We will be starting soon!

Thanks for joining us

Our Changing Climate and Evolving Building Practice

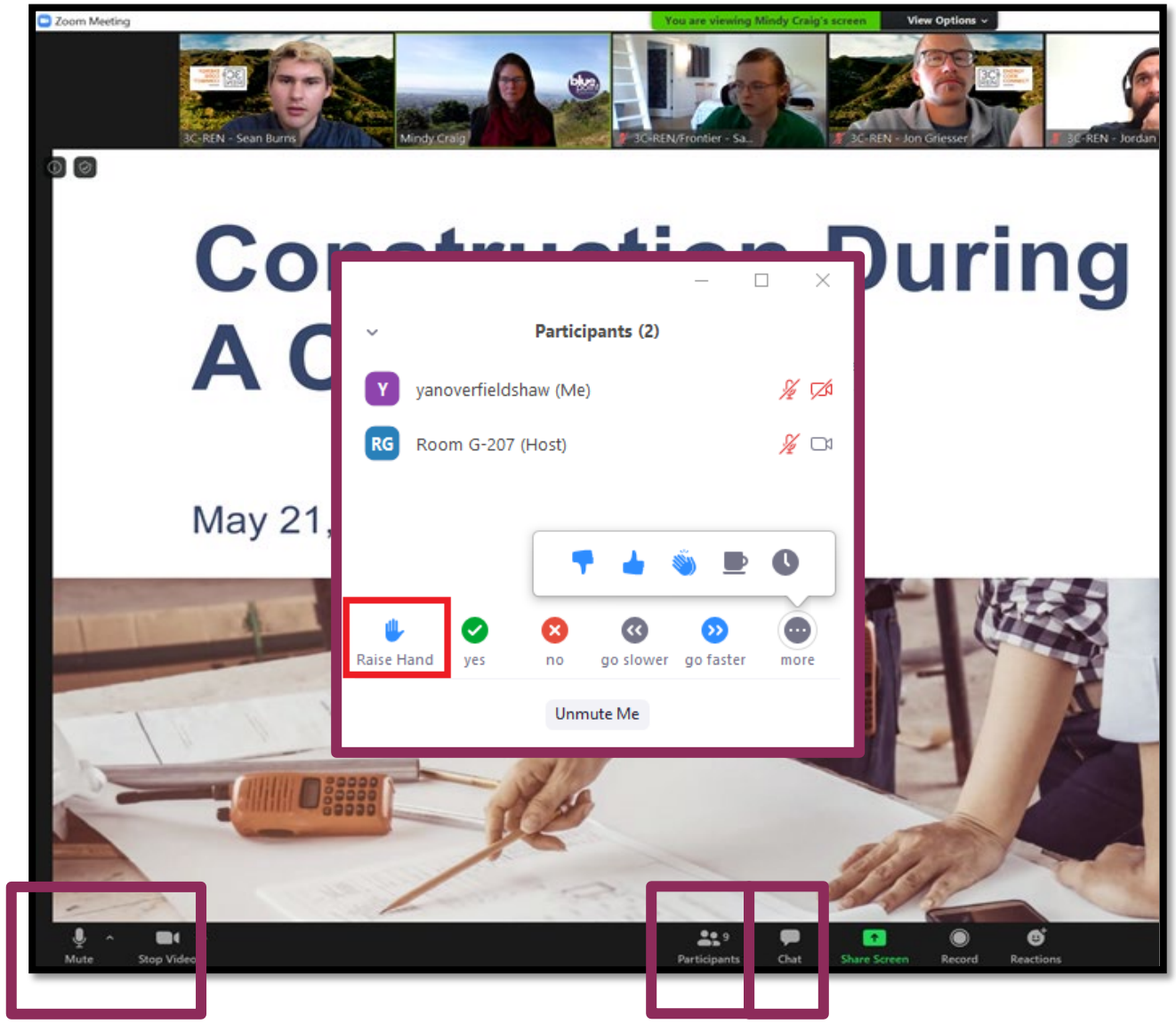
Ann Edminster – Design AVEnues

Jay Gentry – Passive House California

November 16th, 2021

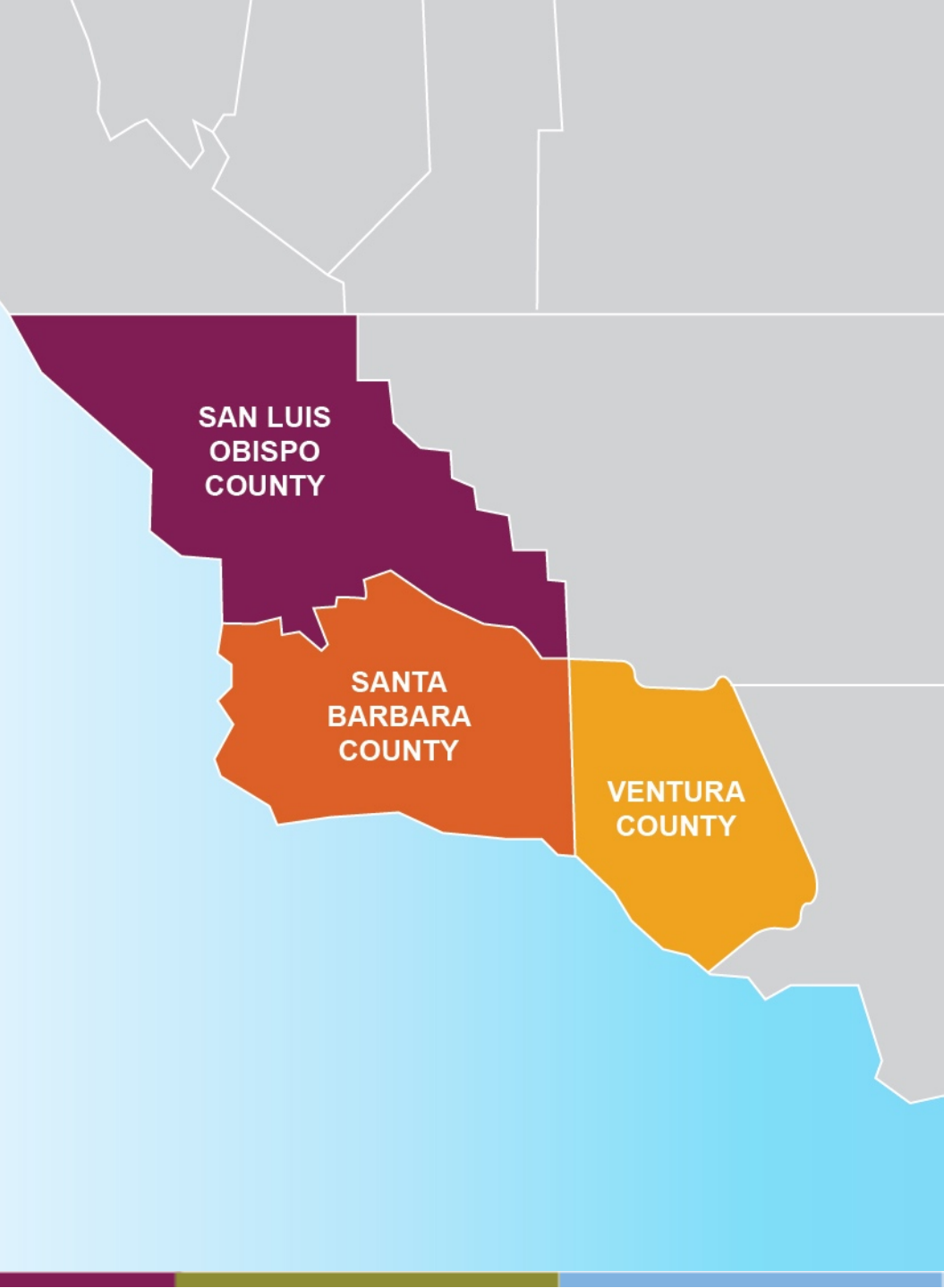
Zoom Orientation

- Please be sure your full name is displayed
- Please mute upon joining
- Use "Chat“ box to share questions or comments
- Under "Participant" select "Raise Hand" to share a question or comment verbally
- The session may be recorded and posted to 3C-REN's on-demand page. Feel free to ask questions via the chat and keep video off if you want to remain anonymous in the recording.



3C-REN: Tri-County Regional Energy Network

- Three counties working together to improve energy efficiency in the region
- Services for –
  - **Building Professionals:** industry events, training, and energy code compliance support
  - **Households:** free and discounted home upgrades
- Funded by ratepayer dollars that 3C-REN returns to the region



3C-REN
Staff Online

Our Changing Climate & Evolving Building Practice

Decarbonization and High Performance

Leveraging the loading order, building science, and integrated design & delivery

ANN V EDMINSTER

AVE DESIGN AVEnues LLC

annedminster.com | zero energy consulting

PHCA PASSIVE HOUSE CALIFORNIA

Greetings, Earthlings!

ANN V EDMINSTER

DESIGN AVEnues LLC

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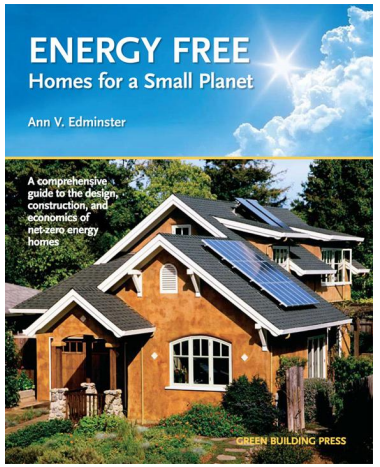
- Architecture boot camp
  - B.Arch., Cal Poly SLO
- Green building immersion
  - M.Arch., UC Berkeley
- Led development of LEED for Homes
- In 2009 wrote 1st book on zero-energy homes
- Laser-focused on reducing emissions in the built environment



Thank you for the opportunity

Jay Gentry

- Graduate of UCLA Business School
- USAF instructor pilot
- Marketing and sales consultant
- Passive House California Board of Directors
- Advocate for state of the science design and construction

Learning Objectives

GENERAL:

- **Awareness and alignment:**
  what is, what is happening, and what is possible
- **Knowledge to make informed and purposeful choices:**
  where you fit and how you will proceed in this critically important emerging market

AIA: after attending this class, participants will be able to—

- **Identify** key issues driving evolution within the building industry
- **Describe** policies & programs emerging to address these realities
- **Explain** the three pillars of high-performance, climate-responsive building practice
- **Incorporate** high-performance priorities & practice into a personal or professional action plan

POLL

Which best describes YOU?

A. **Builder, contractor, or trades person**

B. **Architect, engineer, or other type of designer**

C. **Public agency official or staffer**

D. **Other** (select D + explain in chat box!)

TOPIC OUTLINE

- **WHY** we're here
- **WHAT** this means for the building sector
- **HOW** to implement high performance
- What **YOU** can **DO**

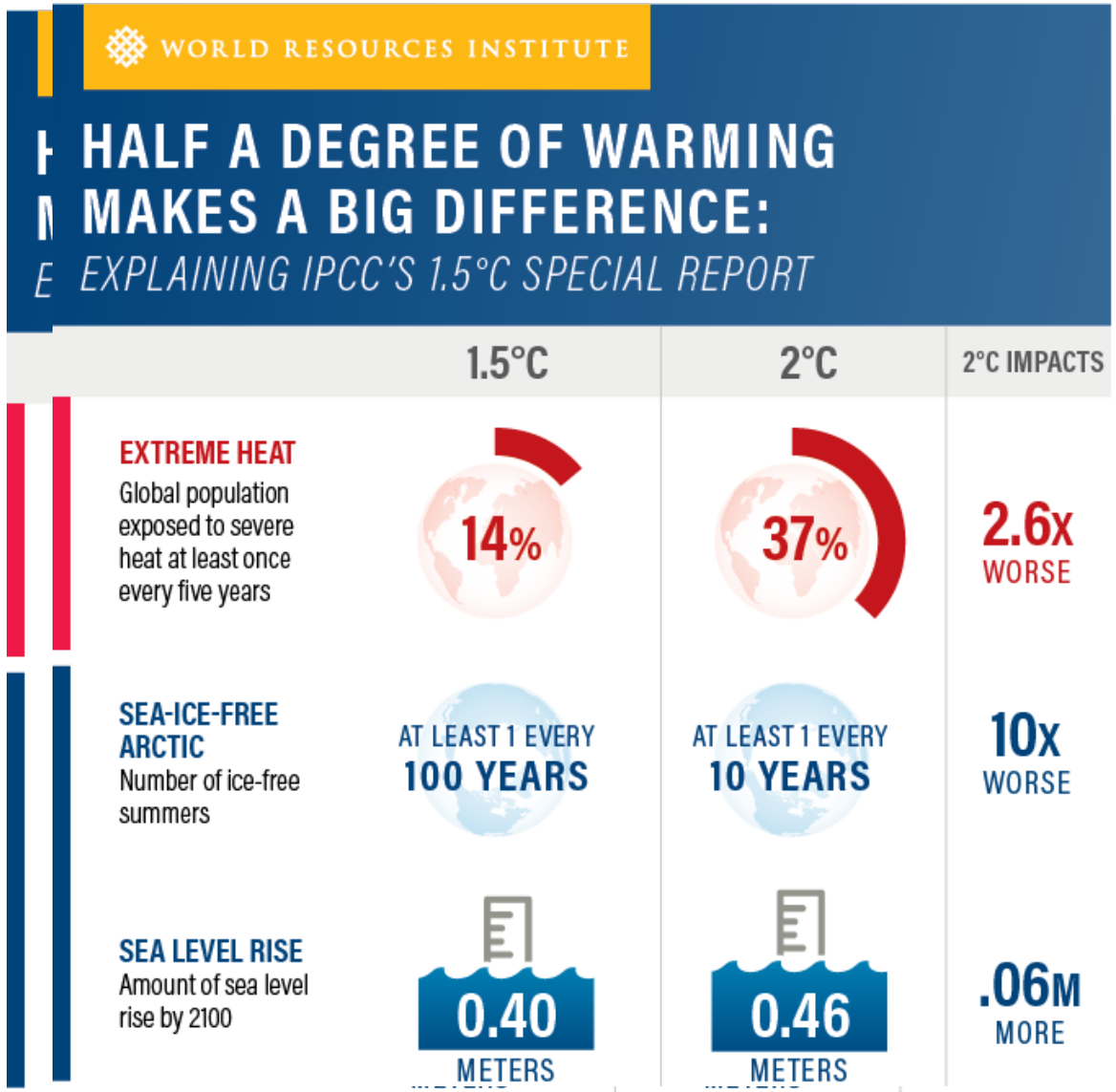
WHY we're here

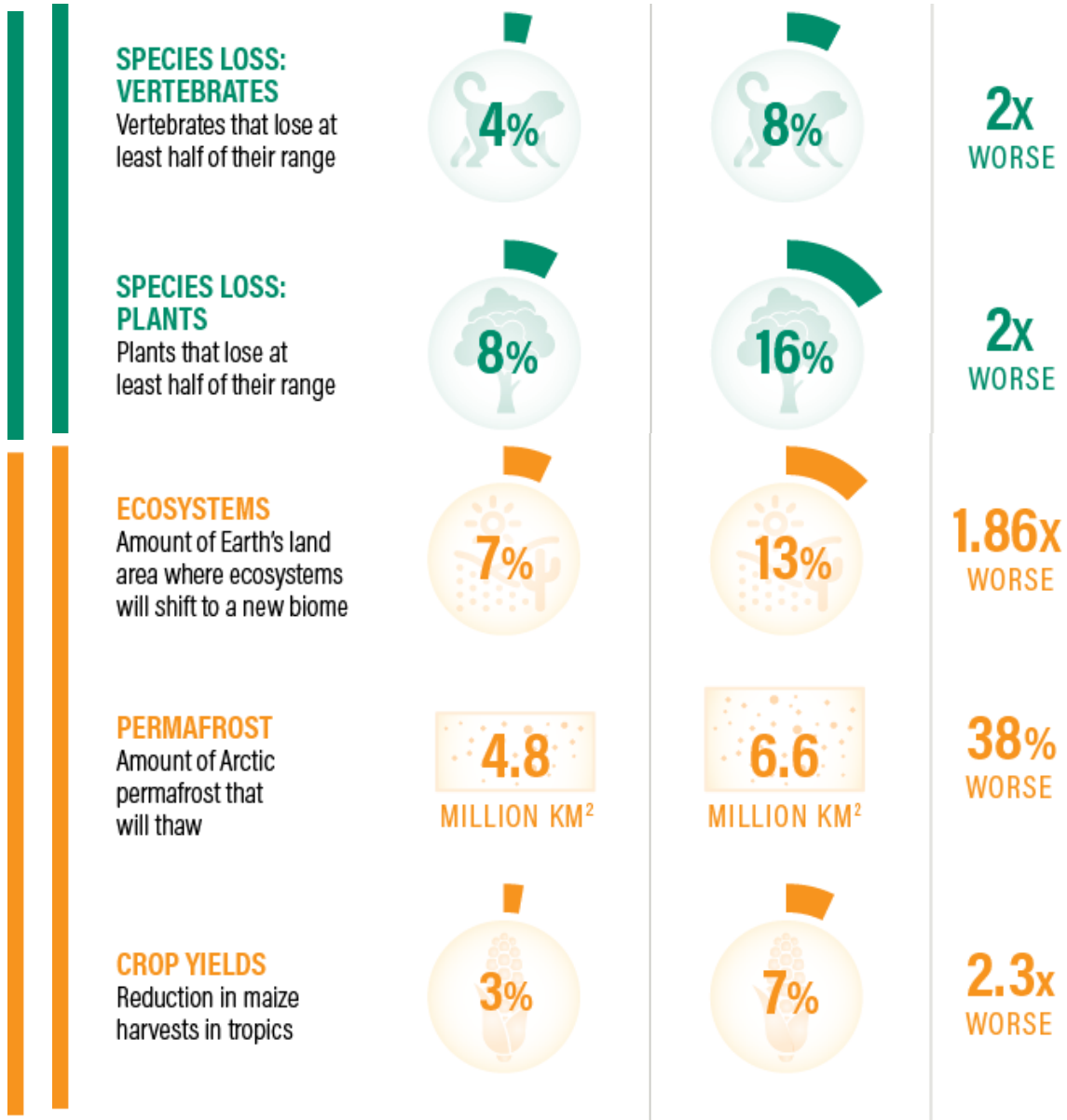
Preserving a **livable Earth** requires limiting temperature rise to **1.5°C**

Our home is on fire!

