

## Background

Advanced Energy Communities (AECs) in California assist in accelerating deployment of renewable energy resources from 27% at present to 33% by 2020.



AECs achieve net zero energy with onsite renewables and storage to improve grid reliability and resiliency. Best practices are developed to be replicable and scalable by other communities.

**Phase I:** Two year feasibility study with \$1.9M from CEC EPIC grant; senior design projects to be incorporated into phase I.  
**Phase II:** Construction of AEC with \$8M CEC EPIC grant plus \$8M cost share following completion of phase I.

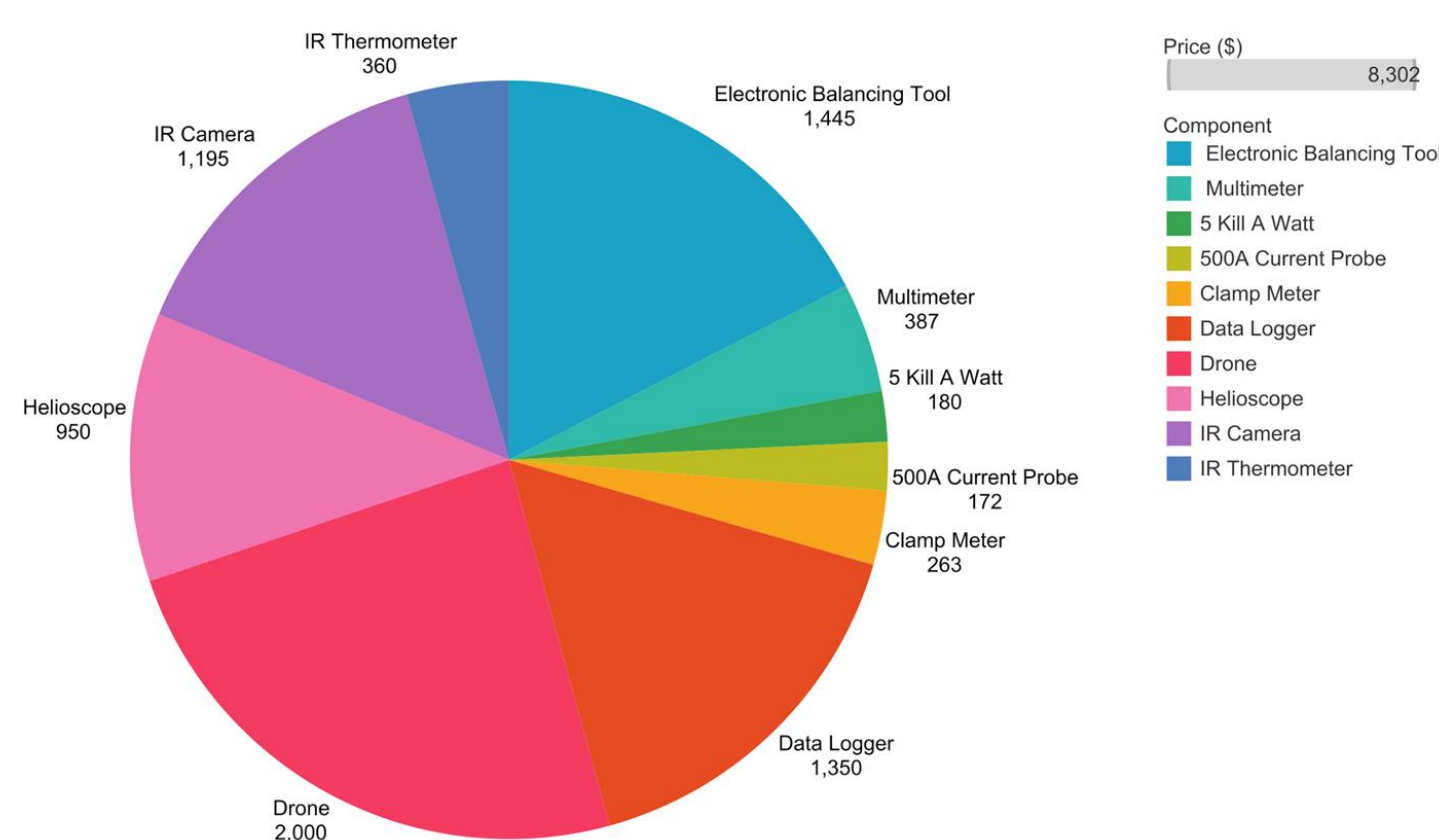
## Goals & Objectives

Contribute to a feasibility study of a solar powered microgrid within the low-income community of Oak View; a neighborhood in Huntington Beach, CA. Our objective being to conduct an energy demand study of Oak View to better understand the extent of retrofit needed to supply its energy needs with a solar microgrid.

## Requirements

- Commission a representative portion of the community.
- Estimate energy demand for calibration and benchmarking.
- Determine emissions for present energy demand.
- Research built environment thermodynamic principles.
- Model the energy demand of the community in Open Studio.
- Compare aggregate grid demand to solar PV potential.

