



HB Advanced Energy Community

1. Overview of AEC project, Oak View community, and AEC Vision
2. Community challenges and outreach
3. Financial and business models
4. AEC design tools
5. Current AEC design
6. Future work



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Advanced Energy Community (AEC) Award

*Huntington Beach Advanced Energy Community
“A Scalable, Replicable, and Cost-Effective Model for the Future”*

- **GOAL:** Develop extensible tools and plan and design the integrated set of energy infrastructure and advanced energy technology approaches to convert the Oak View community of Huntington Beach into an AEC

Funding: California Energy Commission (\$1.5M); UCI (\$320K);
SCE (\$200K); SoCalGas (\$150K)

Partners:

- City of Huntington Beach
- Altura Associates, Inc.
- National Renewable Energy Laboratory
- Southern California Edison
- Southern California Gas Company

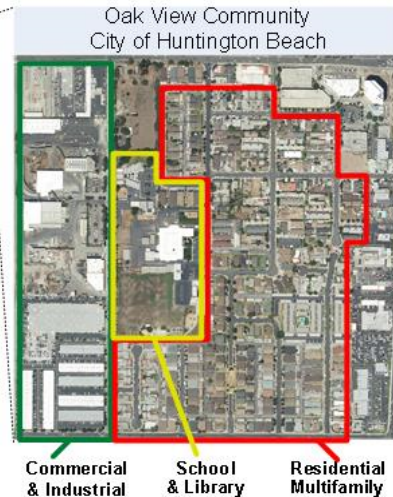


Oak View Community

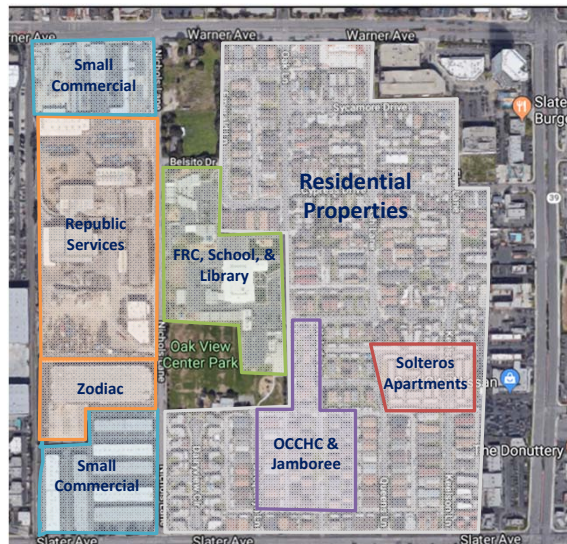


Oak View by the Numbers

CalEnviroScreen 3.0 score is 76 - 80%
 Average household size is 7 occupants.
 A dense, 1-square-mile neighborhood with a population over 10,000.
 The crime rate is 200% that of Orange County.
 70% of those 25 or older lack a high school diploma or GED.
 97% of students qualify for free or reduced-price lunch.
 Only 48% of those 16 and over are employed.
 Per capita income in Oak View is \$16,700 vs. \$31,400 for Orange County.
 Facilities: 1 primary school, 1 library, 1 community youth center, 1 small park and 2-3 community-based non-profits



Oak View Community



Residential:

- Primarily multifamily, pre-1985 constructed residencies (4- or 5-plex)
- Contains portion of affordable housing units (OCCHC and Jamboree)
- Energy Use Profile: lighting, interior plugload, domestic water heating (very minor space heating and cooling)

Commercial:

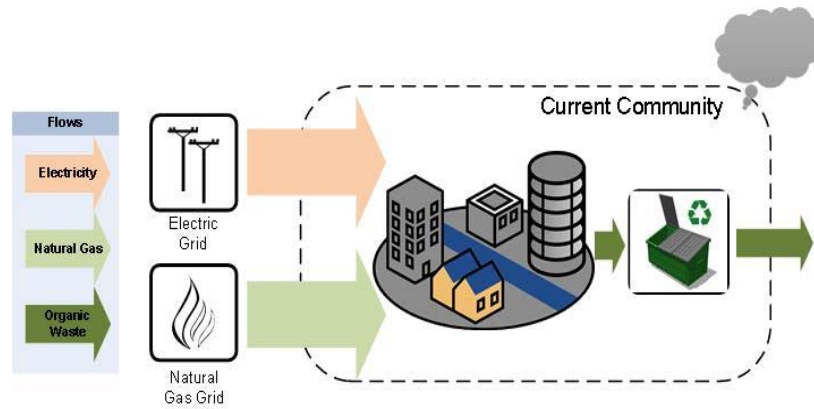
- Small Commercial Buildings (small shops)
- FRC, School and Library