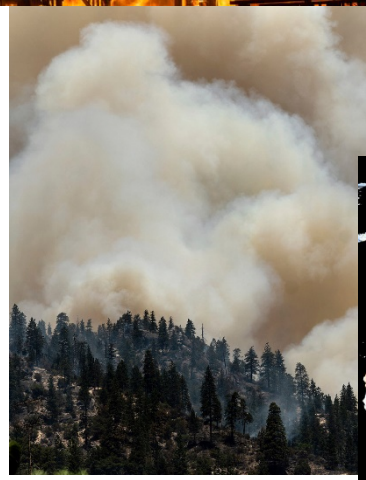
10/25/21: UN warns world is on course for **catastrophic warming of 2.7°C**

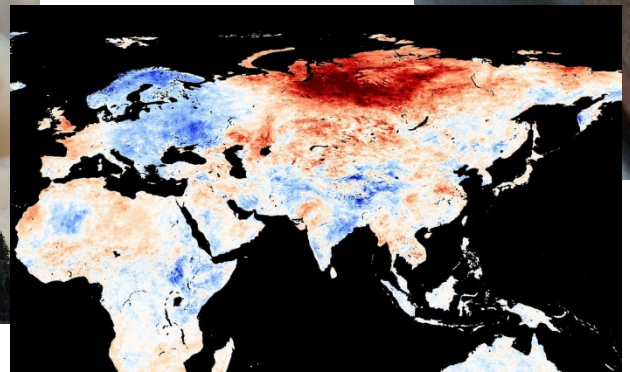
Limiting temperature rise is PRIORITY #1

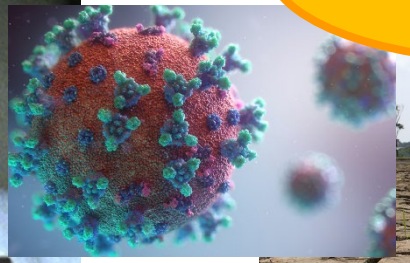


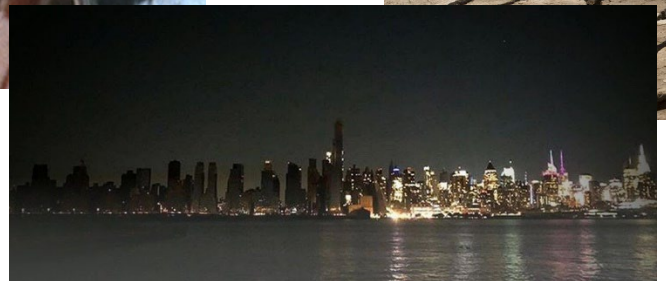


Converging crises are changing our priorities







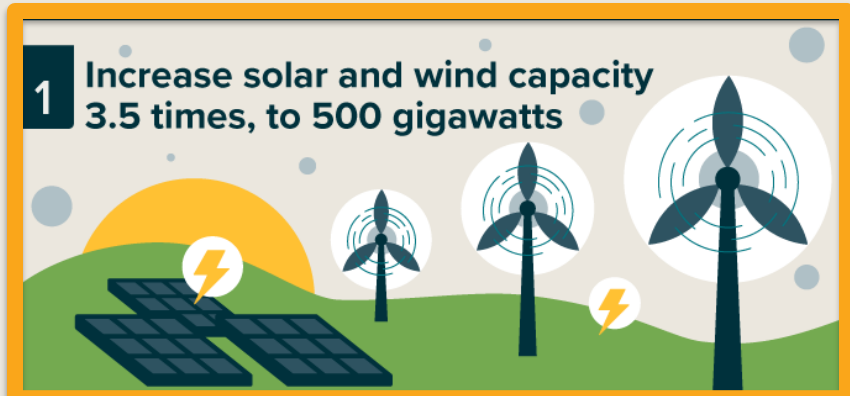


BERKELEY LAB

Getting to Net-Zero Carbon Emissions by 2050

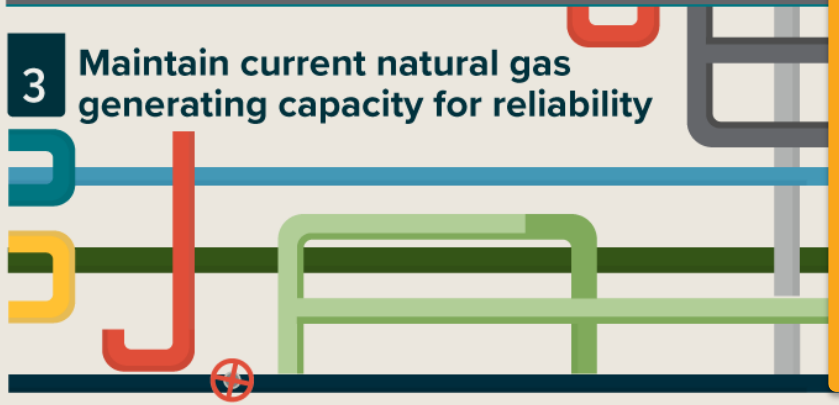
8 actions needed by 2030

1 Increase solar and wind capacity 3.5 times, to 500 gigawatts

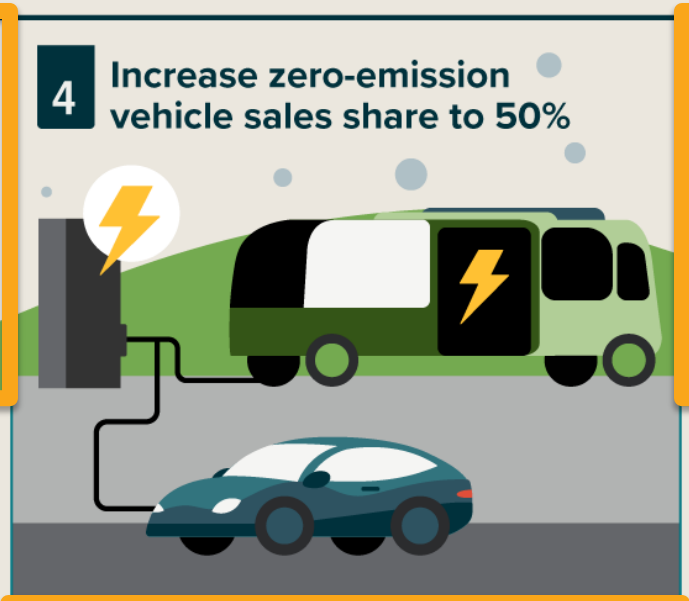


2 Eliminate most electricity generation from coal

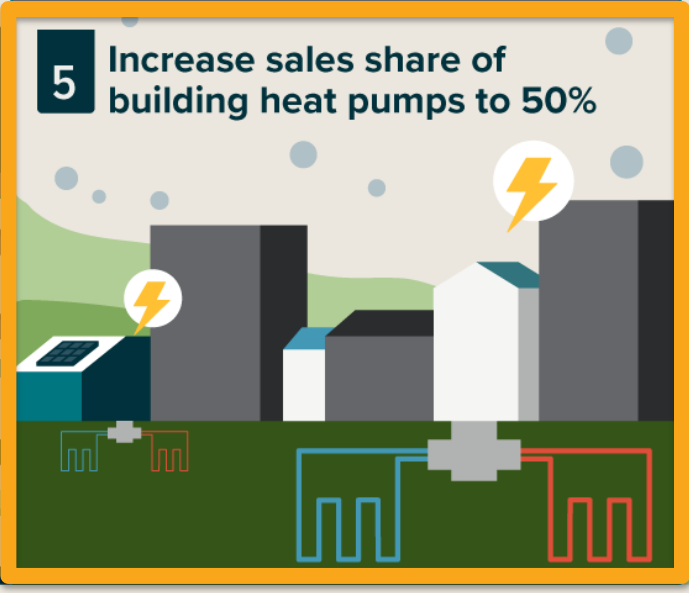
3 Maintain current natural gas generating capacity for reliability



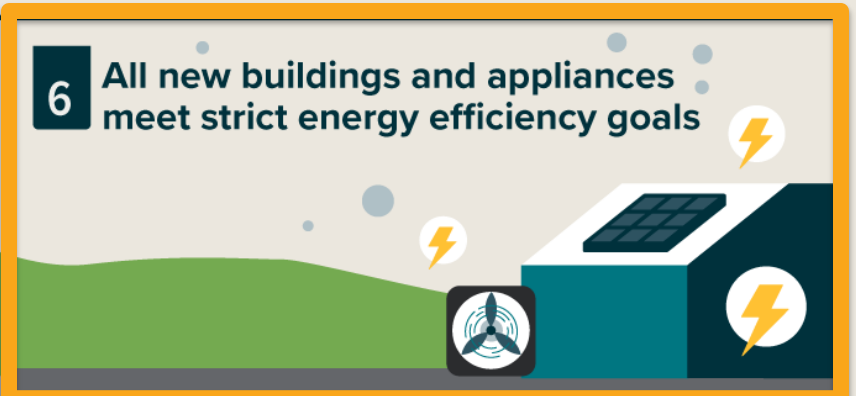
4 Increase zero-emission vehicle sales share to 50%



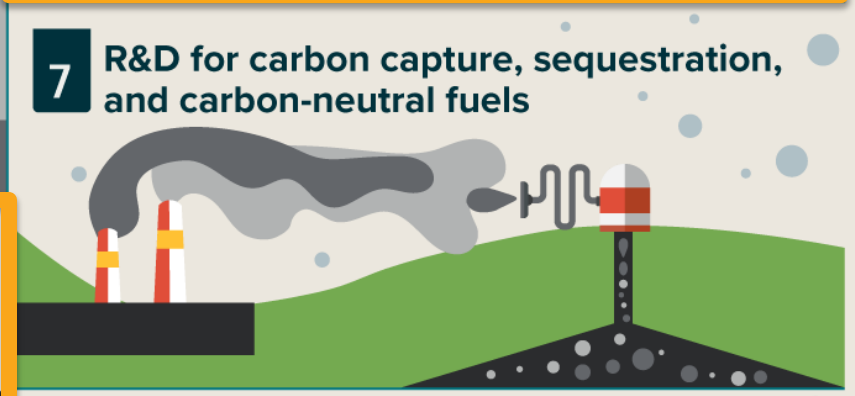
5 Increase sales share of building heat pumps to 50%



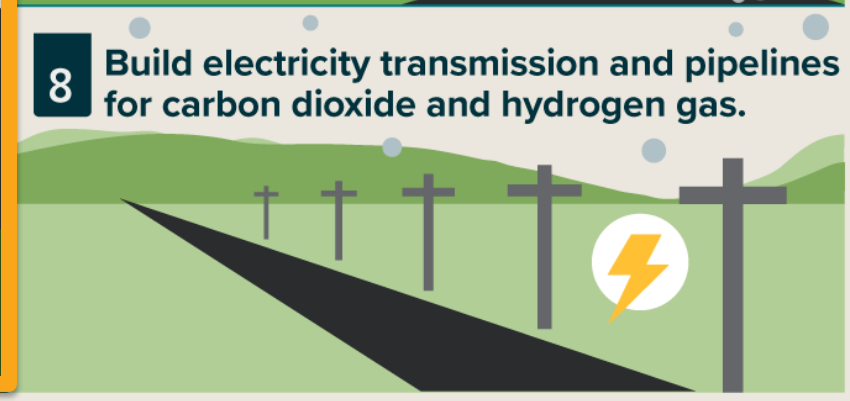
6 All new buildings and appliances meet strict energy efficiency goals



7 R&D for carbon capture, sequestration, and carbon-neutral fuels



8 Build electricity transmission and pipelines for carbon dioxide and hydrogen gas.



Public agencies are acting …

- TITLE 24 2022 is upping the ante
- CA carbon-neutral by 2045 LATEST
- CEC's TECH & BUILD programs
- 50+ local REACH CODES & natural gas bans

{POLICIES, PROGRAMS, INCENTIVES, AND MANDATES}

=

AN EVOLVING BUILDING INDUSTRY AND CULTURE

The IPCC calls for “unprecedented action”

It is possible:
United States production of Military Aircraft

<3,000 in 1939

Mid 1944 — 3,000 Every 11 Days

With vision, engagement, and commitment

On July 20, 1969, Apollo **11** **astronaut Edwin E. "Buzz" Aldrin** walked on the Moon

On July 24, 1969, Apollo **11** returned safely to Earth

WHAT this means

for the building sector

Graphic by Stacy Smedley, 2021

Understanding a Building's Carbon Footprint

Embodied Carbon

Manufacturing Emissions

(extraction through manufacturing of building product)

We need to shift to HIGH PERFORMANCE

- Low/zero-carbon **fuel sources**
- Low/zero **embodied carbon**
- High **efficiency**
- Lowest-possible **technology footprints**
- Grid-friendly **timing of energy use**
- Built-in **resiliency**

by 2030! EIGHT years!

Fuel sources

- Meeting the State's climate goals means eliminating fossil fuels from buildings—

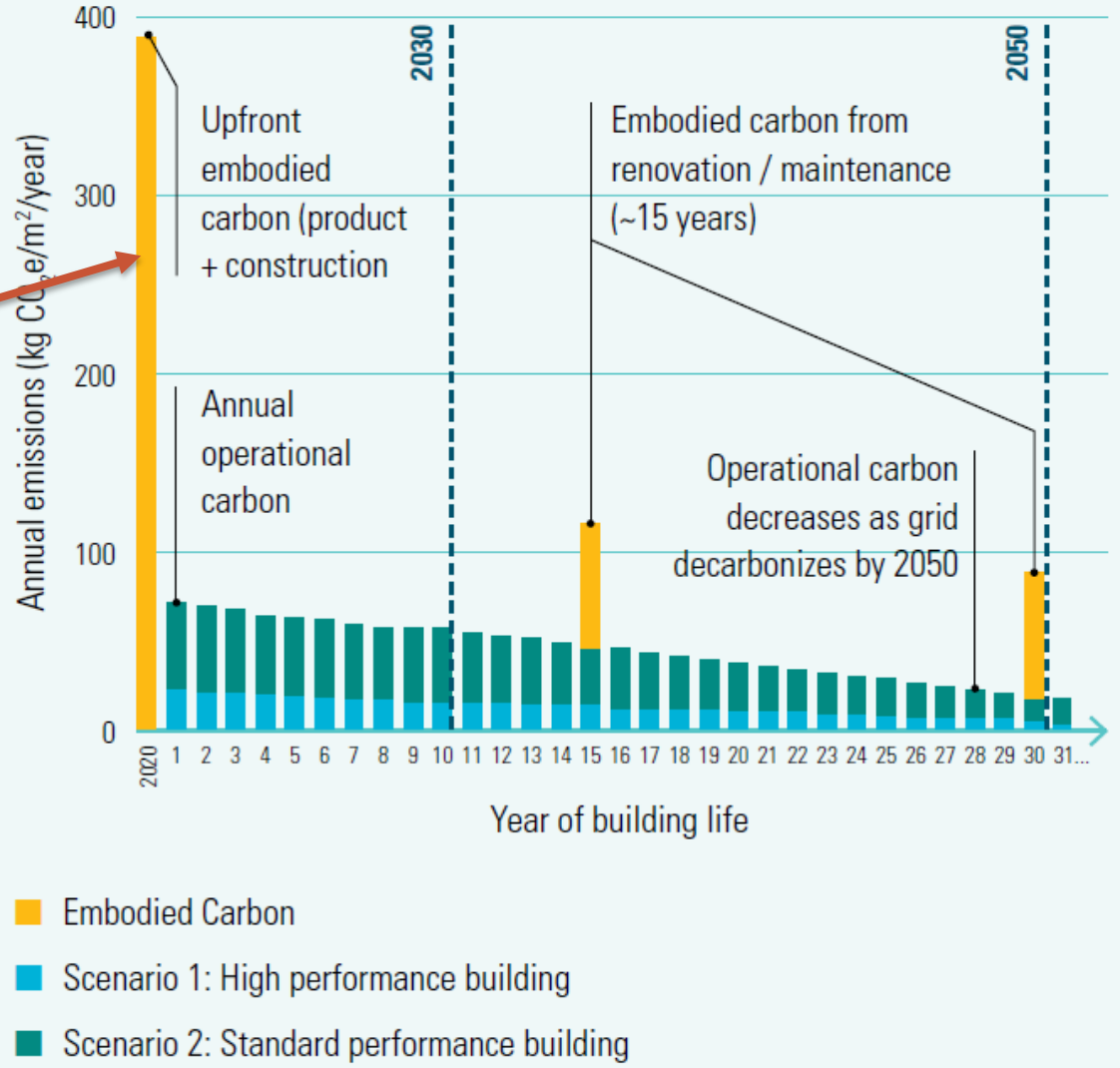
No more gas:

- Furnaces
- Water heaters
- Clothes dryers
- Stoves/cooktops
- Fireplaces
- Pool heaters
- Spas
- Barbecues
- Leaf blowers
- Lawn mowers *etc.* …

Embodied carbon

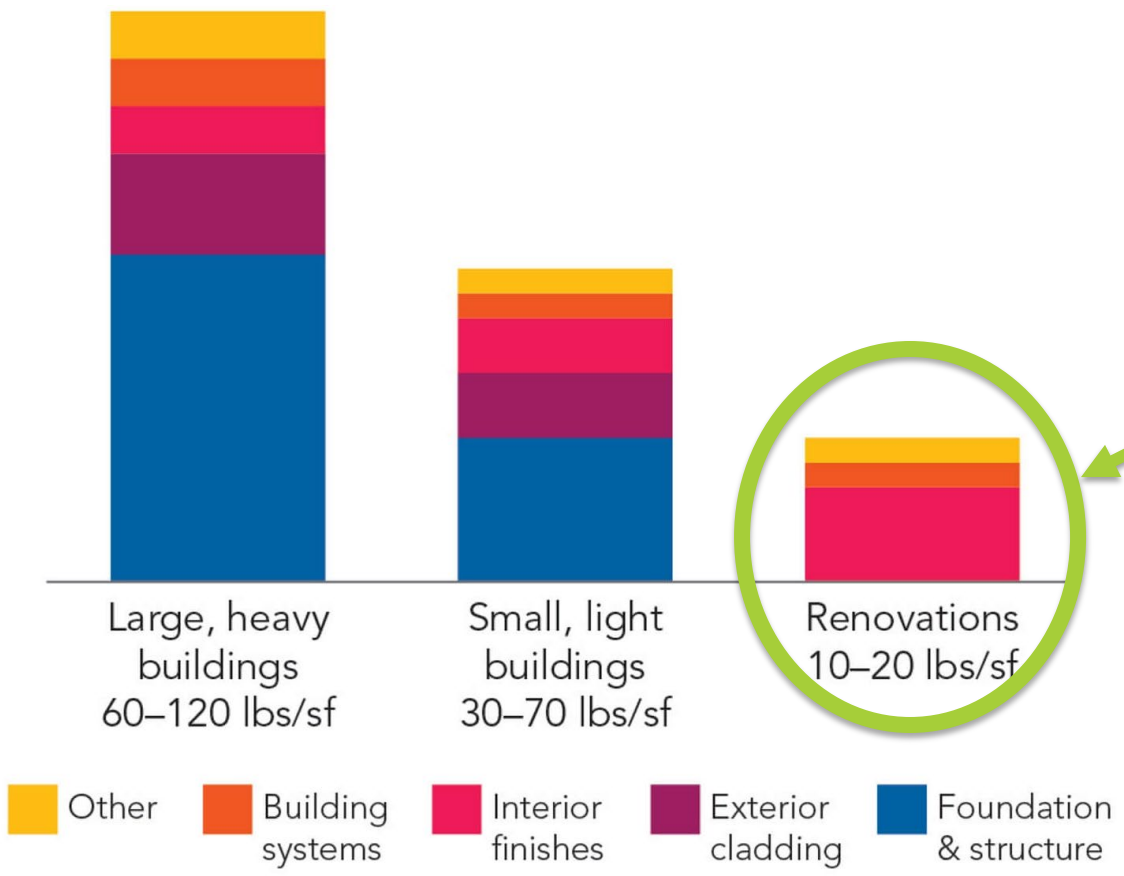
- We have 8 years to make the shift
- "Embodied carbon may represent … almost 75% of all construction-related emissions over the next decade"

RELATIONSHIP BETWEEN EMBODIED CARBON AND OPERATIONAL CARBON OVER A BUILDING'S LIFECYCLE



Source: Carbon Leadership Forum

Embodied carbon (EC) reduction strategies



- Build LESS—only what's essential (affordable housing!)
- Rehab and repurpose EXISTING buildings (& reduce operating carbon)
- Make the DESIGN EC-savvy
- Choose low-EC MATERIALS

Carbon emissions by building type and material.

Credit: reproduced from Siegel & Strain Architects in *The New Carbon Architecture*, Bruce King ed.

Technology* footprint

* from Greek ***tekhnologia:*** systematic treatment of an art, craft, or technique

Strategies to achieve high performance

LOW-TECH, LOW-IMPACT

HIGH-TECH, HIGH-IMPACT

BUILDING GEOMETRY DECISIONS — siting, orientation, building shape & complexity, window placement

PASSIVE COMFORT FEATURES — overhangs, insulation, high-performance windows

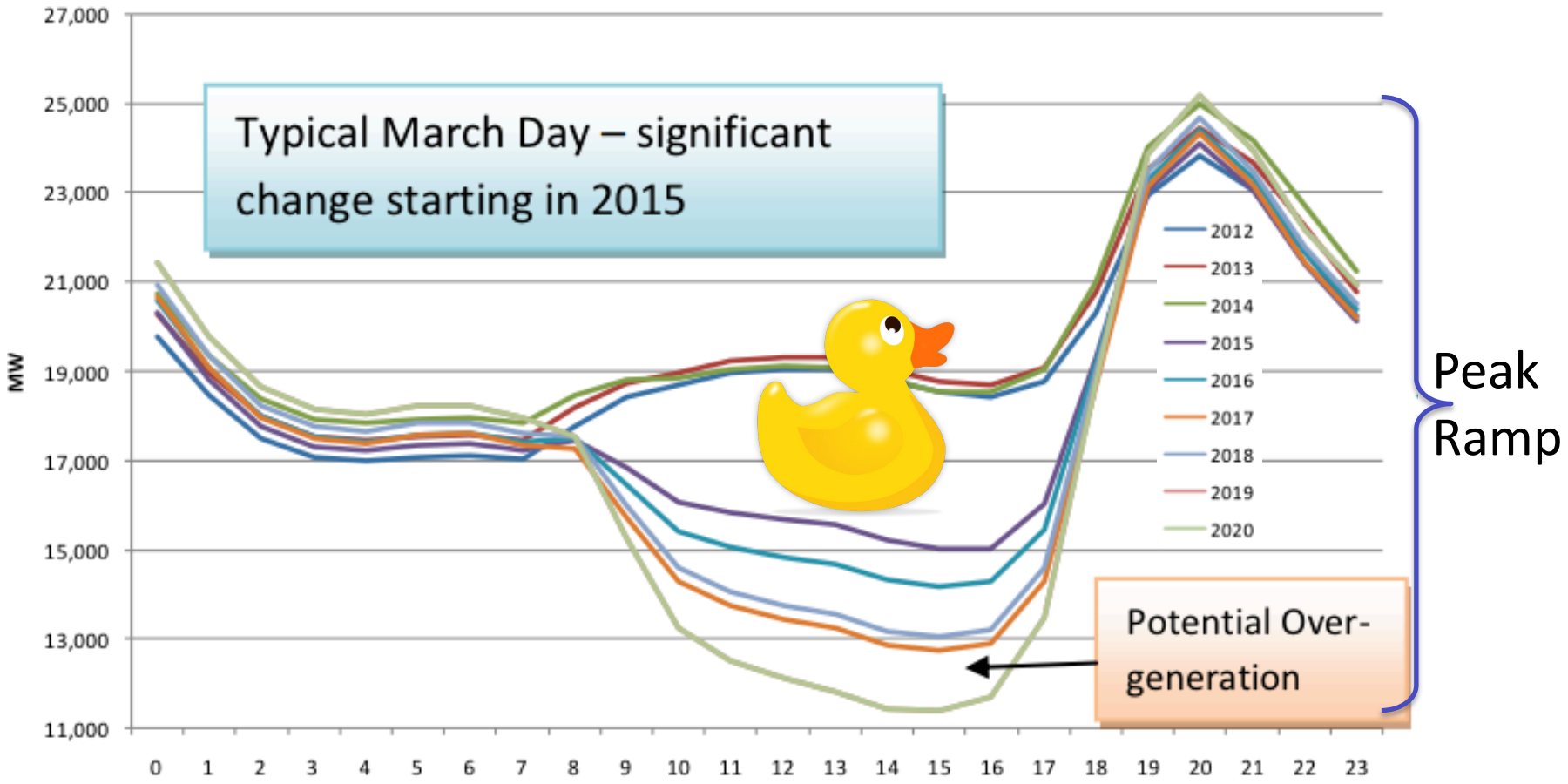
ACTIVE LOW-ENERGY COMFORT FEATURES — paddle fans, evaporative cooling

