



California's New Residential ZNE Action Plan

CABEC Conference

San Diego, California

October 11, 2014

California Long-Term Energy Efficiency Strategic Plan – Bold Goals . . .

All new residential construction in California will be ZNE by 2020

All new commercial construction will be ZNE by 2030

50% of existing commercial buildings will be retrofit to ZNE by 2030

Goal 1. Deliver Zero Net Energy New Homes by 2020

“Goal 1 envisions a continual and dramatic increase in the demand for and supply of lower energy homes based on **new technologies, new building principles, and policy support...**”

- Heating, Ventilation and Air Conditioning (HVAC) will be transformed to ensure that its energy performance is optimal for California’s climate
- All eligible low-income customers will be given the opportunity to participate in the low income energy efficiency program by 2020.

ZNE Goals: Residential ZNE code 2020

THE TASK

ZNE Code Definition

*“A ZNE Code Building is one where the **net of the amount of energy produced by on-site renewable energy resources is equal to the value of the energy consumed annually by the building**, at the level of a single “project” seeking development entitlements and building code permits, measured using the California Energy Commission’s Time Dependent Valuation (TDV) metric. **A ZNE Code Building meets an Energy Use Intensity value** designated in the Building Energy Efficiency Standards by building type and climate zone that reflects best practices for highly efficient buildings.” (IEPR 2013).*

Source: IEPR 2013 (CEC-100-2013-001-CMF available at www.energy.ca.gov)

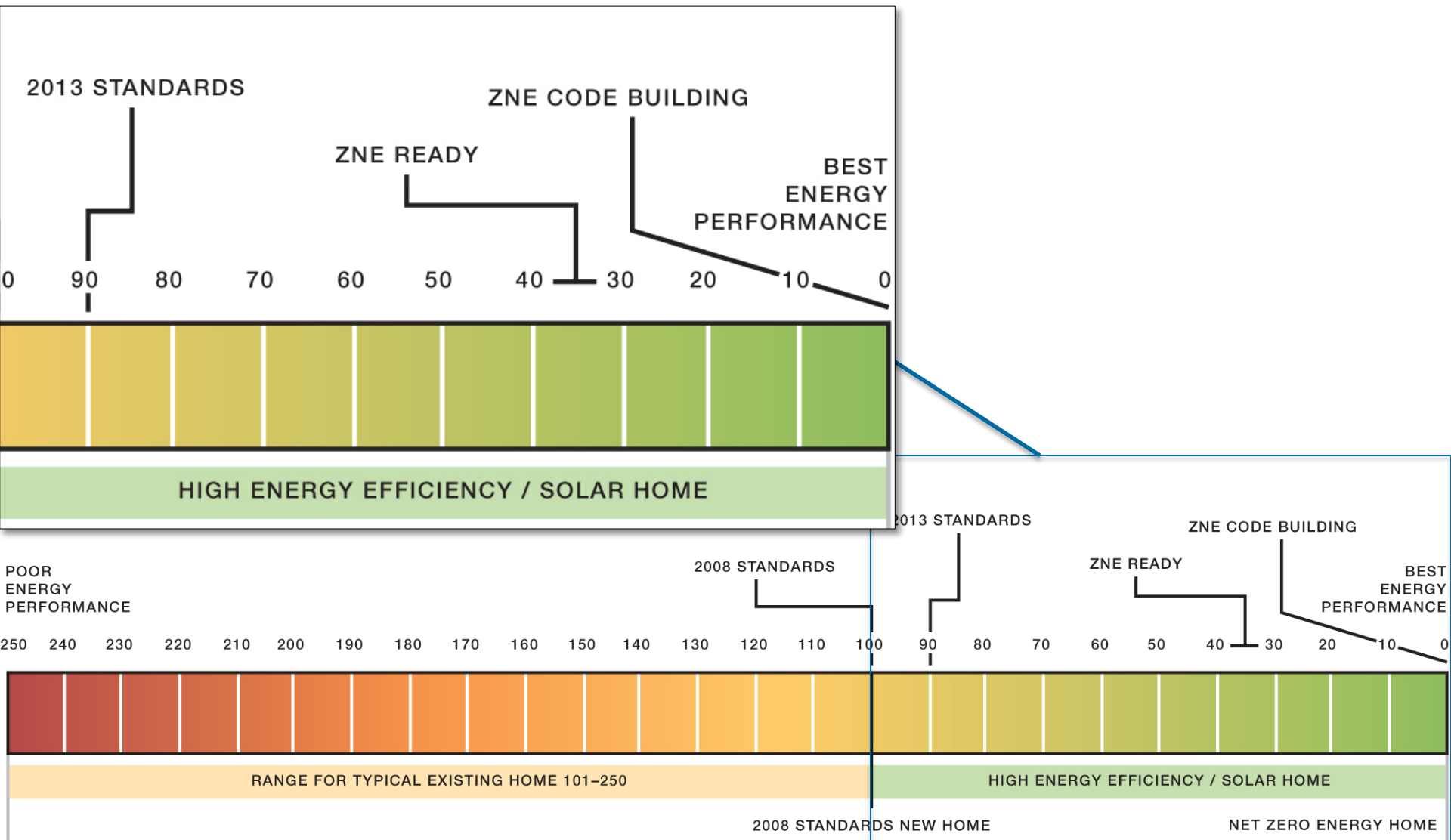
“Common Sense” Definition

“The societal value of energy consumed by the building over the course of a typical year is less than or equal to the societal value of the on-site renewable energy generated”

