

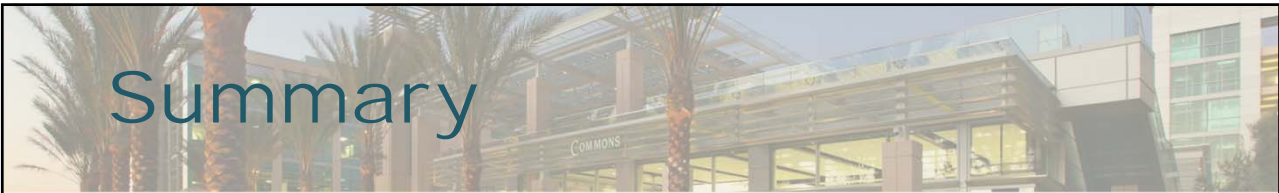


Zero Energy Initiatives

At The County of San Diego



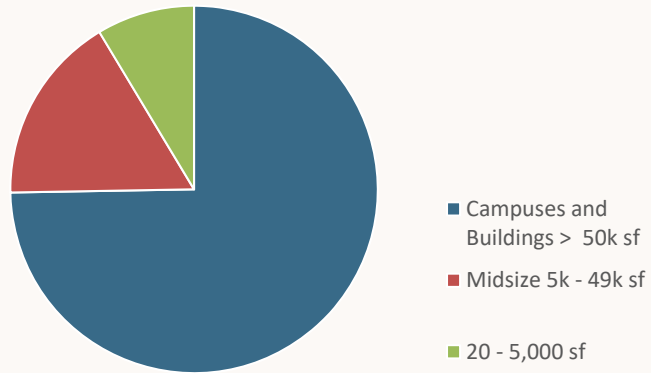
1



Summary

- **10,000,000 GSF**
- **1,000 facilities**

San Diego County Facility Portfolio



2

Summary

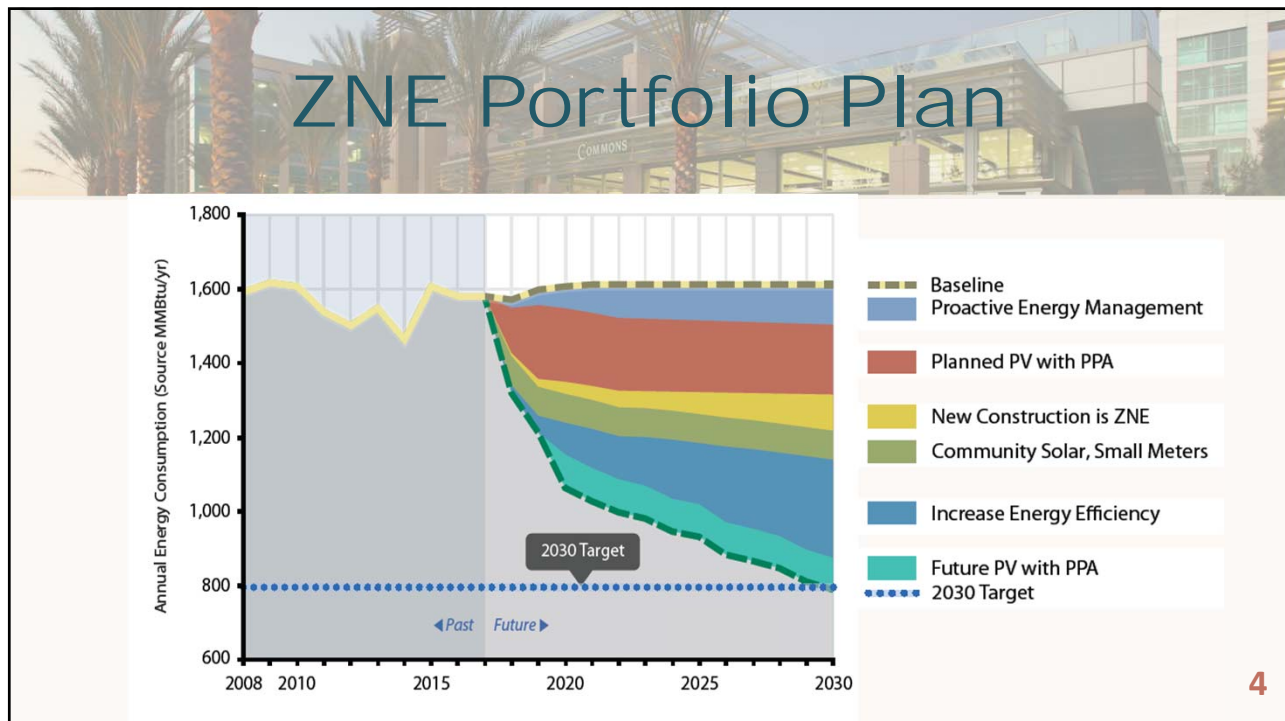
- **How to reach 50% energy reduction goal by 2030**
- 5 strategies to cover varying situations