Industrial:

- Republic Services – waste and materials processing facility
- Zodiac – aerospace manufacturing



Conventional Community Design

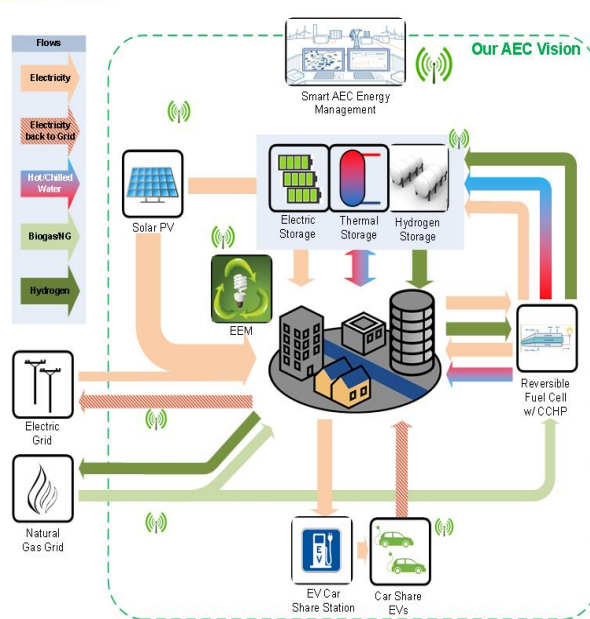


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Advanced Energy Community Concept



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Challenges & Solutions

	
Cost of energy not a priority	Focusing on other incentives, health benefits, job opportunities, education for children.
Locating space for workshops that was not already in use for other community services	Adapting to available space at the Oak View Family Resource Center and changing outreach strategy
Loss of Civic Spark Fellow	Increased use of City staff and hiring of consultant
Fear of Gentrification	Building trust, attending community events, increased outreach to community leaders and social workers
Need for Childcare	Allowing children to attend workshops with their parents and increasing interactive learning exercises

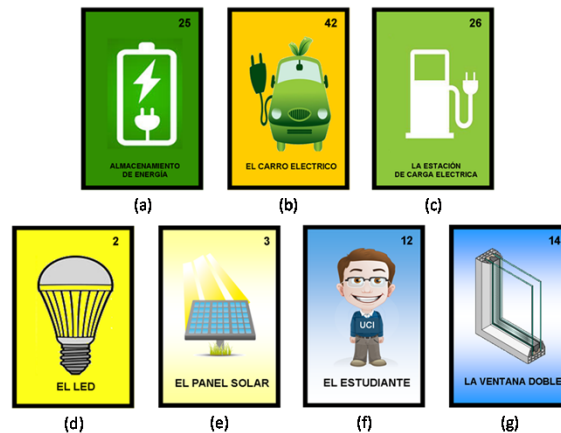


Community Outreach Goals

- **Energy and AEC education**
 - Novel literature design
 - Workshop development
 - Student education
- **Green collar career development**
 - Education/certification requirements
 - Identify and overcome barriers to Oak View workforce development



Energy and AEC Education: Literature



Novel Loteria cards designed to help inform the community about the AEC project, including (a), electric energy storage, (b) electric vehicles, (c) EV charging (d) LED lightbulbs, (e) solar panels, (f) student researchers at UCI, and (g) double paned windows



Energy and AEC Education: Workshop

- Weekly class open to all
 - February 27 – March 27
- Includes project
 - Potential Benefits
 - Technologies
 - Support other outreach



CLASES DE ENERGÍA LIMPIA

CLASES INICIAN
EL 27 DE FEBRERO A LAS 6 PM

CENTRO DE RECURSOS FAMILIARES DE OAK VIEW
(OAK VIEW FAMILY RESOURCE CENTER)
17261 Oak Lane
Huntington Beach, CA 92647

VENGA APRENDER SOBRE:
EL AHORRO DE ENERGÍA, TECNOLOGÍA
LIMPIA Y RECURSOS Y EMPLEOS DE
ENERGÍA LIMPIA.