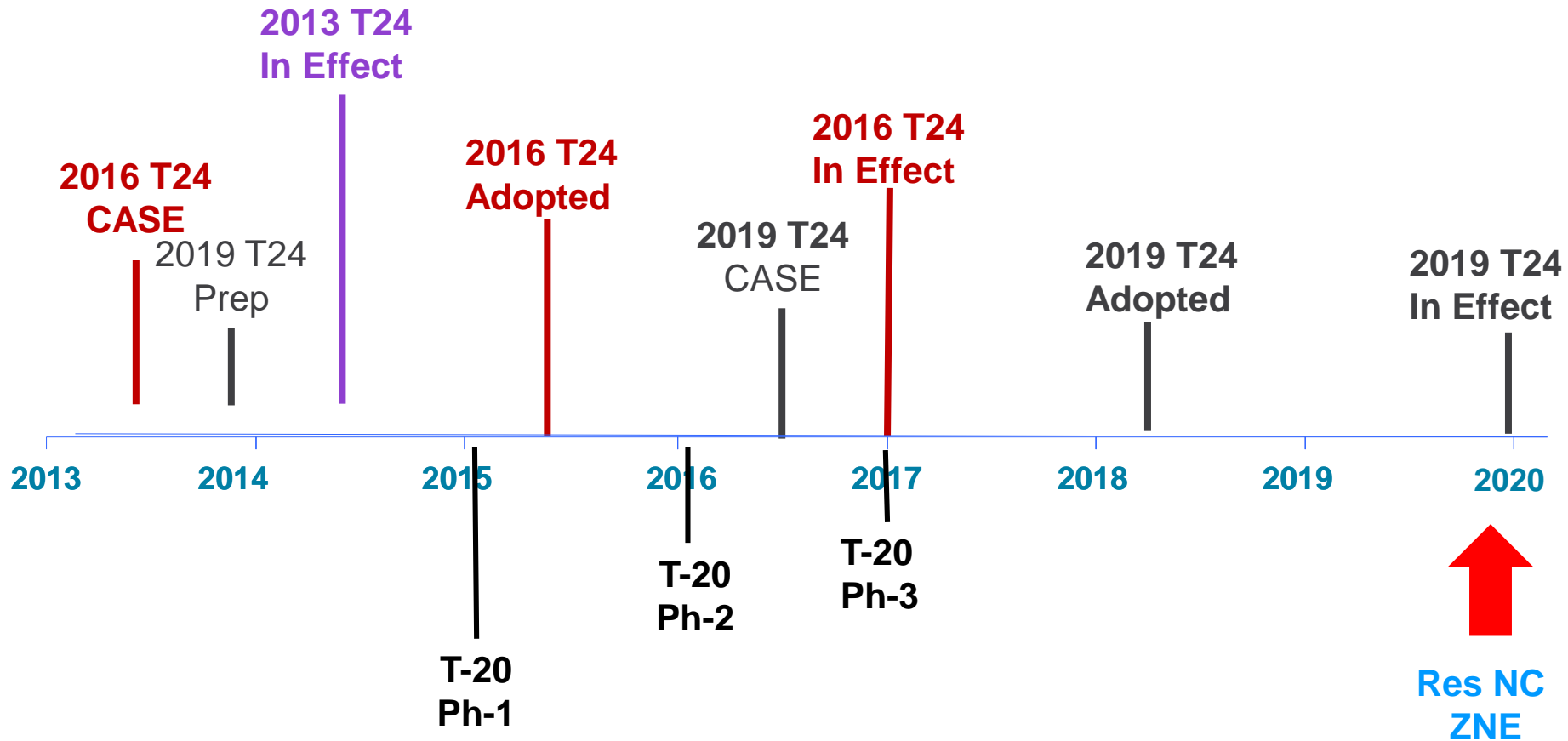
--IEPR Workshop on the Definition of ZNE,
July 2013

