Zero Energy Initiatives

At The County of San Diego

Summary

• 10,000,000 GSF
• 1,000 facilities
Summary

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

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

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

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
County of San Diego
Background

• ZNE Inventory

<table>
<thead>
<tr>
<th>Occupied Facilities</th>
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<tbody>
<tr>
<td>Alpine Library</td>
<td>12,700 sf</td>
</tr>
<tr>
<td>Imperial Beach Library</td>
<td>14,800 sf</td>
</tr>
<tr>
<td>North Coastal Live Well Center</td>
<td>54,500 sf</td>
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<tr>
<td>Borrego Springs Library</td>
<td>13,600 sf</td>
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<table>
<thead>
<tr>
<th>Construction Phase</th>
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<tbody>
<tr>
<td>East County ARCC</td>
<td>25,000 sf</td>
</tr>
<tr>
<td>Santa Ysabel Nature Center</td>
<td>6,300 sf</td>
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<tr>
<th>Solicitation</th>
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<tr>
<td>Ohio Street Probation Office</td>
<td>21,000 sf</td>
</tr>
<tr>
<td>Lakeside Library</td>
<td>16,900</td>
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<tr>
<td>Southeast Live Well Center</td>
<td>80,000 sf</td>
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<tr>
<td>Juvenile Justice Campus</td>
<td>130,000</td>
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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
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

Alpine Library – Certified ZNE

• ZNE verified 2017

Data acquired through robust monitoring system

6,850 kWh net positive in 2017
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

Next Challenge - Carbon
Problem 1 - Daily

- Net Zero doesn’t mean never using the grid

Over-generation in the middle of the day
But evening spikes are full of carbon
Solution: onsite energy storage to cover evening peak

Problem 2 - Annual

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

Grid Solution needed
PV production
Building consumption

Alpine Branch Library ZNE Status 2017
Predicted Consumption (kWh) | Actual Consumption
Predicted Production (kWh) | Actual PV Production
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]

- 49% Embodied Carbon
- 51% Operational Carbon