## Budget

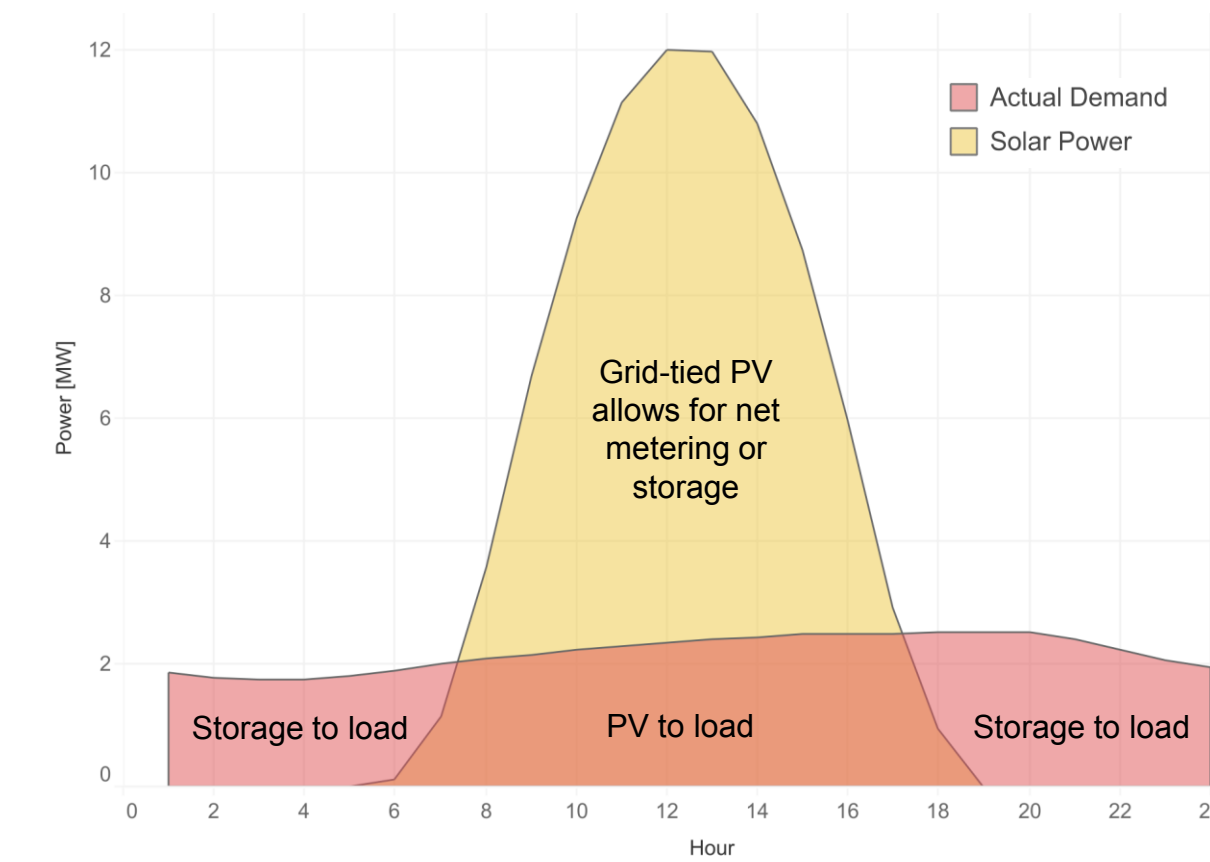


Commissioning the Oak View community has been critical in calibrating energy modeling against real-world building diagnostics. Energy auditing continues at the Rainbow solid waste facility. The budget reflects the plethora of tools necessary to collect sufficient building diagnostics at an urban scale.

