reduce inertia and accelerate project timelines.

We have also identified an ideal location for future solar integration at Pomona. The college has the capacity, space and need for the installation of solar carports at the TCCS parking lot. Such an installation would not only represent the biggest step so far towards achieving Pomona's sustainable energy development goals, but would furthermore provide tangible benefits including shade, heat reduction, and EV charging spots for the TCCS employees and visitors who park in this area and are involved in campus energy decisions.