Decarbonization and Affordable Housing

August 6, 2020

Welcome:
Matt Gough | Sierra Club

Organized by:
Scott Shell, FAIA | AIA CA COTE Steering Committee
Simone Barth, Assoc. AIA | AIA CA COTE Steering Committee
John Delaney, RA, LEED AP BD+C

Special Thanks to AIA|LA
Welcome

Panel Introduction / Presentations
- Tara Barauskas | Community Corporation Santa Monica
- John Delaney, RA, LEED AP BC+D | KoningEizenberg Architecture
- Tim Kohut, AIA | National Community Renaissance
- Jason Lorcher, PE | Green Dinosaur

Panel Discussion

Audience Q&A
HAVE COMMENTS / QUESTIONS?

Click on the Q&A button located on the black menu bar either on the top or bottom of your computer screen. Type in any questions you might have.
Learning Objectives

Attendees will discover how efficient electric building technologies combined with clean, renewable energy can lower construction and operating cost, improve health outcomes, and dramatically lower emissions.

Attendees will identify California cities with passed electrification reach codes.

Attendees will explore opportunities and challenges for decarbonizing affordable housing.

Attendees will learn best practices, high impact strategies, resources, and case studies that promote climate action.
1. Advocacy: work with strategic partners to advance rapid de-carbonization in California
   - Municipal level: Advocate for rapid electrification, renewable energy, adaptive reuse and mass timber
   - State level: Advocate for the ZERO Code or equivalent as a reach code within CALGreen by 2022
   - State level: Advocate for the ZERO Code or equivalent to be adopted within Title 24 ASAP

2. Education / Professional Development: advance NZC literacy within the profession
   - Prepare our membership for a rapidly changing regulatory landscape; distribute simple tools
   - Support existing AIACA ZNC education programs and create new ones
   - Advocate for required CE in ZNC design for license renewal in California and AIACA members

3. Communication: convey the urgency of rapid de-carbonization to the profession and public
   - Provide enhanced communication to AIACA and COTE membership
   - Manage communications and outreach with the general public
   - Continue evolution of the AIACA Design Awards to reflect de-carbonization as a key design value

4. Chapter Input: cultivate an active network among state chapters to coordinate efforts
Tara Barauskas  
Community Corporation Santa Monica

John Delaney  
KoningEizenberg Architecture

Jason Lorch, PE  
Green Dinosaur

Tim Kohut, AIA  
National Community Renaissance
Tara Barauskas
Community Corp. of Santa Monica
COMMUNITY CORP’S WORK AND IMPACT

- IKAR-La Cienega Boulevard, Los Angeles
- Vista Ballona-under construction, Mar Vista, Los Angeles, Unit Count: 50
- CPUMC-Sepulveda Boulevard, Culver City
- Airport Boulevard, Los Angeles
Framing the conversation
Decarbonization in affordable housing IS social justice

• Lower income communities and people of color are the most adversely affected by unhealthy environments
• Poor air quality has also increased susceptibility to Covid and other diseases
• Decarbonization and energy efficiency can address structural inequities
• Reduced operating costs will give more funding for other services
• We need to set the example
What is the housing of our future?

• Affordable, economically sustainable
• Restorative, regenerative rather than detracting
• Near transit, schools and job centers
• Uplifting and empowering
What does the path look like?

Commit to all-electric. For every project!

• Design team selection
• Problem-solving
• Prioritizing
• Test it out – try and if you fail, try again.
• Retrofit—the new frontier but what the future holds!
John Delaney, RA, LEED AP
BD+C
Koning Eizenberg Architecture
jdelaney@kearch.com
Why?
Advocate

• The benefits of lasting, committed investments in energy technologies can significantly outweigh the costs; climate initiatives could be justified solely on public health grounds

• Economic and public health benefits are greater in disadvantaged communities

• Climate policy benefits contribute to reducing inequality

Advocate

Keep yourself, your client, colleagues and government agencies up-to-date about the rapidly-changing marketplace and regulatory environment for affordable housing

Promote the value of architecture in building more healthy communities

• Develop easy-to-understand communication tools

  Tally, Cove Tool
Code & Green Cert.
- T24 (especially Energy Code)
- LEED, LBC
- Local amendments & reach codes (i.e. Santa Monica)

Financing
- Subsidies: LACDA, HCID etc., IIG
- Tax Credits: CTCAC Application Attachment 25 – baseline energy performance
- NOFA 25A Appendix 7 Architectural Design Requirements
- Development Agreements
- Other incentives: TOD (focused on density bonuses)

Technologies
- Software
- Materials
- Building Systems
- Construction Methods (modular, efficient framing, QII, PassiveHaus)
- Regional Infrastructure (traffic, grid, etc.)