ACTIVE MID-ENERGY COMFORT FEATURES — heat pump water heating, space heating & cooling

ACTIVE HIGH-ENERGY COMFORT FEATURES — resistance heating

Energy time of use (TOU)

"The Duck Curve"



- **How MUCH energy we use matters**

  and

- **WHEN we use it matters!**

Energy TOU: demand response (DR)

- **Customer opts into DR progran**
  - Utility controls certain "smart" devices
  - Devices are managed based on grid needs
  - Customer maintains some control *(specifics vary by program)*

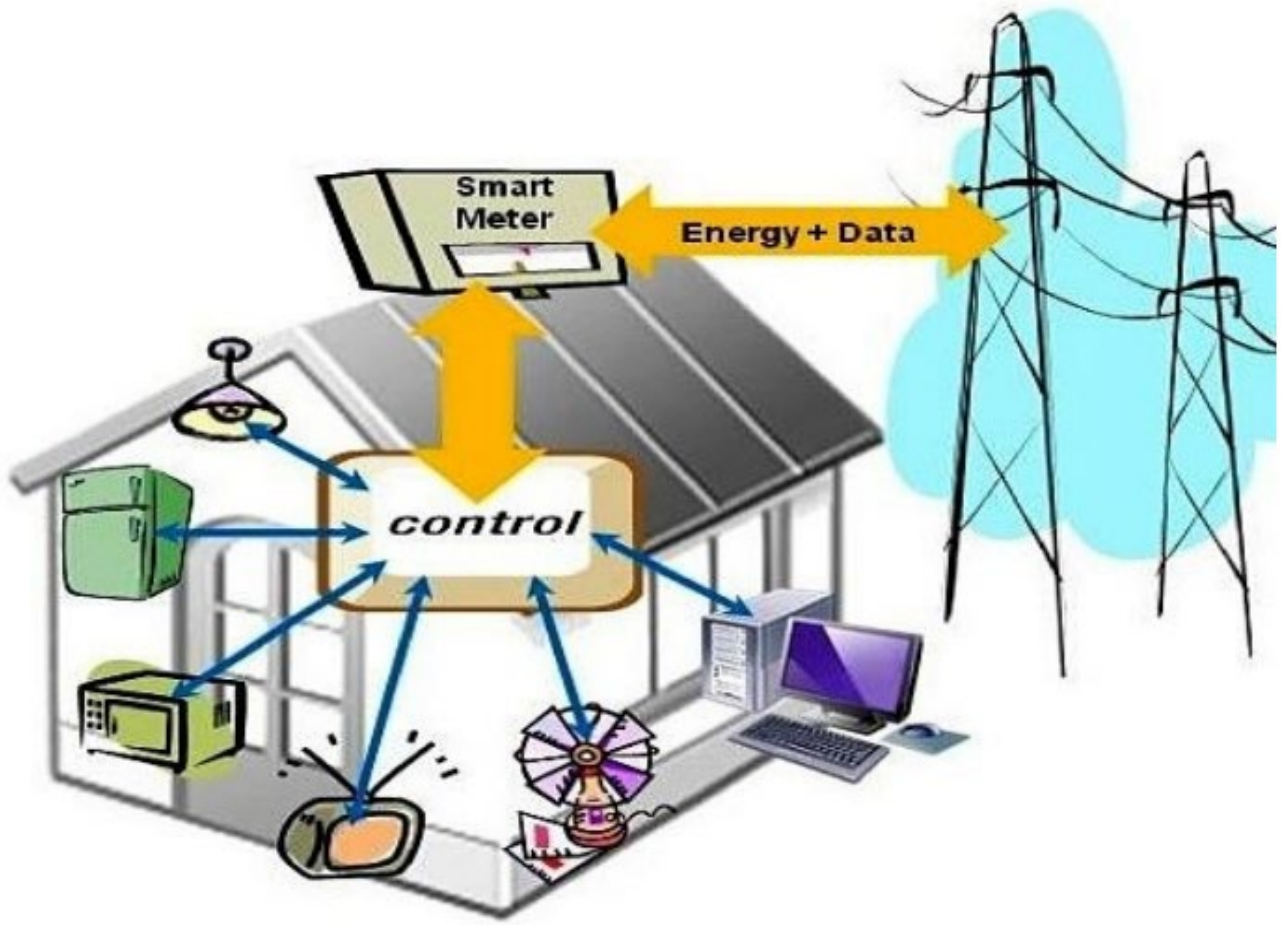
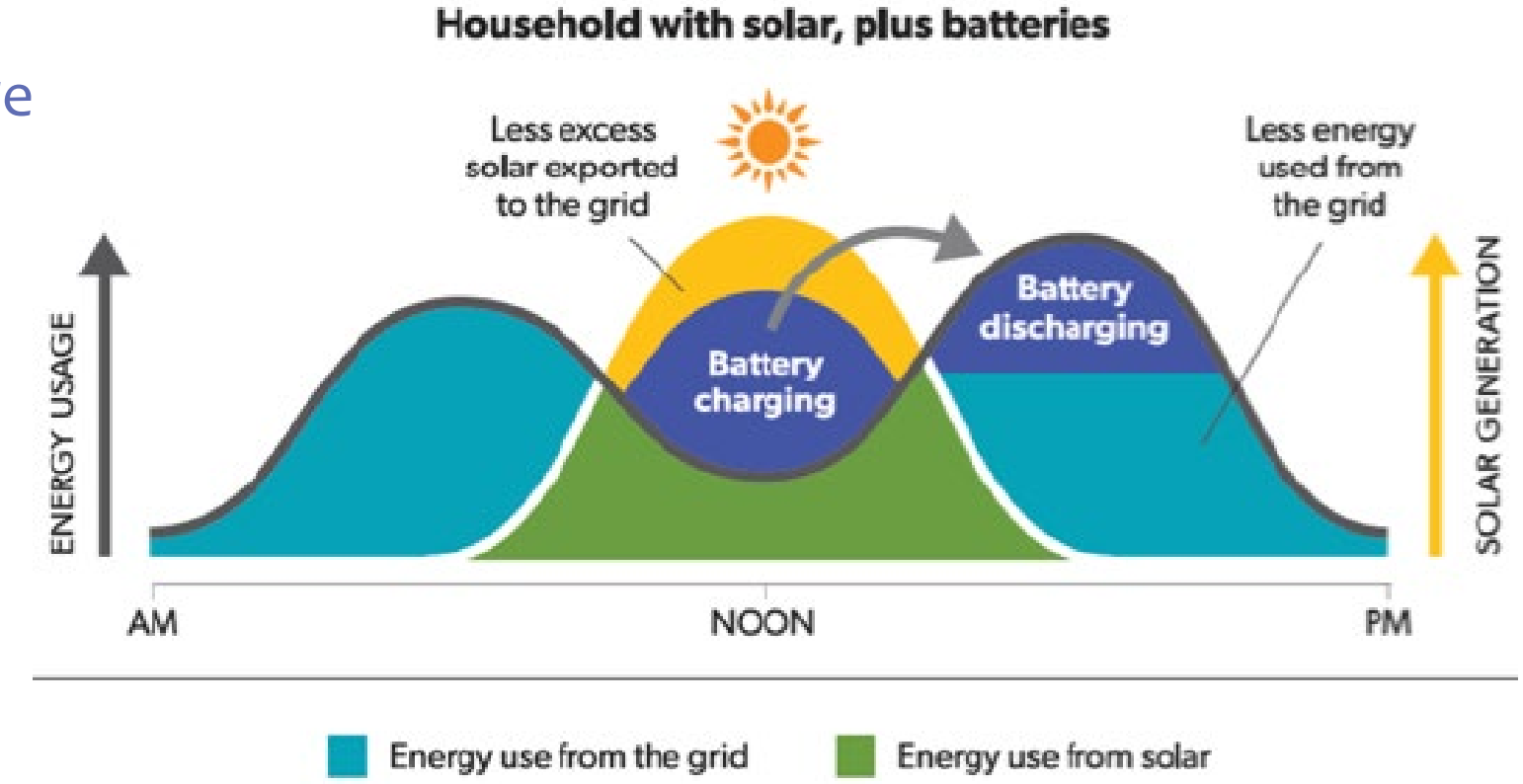


Image: SMART GRID-SHAPING THE POWER SYSTEM, Jai SINGH Arya & Mohan Kashyap

Energy Time of Use: Solar + Storage

- **Solar self-consumption**
  - Use daytime excess to charge EVs & batteries, use during peak rate periods
  - Good for the grid—reduces ramp need
- **Emergency backup**
  - Use stored electricity during outages

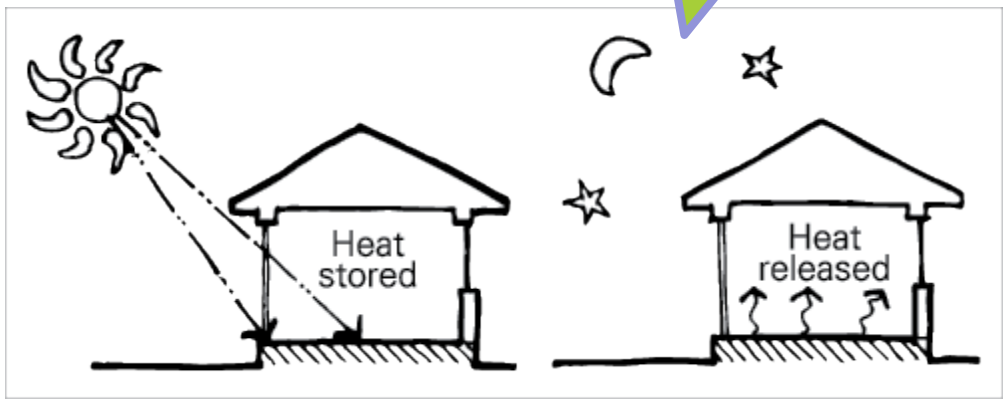


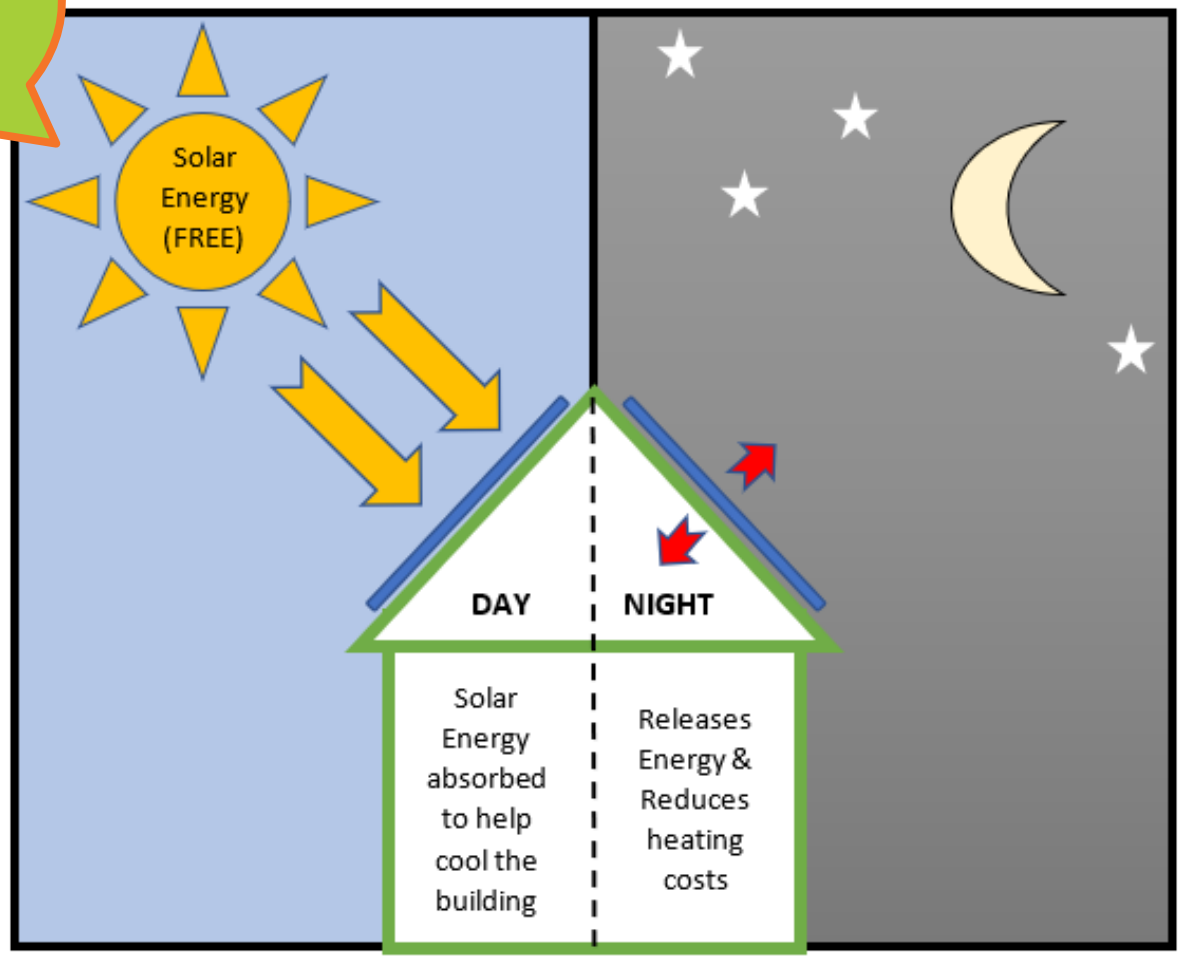
Energy TOU: Thermal Storage

Heat pump water heater

Phase change material

Thermal mass





Resiliency

Vulnerabilities:

- Extreme heat
- Wildfire
- Smoke/air pollutants
- Power outages

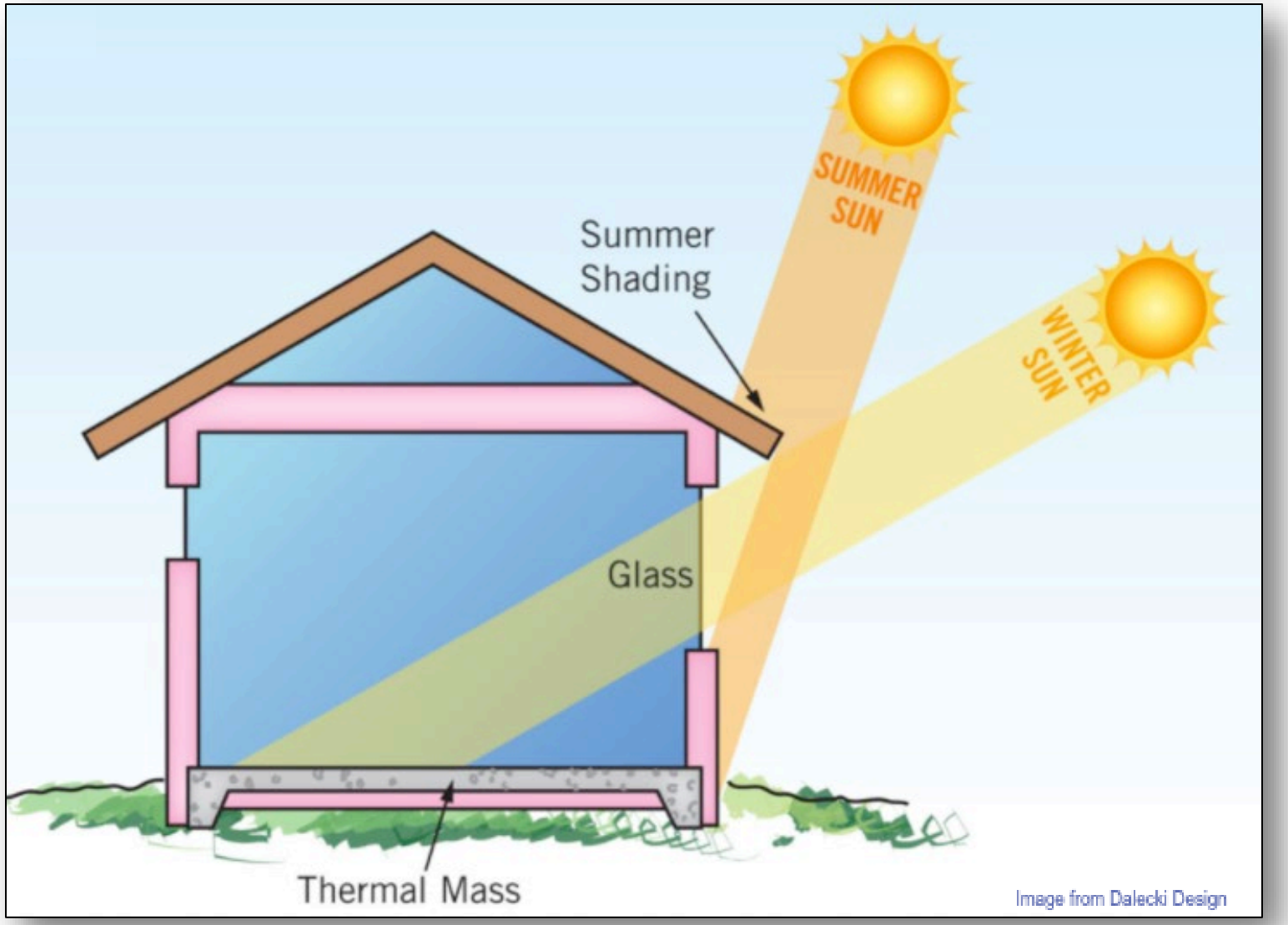
High-performance solutions:

- Robust thermal enclosure
- Fire-hardened enclosure
- Airtight enclosure, filtered ventilation system
- Robust thermal enclosure, energy storage

A HIGH-PERFORMANCE ENCLOSURE IS THE #1 PRIORITY FOR ACHIEVING RESILIENCY—and air sealing is the #1 priority for a high-performance enclosure

The Loading Order of High Performance

Passive solar: siting, orientation, shading



Passive – it’s in the name!

Passive solutions deliver desired performance naturally, as a function of design…

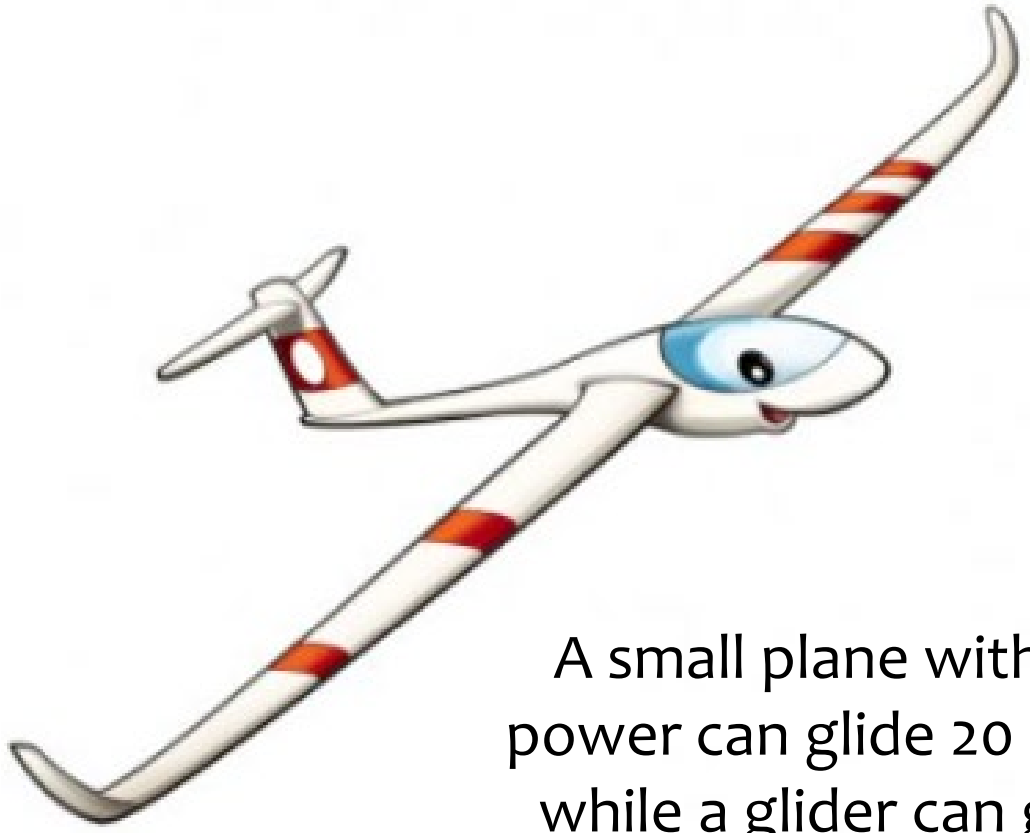
Reverse diagonal parking

The wing on a race car

…and often, do not require any additional investment

Modular components

How is a resilient, passive house like a glider?



A small plane without power can glide 20 miles, while a glider can glide **more than 200 miles ...**

Hours a normal home without heat will stay livable (above 40 degrees) for—

- 1950s home: 8
- 1980s home: 24
- 2009 home: 42

A passive house: 154

(More than SIX DAYS!)

