# Advanced Energy Community

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## Background

Advanced Energy Communities (AECs) in California assist in accelerating deployment of renewable energy resources from 28% at present to 33% by 2020.

These communities achieve net zero energy with onsite renewables and storage to improve grid reliability and resiliency. By avoiding construction of new transmission and distribution lines, AEC best practices can be replicated and scaled to improve upon existing infrastructure.

## Goals & Objectives

The California Energy Commission (CEC) has identified the low income community of Oak View in Huntington Beach, CA as a good candidate for an AEC demonstration project.

In order for the community at large to achieve zero net energy, the energy demand of its building stock must be dramatically reduced.

## Requirements

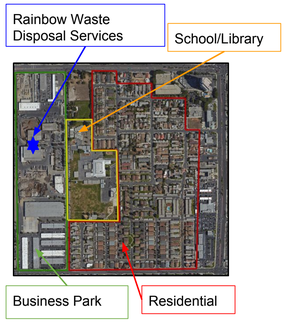
*Fall Quarter - Best Practices*
- Energy modeling via Open Studio with Energy Plus
- Building diagnostics
- Thermodynamic theory
- Research retrofit techniques

*Winter Quarter - Community Analysis*
- Development of business model
- Optimization of energy model
- Model entire community

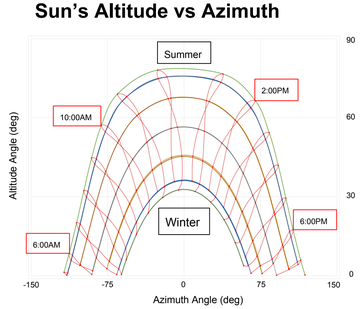
*Spring Quarter - AEC Scenarios*
- Best practices to inform building life cycle analysis
- Comparison of different scenarios:
  - ➔ Business as usual
  - ➔ Optimal solution
  - ➔ Money is no object

## Design and Innovation

**Community Overview**

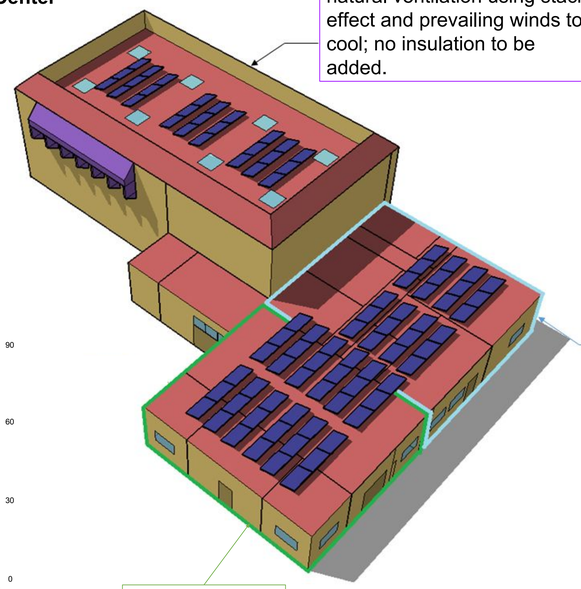



**Sun's Altitude vs Azimuth**




Passive solar design requires understanding of seasonal sunpath

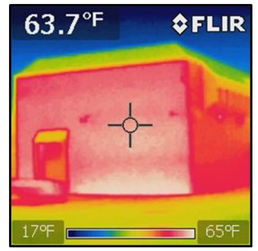
**Retrofitted Oak View Community Center**



**Zone 3 (Gym)**
Operable windows allow for natural ventilation using stack effect and prevailing winds to cool; no insulation to be added.

**Zone 1 (Classroom)**
This zone will be insulated with a foam wrap.

**Zone 2 (Office)**
This zone will be insulated with a foam wrap.




Non-insulated walls of the gym show evening winter heat gradient of the gym.

Aerial view of the existing Community Center

**Retrofitting**
- Lighting: upgrade to LEDs
- HVAC Zones: operate independently based on occupancy and schedule with Zone 1 and 2 using split systems, and Zone 3 utilizing operable windows and a large commercial ceiling fan
- Air Handler Units (AHUs): to be removed for solar panels, and to phase out R-22 refrigerant which utilizes ozone depleting chlorofluorocarbon (CFC's)
- Energy Management Control System: to control building's MEP systems and integrate with Huntington Beach's central control for improved Operations and Management

**Economics**
- Building Life Cycle Analysis for building retrofits within the community to include projected payback period for energy upgrades and greenhouse gas emissions reduction
- Use a cost effective approach to energy savings with attention paid to lighting, HVAC, envelope, and controls

## Timeline

**FALL** — BEST PRACTICES

**WINTER** — COMMUNITY ANALYSIS

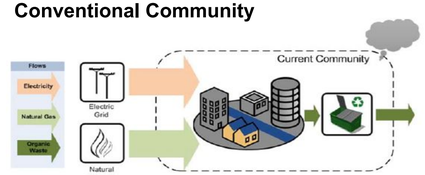
**SPRING** — AEC SCENARIOS

**Current Status**
- Developing energy model and building diagnostics of the Oak View Community Center to understand retrofit best practices.

**Next Steps**
- Design and apply best practices to the Oak View community at large based on community center retrofit, and compare and contrast different energy reduction scenarios for the community.

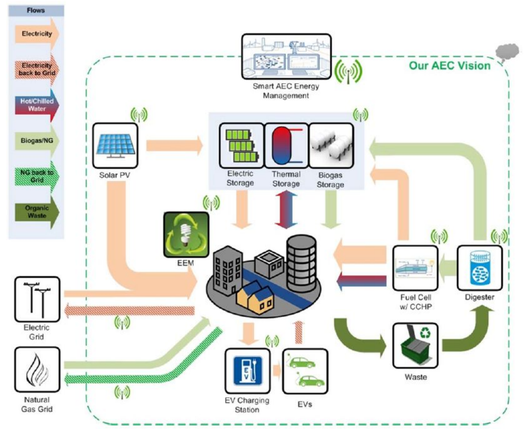
## The Bigger Picture

**Conventional Community**




External electricity and natural gas enter the community. Waste, recyclable waste, and emissions leave the community to be processed elsewhere.

**AEC Community**




Resources enter the community and are generated internally. The waste is processed in the community and extra electricity and natural gas flow back into the grid.

The proposed work will combine regulatory streamlining strategies with a real-world development example to produce an Advanced Energy Community, and a case study that describes the actions, challenges and lessons learned from the project.

## Budget

**Phase I:** Two year feasibility study with $1.9M from CEC EPIC grant; senior design rolled into phase I with a complementary budget of $1,280 for incidentals.
**Phase II**: Construction of AEC with $8M CEC EPIC grant plus $8M cost share following completion of phase I.

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