- *Does not imply zero utility costs*

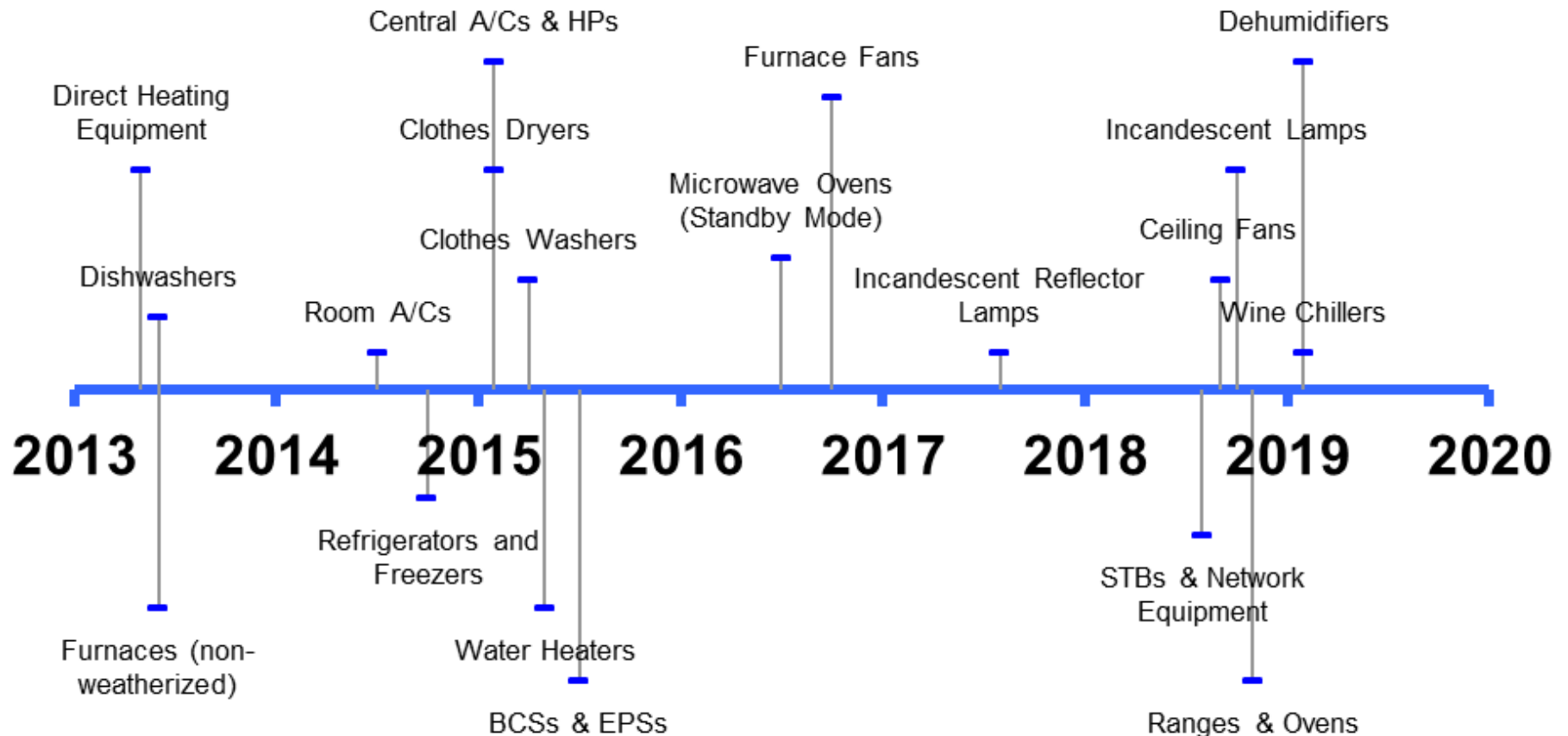
ZNE on the HERS Scale



California Standards



Federal Standards



New Residential ZNE Action Plan

THE PLAN

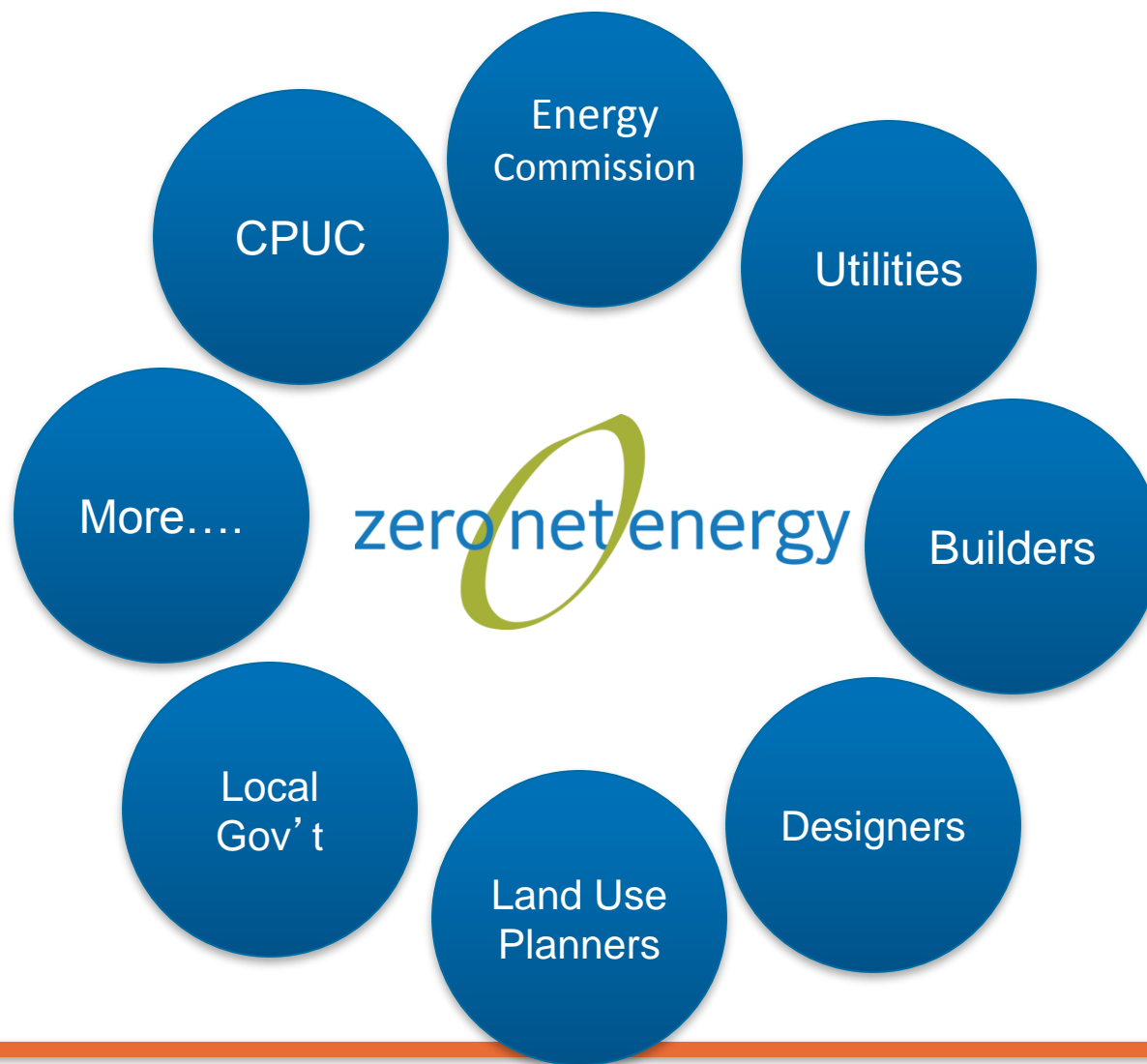
What does it mean for California to go ZNE?

- AB 32 – Required Substantial Reductions in Greenhouse Gas Emissions
- Market Transformation!
- Sustained, long-term approach
- Broader engagement and activation of the market
- A new way to think!



“The state and nation must be aggressive about setting goals, such as having zero-net-energy residential buildings by 2020 and commercial buildings by 2030.”

Who is involved in reaching this goal?