INFORMATE:
HAZ LA DIFERENCIA

HORARIO DE CLASES:
2/27 DE 6-7 PM
3/6 DE 6-7 PM
3/13 DE 6-7 PM
3/20 DE 6-7 PM
3/27 DE 6-7 PM

INSCRIPCIÓN GRATIS:
(714) 536-5265



Energy and AEC Education: Student Education

- Out-of-School Time Energy Program (OSTEP)
- Partners with Oak View Branch Library and Oak View Boys and Girls Club
- Weekly program introduces:
 - Energy concepts
 - Electricity
 - Energy efficiency
 - Renewable energy
 - Water-Energy-Nexus
 - Climate and pollution concepts
 - Fuel cells
- To start April 11th

VOLUNTEER OPPORTUNITY

FREE TRAINING!

TEACH K-5TH GRADERS HANDS ON STEM LESSONS

LOOKING FOR EXPERIENCE WORKING WITH KIDS?
SIGN-UP TO BE AN EDUCATION AMBASSADOR!

- ✓ Get trained in teaching OSTEP, an Out-of-School Time Energy Program focused on environmental and sustainability concepts
- ✓ Gain experience in the field teaching elementary aged students
- ✓ Book volunteer or professional development hours!

DATE: TO LAUNCH APRIL 2018
LOCATION: OAKVIEW BRANCH LIBRARY, HUNTINGTON BEACH
CONTACT: ASHLEY HOOVER AT AHOOVER@ENERGYCOALITION.ORG

OSTEP is a program of the Energy Coalition, a 501(c)(3) non-profit organization. The program is funded by the City of Huntington Beach and the Huntington Beach Library. The program is a partnership between the City of Huntington Beach, the Huntington Beach Library, and the Energy Coalition. The program is a partnership between the City of Huntington Beach, the Huntington Beach Library, and the Energy Coalition. The program is a partnership between the City of Huntington Beach, the Huntington Beach Library, and the Energy Coalition.



Workforce Development

- Modeled after Emerald Cities Initiative Los Angeles programs
- Identified 40 green collar options
 - Electrical engineers to electrician
- Identified barriers
 - Education (college to GED)
 - Soft skills and language
 - Financial aid
 - Supporting services (ex: childcare and transportation)
- Plan: translation of information to booklets

Specialized Craft

Electrician (inside wireman)

Skills To Be Learned

Apprentices will learn to install, maintain and repair many types of electrical equipment and electronic systems in residential, commercial and industrial establishments. Apprentices will also learn lighting, power and controls in any premise.

Wages

Hourly wages start at \$15.36 for entry-level apprentices and \$36.40 for journeymen.

Benefits

Health and pension plan

Contact

Electrical Training Institute
Brett Moss, Western Training Director
6025 S. Garfield Avenue
City of Commerce, CA 90040
(323) 517-6910 phone
(323) 725-0623 fax

www.taett.com

When to Apply

The dates for 2014 are February 26, 2014 and October 22, 2014.

8:30 AM to 10:00 AM

Length of Program

Typically, during the term of your apprenticeship you will work 8,000 hours on-the-job for a five-year program with various electrical contractors. In addition, you will attend school for 1,200 hours during the five-year period. Wages start at a percentage of full journeyman pay and increase in increments through graduation to full pay.

Requirements

Algebra is a requirement. Either a year of high school algebra with a "C" or better or one semester of college algebra with a "C" or better. Also, a current valid ID is required to apply, and a driver's License is strongly recommended.