HOW to implement

HIGH PERFORMANCE—

Image: Wannapik Studio
(non-commercial license)

1. The *NEW* loading order
2. Building science
3. Integrated design & delivery

How do we achieve high performance affordably?

BY DESIGN


Rocky Hill Co-Housing Community, Northampton, MA

Making Choices Instead of Paying Premiums for Greener Buildings

By Bruce Coldham

It is often presumed that "green" resourceful building involves a cost premium. This is not a universal truth. Though it is reasonable to assume that a superior product should come at a premium, good performance-enhancing design is more a matter of examining design goals and objectives with a view to redirecting investment. On this basis, a performance enhancement can be seen as favoring one option over another —a choice rather than a cost premium. Unfortunately, due to the rather extreme conservatism in the building industry, many choices are never made explicit. They are never discussed, never offered.

In this article I will address a particular residential opportunity for improving green resourceful building performance by means of conscious choice rather than cost premium. It involves improving the thermal envelope at the expense of committing to a central heating system. Let's begin with three questions:

1. Can compact, open-planned houses with well designed, well constructed, thermally-efficient building envelopes achieve a reasonable standard of comfort by relying solely on the natural convection air circulation within the house to distribute heat throughout the interior spaces?
2. Can a single space heater located in the first floor living space provide comfortable heating for the whole house?
3. Can the envelope upgrade cost be covered by savings generated by the elimination of the heating ducts/pipes and the associated fans/pumps?

The evidence of recent projects completed by our office is that we can confidently answer YES to each of these three questions.

With the savings from *not* investing in central heating, we are able to afford better windows (at least up to a U value

http://www.candharchitects.com/making-choices-instead-of-paying-premiums/

First and foremost — ask the right questions

DO ASK:

"What do we need to do differently to go high-performance without increasing costs?"

NOT:

~~"How much extra will a high-performance home cost?"~~

Selling high performance as an ***upgrade*** —

"Would you like *to add elements of high-performance?"*

Code-compliant
(barely legal)

5% $

High-performance
(21st-century)

Or as the ***baseline?***

"Would you like to downgrade any elements of high performance?"

High-performance

? $

Barely legal

What would you sacrifice: energy efficiency… controlled air quality… thermal comfort… resilience… durability… resale value… peace of mind???

What if safety features were not ***required*** in cars?

Baseline Model

Compliant with 1959 safety regulations

+ Passive Safety Features

Safety belts, airbags, anti-lock brakes, energy absorbing frame …

Would you invest 5% more to have them?

The *NEW* loading order

PRIORITIZE IN THIS ORDER to:

- minimize utility costs
- maximize passive survivability

1. Minimize embodied carbon
2. Optimize efficiency
3. All-electric (zero-carbon) operation
4. Renewable energy
5. Energy storage

Build:

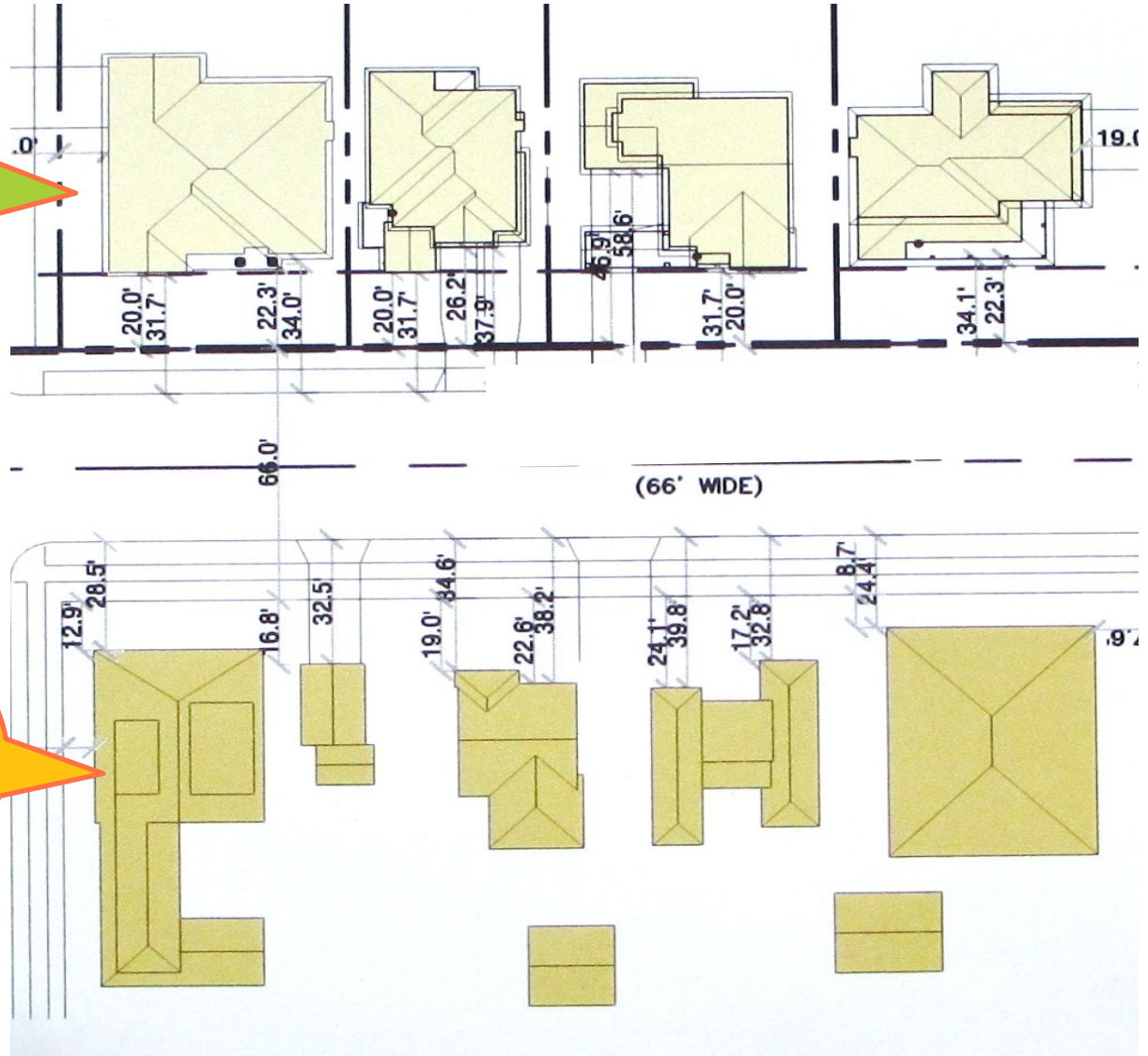
- Building geometry
- Enclosure/envelope
- HVAC
- Water heating
- Filtered ventilation

- Battery (or EV someday soon!)
- Water heater
- Phase change materials

Efficiency: building geometry

NEW (more complex)

EXISTING (simpler)



What are the costs of complexity here?

- Design $$$
- Construction $$$
- Liability risks
- Lost solar opportunity
- Higher utility costs
- Potential moisture intrusion

Efficiency: building geometry

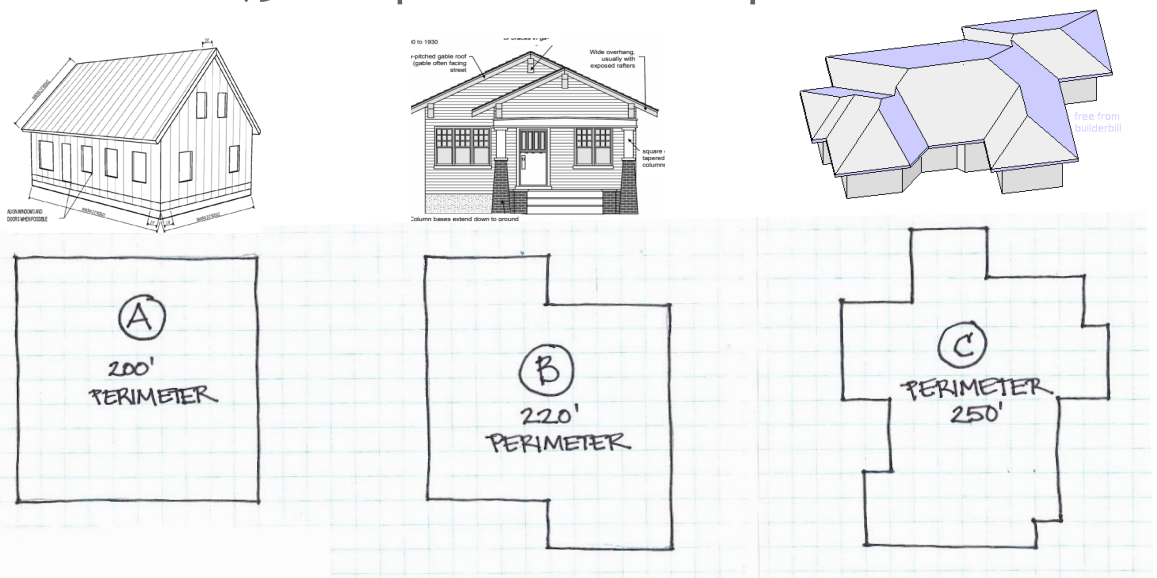
Construction cost assumptions (labor + materials):

- $300 / foot of perimeter
- $500 / corner

Not included:

- Interior impacts
- Roofing impacts
- Design costs
- Occupant utilities

2,500 square foot floor plans

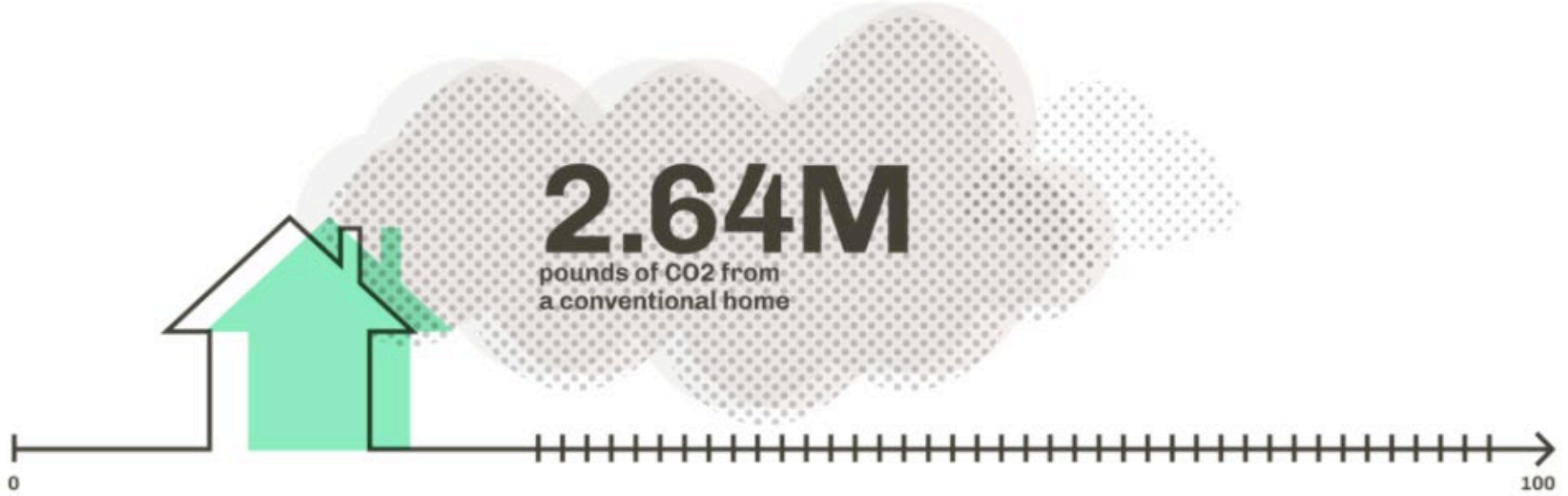


Compare:	Plan A	Plan B	Plan C
Perimeter	200 ft	220 ft	250 ft
Corners	4	8	18
$ increase		**$9,000**	**$15,000**

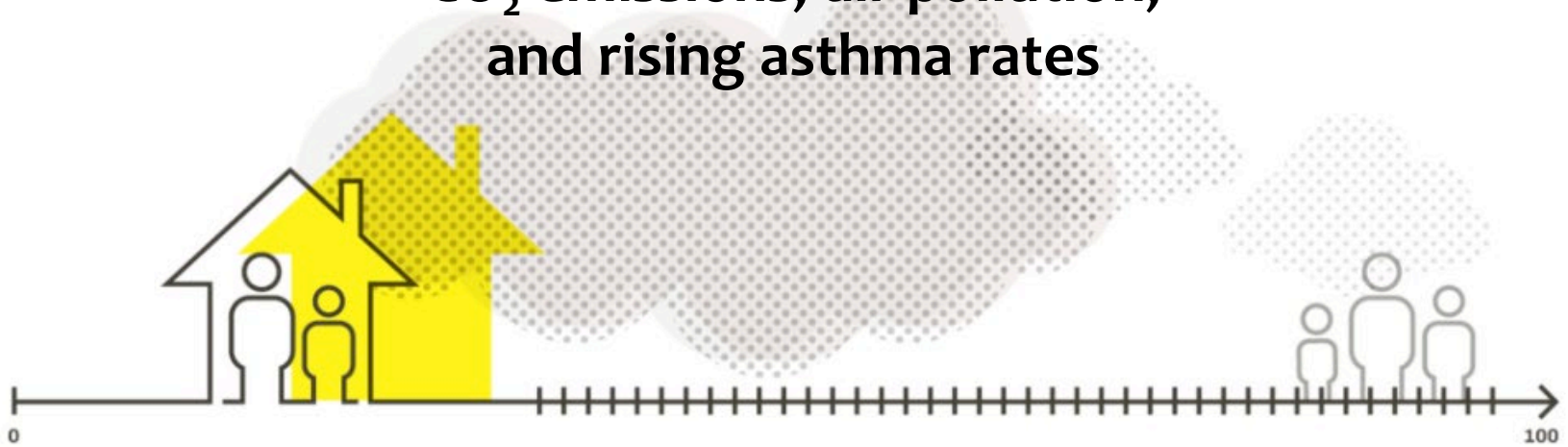
Image A greenbuildingadvisor.com | Image B greenvillesc.gov | Image C www.builderbill-diy-help.com

The envelope: the **100-year decision**

The life of a building envelope is usually 100+ years



That's 100 years of fossil fuels,
CO_2 emissions, air pollution,
and rising asthma rates



Images: ERASE40.org

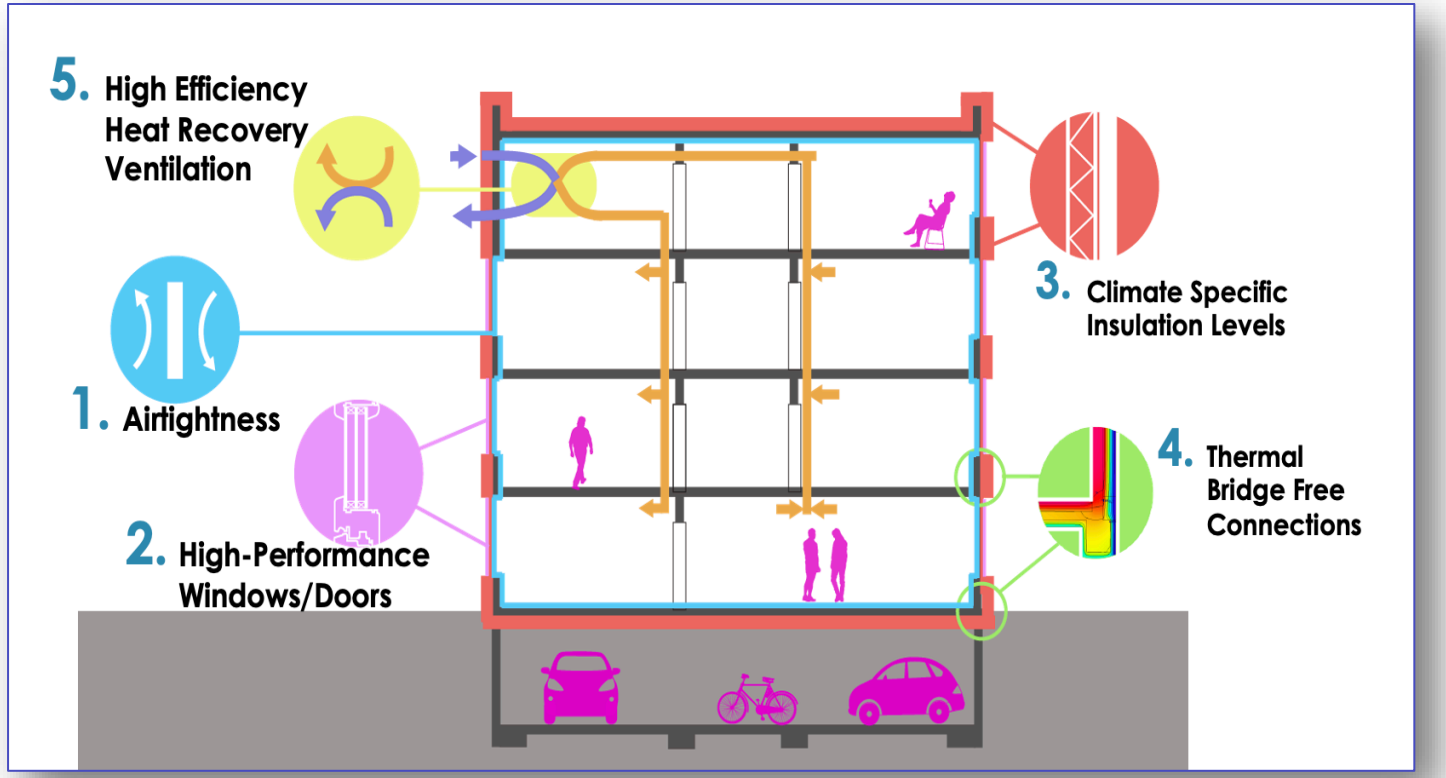
The envelope: decorate it … but not ***with*** it!

Windows need to serve a purpose!

- Daylight
- Fresh air
- Views
- Egress

The envelope: PPE

Personal Protective
Equipment



Personal Protective
Envelope

The envelope's job: provide resiliency

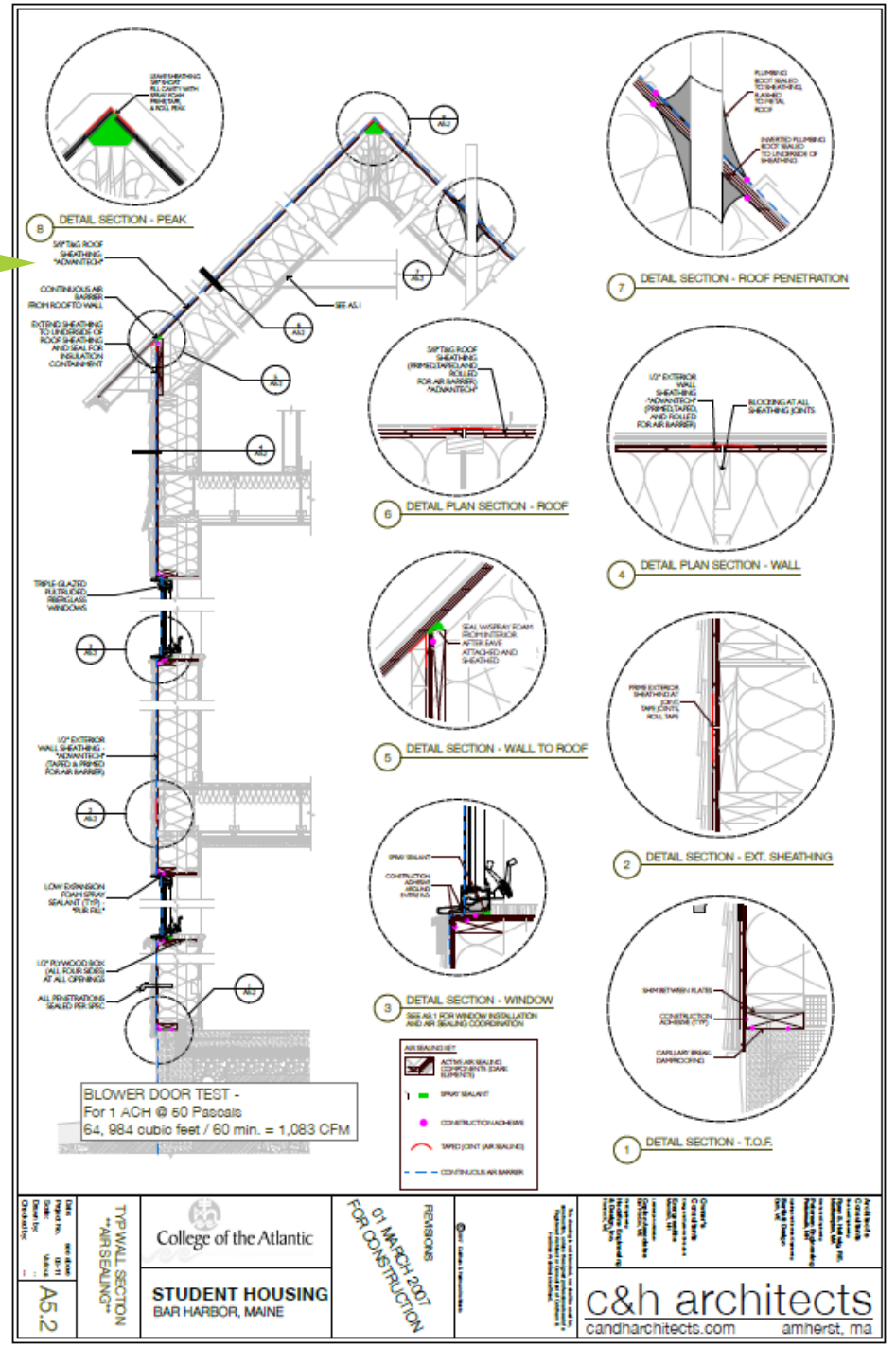
- **Airtight shell**
- **Sufficient insulation**
- **Continuous fresh air**