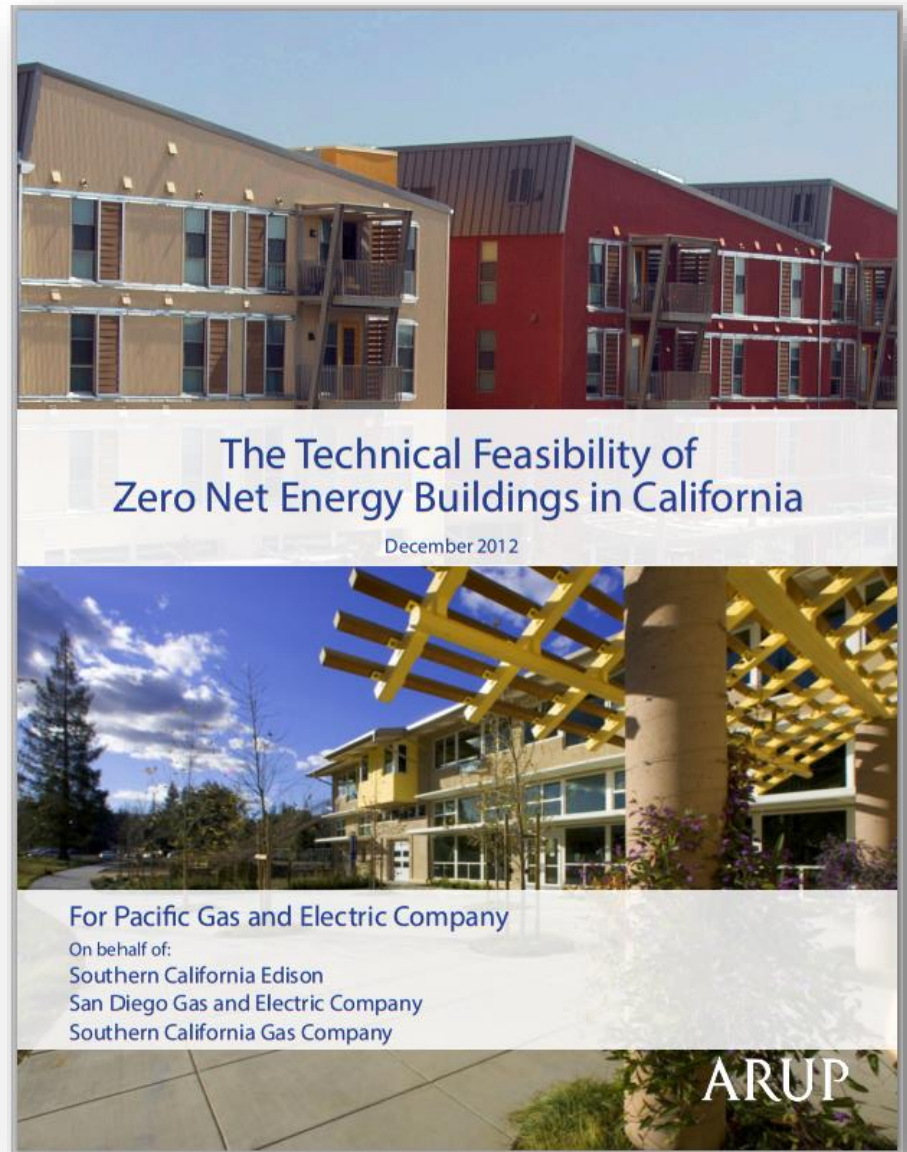


Major Barriers to ZNE

- Market, Industry and Consumer Awareness
- Cost – to build and to buy
- Technical Capabilities – Advance techniques training, tools, and resources
- Grid Impacts
- Policy Alignment – Local Government, CPUC, CEC IOUs, RENs, ARB

“The study’s central finding is that ZNE buildings will be technically feasible for much of California’s new construction market in 2020.”