Community Outreach
- Grassroots activism
- Environmental justice
- Political climate for electrification
- 2030 Challenge = transparency
Max Indoor Air Temperatures without West Facing Courtyard Sunshades
View from South West

Source: Bright Green Strategies / David Baker Architects
Decarb Team

- Experience
- Creative Thinking
- Shared Values
- Collaboration

Architect

Energy Modeler

MEP

Dry Utilities

Facilities Management

Renewables

CM / Cost Estimator

PV system "right-sizing" and spatial layout

Title 24, optimization, LEED, LBC, HERS, etc.

Commissioning

Systems design, integration

Load calcs, transformers, power supply

Maintenance training, orientation for tenants and supportive services personnel

Allowances for new technologies, long-term payback

Decarb Team

• Experience
• Creative Thinking
• Shared Values
• Collaboration
Plan and Prioritize

Set ambitious goals and achieve them with sound fundamentals and cutting-edge technologies. Where can we make the most impact for the least expense?

- Prioritize passive design strategies
- Shared facilities (i.e. play, laundry) as outdoor social spaces where possible

What makes the most “local” sense?

- Access to expertise, materials, clean grid energy and on-site renewables
- Climate-oriented responses
<table>
<thead>
<tr>
<th>Design decision</th>
<th>Energy performance design decision</th>
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<tbody>
<tr>
<td>Form and orientation</td>
<td>Solar geometry</td>
</tr>
<tr>
<td>Roof form and slope</td>
<td>Solar geometry, natural ventilation, solar ready</td>
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<tr>
<td>Structural system</td>
<td>Thermal mass</td>
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<tr>
<td>Floor-to-floor height</td>
<td>Daylight</td>
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<tr>
<td>Wall design</td>
<td>Thermal mass, insulation, heat transfer</td>
</tr>
<tr>
<td>Skin-to-core depth</td>
<td>Daylight and natural ventilation</td>
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<tr>
<td>Façade development</td>
<td>Window-to-wall ratio</td>
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<tr>
<td>Window size</td>
<td>Window-to-wall ratio</td>
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<tr>
<td>Window design, orientation, and size</td>
<td>Passive heating and cooling</td>
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<td>Daylight</td>
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<td>Shading</td>
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<td></td>
<td>Glare control</td>
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<tr>
<td>Window operation</td>
<td>Natural ventilation</td>
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<td>Mullion spacing</td>
<td>Thermal bridging</td>
</tr>
<tr>
<td>Balcony structure</td>
<td>Thermal bridging</td>
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Source: AIA Guide to Building Performance
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</tbody>
</table>
Energy budget: activities driving carbon output in affordable housing

- Air Heating and Cooling
- Water Heating
- Ventilation
- Lighting
- Elevators
- Laundry
- Cooking
- Plug Loads / Misc.
- Parking
Air Heating and Cooling
Water Heating
Ventilation
Lighting
Elevators
Laundry
Cooking
Plug Loads / Misc.
Parking
Walnut Park Apartments

• 64 Units, 100% Affordable, 1-2- and 3-bedroom

• All-Electric

• Centralized Heat Pump HW – 2 Colmac Units, 3 Storage Tanks located in 300 sf ground floor pump room w/ ventilation grille, no solar pre-heat (58k SF total floor area)

• 49 Parking Stalls due to adjacency to major bus line

• Ceiling fans in every bedroom and living room
1015 Vermont

- 187 units, 100% affordable
- Transit-oriented development
- 69 commercial parking stalls
- 30% EV infrastructure / 10% installed EV charging stations (LA Ordinance 186485, Jan. 2020)
Flor 401

- 97 studio units, 100% affordable transitional housing
- 7 parking stalls
- Greywater system for irrigation
6 Plastic decking (and other simulated woodwork), solid surface (and other simulated stone), wood preservatives, fire retardants, plastic laminates

7 Roofing membranes, weather and vapor barriers, plastic siding, insulation (especially foams)

8 Vinyl Windows

9 Carpet, Textiles, Vinyl Flooring, Terrazzo, Stains & Coatings

Challenges & Opportunities

• Confronting status quo
• Post-occupancy data for designers
• Balanced Ventilation w/ ERV or HRV, PassiveHaus in SoCal – scale up
• Restaurants and retail tenants in mixed-use applications
• Heat-pump dryers for commercial laundry operators
• Retrofit and redesign
• Urban infill roof coverage and achieving ZNE / ZNC (in addition to T24 and NOFA)
• Expanding conversation to materials, water, supply chains, and transit, diminishing returns on technological improvements
What do you envision for the new normal in our industry?
CEDAR SPRINGS APARTMENTS

Location La Verne, CA 91750

Project Goal: Achieving Energy Petal

End Users Transition Age Youths (TAY) Tenants with a mental health diagnosis & low-income families.