The envelope: air sealing

Air leakage control:

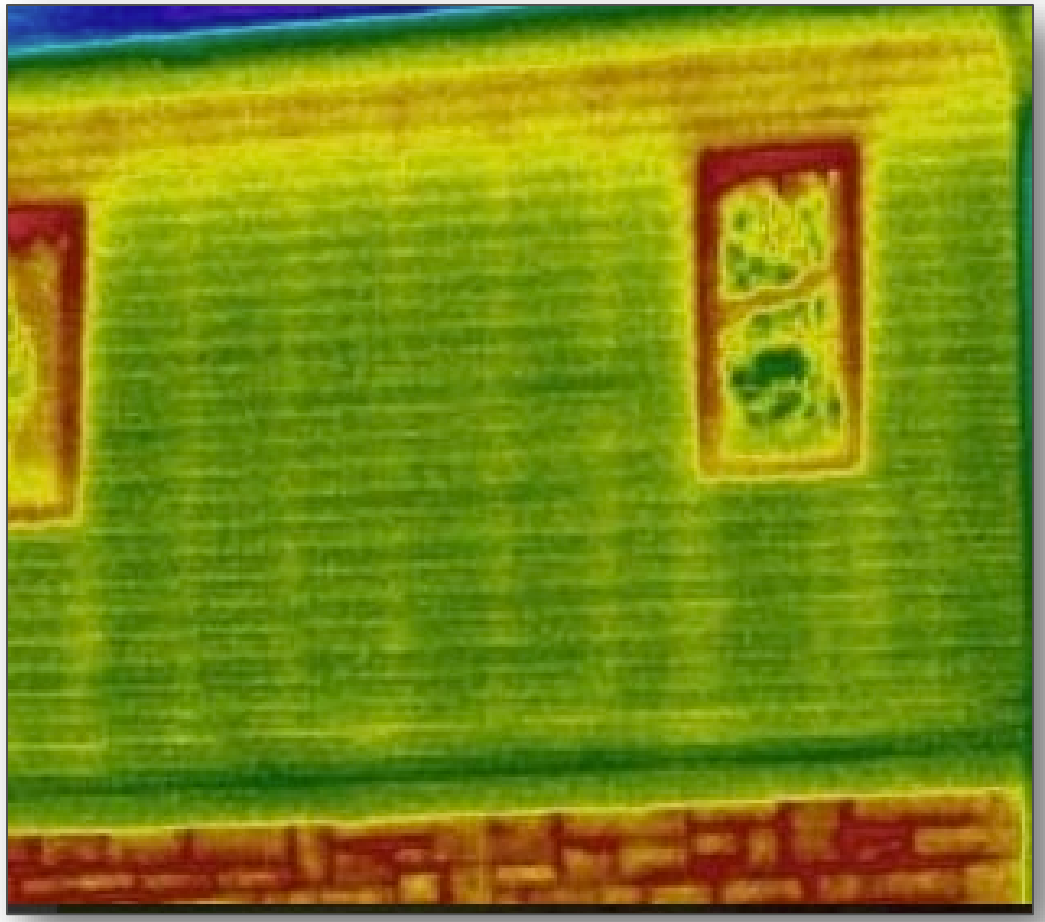
FREE DOWNLOAD: Air sealing drawing by Coldham & Hartman Architects ➔

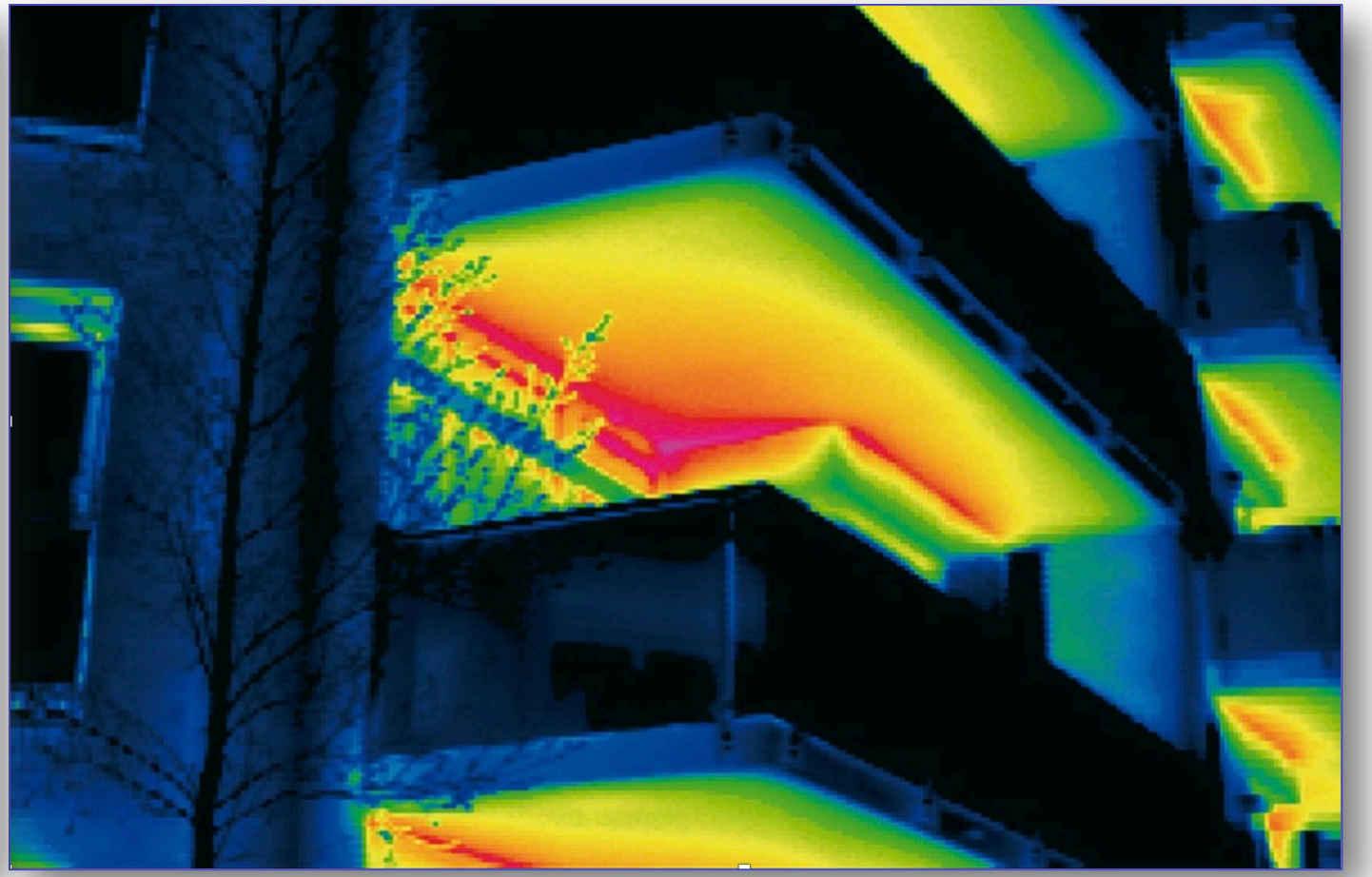
- **Details** for air sealing & exterior insulation
- Air sealing **cross section** (keyed to details)
- **Specifications** for air sealing, insulation installation, other critical construction quality tasks
- **Intent communicated** to contractor & subs
- **Quality managed** during construction



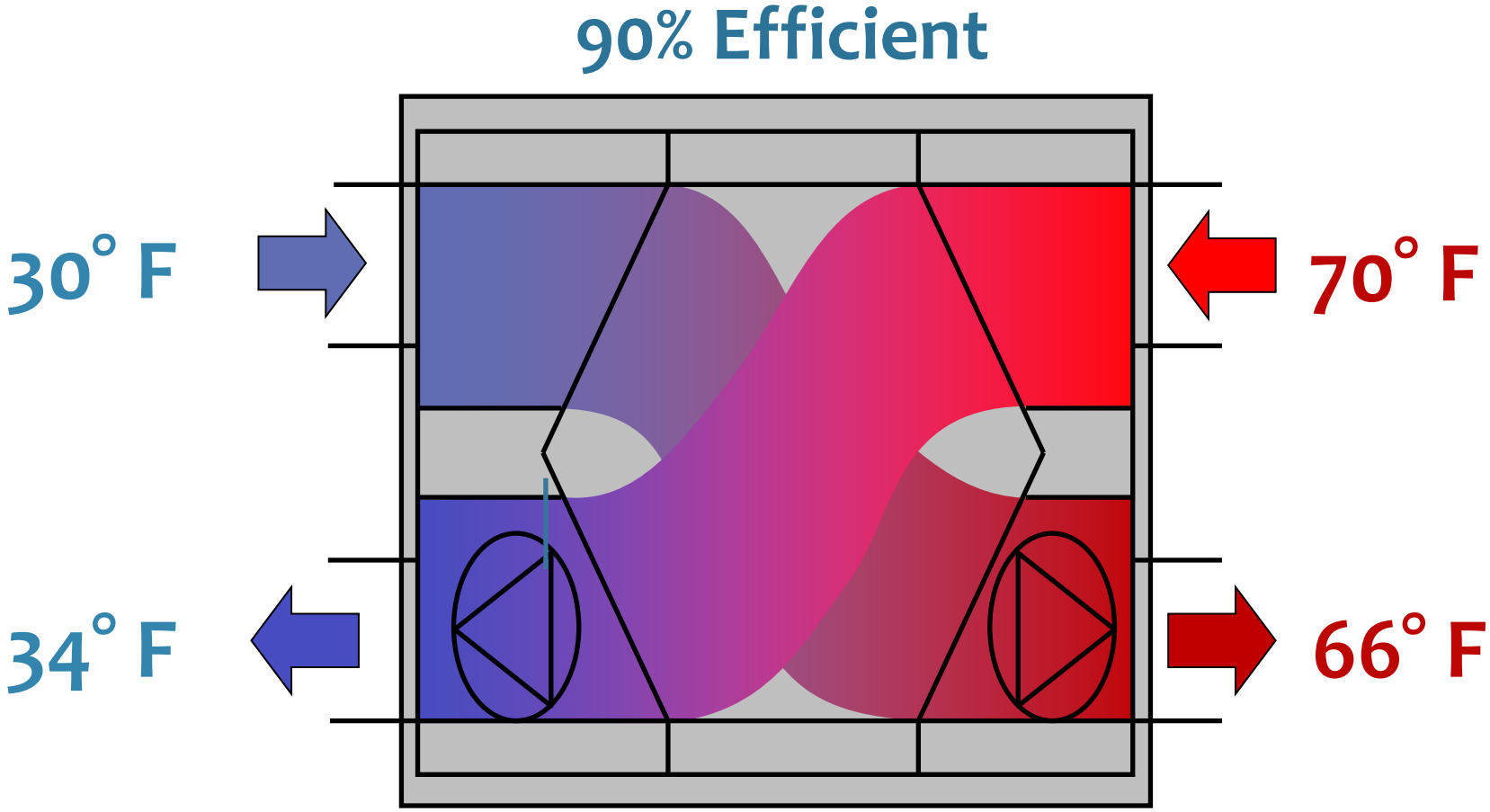
The envelope: climate-specific insulation

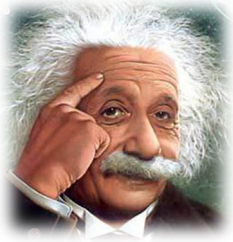
… and free of thermal bridges





Heat/energy recovery ventilation (HRV/ERV)

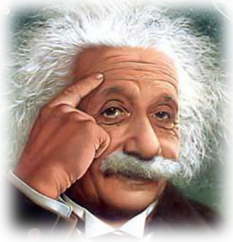




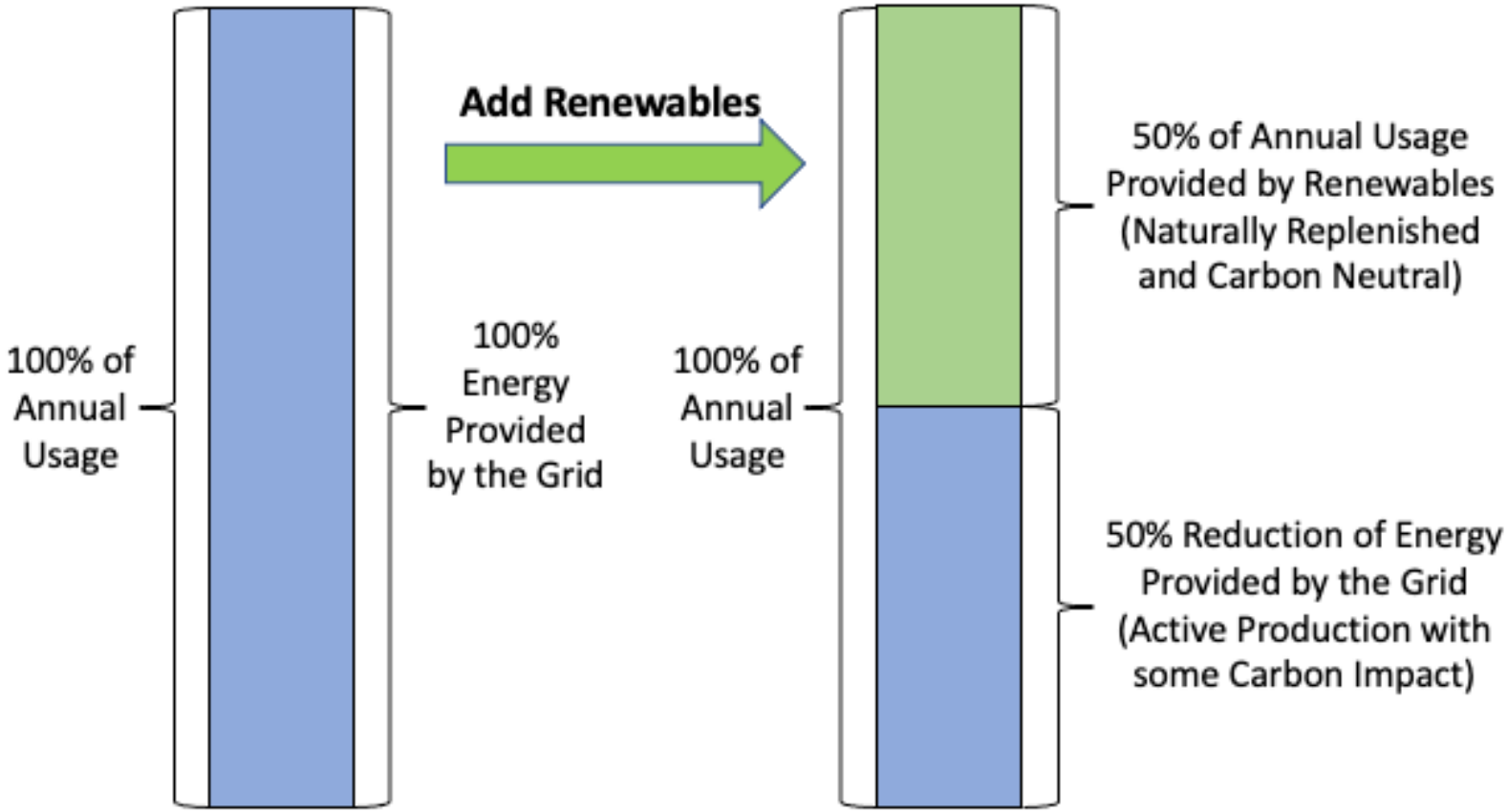
90% versus 80% efficiency

Seems like a pretty small difference

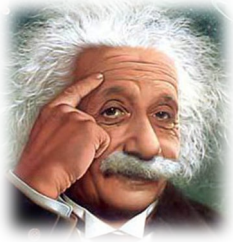
But it **doubles** the energy required!



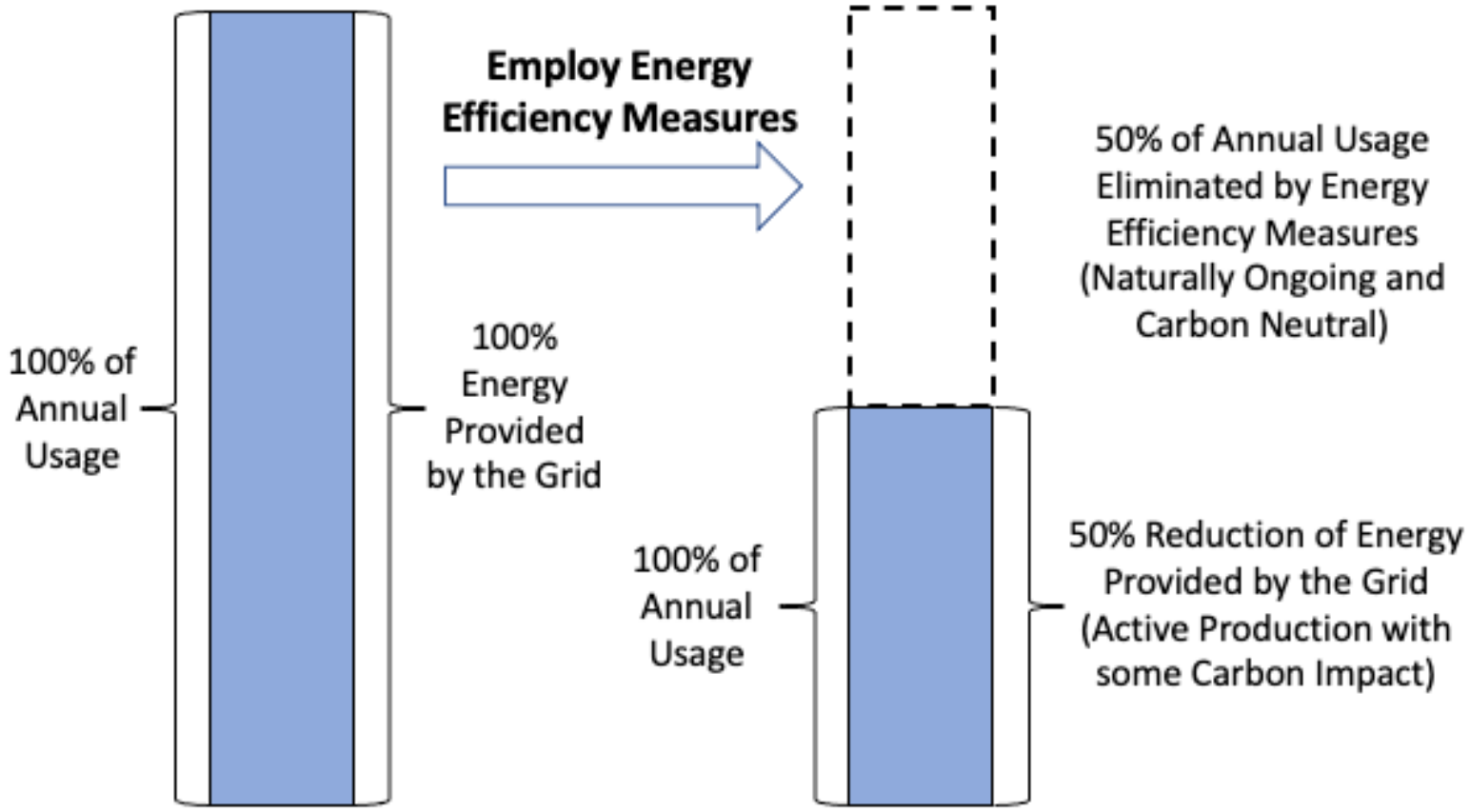
Efficiency is the first renewable



The 50% of energy that you are no longer using costs you nothing, year after year.
The least expensive energy is the energy that you do not use.



Efficiency is the first renewable



When you compare the relative outcomes, the results are essentially the same.
Both approaches are ongoing and carbon neutral.

Building science

Is a dog made up of the sum of its parts?