**→ ZNE buildings
need not have any
incremental cost**



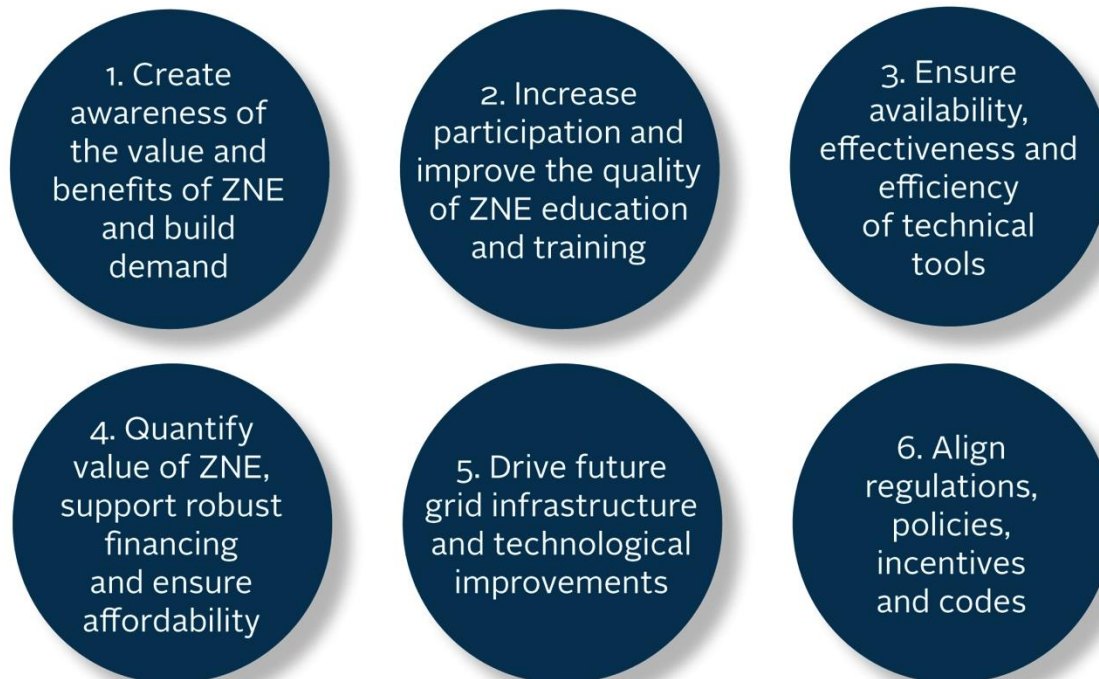
VISION

100% of all New Homes in California will be Zero Net Energy starting in 2020

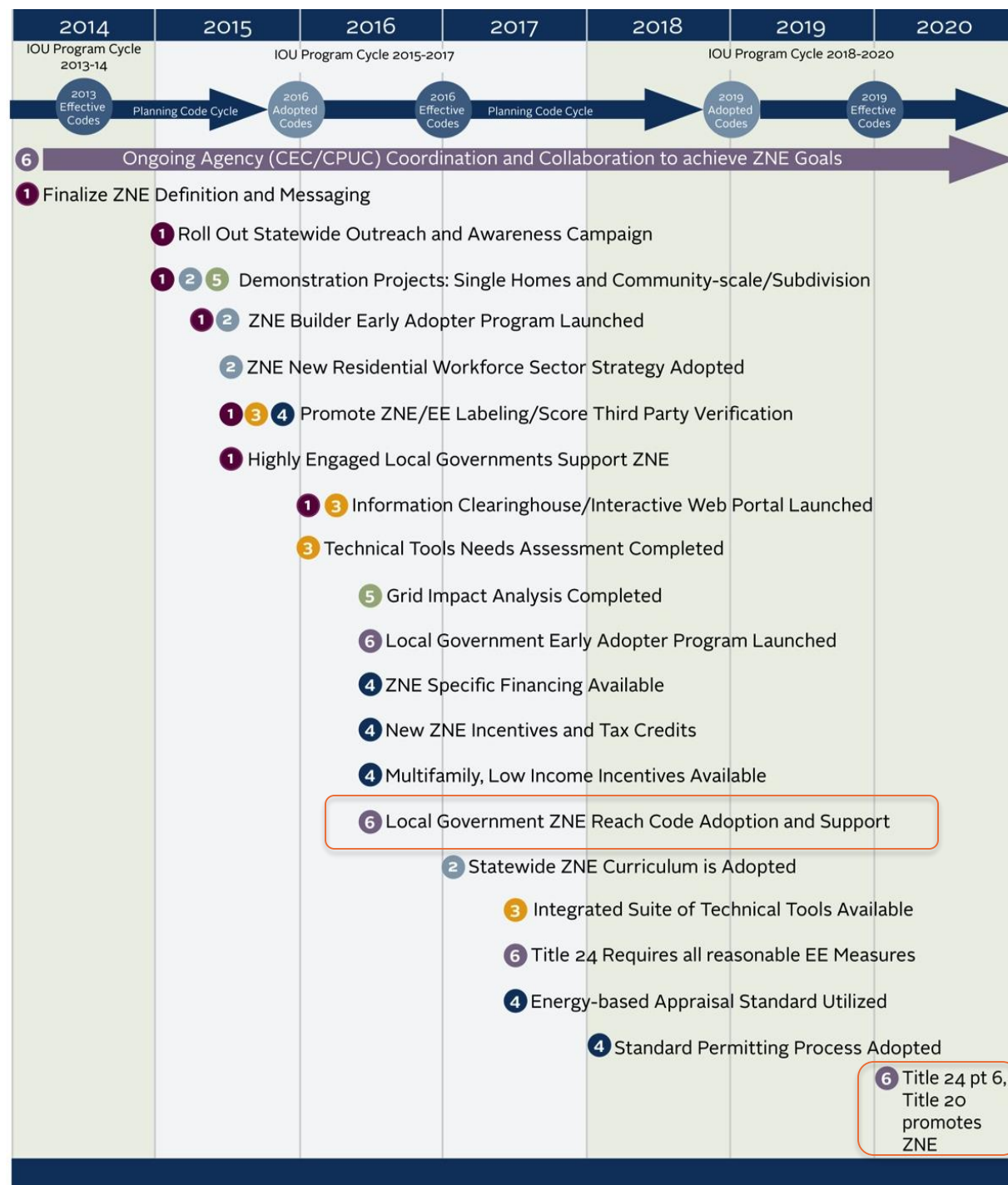
GUIDING PRINCIPLES



PLAN GOALS



Critical Path & Priorities



Overarching Benchmarks

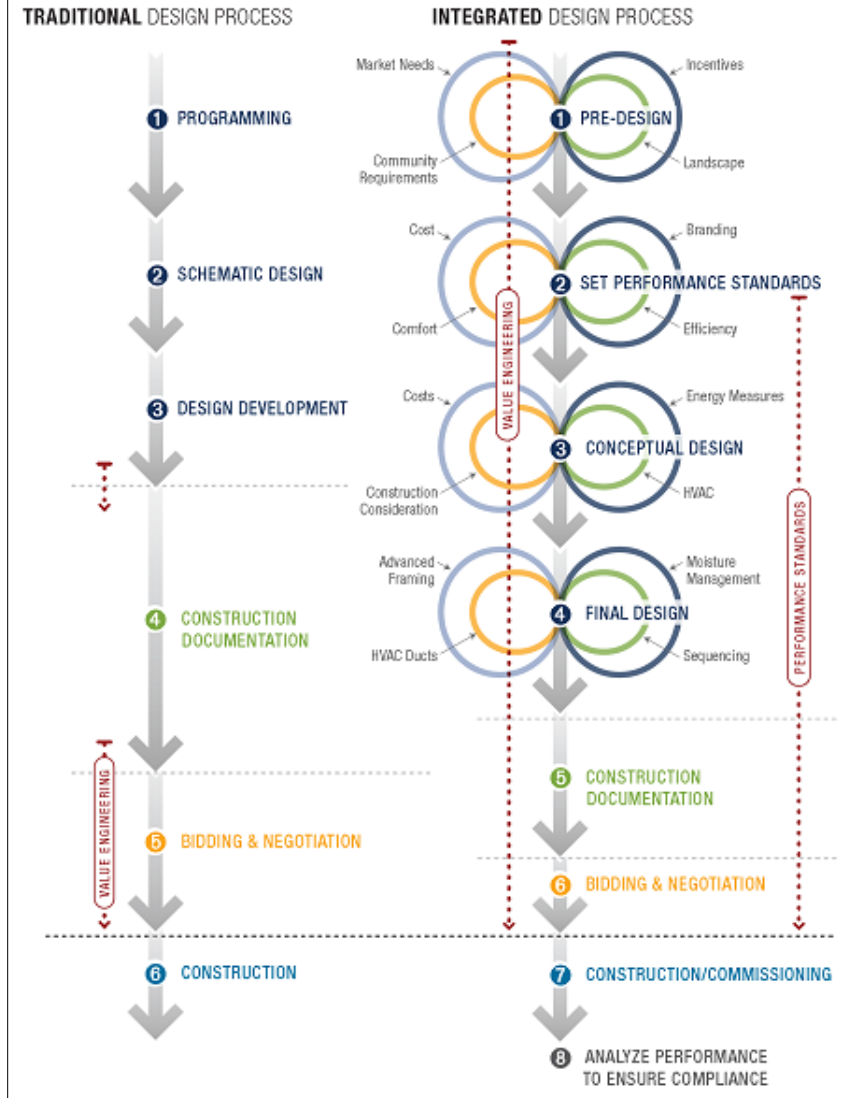
1. By 2020, **all new homes are ZNE Code or ZNE Ready homes.**
2. By early 2016, utility new construction activities include fully subscribed **ZNE Builder Early Adopter Programs** that address incentives, training, market adoption, and demonstration projects, etc.
3. An Updated California Residential Building **Rating and/or Labeling System** (Updated HERS or equivalent) is in place by 2016.
4. Between 2013 and 2017, California sees a 5-10% percentage **decrease in the cost** of implementing ZNE on production homes.
5. By 2017, a **nationally recognized appraisal standard**, accepted by underwriters and funders for ZNE homes is in place and utilized in California.
6. An adequate **pool of trained and educated professionals** in design, engineering and construction to support ZNE demand in California is in place by 2018.