Details 36 living units, community spaces, outdoor amenity including children’s play area and community vegetable garden

Total Cost $21.0 million

Completed June 2016
Pre-Performance Accomplishments

• All Electric Site - no fossil fuels used

• Net Zero Energy target, meets and exceeds 2030 Challenge

• Optimize Energy Performance exceeds 2008 Title 24 by 56%

• Implemented a greywater system, offsetting 100% of the irrigation demand and toilet flushing

• Quality air sealing and insulation installation
Silver Star Apartments

Location: Los Angeles, CA 90043
Project Goal: Achieving Energy Petal
Details: apartment building consisting of 48 one-bedroom units and one (1) two-bedroom manager’s unit.
Total Cost: $19.9 million
Completed: June 2017

End Users: Veterans who were homeless and have disabilities
Pre-Performance Accomplishments

• All Electric Site (no fossil fuels used)
• Net Zero Energy target, meets and exceeds 2030 Challenge
• Optimize Energy Performance exceed 2013 Title 24 by 54.2%
• Implemented to stormwater quality infiltration feature
• Quality air sealing and insulation installation
CHALLENGES & OPPORTUNITIES

#1 OPTIMIZE DESIGN EARLY WITH PROJECT STAKEHOLDERS
#2 ACCESSIBILITY, MAINTENANCE & POSITION OF SOLAR SYSTEMS
CHALLENGES & OPPORTUNITY

#3 PROVIDE ON GOING TRAINING FOR OCCUPANTS AND FACILITY MANAGERS
#4 RESERVE BUDGET FOR POST-OP VERIFICATION & STRATEGY
Tim Kohut, AIA, CEA
Director of Sustainable Design
National Community Renaissance
OUR COMMITMENT TO SUSTAINABILITY…

National CORE awarded Power Builder distinction by U.S. Green Building Council's 2018 LEED Homes Awards

Jun 20, 2019

Annual awards honor prominent projects, developers, and builders in residential sustainability Rancho Cucamonga, Calif. – June 20, 2019 – National Community Renaissance (National CORE) has been named a Power Builder by the U.S. Green Building Council (USGBC) as a part... read more

National Community Renaissance becomes first developer to sign onto AIA's 2030 Commitment

Apr 16, 2019

WASHINGTON – April 16, 2019 – The American Institute of Architects (AIA) is welcoming National Community Renaissance (National CORE), one of the nation's largest nonprofit developers of affordable housing, as the first developer to sign the AIA 2030 Commitment. AIA’s... read more
The Dropping Cost of PV

1. These are real savings
2. We see this playing out on every project.
3. Affordable housing developers must take advantage of this (there is too much at stake not to)
4. The impact of Time of Use energy and Battery Storage is a work in progress
How does this work..?
San Ysidro Senior Village
Operational Economics...Before PV...
(PV = Photovoltaic Energy...) Energy from the sun (it’s free)

2.1.4 Current Electric Bill

The table below shows your annual electricity costs based on the most current utility rates and your previous 12 months of electrical usage.

**Rate Schedule: SDG&E - TOU-DR1**

<table>
<thead>
<tr>
<th>Time Periods</th>
<th>Energy Use (kWh)</th>
<th>Charges</th>
<th>Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/1/2018 - 2/1/2018 W1</td>
<td>$5,190</td>
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<tr>
<td>2/1/2018 - 3/1/2018 W1</td>
<td>$4,100</td>
<td>$4,402</td>
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<tr>
<td>3/1/2018 - 4/1/2018 W2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/1/2018 - 5/1/2018 W2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/1/2018 - 6/1/2018 W3</td>
<td>$4,296</td>
<td>$4,612</td>
<td></td>
</tr>
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<td>6/1/2018 - 7/1/2018 S1</td>
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<tr>
<td>7/1/2018 - 8/1/2018 S1</td>
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<tr>
<td>8/1/2018 - 9/1/2018 S1</td>
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<tr>
<td>9/1/2018 - 10/1/2018 S1</td>
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<tr>
<td>10/1/2018 - 11/1/2018 S1</td>
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<tr>
<td>11/1/2018 - 12/1/2018 W1</td>
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<tr>
<td>12/1/2018 - 1/1/2019 W1</td>
<td></td>
<td></td>
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<tr>
<td><strong>Totals:</strong></td>
<td><strong>$53,074</strong></td>
<td><strong>$56,775</strong></td>
<td></td>
</tr>
</tbody>
</table>

This is the annual operational budget for electricity.
Designing for PV – now T24…101

Install guardrail at north side of roof and incline Solar Thermal Panels at north edge of roof.