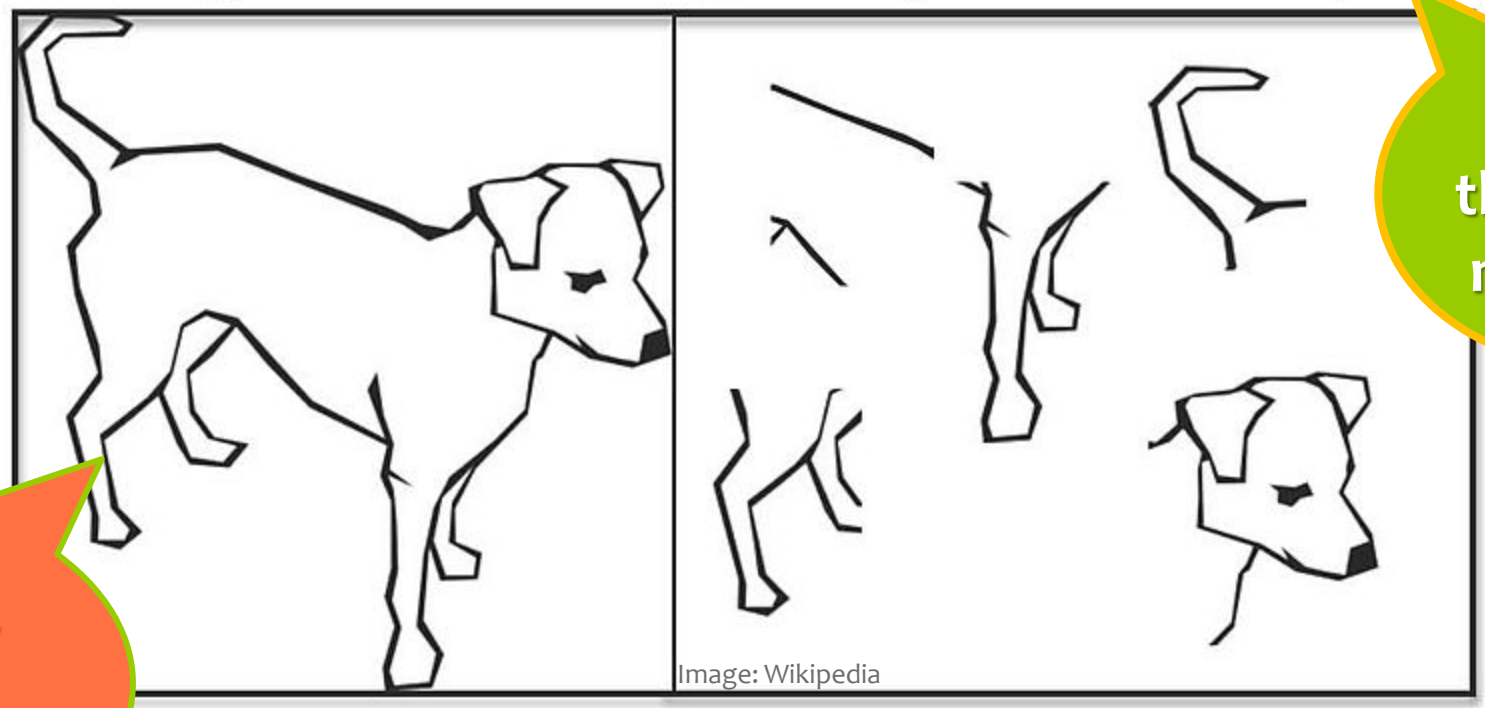


Image: Wikipedia

Maybe there's a bit more to it?

Maybe it matters *HOW* the parts go together??!

The whole is MORE than the sum of the parts!

Image: snappygoat.com

Physics rules: assemblies matters

CONTROL MOVEMENT OF:

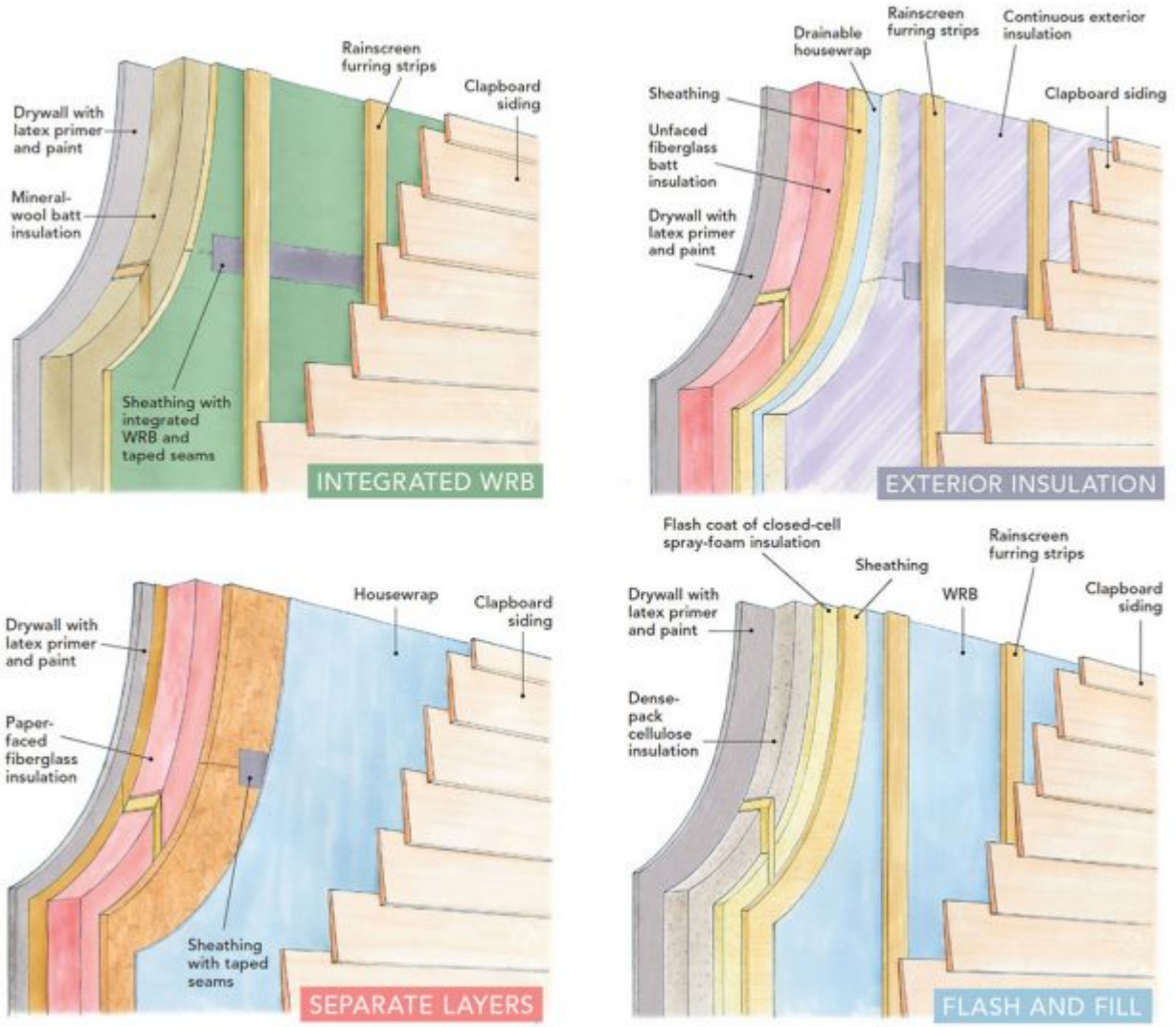


Image: FineHomebuilding.com

Integrated design & delivery

TYPICAL
Design
+
HP Construction
≠
HP Buildings

QUALITY IS CRITICAL

HP Design
+
TYPICAL
Construction
≠
HP Buildings

How to assemble the parts WELL—

Buildings perform well when the building *components and systems* are **well integrated;**

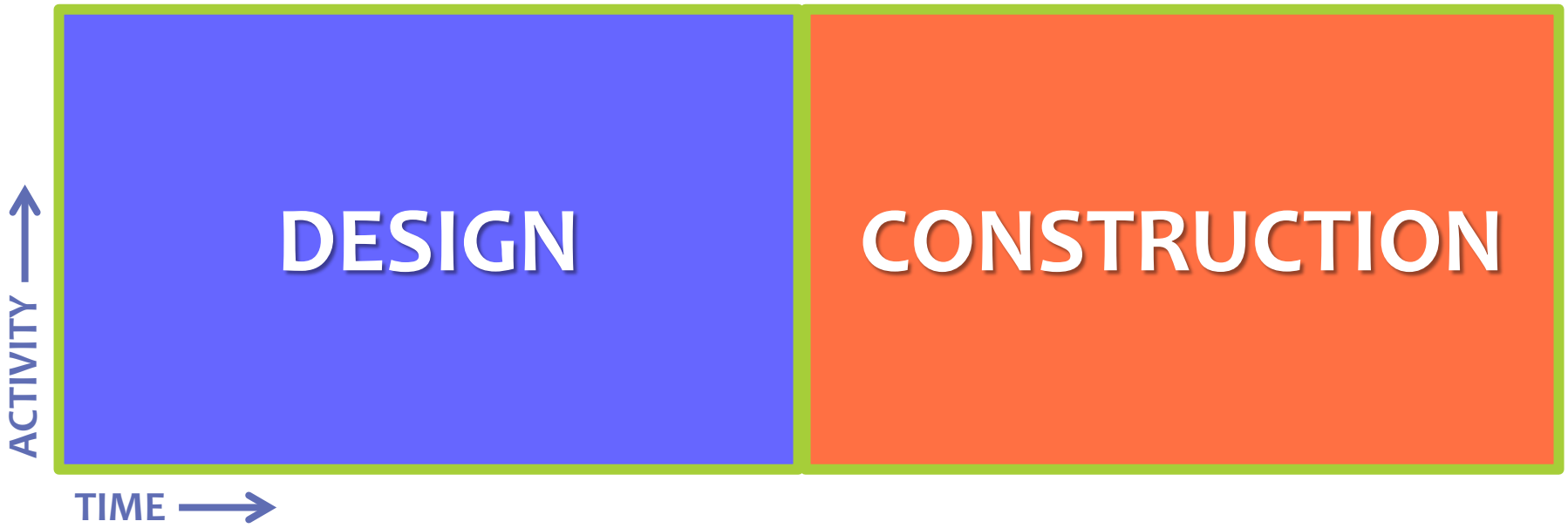
Effective building integration happens only if the *project team* is also **well integrated.**

THIS

THAT

How DO the parts go together?

The (myth of the)
project development
DIVIDE

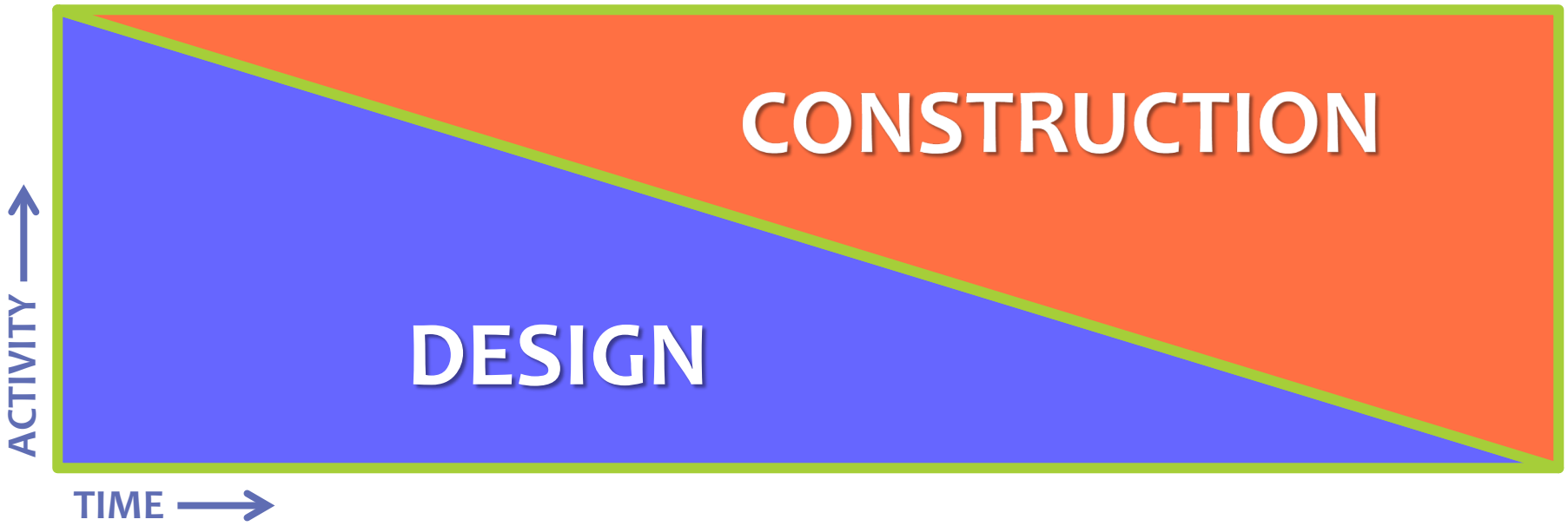


How we typically think about building creation

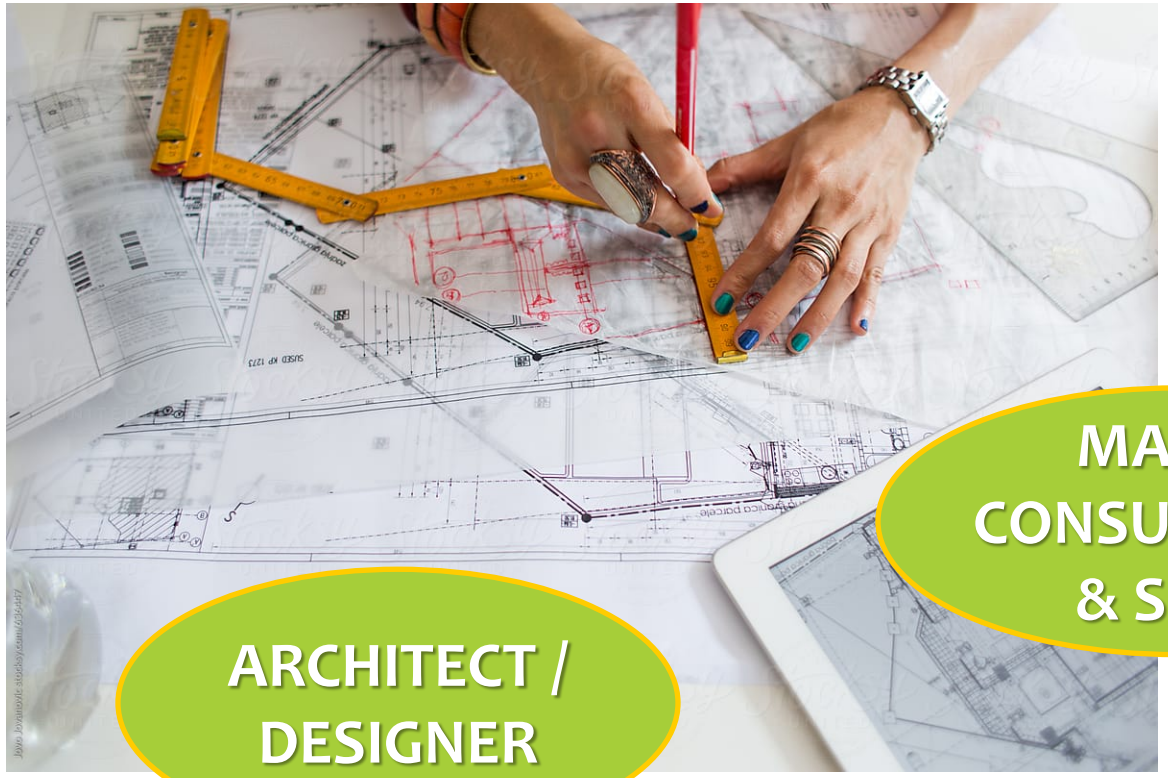
How DO the parts go together?

What's really happening

The (reality of the)
project development
CONTINUUM



Therefore: engage key people EARLY



ARCHITECT / DESIGNER

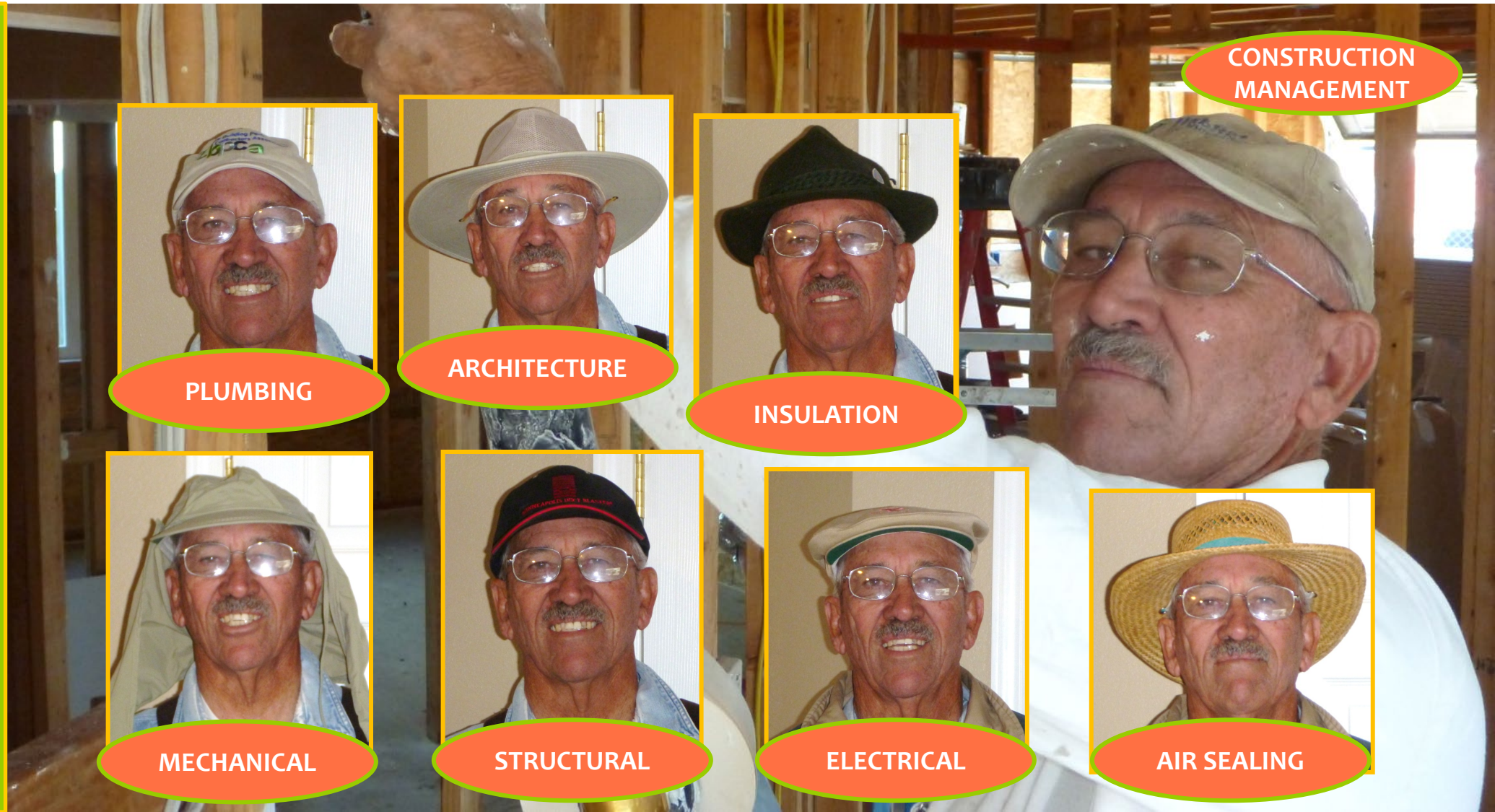
MAJOR CONSULTANTS & SUBS

BUILDER / CONTRACTOR

All should have experience on projects comparable in NATURE and SCOPE

What does an integrated team look like?

The ideal integrated team has the FEWEST MEMBERS with the necessary skills and traits!



Choose well:
key traits of high-performance teams

- Commitment
- Creativity
- Experience
- Engagement

definition:
plays well
with others

The *process* of integrated design and delivery

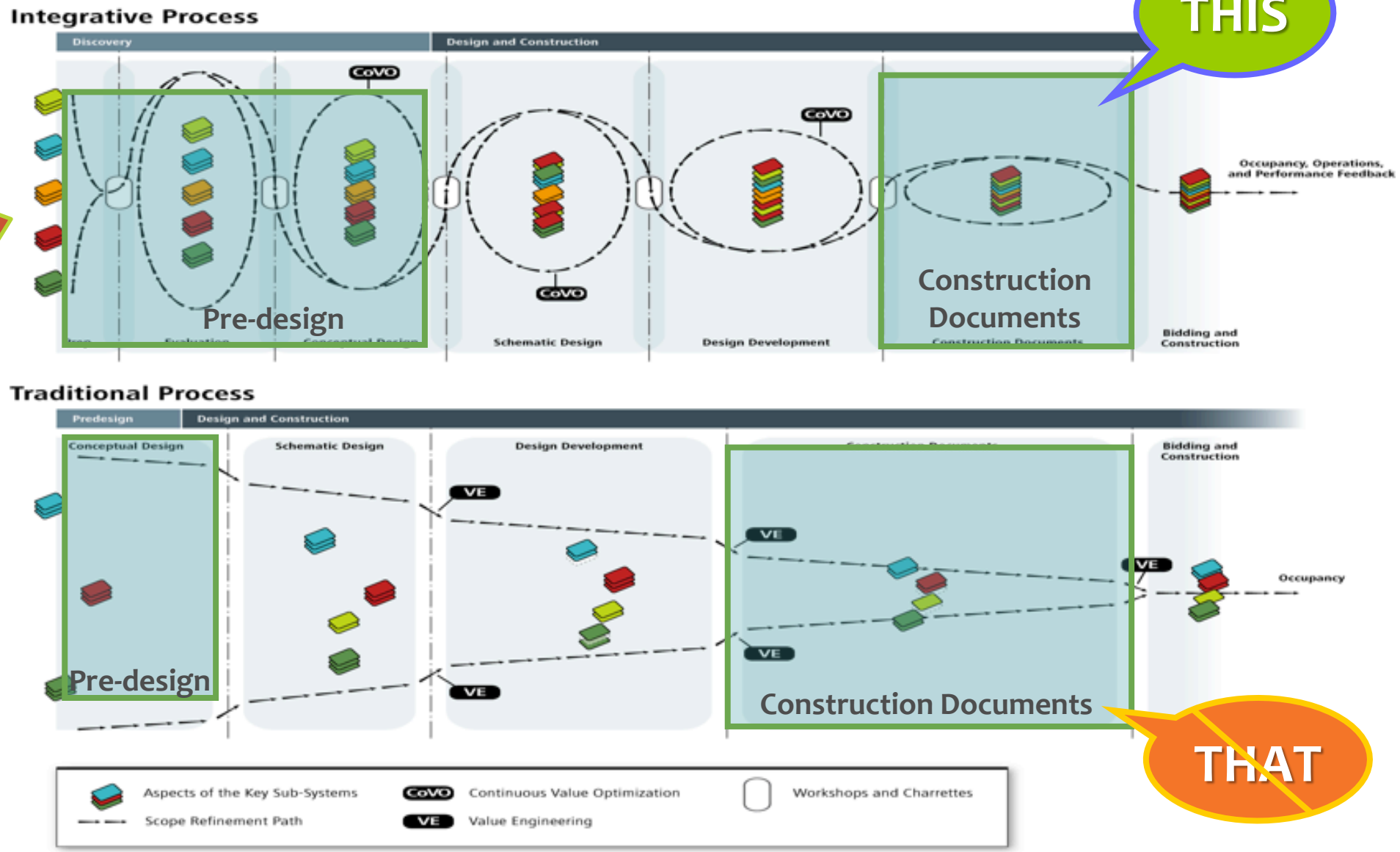
OWNER COMMITS TO ID+D → TEAM IS ASSEMBLED → GOALS / OBJECTIVES WORKSHOP → SCHEMATIC (EARLY) DESIGN → DESIGN WORKSHOP → .....