Catalytic Projects and Programs

- Early Adopter Program
- Third Party Verification System (Rating/Labeling)
- Reach Codes
- Demonstration Projects
- Integrated Building Design


Traditional Versus Integrated Design Process

The Integrated Design Process loops in design input at every stage of development (Adapted from IEA 2003).



Goal 1. Demand and Awareness

- Launch Outreach and Awareness Activities
- Leverage Civic and Community Leadership
- Incorporate Builder Recognition Program as part of Early Adopters Program
- Promote 3rd Party Verification
- Monitor and Enhance Marketing and Outreach Efforts
- Evaluate New Billing Formats



ZNE Facts for Commercial Building Operators & Owners

A ZNE building produces as much energy as it consumes over the course of a year



Brentwood Apartments Edmonton, Alberta, Canada
(Photo: David Dodge, Green Energy Futures)

F1 / ZERO-NET ENERGY STANDARDS FOR BUILDINGS ARE COMING IN CALIFORNIA.

California has set a course to achieve zero-net energy (ZNE) for all new construction and half of the existing building stock in the next two decades. Owners should begin to prepare for this change and can put themselves in a leading position by moving to a ZNE performance goal now.

F2 / ZNE BUILDINGS FOR A NUMBER OF BUILDING TYPES ARE FEASIBLE TODAY.

While the market share of ZNE buildings is still small, it's growing. ZNE is currently feasible in most multi- and single-family homes, schools, smaller office buildings, libraries and other public assembly-type buildings. There are numerous examples around the country, built by a variety of design teams and developers.

Zero net energy building projects are located in most U.S. climates. While mild climates—like California—certainly help make zero energy buildings more easily achievable, projects have also been successfully completed in the harsher climates of Minnesota, Massachusetts and New York.

F3 / INVESTING IN ZNE BUILDING OFFERS MULTIPLE BENEFITS.

Beyond the environmental benefits of reduced carbon and greenhouse gas emissions, ZNE buildings provide substantive business advantages. ZNE performance helps reduce exposure to risk by ensuring that an asset is more resilient, has higher employee and tenant retention, and enjoys higher rents.

ZNE buildings typically rely on more passive strategies such as natural ventilation and daylighting, which means they can be kept cool and interior spaces illuminated even when the power is out. They also have demonstrated reduced operating and equipment replacement costs, which can grow the bottom line while providing valuable brand recognition in a competitive building market.

F4 / THE COST OF ZNE BUILDINGS IS IN LINE WITH THE COST OF GREEN BUILDINGS.


Commercial buildings cover a broad array of building types, and information on costs is based on a limited number of buildings. However, some commercial buildings have achieved ZNE within typical construction costs for their building type. Achieving ZNE is based on a careful integrated design process focused on a clear energy performance goal. Most reported examples range from 0% to 10% additional costs.

Resources & More Information

Net Zero Energy Design: A Guide for Commercial Architecture. | Tom Hootman, 2012

"Getting to Zero 2012 Status Update: A First Look at the Cost and Features of Zero Energy Commercial Buildings" NBI | newbuildings.org/zero-energy

"Zero and Net-Zero Energy Buildings + Homes" (Chapter 4 — Analyzing the Business Case). | bdcnetwork.com/2011-white-paper-zero-and-net-zero-energy-buildings-homes-0



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Goal 2. Technical Training and Education

- Develop New/Coordinated ZNE Curriculum
- Integrate Training & Education into Early Adopter Program
- Create Local Gov't Peer-to-Peer Early Adopter Program for Building Departments
- Foster Partnerships with Education Providers to Expand Training and Education Programs
- Monitor ZNE Training Program Effectiveness



Honda House, UC Davis West Village

Goal 3. Technical Tools

- Complete Needs Assessment of Existing Software
- Develop ZNE model Standards and Criteria for Tools; **Ensure that they support codes and standards**
- Support Development of Energy Management Tools for User Feedback and Monitoring
- Establish ZNE Best Practices, Tools and Resources Web Portal
- Develop Tools to Support Labeling/Rating
- **Pilot Online Permitting Platform for increased Code Compliance**



Goal 4. Financing, Affordability & Value

- Facilitate National ZNE Appraisal Standard
- Establish/Update 3rd Party Verification/Labeling
- Leverage Existing Finance & Develop New Ones
- Continue and Grow Incentive Programs
- Integrate Financing Incentives and Non-Financial Tools into Early Adopter Program

AI Reports®
Form 020.03*

Client File #: _____ Appraisal File #: _____

Residential Green and Energy Efficient Addendum

Client: _____
Subject Property: _____
City: _____ State: _____ Zip: _____

Additional resources to aid in the valuation of green properties and the completion of this form can be found at http://www.appraisalinstitute.org/education/green_energy_addendum.aspx

ENERGY EFFICIENT ITEMS
The following items are considered within the appraised value of the subject property:

Insulation	<input type="checkbox"/> Fiberglass Blown-In <input type="checkbox"/> Other (Describe): <input type="checkbox"/> Basement Insulation (Describe): <input type="checkbox"/> Floor Insulation (Describe):	<input type="checkbox"/> Foam Insulation <input type="checkbox"/> Cellulose <input type="checkbox"/> Fiberglass Batt Insulation	R-Value: <input type="checkbox"/> Walls <input type="checkbox"/> Ceiling <input type="checkbox"/> Floor
Water Efficiency	<input type="checkbox"/> Reclaimed Water System (Explain): <input type="checkbox"/> Rain Barrels - #:	<input type="checkbox"/> Cistern - Size: Gallons <input type="checkbox"/> Rain Barrels Provide Irrigation	Location:
Windows	<input type="checkbox"/> ENERGY STAR® <input type="checkbox"/> Low E <input type="checkbox"/> High Impact <input type="checkbox"/> Storm	<input type="checkbox"/> Double Pane <input type="checkbox"/> Triple Pane <input type="checkbox"/> Tinted <input type="checkbox"/> Solar Shades	
Day Lighting	<input type="checkbox"/> Skylights - #: <input type="checkbox"/> Solar Tubes - #:	<input type="checkbox"/> ENERGY STAR Light Fixtures <input type="checkbox"/> Other (Explain):	
Appliances	ENERGY STAR Appliances: <input type="checkbox"/> Range/Top <input type="checkbox"/> Dishwasher <input type="checkbox"/> Refrigerator <input type="checkbox"/> Other:	Water Heater: <input type="checkbox"/> Solar <input type="checkbox"/> Tankless (On Demand) Size: _____ Gal.	Appliance Energy Source: <input type="checkbox"/> Propane <input type="checkbox"/> Electric <input type="checkbox"/> Natural Gas Other (Describe):
HVAC (Describe in Comments Area)	<input type="checkbox"/> High Efficiency HVAC - SEER: <input type="checkbox"/> Programmable Thermostat	<input type="checkbox"/> Heat Pump <input type="checkbox"/> Wind	<input type="checkbox"/> Thermostat/Controllers <input type="checkbox"/> Radiant Floor Heat <input type="checkbox"/> Passive Solar <input type="checkbox"/> Indoor Air PLUS Package <input type="checkbox"/> Energy Recovery Ventilator Unit <input type="checkbox"/> Certification Attached
Energy Rating	<input type="checkbox"/> ENERGY STAR Home <input type="checkbox"/> HPwES (Home Performance with ENERGY STAR) <input type="checkbox"/> Other (Describe):		
HERS Information	Rating: _____	Date Rated: _____	Monthly Energy Savings on Rating: \$ _____
Utility Costs	Average Utility Cost: \$ _____	per month based on: _____	<input type="checkbox"/> Dashboards - #:
Energy Audit	Has an energy audit/rating been performed on the subject property? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown If yes, comment on work completed as result of audit.		
Comments			

*NOTICE: The Appraisal Institute publishes this form for use by appraisers where the appraiser deems use of the form appropriate. Depending on the assignment, the appraiser may need to provide additional data, analysis and work product not called for in this form. The Appraisal Institute plays no role in completing the form and disclaims any responsibility for AI Reports® AI 020.03 Residential Green and Energy Efficient Addendum.

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Goal 5. Future Infrastructure

- Develop and Adopt Utility Distribution Plans (AB 327)
- Research and Data on Impact of Energy Production and Demand Response; Data and Costs/Benefits of Title 24 TDV and cost-effectiveness of ZNE Code Homes
- Develop Community-Scale Pilot Projects
- Address Potential Policy and Code Barriers to Community Scale ZNE
- Influence Equipment Supply Chains



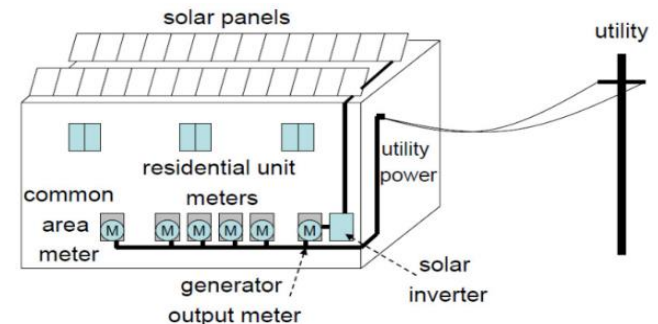
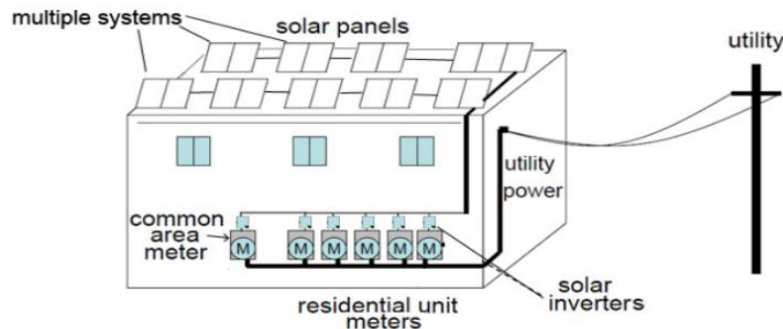
Goal 6. Alignment

- Ensure ongoing Collaboration with Agencies and Utilities
- Adopt Statewide Policies Towards an Achievable Path to ZNE
 - Move Closer to ZNE with Title 24, part 6 and Title 20 Appliance Standards
- Launch Local Government Early Adopter Program; Consistent Application of Codes and Compliance
- Expand Communication Methods and Timelines of Code Cycles

Multifamily

- More Complex and Different Barriers and Needs
- Need to Develop Similar but Customized Solutions

Multifamily Net Metering vs Virtual Net Metering System



Market Developments

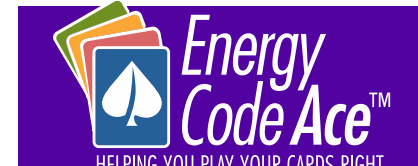


Supporting Residential ZNE

CPUC/PA/CEC ACTIVITIES

C&S Program Implementation Support

- **Tools:**
 - Identify forms, installation techniques, building standards relevant to projects
- **Training**
 - Classroom
 - Online
- **Resources**
 - Fact Sheets, Trigger Sheets, Checklists
- <http://energycodeace.com>