Union

International Brotherhood of Electrical Workers Local 11



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Technology/Knowledge Transfer

- AEC website
- Conferences
 - 12 presentations and counting
 - CEC
 - HB Chamber of Commerce
 - OCSustain
 - ICEPAG
- Press attention
 - Daily Pilot
 - Orange County Register



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Financial and Business Model

Phase II Focus:

- 1. Assess available funding sources and procurement options to create framework for scalable AEC design**
- 2. Establish partnerships with impactful organizations to maximize project success and to leverage required grant cost share**
- 3. Work with partners to explore creative funding mechanisms that fit the AEC model**
- 4. Iterate F&B model and community design to create final AEC plan**



Snapshot – F&B Model Options

Variety of potential financial and business models explored –

Common Financial Models	Power Purchase Agreement (PPA)	Shared Savings Contract	Operating/Capital Lease	Energy Savings Performance Contracts (ESPC/ESCO)
Loan Programs	Home Energy Upgrade Financing (HEUF)	Affordable Multifamily Financing Pilot Program	Property Assessed Clean Energy (PACE)	On-Bill Financing
Grant Programs	Low-Income Weatherization Program (LIWP)	Low-Income Energy Assistance Program (LIHEAP)	Community Development Block Grants (CDBG)	School Facilities Modernization Grants
Rebates and Incentives	Solar on Multifamily Affordable Housing (SOMAH)	Single-Family Affordable Solar Homes (SASH)	Energy Savings Assistance (ESA) Program	Utility Rebates and Incentives
Other Opportunities	Public-Private Partnerships	Preferred Resources Pilot (PRP)		

High-Potential Options: PPAs, ESA, SOMAH/SASH, PACE, LIWP/LIHEAP

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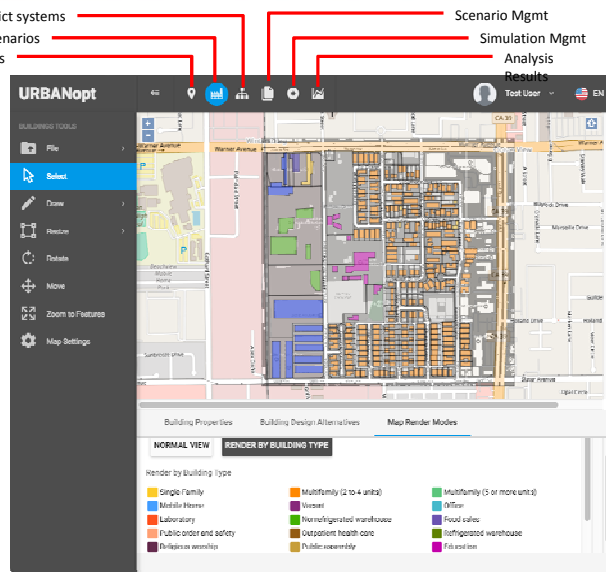
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URBANopt: Enabling Community-Scale Analysis

- **Computational framework**
 - Powered by DOE's OpenStudio and EnergyPlus
- **Deployed at**
<http://urbanopt.net>
- **Bulk data entry for Oak View community buildings complete**
- **Preliminary testing with simple design scenarios complete**
- **Adding additional modeling input (DEER) assumptions, EEMs, and reporting now**



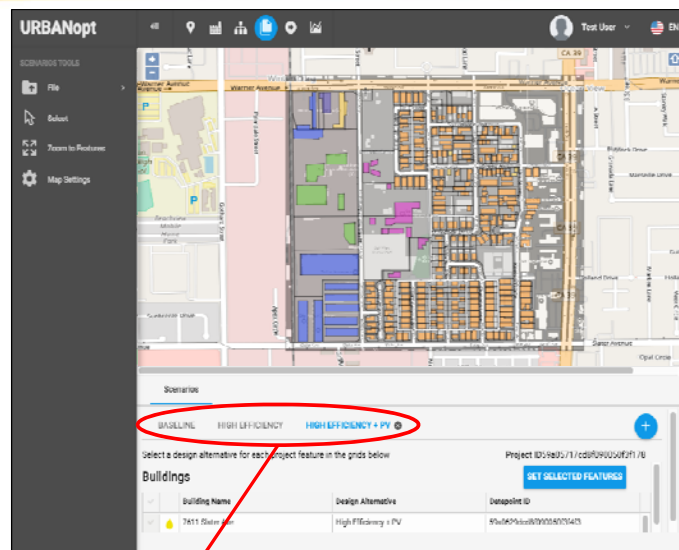
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URBANopt Scenario Analysis Testing

- **Rapid construction of design scenarios:**
 - Selection of building EE measures
 - Addition of rooftop PV
 - Construction of district systems
 - PV
 - Central heating/cooling plants
 - More
- **Cloud-based, scalable simulation**
 - Enables analysis of the community's 300+ buildings
 - Multiple design alternatives