The County of San Diego **ZERO NET ENERGY Portfolio Plan** is a comprehensive strategy to reduce energy consumption by 50% by 2030. The plan includes various measures such as proactive energy management, planned PV with PPA, new construction that is ZNE, community solar, and small meters, and increasing energy efficiency. The brochure also highlights that the plan helps the environment and saves money.

<http://www.sandiegocounty.gov>

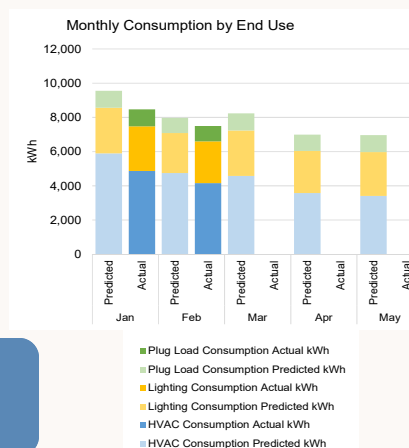
3



Implementation

Strategy #1 – Proactive Energy Management

- **Establish baselines for tracking energy use**
 - End use submeters
 - Energy model for baseline
 - BAS for tracking

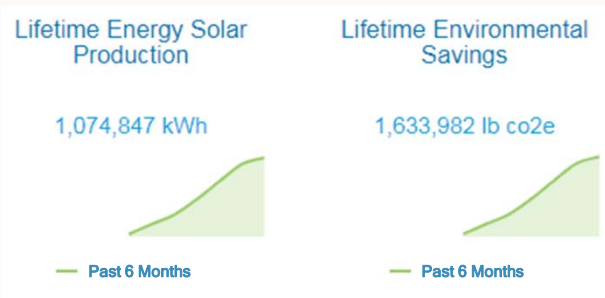


Challenge: Submetering is very complicated and fraught with pain points

Implementation

Strategy #2 – PPA for renewable energy

- **7 contracts executed**
 - 1 completed in 2018
 - 3 will be completed in 2019
 - 3 will be completed in 2020



Renewable Production at 1st Installation
(1.4MW array)

Challenge: PPA delivery reliability is subject to industry and economy variables, such as trade tariffs

6

Implementation

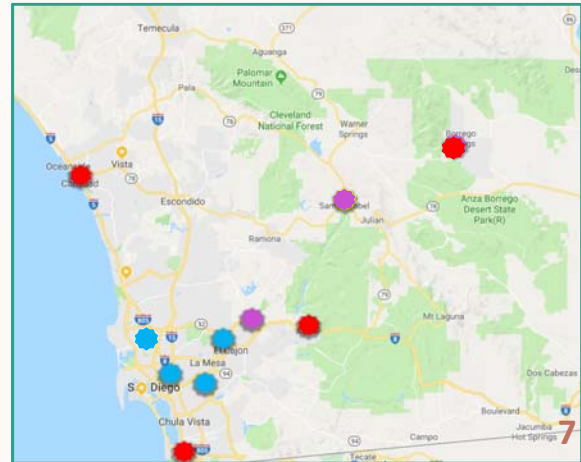
Strategy #3 – ZNE for new construction

- **Capital program best practice**

- 4 occupied
- 2 in construction
- 4 in solicitation/design

Challenge: Inexperienced AEC teams, budget shortfalls

- Occupied
- Construction
- Solicitation



Implementation

Strategy #4 – Purchase community solar

- **Contracted for 300 accounts**

- Completed in January 2018
- 100% renewable with RECs
- Net cost savings



Challenge: None! Easy, quick, cost effective

Implementation

Strategy #5 – Increase energy efficiency

- **Received \$2M from general fund for EE projects**
 - HVAC improvements
 - RCx
 - LED replacements