## Design and Innovation

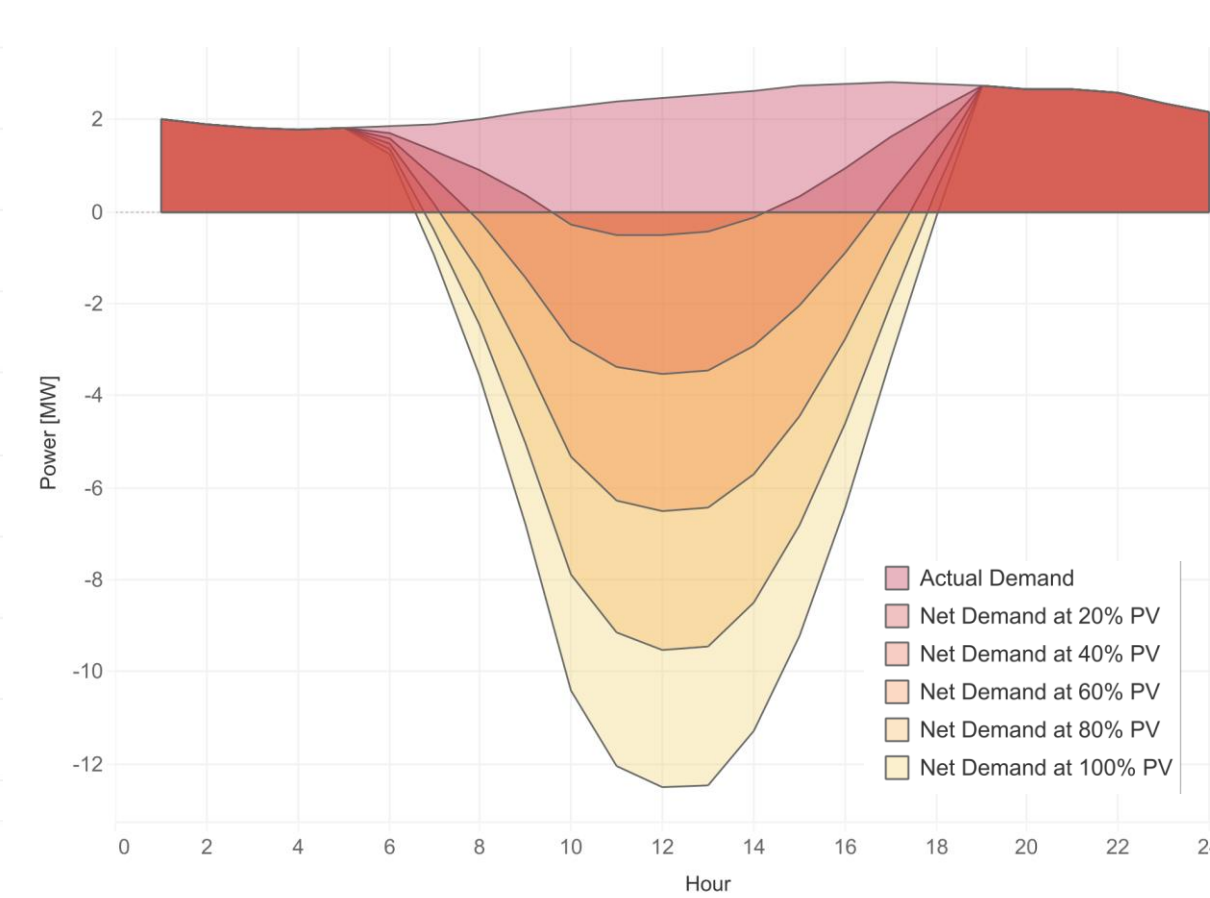


Annual Zero Net Energy Grid Management Strategy



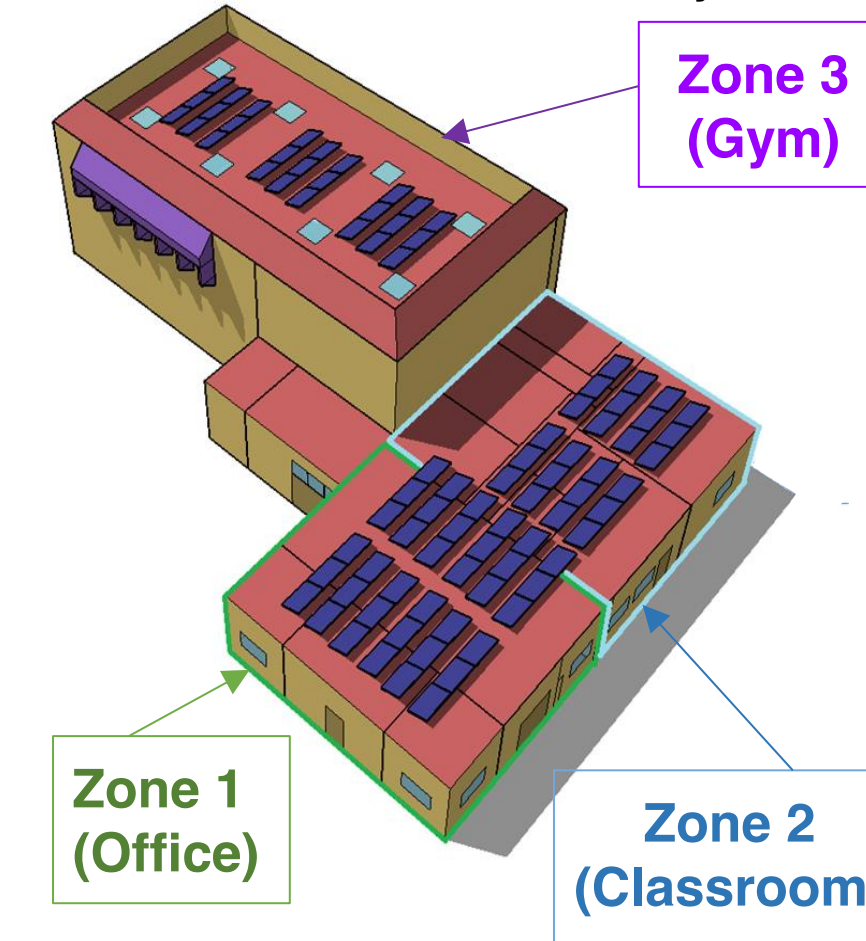
Storage and grid flexibility allow for management of solar production in the community; mitigating ramp rates and providing evening power.

