

TRI-COUNTY REGIONAL ENERGY NETWORK

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A Builder's Perspective on Zero Net Energy

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Zoom Orientation

- Add an introduction in the chat. Be sure full name is displayed.
- Did you call in? Please share first and last name with us.
- Please **mute** upon joining
- Use the "Chat" to share questions or comments
- Under "Participant" select "Raise Hand" to share a question or comment verbally
- Session may be recorded and posted to 3C-REN's on-demand page
- Slides/recording are **shared** after most events
- 3C-REN does **not** allow **AI notetakers**, unless used to accommodate a disability.





Tri-County Regional Energy Network

3C-REN is a collaboration between the tri-counties

Our programs reduce energy use for a more sustainable, equitable and economically vibrant Central Coast

Our free services are funded via the CPUC, bringing ratepayer dollars back to the region



Our Services

Incentives



3c-ren.org/for-residents 3c-ren.org/multifamily



3c-ren.org/commercial

Contractors can enroll at **3c-ren.org/contractors**

Training



3c-ren.org/events 3c-ren.org/building

ENERGY CODE CONNECT

3c-ren.org/code

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ENERGY ASSURANCE SERVICES

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Today's Learning Objectives

- Understand the drivers for ZNE and the related lingo including building electrification, zerocarbon, offsets, true-ups and mixed-fuel.
- Learn the role of heat pumps for ZNE and tips for selection and installation of all-electric equipment for heating, cooling and hot water
- Be able to help clients navigate all-electric choices for appliances including vent less dryers and induction cooktops.
- Understand options and best practices for incorporating renewable energy and battery storage.

Learning Units:

• 1.5 AIA HSW LU approved for this course



Agenda

- 1. Overarching Strategy for ZNE
- 2. Building Enclosure and Air-Sealing
- 3. Heat Pumps and Fresh Air
- 4. Appliances
- 5. Solar PV and Battery Storage





Overarching Strategy for ZNE



Builder's Perspective on a ZNE Strategy

We win this on the demand side which builders control during construction and architects can/should influence!

- 1. Drive down the loads
- 2. Shrink the Problems
- 3. Solutions are easier and cost less money!



- 1. Quality Envelope Assemblies:
 - i. High Quality Insulation
 - ii. Thermal Bridging Eliminated
 - iii. Air Leakage Minimized
- 2. Strategically Placed Quality Windows
- 3. Balanced Ventilation (IAQ) System
- 4. Energy Efficient HVAC, DHW and Appliances
- 5. Solar PV and Battery Storage







Building Enclosure and Air-Sealing



Cost of Air-Sealing ... Cost of Insulation/Thermal Layer





Vapor Barrier – Slab on Grade

Mastic is brush applied to concrete footing or grade beam

Stego 15 mil vapor barrier

is applied directly over

aggregate.

Glavel aggregate is stamped in place

American Concrete Institute (ACI 302.1 R-15) recommends 10 mil minimum vapor barrier meeting ASTM E96 for permeability and calls for the concrete to be placed **directly on** the vapor barrier.



Vapor Barrier – Raised Floor





Use specialized tape –typically sold with the vapor barrier -- securely attached to the foundation



Air Sealing at Exterior of Wall



OSB Sheathing Taped/Sealed to Foundation



Air Sealing Penetrations at Seal Plate







Air Sealing at Sill Plate and Interior of Wall





Air Sealing at Windows



Side Bar: Strategic Window Placement



Large Windows with Overhangs:

- Solar Control
- Ventilation
- Daylight



Non-South and West Facing:

- Strategic Views
- Ventilation
- Daylight



Side Bar: Window Operation and Performance



- Window Operation:
 - Tilt
 - Awning ۲
 - Casement •



Air Sealing at Roof Assemblies



Before Installation of Roof Deck

Taped and Sealed – Rafter to Top of Wall Connections



Wall Assembly - Continuous Insulation with Rain Screen





6030627

Continuous insulation (CI)



Plywood furring strips Creates a 1/2"ventilation gap



Heat Pumps and Fresh Air



Ceiling Recessed Ductless – Mock-up Before Installation





Ductless Recessed-Ceiling





Ductless recessed-ceiling unit placed prior to insulation installation.

Ductless Mini-Split – Wall Mount







Refrigerant and Communications Line from Indoor Unit



Through-the-Wall Spot IAQ Ventilation









Inside Cover and Exterior Opening for Spot IAQ Ventilation





Ducted HRV for Indoor Air Quality (IAQ) –Outside Air

Duct System Includes 'Home Runs' to the Heat Exchanger and Fan Unit





Heat Exchanger and Fan Unit







Appliances: Hot Water Cooking Clothes Drying



Integrated HPWH Considerations

- Integrated HPWH tanks taller than standard gas or electric units
- Sound Level is typically around 50 db
- Cold dehumidified air is expelled
- Condensate Drainage needs to be addressed
- Needs 700 1000 cubic feet volume, or ducted vent kit, newer models only need 450 cu ft
- Operating temperature starts around 45 deg F, some models 37 deg F







Example of a Ducted and Non-Ducted HPWH



The Notes above will become a code requirement under 2025 Energy Code.