**Projects totaling
\$600,000 annual
savings since 2018**

Challenge: Purchasing/contracting, coordination, implementation

9

ZNE New Construction

10

County of San Diego Background

• ZNE Inventory

Occupied Facilities

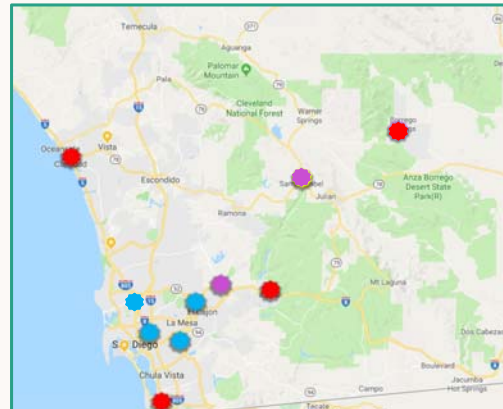
Alpine Library	12,700 sf	May 2016 opened
Imperial Beach Library	14,800 sf	Apr 2017 opened
North Coastal Live Well Center	54,500 sf	Aug 2018 opened
Borrego Springs Library	13,600 sf	Dec 2018 opened

Construction Phase

East County ARCC	25,000 sf	Fall 2019 scheduled
Santa Ysabel Nature Center	6,300 sf	Fall 2019 scheduled

Solicitation

Ohio Street Probation Office	21,000 sf	Summer 2021 anticipated
Lakeside Library	16,900	Spring 2021 anticipated
Southeast Live Well Center	80,000 sf	Fall 2021 anticipated
Juvenile Justice Campus	130,000 sf	Fall 2021 anticipated



● Occupied ● Solicitation
● Construction

11

WHAT MAKES IT ZNE

- **Primarily – energy efficiency**
 - Affects building form and technologies
- **Secondly – match with renewables**
 - Design to maximize PV output
- **Thirdly – monitor to manage**
 - All energy end uses will be submetered

The hardest part, but NO ZNE without monitoring

12

Alpine Library - Certified ZNE

- EE and renewable features

Energy Efficiency



Variable Refrigerant Flow HVAC

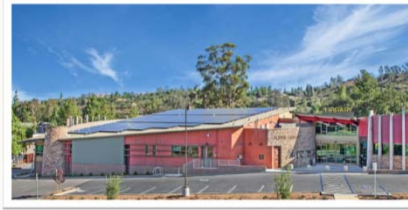


Low Lighting Power Density LED

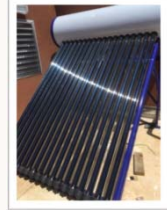


Daylighting and High Performance Glazing

Energy Production



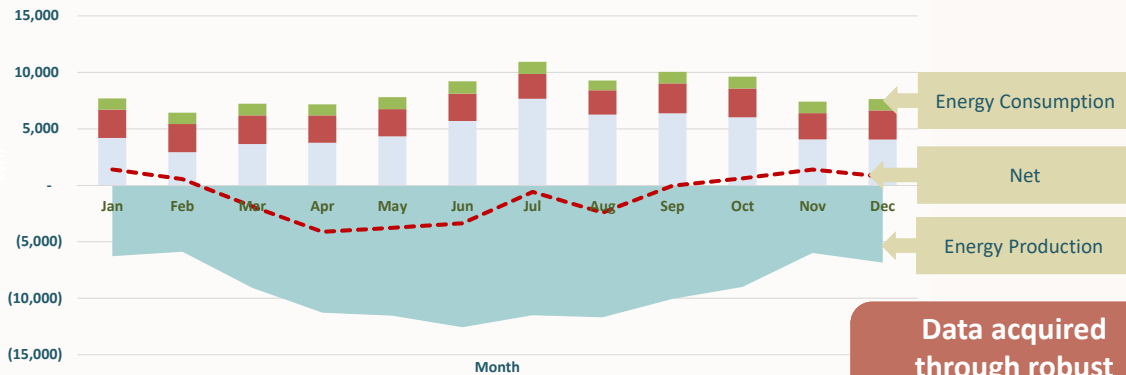
72 kW Rooftop PV



Solar Thermal Domestic Hot Water **13**

Alpine Library - Certified ZNE

- ZNE verified 2017



6,850 kWh net positive in 2017

Data acquired through robust monitoring system

14

Lessons Learned

1. Study feasibility
2. Have very tight specs
3. Get the right team
4. Use advanced EE technologies
5. Measure and Verify
6. Commission
7. Track energy performance