Net Demand with Increasing Solar Capacity Sans Storage

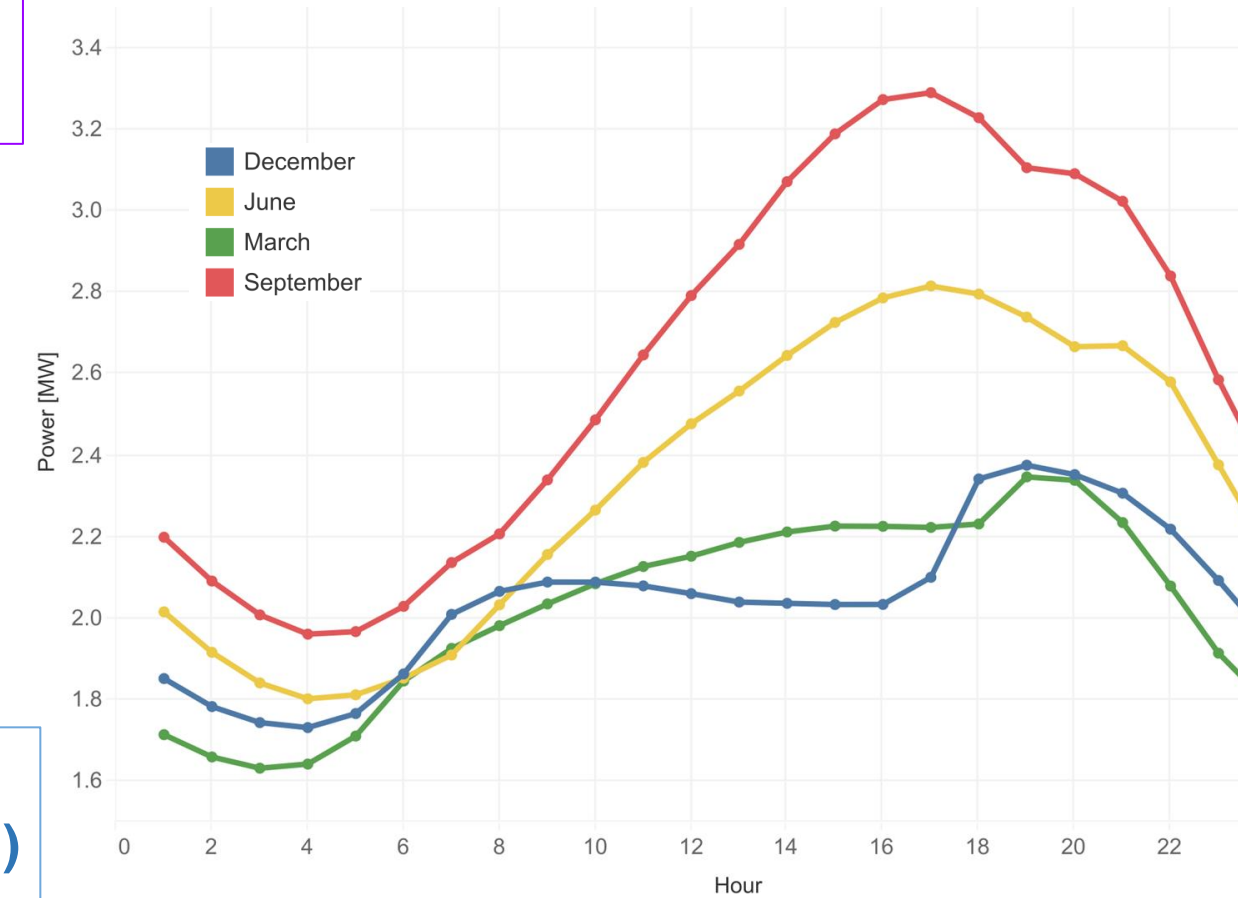


Net demand midday drop is driven by increased solar capacity, and creates a steep ramp-up starting in the afternoon and into the evening.

Retrofitted Oak View Community Center



Seasonal Demand



Energy modeling best practices require understanding of building type, zone use, and HVAC.

Actual demand for energy in Oak View changes significantly with the seasons. Aggregate energy modeling data is benchmarked against utility data.

## Timeline

### FALL Past Work

- **Sept. 29th:** Begin literature review and research into cost, emissions, and theory.
- **Oct. 14th:** Begin calibrating energy modeling against FRC Building data.
- **Oct 28th:** Begin commissioning the community at large as accessible.
- **Nov 11th:** Finish research into grid cost structure, greenhouse gas emissions, and thermodynamic principles.