..... → DESIGN DEVELOPMENT → DESIGN WORKSHOP → .....

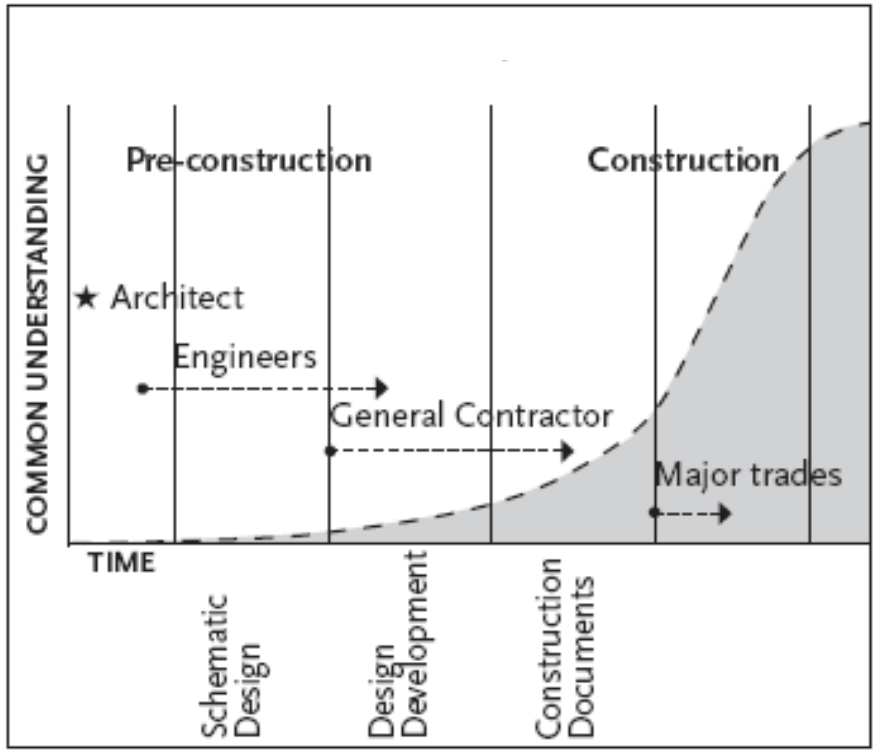
How integration changes the timeline

according to (and courtesy of) Bill Reed

Spend more time in PRE-DESIGN to save time on CDs—and reduce change orders!

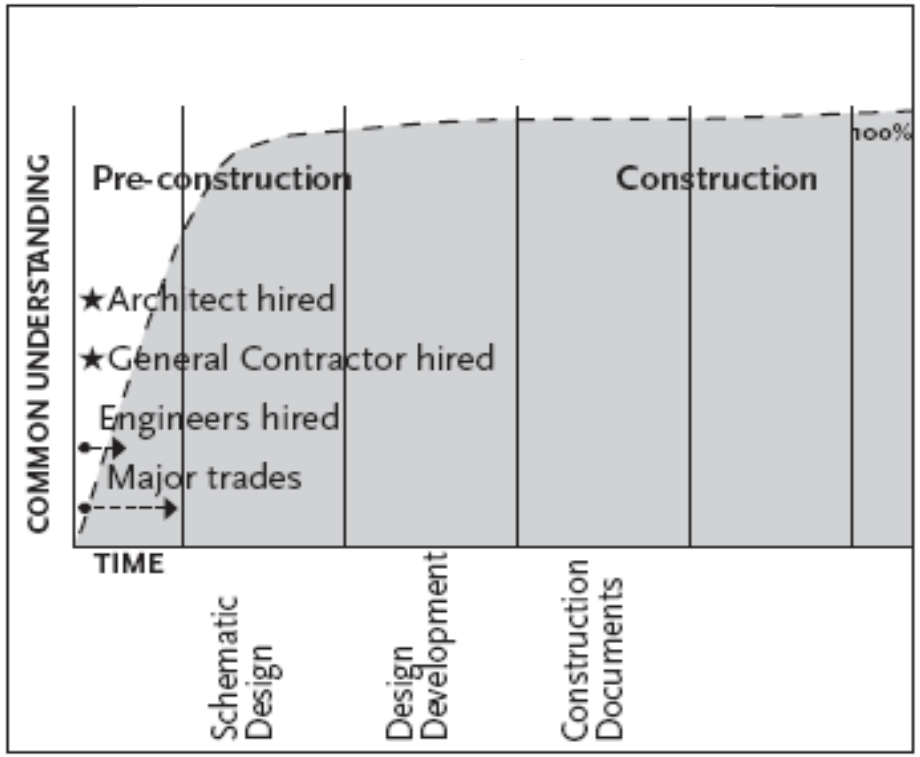


Integration produces better buildings



Business as usual

Collaborate EARLY to unlock myriad benefits



Integrated design & delivery

Illustrations courtesy of Will Lichtig.

BENEFITS: reduced change orders, cost overruns, construction time, liability—and **increased** productivity, harmony, happiness, achievement of goals!

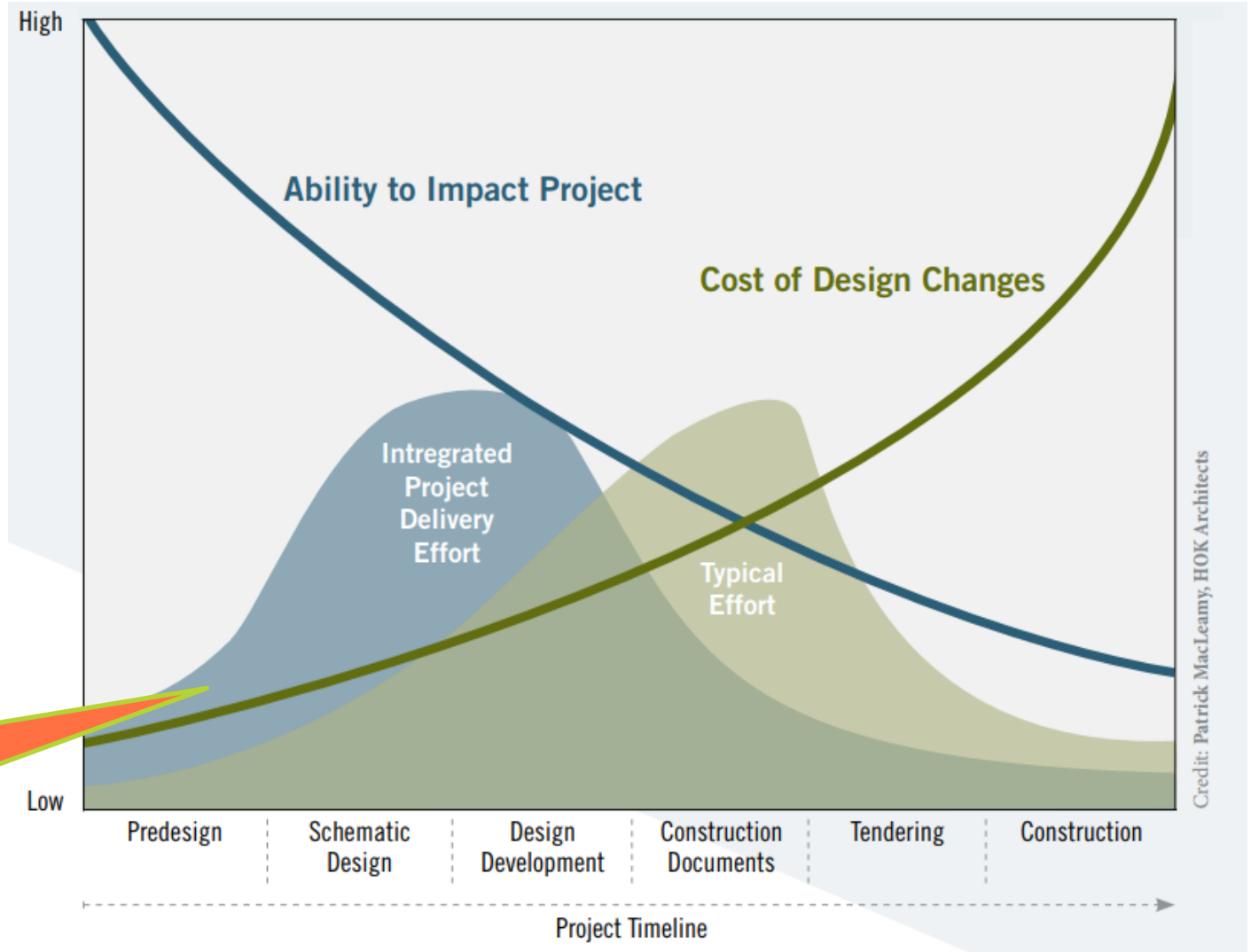
Integration saves money

"Owners who have pursued integrated design and delivery report better outcomes in terms of value and cost."

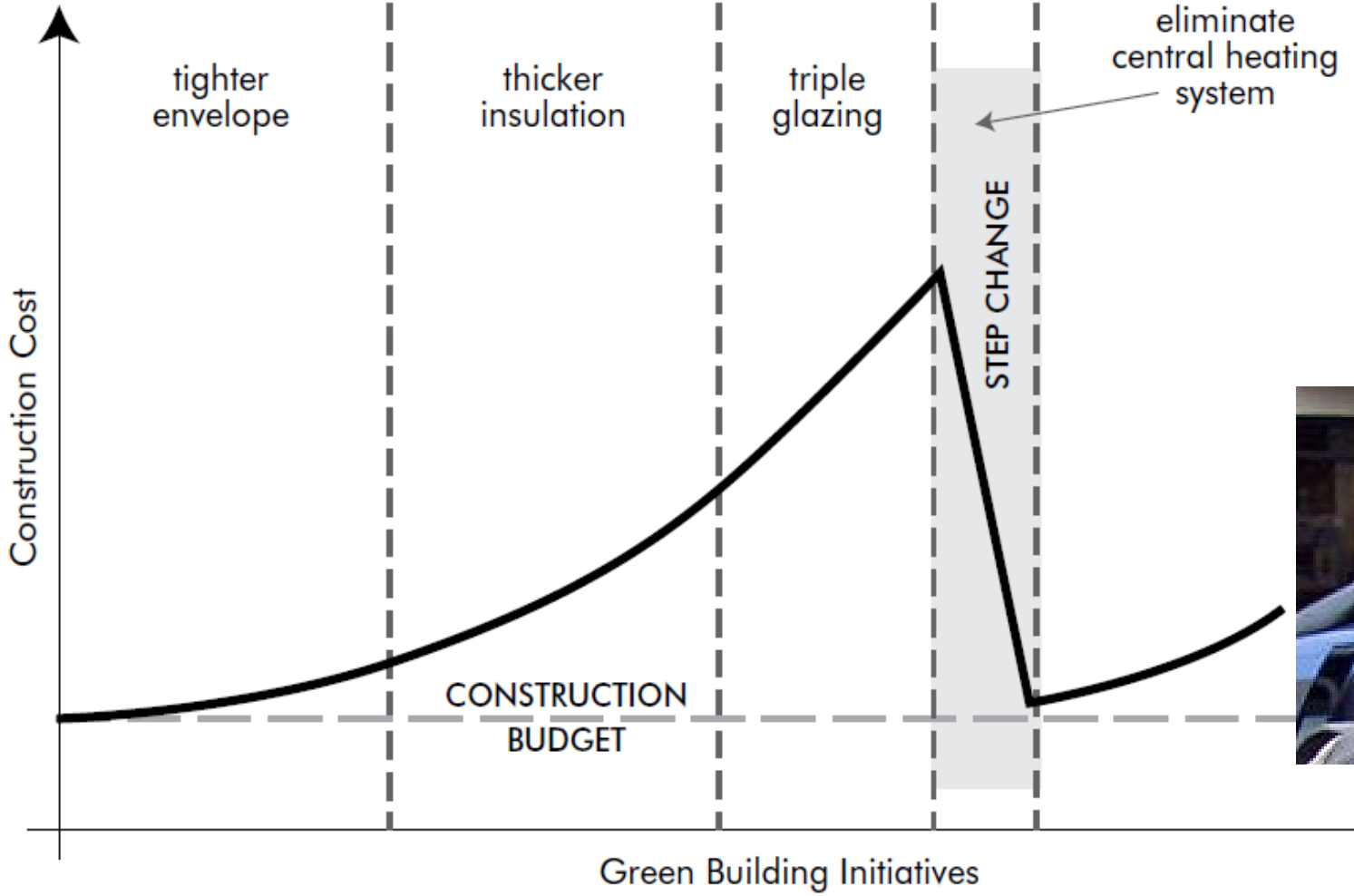
INTEGRATED DESIGN & DELIVERY GUIDE

http://www.cec.org/sites/default/idd/index.php

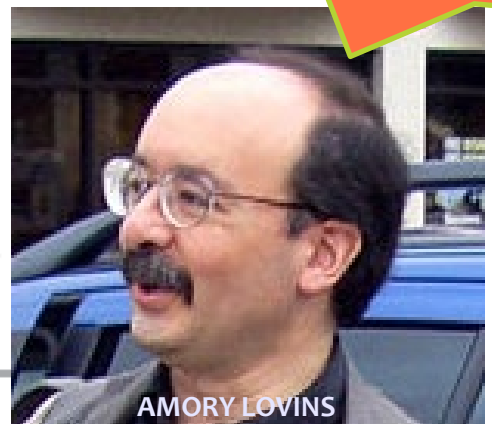
Tap your team's expertise EARLY when it's most valuable



Integration saves money



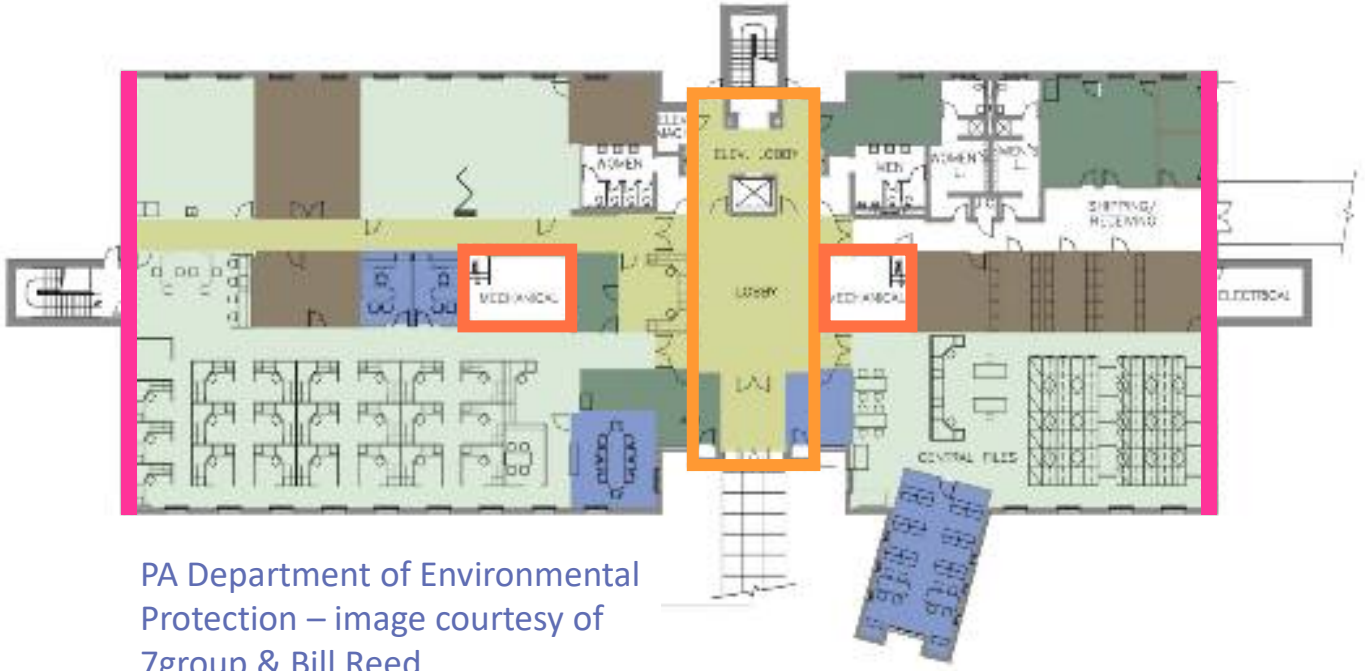
Identify synergies EARLY to "tunnel through the cost barrier"



courtesy of Bruce Coldham, Coldham & Hartman Architects

Integration saves money

Example: savings from design integration



PA Department of Environmental Protection – image courtesy of 7group & Bill Reed

Relocating mechanical room from penthouse to core:

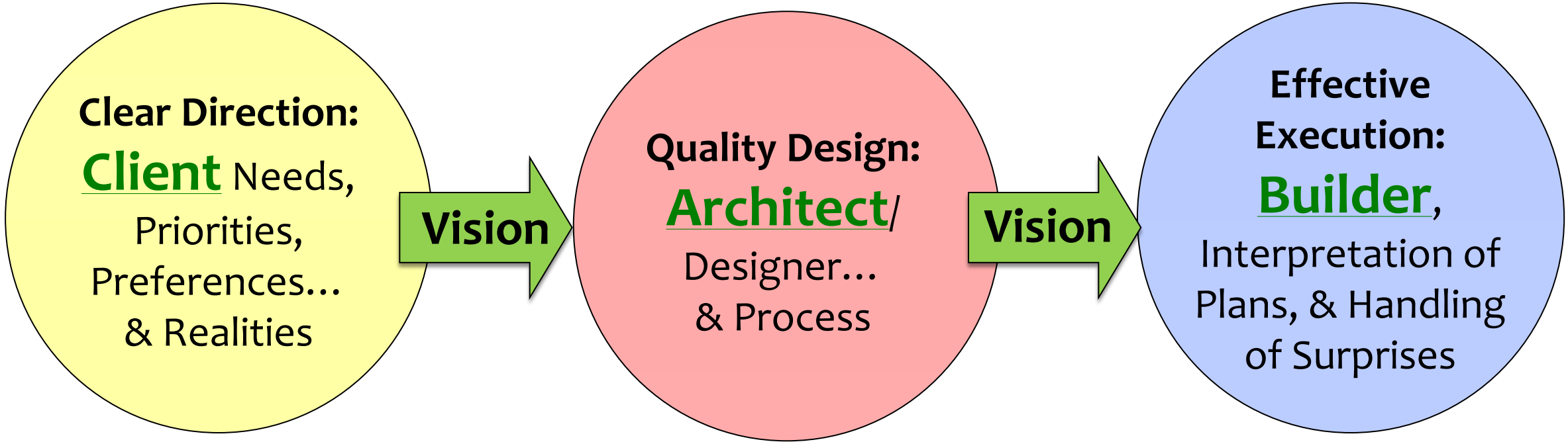
- **Reduced energy loads *and***
- **Reduced first cost by $40,000**

Integration principles

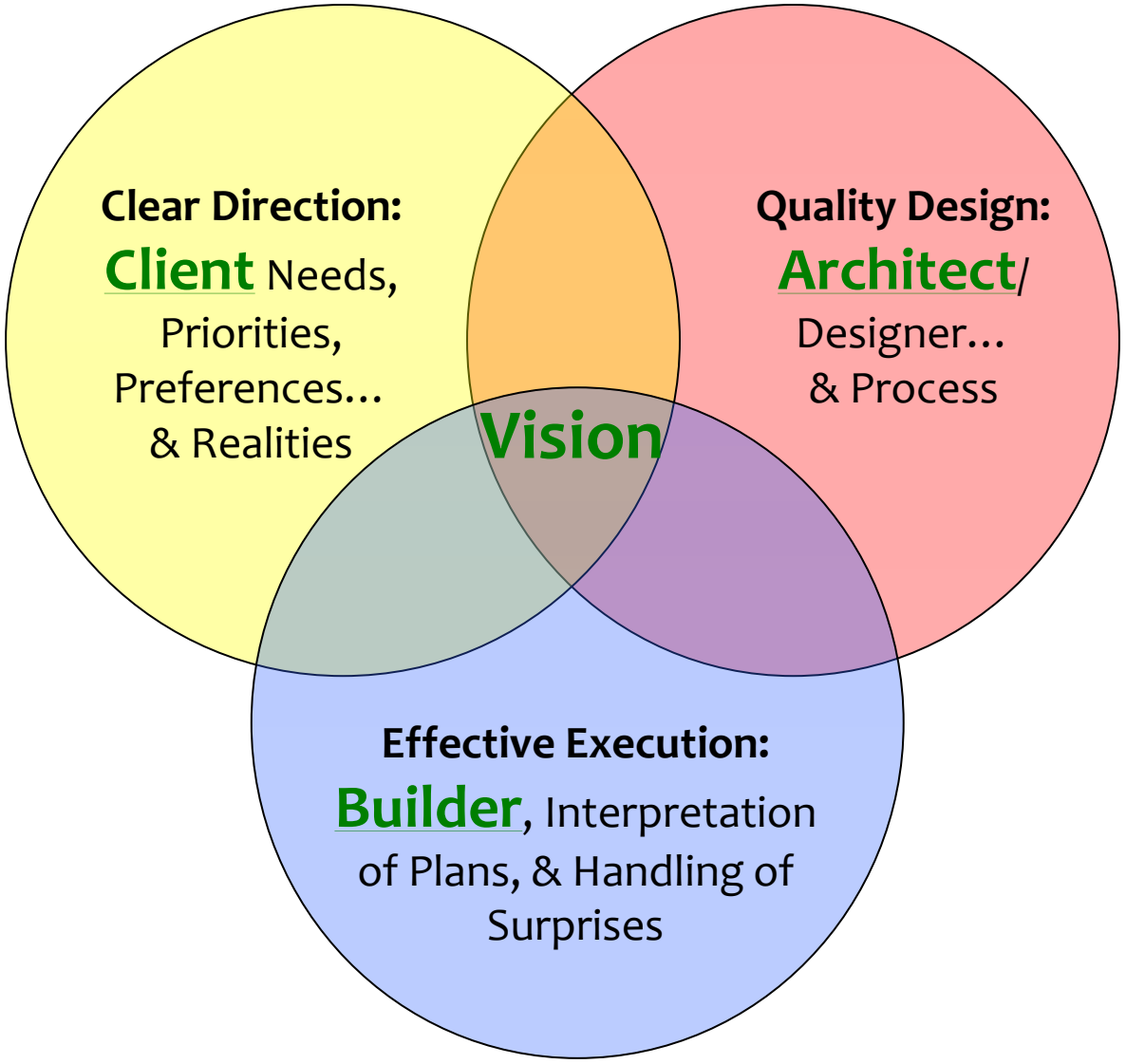
1. If your PROCESS IS SOUND (well integrated), good outcomes will follow.
2. A sound process carried out by the RIGHT PEOPLE virtually guarantees a good project.
   - ✓ Committed
   - ✓ Creative
   - ✓ Experienced
   - ✓ Engaged
3. The party left out is the one who will cause trouble.