California Advanced Homes Partnership

- **Revised California Advanced Home incentive in 2014**
 - Awards incentives based on absolute performance relative to ZNE, not percent better than Title 24
 - Webinars, Newsletters
 - Design Assistance: assess the efficiency of a model and help suggest improvements to get deeper savings
 - Helpline: 1-866-352-7457 for assistance with modeling, home design, participation, etc.
- <http://www.californiaadvancedhomes.com>

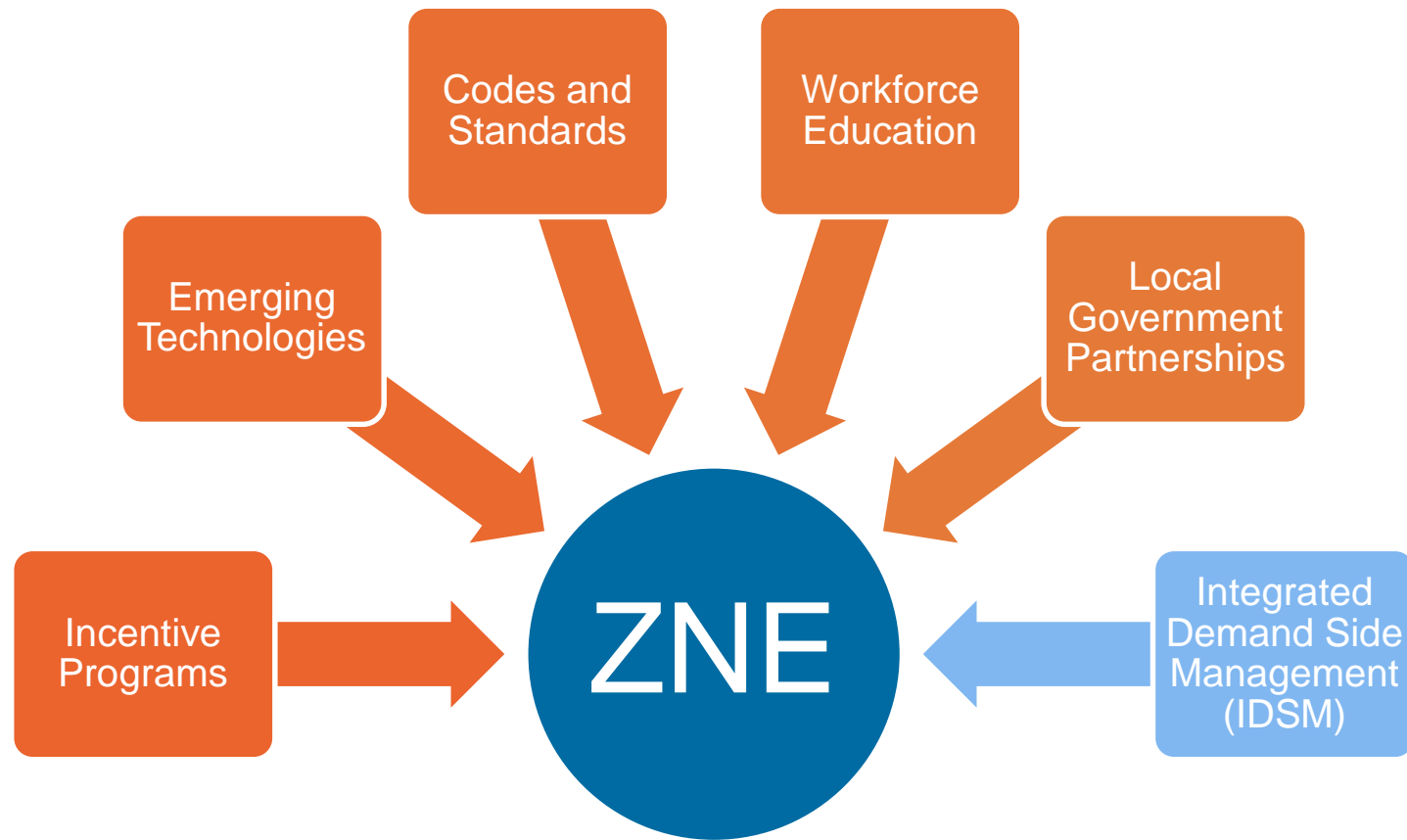
Reach Codes

- **Reach Codes help push the market and prepare for ZNE**
- **Both the IOUs and RENs are supporting local governments**
 - Cost-effectiveness studies to file with the CEC
 - Measure based Reach Codes
 - Cool Roofs
 - Lighting (under consideration)
 - % above code (under way)

Other CPUC/IOU Support

- **Undertaking grid study of costs/ benefits of ZNE Title 24 requirement on distribution circuits**
- **Ongoing ZNE homes and communities pilots and demonstration projects (all IOUs)**
- **Training at Energy Centers in advanced building practices**
- **Additional support for 2016 Title 24:**
 - Exploring additional support for the two key measures proposed by the CEC: high performance attics and walls
- **Improve the coordination of activities in EE portfolio**

Energy Efficiency Portfolio



Energy Commission Activities



- Energy Commission adopts 2013 Title 24 residential energy building code (2012)
- Title 24 (2013) requires new buildings to be. . .
 - Single family homes 25% more efficient
 - Multifamily buildings 14% more efficient
 - Required to be cost-effective for building owners
- Recent E3 study reviewing cost-effectiveness of PV systems on new homes
- New Solar Homes Partnership Incentives
- AB 758 and HERs

Future Code Development/Implementation

HOW CAN YOU GET INVOLVED?

Ongoing Action Plan Implementation

- Meetings and Workshops
- Case Studies
- Plan Documents
- Resources
- Communications Tool Kit

www.CaliforniaZNEHomes.com



Get Involved - Regulatory

- **Talk with the utility Program Managers**
 - Let them know your difficulties, needs and provide feedback on the programs
 - Call the hotlines, visit the websites, attend trainings, explore incentives
- **Get involved in the code development process at the CEC**
 - The code development process is public
 - The CEC welcomes comments to the proposals, both written and during the workshops.
- **Participate in the 2016 Title 24 workshops, provide comments**



Get involved or find out more:

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