Two Common Issues to 'Watch Out For' with HPWH



Issue: Elec conduit was installed over the top of the filter access zone

Issue: Condensate line terminates to an interior closet



Note:

Condensate Piping –clear PEX –good for visual inspection

Ducts (or Other Objects) Over Top of Tank – Minimum Clearances



Example of HPWH Installations –No Ducts Needed



Examples – All-Electric Kitchens







Example – Ventless Condensing Dryer



Fisher Paykel – approx. \$2500 available locally and on-line

Cleaning the condenser

If the 'Condenser' indicator light starts to flash this indicates that the condenser needs to be cleaned. The condenser should be cleaned once a month. The light illuminates when you first turn the machine on, then turns off once the **I** button has been touched.



Turning the condenser locking levers

> Pulling out the condenser



- Open the condenser cover.
- ② Turn the two condenser lock levers 90 degrees then pull out the condenser.
- ③ Clean the condenser with pressurized water and wait until the water drains.
- ④ Replace the condenser.
- S Turn the two condenser lock levers to lock the condenser back in place again. Make sure that these locks are engaged securely.
- 6 Close the condenser cover.



water collection tank

Condensate Collection Tank: Manual empty or set up drain hose.



Example – Ventless Heat Pump or Condensing Dryer



LG ThinQ – Available locally at Lowe's and other outlets – approx. \$ 2500

Condenser Care

The appliance automatically cleans built-up lint off of the condenser using water condensed from the drying process. If needed, the condenser can also be cleaned manually. See the **Maintenance** section for the dryer for details. Appliance takes about an hour for the manual clean condenser mode

6 Condenser Clean Indicator

 This icon indicates the condenser auto cleaning status. The icon is displayed when water is being sprayed on the condenser.

Lint Filter Status Indicator

- Ights up when the appliance is turned on as a reminder to clean the lint filter. It turns off when the Start/Pause button is pressed. It also lights up if the lint filter needs to be cleaned.
- On models with a 3-piece lint filter, remember to check, clean and reinstall both the inner and outer parts of the filter.



Ventless Inverter All-In-One Clothes Washer and Dryer











Solar PV and Battery Storage



PV and Battery – New Construction Considerations



Net cumulative cashflow



Zero Net Energy (ZNE) – the energy a home uses in one year is equal to the energy produced on-site for that year



Under the new electric pricing system (NEM 3), a solar PV system with battery storage can be more cost effective than a PV System alone for a 7NF home.

Battery Storage System can add Resiliency and **Energy Independence**

For Example: New Construction 2000 SF home in Atascadero (climate zone 4) a 2.38 kW system would be required. Santa Barbara and Ventura coastal areas would be slightly less.



Energy Consuming Systems – *Energy efficient electric options*

- HVAC Ducted and Ductless (Ducted Air-Handler and Mini-Splits)
- Domestic Hot Water –Heat Pump Water Heaters
- Ranges, Cooktops and Ovens –Induction and Electric
- Laundry- Clothes Dryers Electric, Condensing, Heat Pump



Managing Client Expectations... Zero Net Energy



Zero Net Energy: Goal is to use as much solar energy as possible such that at 1 year's end, a home pulled from the grid as much as it sent to the grid.

Battery Storage allows a home to be more resilient and to "self-utilize" daily solar production rather than send it to the grid.

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Example from Oct, 2024

Main Panel, Subpanel and BESS Isolation Equipment

225 Amp Main Elec Panel



Tesla Gateway
(Approx. 16" x 26")
Transfer/Isolation
Equipment
Purpose is to isolate
the building from the
electrical grid during
a power outage.

Subpanel "Back-up Loads" with 4 branch circuits minimum – can have more, can be the whole house.

Inverter, Disconnect/Load Center, and Battery



Garage Installs with EV Charging





Sunny Days vs Cloudy Days







Managing Client Expectations



Some Take-Aways:

- Some days, even with Solar and Battery Storage, the household will use 'grid' electricity.
- Will have an electric bill.
- Many days my car 'charges' on solar and that saves me over \$100 /month.



Wrap Up

We win this on the demand side which builders control and architects can influence!

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Questions about Title 24?

3C-REN offers a free Code Coach Service



Online: 3c-ren.org/code Call: **805.781.1201**

Energy Code Coaches are local experts who can help answer your Title 24 Part 6 or Part 11 questions.

They can provide code citations and offer advice for your res or non-res projects.

Closing

Continuing Education Units Available

Contact <u>chloe.swick@ventura.org</u> for AIA LUs

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Slides, Recording, & Survey – Please Take It and Help Us Out!

Upcoming Courses:

- Green Building Construction Tour: Santa Barbara (6/3)
- Natural Insulation Options for Low-Carbon Construction (6/13)
- ADU: Energy Code Implementation Series (6/25)
- Passive House Design/Build Boot Camp with Emu Passive
- Certified Passive House Designer/Consultant Pacific Summer Cohort

Any phone numbers who joined? Please share your name!



Thank you!

More info: **3c-ren.org** Questions: **info@3c-ren.org** Email updates: **3c-ren.org/newsletter**



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