Rooftop PV

This scheme would leave the landscape on the hill intact.
Utility Energy vs. Solar PV Energy

**Monthly Energy Use vs Solar Generation**

- **Energy Use (kWh)**
- **Solar Generation (kWh)**

**Solar PV System Rating**
- Power Rating: 91,000 W-DC
- Power Rating: 79,266 W-AC-CEC

**Energy Consumption Mix**
- Annual Energy Use: 148,062 kWh
  - Utility: 14,529 kWh (9.81%)
  - Solar PV: 133,533 kWh (90.19%)
Reporting to the AIA-DDx

23kBtu/SF > 9kBtu/SF….What happened?

**PROJECT VIEW**

2019 - Final

**PROJECT SUMMARY**
San Ysidro Senior Village
Residential

**PREDICTED**

**23**

kBtu/sf/yr

(Predicted Energy Use Intensity)

**BASELINE**

**30.0**

kBtu/sf/yr

(Baseline Energy Use Intensity)

**GOAL**

**9.0**

kBtu/sf/yr

(Energy Use Intensity)

**SAVINGS**

**23%**

**GENERAL INPUTS**

<table>
<thead>
<tr>
<th>Project Name *</th>
<th>San Ysidro Senior Village</th>
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</thead>
<tbody>
<tr>
<td>Project Category *</td>
<td>Residential</td>
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<tr>
<td>Construction Type *</td>
<td>New Construction</td>
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<tr>
<td>Year of Occupancy</td>
<td>2019</td>
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<tr>
<td>Project ID *</td>
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<tr>
<td>Country *</td>
<td>United States of America</td>
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<tr>
<td>State/Province *</td>
<td>California</td>
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<tr>
<td>Zip/Postal Code *</td>
<td>92173</td>
</tr>
</tbody>
</table>

Natual gas DHW +/-20% of total building energy
How about a different approach on day 1?
Analytics, especially for DHW and Renewables is critical

97% NG Boiler

Heat Pump Boiler (Energy Factor = 3.5)

HP Boiler + PV

Iris at San Ysidro – 100 units-family
Back to San Ysidro Senior Village. .... If you’re out of money, lease the PV???

### 3.2 Cal Solar Lease

<table>
<thead>
<tr>
<th>Inputs and Key Financial Metrics</th>
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</thead>
<tbody>
<tr>
<td>End of Term Buyout Payment</td>
</tr>
<tr>
<td>PPA Escalation Rate</td>
</tr>
<tr>
<td>Starting PPA Rate</td>
</tr>
<tr>
<td>Upfront Payment</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

| Term                           | 6       |
| Total Payments                 | $134,251|
| PV Degradation Rate            | 0.8%    |
| Electricity Escalation Rate    | 3%      |
| Federal Income Tax Rate        | 0%      |
| State Income Tax Rate          | 0%      |

#### Financial Metrics Table

<table>
<thead>
<tr>
<th>Years</th>
<th>PPA Payments</th>
<th>Electric Bill Savings</th>
<th>Total Cash Flow</th>
<th>Cumulative Cash Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-$16,024</td>
<td>$47,525</td>
<td>$31,501</td>
<td>$31,501</td>
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<tr>
<td>2</td>
<td>-$16,293</td>
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<td>-$16,566</td>
<td>$49,587</td>
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<td>$57,405</td>
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3.1 Cash Purchase

<table>
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<tr>
<th>Years</th>
<th>Project Costs</th>
<th>NSHP - Step 7 (affordable housing)</th>
<th>Electric Bill Savings</th>
<th>Total Cash Flow</th>
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<td>Upfront</td>
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<td>$57,405</td>
<td>$57,405</td>
<td>$325,452</td>
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Or, better yet, buy it???
## Operational Economics – This is the key

### Rate Schedule: SDG&E - TOU-DR1

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<tr>
<td></td>
<td>Bill Ranges &amp; Seasons</td>
<td>On Peak</td>
<td>Off Peak</td>
<td>Super Off Peak</td>
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<tr>
<td>1/1/2018 - 2/1/2018 W1</td>
<td>2,746</td>
<td>681</td>
<td>1,942</td>
<td>$212</td>
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<tr>
<td>2/1/2018 - 3/1/2018 W1</td>
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<tr>
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<td>901</td>
<td>-3,327</td>
<td>1,175</td>
<td>$7,097</td>
</tr>
<tr>
<td>9/1/2018 - 10/1/2018 S1</td>
<td>2,044</td>
<td>-418</td>
<td>2,127</td>
<td>$2,070</td>
</tr>
</tbody>
</table>

**Annual Electricity Savings:** $47,525
If you remember one slide, remember this one

San Village – 51 Units – Housing for the formerly homeless

$2M of operational savings in 30 years
What can we do with that utility savings?...

...we have plenty of ideas

This is just a piece of the social / environmental justice equation
Elevating the well-being and self-sufficiency of children, families, and seniors!

LEARN MORE
Thank you