4. If it ain't in black & white, it won't happen!

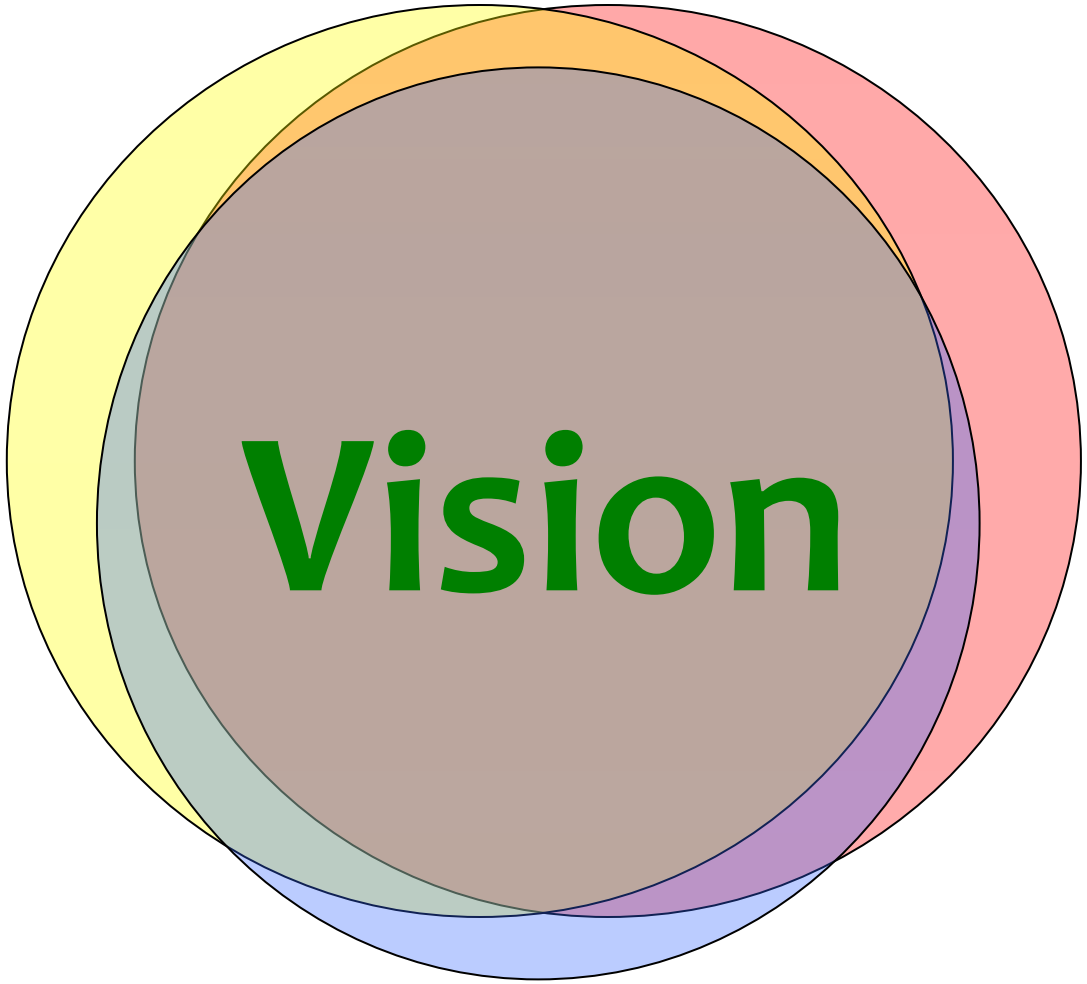
The old model — a relay race



The high-performance model — collaborative team effort



The collaborative team, *leaning in = better outcome*



Evidence-based performance

- Set performance goals & measurement methods
- Employ detailed modeling
- Test/commission to verify performance
- Monitor performance and occupant experience

Change is happening all the time—

Our evolving view of sustainability, 1960s – 2020s

THINK IT:
Conservation & activism – EDF, Greenpeace …

CHOOSE IT:
Prescriptive Stds. – Energy Star, LEED, Build it Green

MEASURE IT:
Performance Stds. – Passive House, Living Building, WELL, RESET

PROVE IT:
Legislation, Disclosure Ordinanses, Reach Codes…

Begin early — with the end in mind

Owner's Project Requirements (OPR)

- Envelope
- Energy efficiency
- Water management
- Materials
- Indoor air quality
- Indoor environmental quality
- Community
- Operations and maintenance
- Waste management

A buffet approach

Use existing toolkits

Select best-fit elements of each

Owner's Project Requirements (OPR)

Define Success

Targets & Goals

SUSTAINABILITY PROGRAM GOALS	Passive House (PHI) Classic Standard (certification)
	RESET Air (certification)
	Fitwel (certification)
	C-PACE (compliance)
	p4 Performance Measures (narrative only)
	The 2030 Challenge (compliance)
MEASUREMENT AND VERIFICATION	Integrated Solutions includes:
	- AIA 2030 District Whole-Building Analytics
	- RESET Air Accredited Data Provider
	- Interrogation-based Commissioning
	- Monitoring-based Commissioning
	- Single-Pane of Glass for all Operational Networks
	Converged Network, Open-Integration Data Platform and DDC System
	Optimal Solar Integration
COMMUNITY	
MWDBE Subcontracting Participation	25% to MBEs and 10% to WBEs
MWDBE Tradesperson Participation	25% to Minority and 10% to Women
Qualitative Health and Development	
Workforce Training and Education	Passive House Tradesperson and Renewables Technologies
ENERGY	
Site EUI	14-20 kBtu/sf/yr
Renewables (Photovoltaic Panels)	TBD
INDOOR AIR QUALITY	
Carbon Dioxide (CO2)	< 600 ppm
Humidity	Monitored
Ozone (O3)	< 51 ppb
Particulate Matter 2.5 (PM2.5)	< 12 µg/m3
Radon	< 0.148 Bq/L [4 pCi/L] in the lowest occupied level
Temperature	Monitored
Total Volatile Organic Compound (TVOC)	< 0.4 mg/m3 (< 400 µg/m3)

Owner's Project Requirements (OPR)

Define Success

Targets & Goals

INDOOR ENVIRONMENTAL QUALITY	
Sound (Internally Generated Noise)	WELL compliance with S01 Sound Mapping WELL compliance with S02 Maximum Noise Level
LANDSCAPING	
Beauty	Exterior Wall Mural, Local Artist
Biophilia	Use Natural Materials Activate Public Plaza
MATERIALS	
Material Toxicity	WELL compliance with X09 Cleaning Products and Protocol WELL compliance with X10 Volatile Compound Reduction WELL compliance with X11 Long-Term Emission Control WELL compliance with X12 Short- Term Emission Control LEED compliance with MR Building Product Disclosure and Optimization - Material Ingredients
OPERATIONS AND MAINTENANCE	
Annual Maintenance Budget	Annual expense analysis
WASTE	
Construction Waste	LEED compliance with MR Construction and Demolition Waste Management Planning
Post-Construction Waste	WELL compliance with X04 Waste Management
WATER	
Potable Water Reduction	50% total water reduction from Pittsburgh 2030 District Goals, with efficient fixtures
Potable Water Quality	WELL compliance with W01 Fundamental Water Quality WELL compliance with W02 Water Contaminants WELL compliance with W03 Legionella Control WELL compliance with W04 Enhanced Water Quality WELL compliance with W05 Water Quality Consistency WELL compliance with W08 Handwashing
Storm Water Reduction	WELL compliance with W09 Onsite Non-Potable Water Reuse. Implement grey water solution for toilets and landscape irrigation
TRANSPORTATION	
Bicycle & Scoobi Share, Bicycle Parking	LEED compliance
Bicycle Storage and Support	
BRT Access Point	

What YOU can DO

Image: https://bioresource.nihr.ac.uk/

{POLICIES, PROGRAMS, INCENTIVES, AND MANDATES}
=
AN EVOLVING BUILDING INDUSTRY AND CULTURE

As high performance becomes more prevalent ...

Threat
Lack of knowledge about High-Performance will hurt my credibility... and business

Opportunity
Knowledge about High-Performance will be a positive differentiator

Choose: how you will proceed

TODAY'S OBJECTIVES

- **Awareness and alignment:**
  what is, what is happening, and what is possible
- **Knowledge to make informed and purposeful choices:**
  where you fit and how you will proceed in this critically important emerging market

SET PRIORITIES & OBJECTIVES

- **Plan**
  - analyze and allocate resources
- **Implement**
  - Measure and track results
- **Optimize**
  - Strategies, tactics, and outcomes

Steps to success

- **Identify the leaders**
- **Set higher targets**
- **Support front runners**
- **Educate everyone**
- **Remove barriers and increase incentives**
- **Pilot projects**

Educate everyone

Get brighter yourself

- Stay informed
- Keep learning

Spread the word

- Websites
- Event calendars
- Sponsor & host learning opportunities

Pilot projects/initiatives = proof of concept

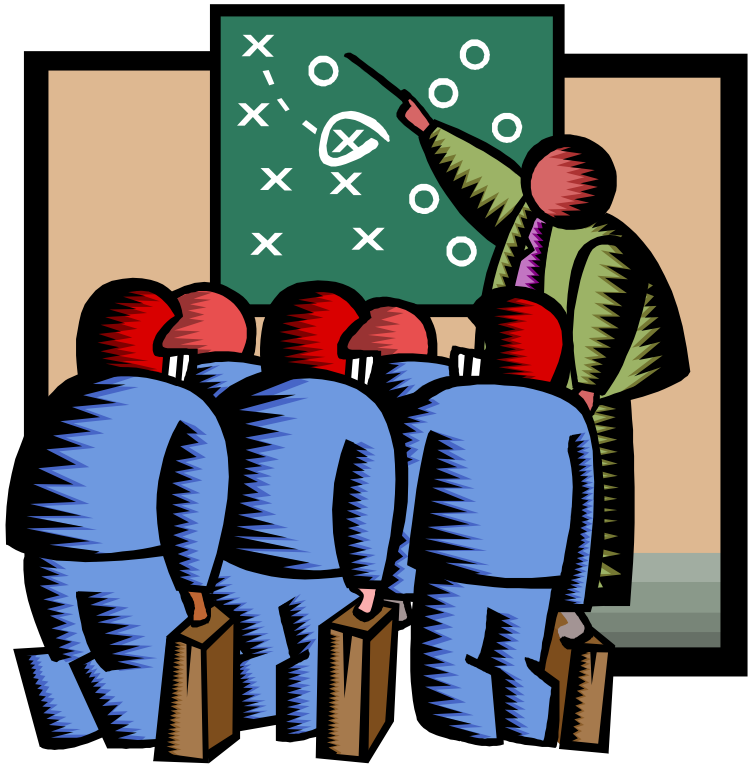
Positive examples & experiences accelerate adoption … and lower required investment

- New buildings
- Retrofits
- Underway
- On the horizon

Industry professionals

Top-down and bottom-up

- Define and implement values-based business practices
- Provide knowledge and skills
- Inspire commitment
- Reward effort and celebrate success



Jurisdictions: policy makers and staff

Incentivize high-performance projects

- Fast-track planning/building process
- Adjust requirements/allowances (FAR, height, parking, coverage, etc.)

COST-NEUTRAL

- Waive or reduce fees
- Provide $$$ and/or promotion
- Initiate projects on jurisdiction-owned buildings

$$$

Anyone … and everyone

Add your voice in support of high-performance building

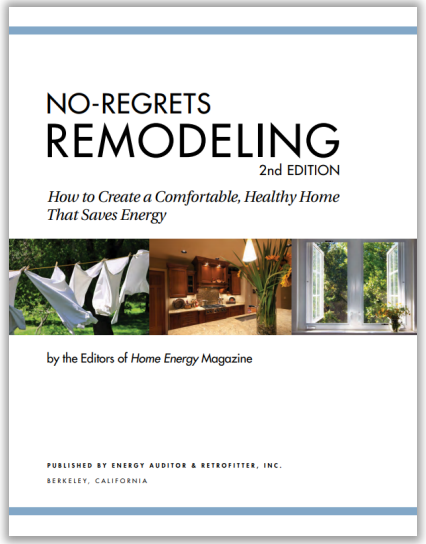
- Policies
- Programs
- initiatives
- Projects

Get involved and build toward positive progress

“Do the best that you can until you know better. Then, when you know better, do better.”

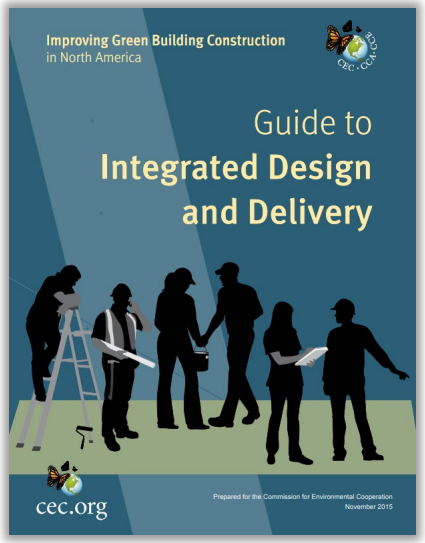
Maya Angelou

Resources



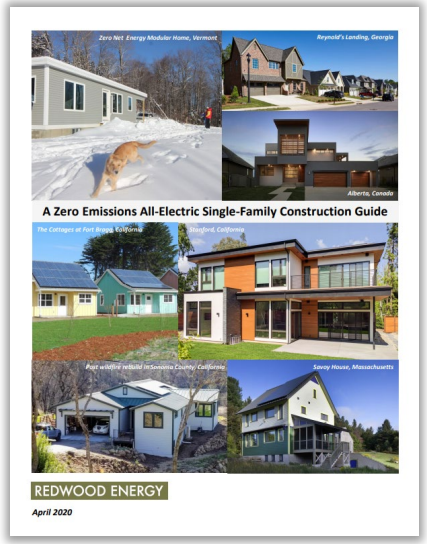
No Regrets Remodeling

Download here



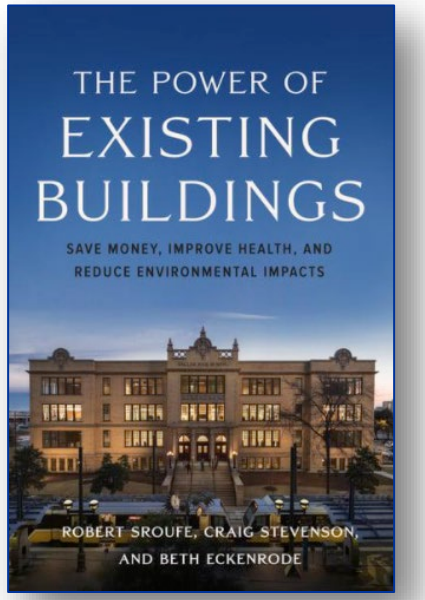
Integrated Design Guide

Download here



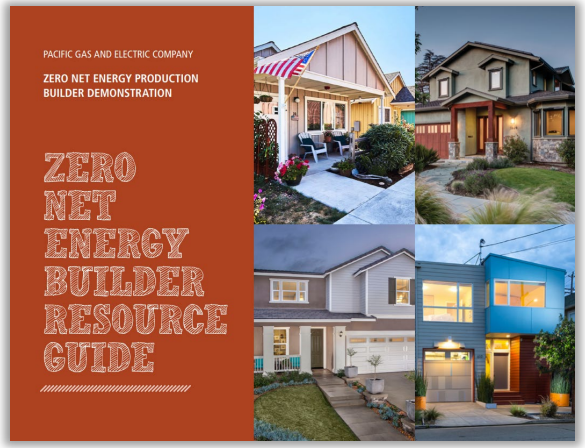
All-Electric New Home Guide

Download here



ZNE Primer for Architects

Download here



ZNE Builder Resource Guide

Download here

Thank you!

AnnEdminster.com

- Zero energy consulting
- Integrated design & delivery facilitation
- Capacity building

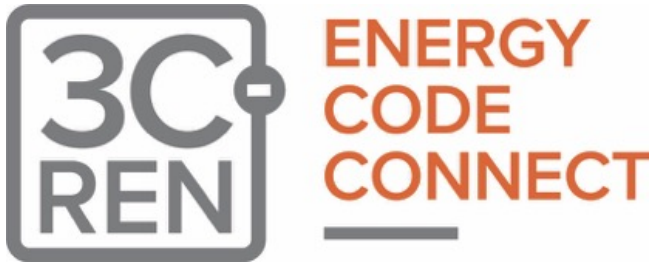
Thank you!

PASSIVE HOUSE CALIFORNIA

Jay.Gentry@passivehousecal.org

- Passive House California Board
- High-performance advocate
- Marketing and sales consulting

3C-REN Overview
& Upcoming Events


3C
REN
ENERGY
CODE
CONNECT


3C
REN
BUILDING
PERFORMANCE
TRAINING


3C
REN
HOME
ENERGY
SAVINGS

3C
REN

3C REN ENERGY CODE CONNECT

- Serves all building professionals
- Three services –
  - **Energy Code Coach**
  - **Training and Support**
  - **Regional Forums**
- Makes the Energy Code easy to follow

Energy Code Coach:
3c-ren.org/codes
805.220.9991

Event Registration:
3c-ren.org/events

BUILDING PERFORMANCE TRAINING

- Serves current and prospective building professionals
- Expert instruction:
  - **Technical skills**
  - **Soft skills**
- Helps workers to thrive in an evolving industry

Event Registration:
3c-ren.org/events

3C REN HOME ENERGY SAVINGS

Multifamily (5+ units)

- No cost technical assistance
- Rebates up to $750/apartment plus additional rebates for specialty measures like heat pumps

3c-ren.org/home

Single Family (up to 4 units)

- Coming soon, and DIY toolkits available now

3c-ren.org/diy-toolkit

Closing

- 1.5 AIA HSW|LU's Available
  - Contact ian.logan@ventura.org for any questions regarding LUs
- Coming to Your Inbox Soon!
  - Slides, Recording, & Survey – Please Take It and Help Us Out!
- Upcoming Courses
  - 11/18 All Electric Homes 101
  - 12/2 Efficient Yields Tri-County: Greenhouse Optimization—Aligning Your Systems with Your Surroundings

Q1 2022 Course Calendar Coming Soon

Thank you!

For more info:
3c-ren.org

For questions:
info@3c-ren.org

3C REN

TRI-COUNTY REGIONAL ENERGY NETWORK

SAN LUIS OBISPO • SANTA BARBARA • VENTURA