### WINTER Current Status

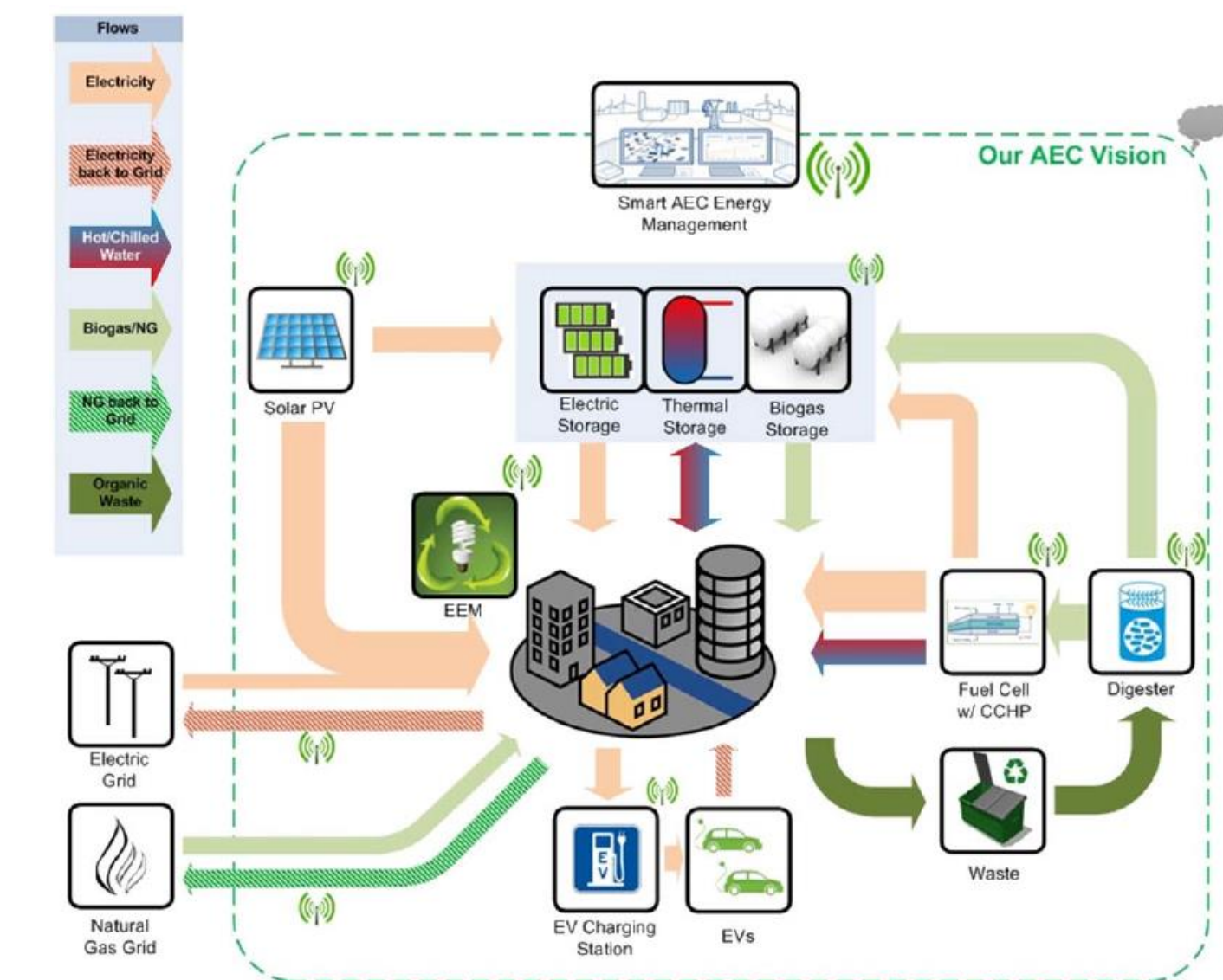
- **Jan 17th:** Identify additional software and tools needed.
- **Jan 19th:** Develop benchmarking methodology for aggregate data.
- **Jan 24th:** Finalize Community Building calibration.
- **Feb 7th:** Begin modeling energy modeling of 30 representative building types for community.