Customizable scenarios can be applied to any or all buildings

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Early URBANopt Analysis Results for Oak View



Improved lighting and
plug load efficiency

Rooftop PV

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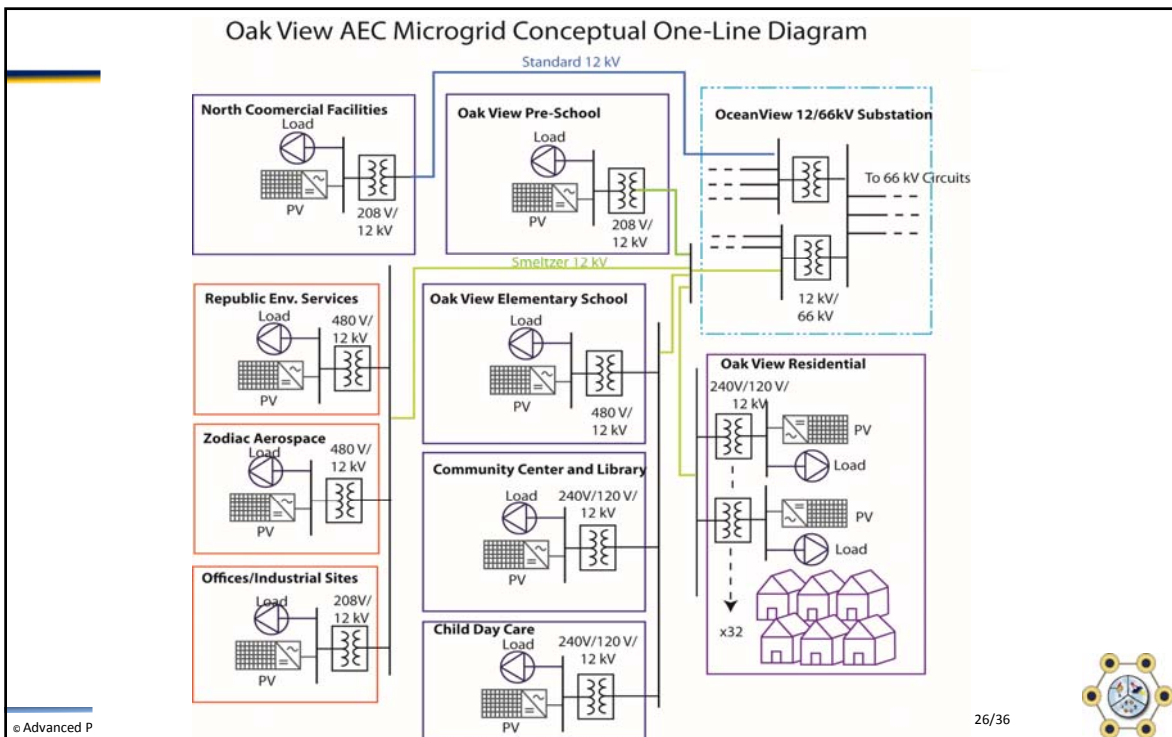
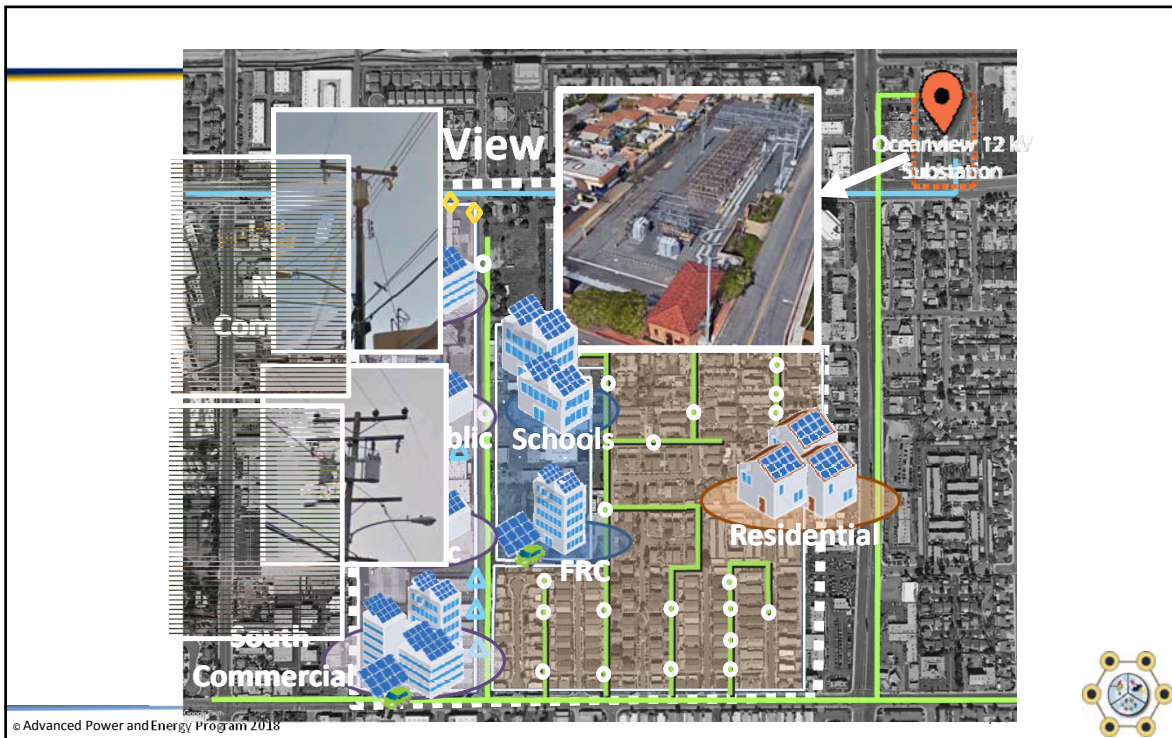
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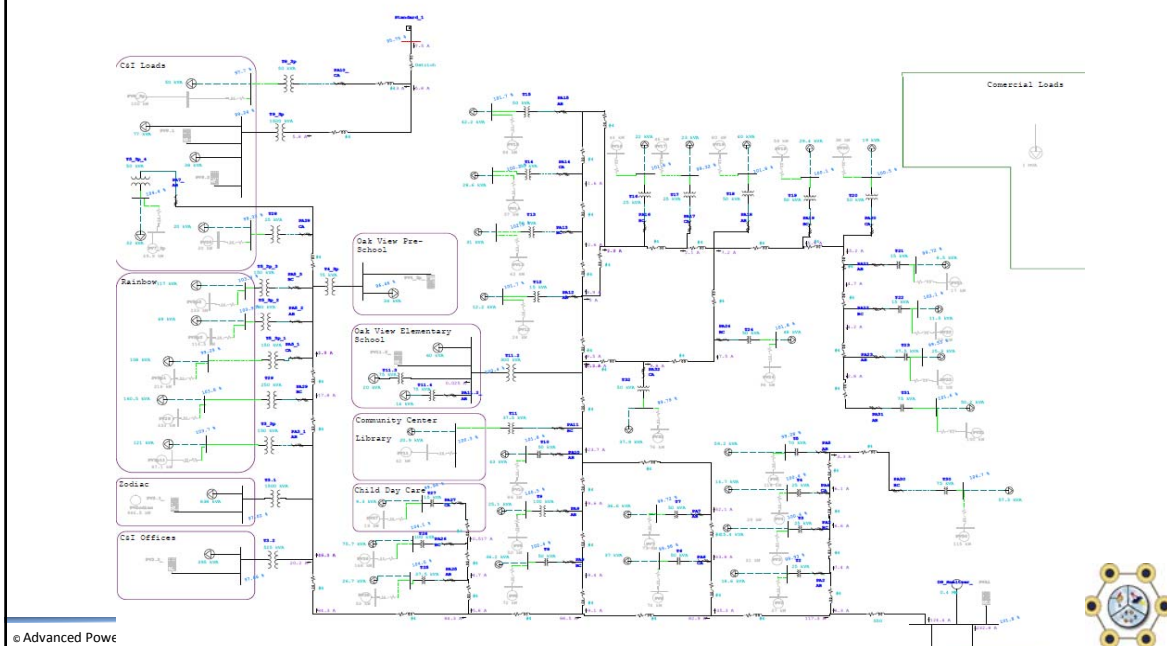
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AEC grid model: Peak Load/No PV