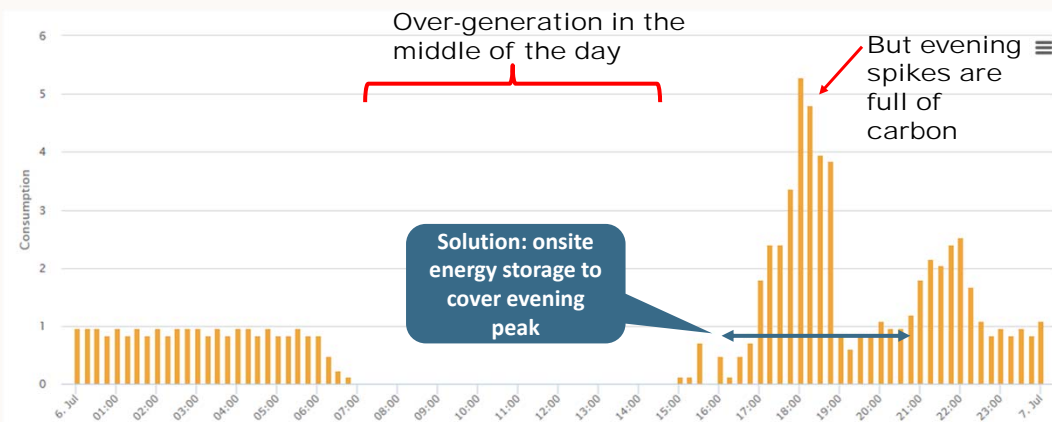
15

Next Challenge -
Carbon

16

Problem 1 - Daily

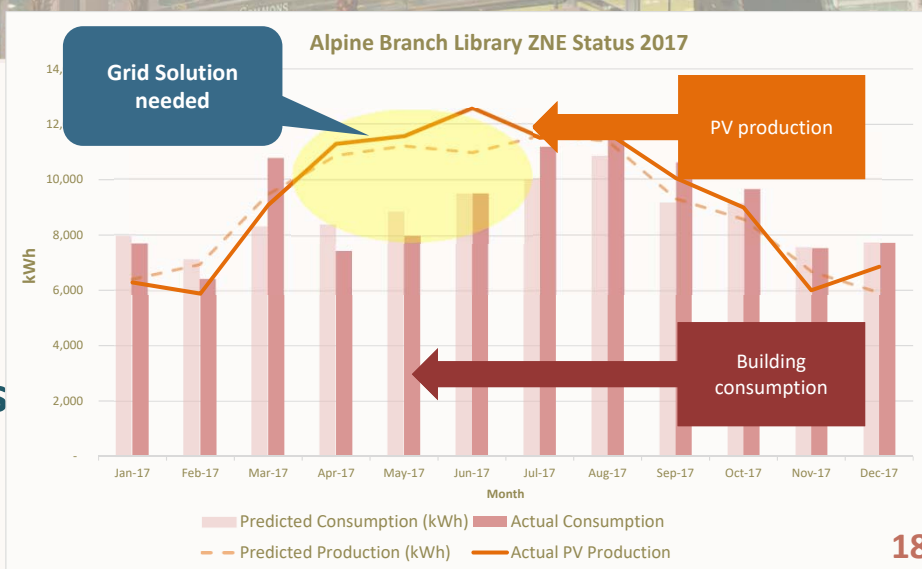
- Net Zero doesn't mean never using the grid



17

Problem 2 - Annual

- Months when production exceeds demand
- NEM covers cost but not carbon



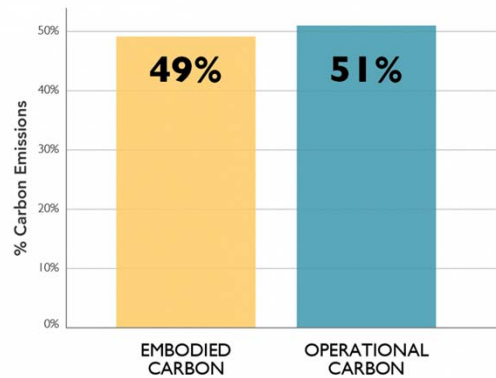
18

Problem 3 - Construction

- **Carbon impact from new building pre-occupancy activities**

- Reuse building material
- Specify low-embodied carbon products for new material
- Use low-carbon fuel in construction equipment

Total Carbon Emissions of Global New Construction from 2020-2050
Business as Usual Projection



© 2018 2030, Inc. / Architecture 2030. All Rights Reserved. Data Sources: UN Environment Global Status Report 2017; EIA International Energy Outlook 2017

19