### SPRING Next Steps

- **May 29th:** Finish modeling building types.
- **June 9th:** Finish analysis by comparing models to benchmarked demand data via Energy Use Intensity methodology (energy/area by building type), and comparing results to solar PV potential.

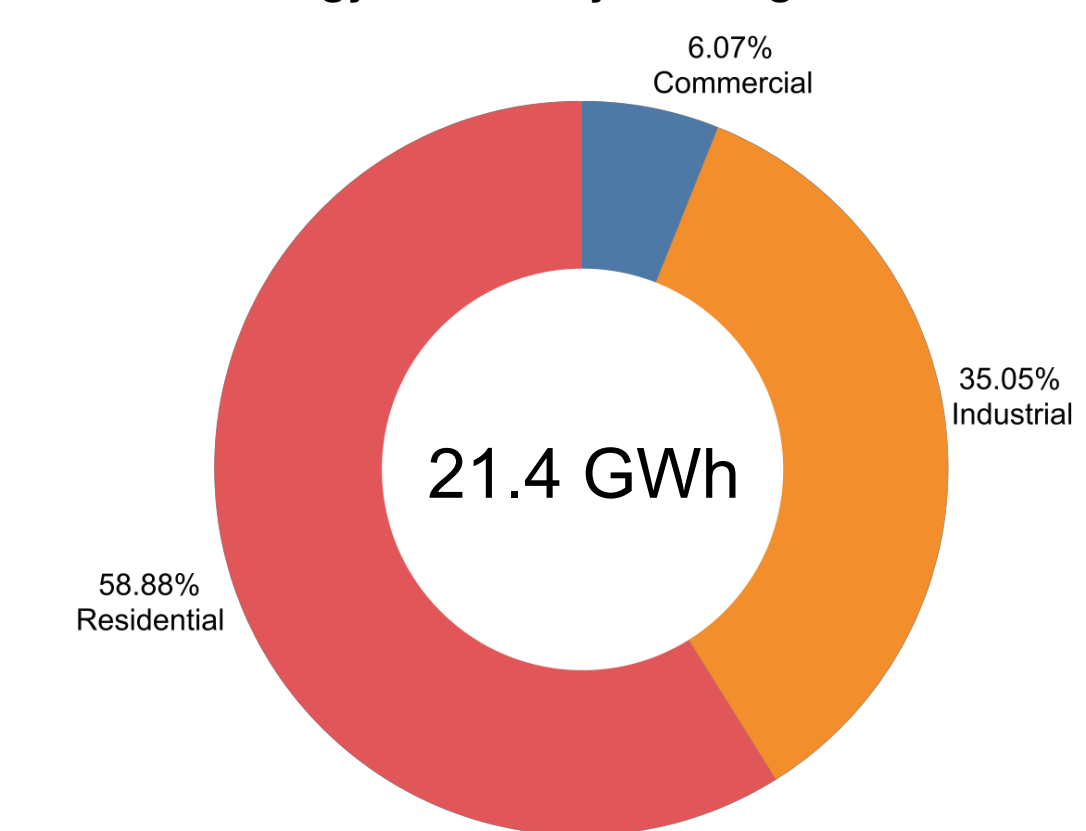
## The Bigger Picture

AECs generate more solar energy than needed while waste is processed within and turned into energy when feasible, and extra electricity and gas flow back into the grid.