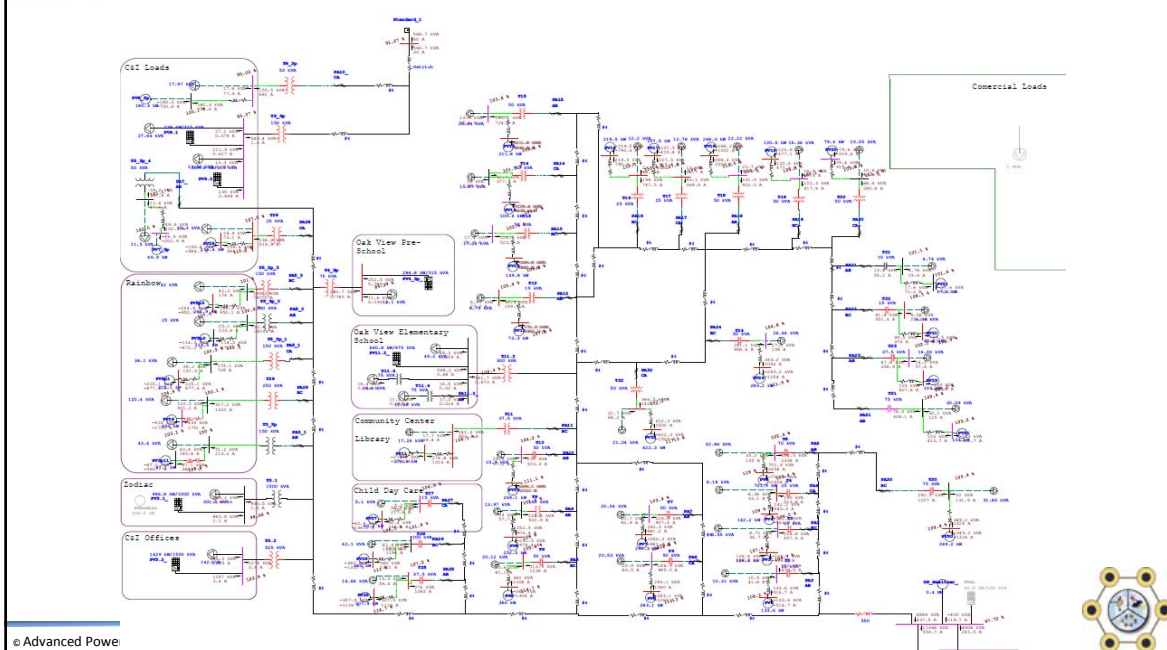
What Happens With Maximum Solar PV?



- C&I: 7.42 MW
- School Commercial: 1.38 MW
- Residential total: 6.06 MW
- Community Total: 14.86 MW



AEC grid model: Peak Load/Peak PV



Grid Constraint Solar PV Capacity



- C&I: 3.62 MW
- School Commercial: 0.67 MW
- Residential total: 1.73 MW
- **Community Total: 6.02 MW**



AEC Case Studies

Case Study	ECM Item 1	ECM Item 2	ECM Item 3	ECM Item 4	DER Item 1	DER Item 2	Budget Constrained (Y/N)
A	Maximize ECMs				Maximize Solar PV	Battery Storage for PV	N
B	Maximize ECMs				Maximize Solar PV	Battery and EVs	N
C	Maximize ECMs				Maximize Solar PV		N
D					Maximize Commercial & Industrial Solar PV		Y
E					Maximize Residential Solar PV		Y
F	Maximize ECMs				Rooftop Solar PV		Y
G					Rooftop + Canopy Solar PV		Y
H	All ECMs						Y
I	LED Lighting				Canopy Solar PV		Y
J	LED Lighting				Rooftop Solar PV		Y
K	LED Lighting	Appliances and Plugload*			Canopy Solar PV		Y
L	LED Lighting	Appliances and Plugload*	Envelope Upgrade*		Canopy Solar PV		Y
M	LED Lighting	Appliances and Plugload*	Domestic Hot Water Upgrade*		Canopy Solar PV		Y
N	LED Lighting	PPL Retrofit**			Canopy Solar PV		Y
O	LED Lighting	Appliances and Plugload*	PPL Retrofit**	Domestic Hot Water Upgrade*	Canopy Solar PV	Battery Storage for PV	Y
P	LED Lighting	Appliances and Plugload*	PPL Retrofit**	Domestic Hot Water Upgrade*	Canopy Solar PV	EV Shared Use	Y

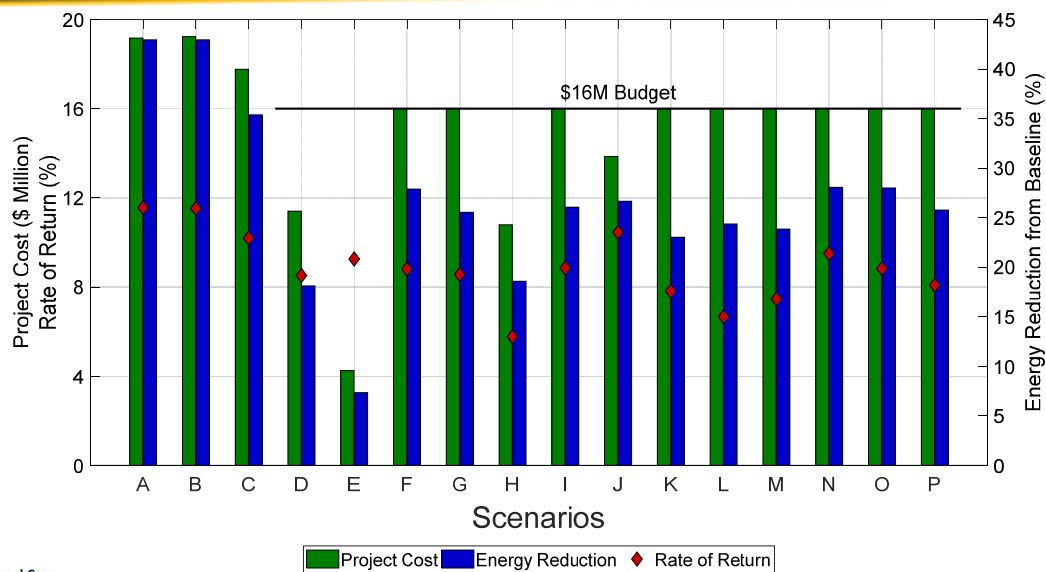
PPL: Plug and Process Load
DHW: Domestic Hot Water

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Case Studies with Energy Efficiency, Solar PV, with Storage



Optimal Case –

- Case O: 3 MW solar, 1.1 MW battery storage, LED lighting, appliance and PPL retrofits, and DHW retrofits
- Case O presents a good balance between balances costs, rate of return, energy savings, and use of advanced technology

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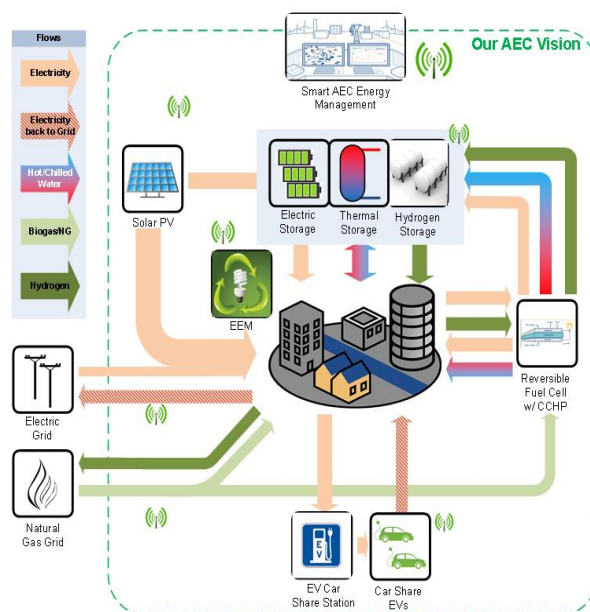


Other Design Topics/Future Work

- Car share
- Optimal solar PV and energy storage placement and sizing
- Multiple solar PV designs/scenarios
- Renewable gas production from waste transfer station
- Novel community control strategies



Advanced Energy Community Concept



Thank You!

- **California Energy Commission**
 - Rachel Salazar
- **Local Government Commission**
 - Cary Garcia
- **The City of Huntington Beach**
 - Antonia Graham
- **Ocean View School District**
 - Gina Clayton-Tarvin
- **Republic Services**
- **Oak View Community**



Questions?