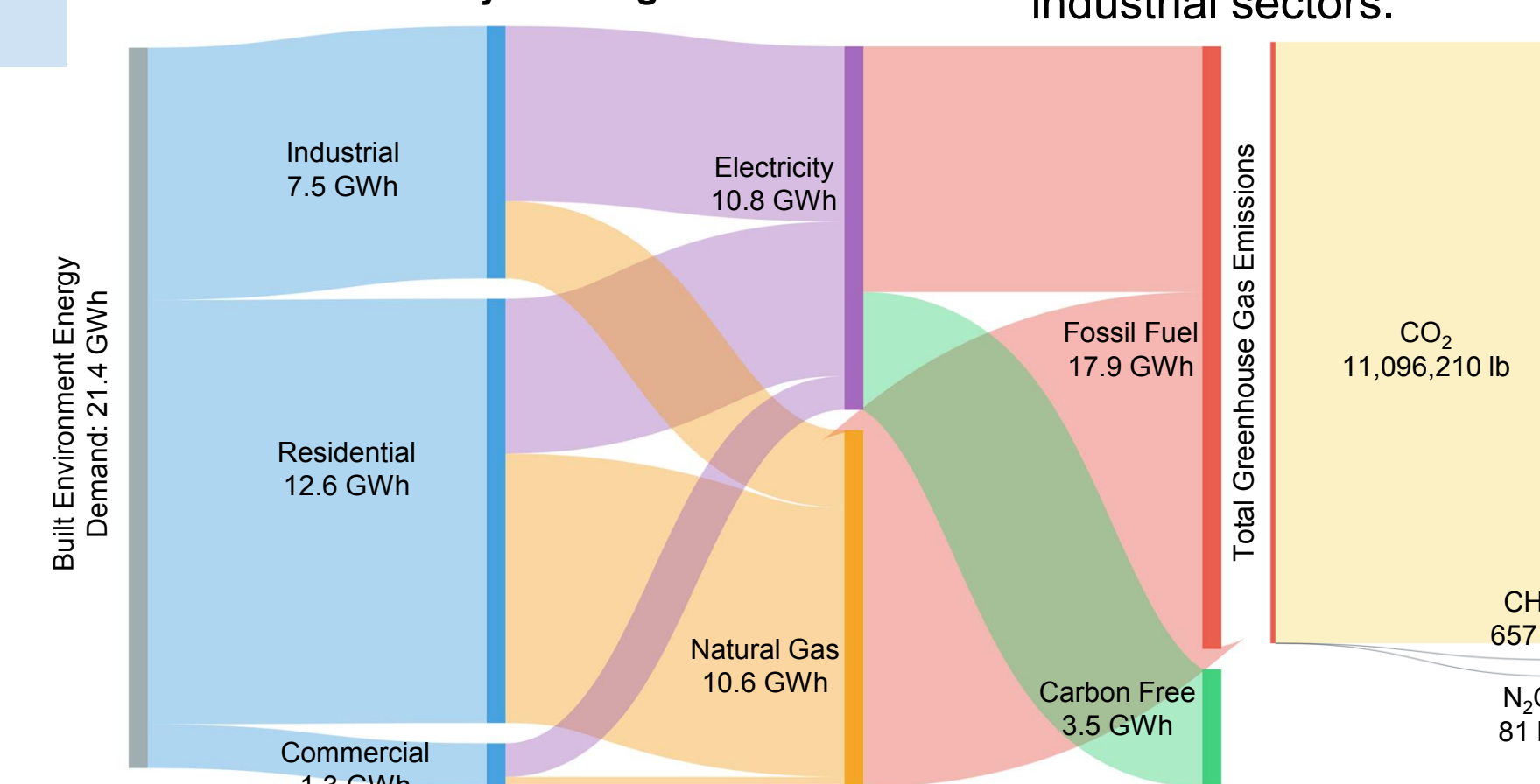
## Estimation

Annual Energy Demand by Building Sector



Oak View's energy demand is largely driven by its residential and industrial building sectors.

Annual Emissions by Building Sector



Oak View's built environment contributes significantly to its greenhouse gas emissions, and is clearly dominated by its residential and industrial sectors.