

BROUGHT TO YOU BY

EVERSOURCE



PROUD SPONSORS OF



The Sponsors of Energize Connecticut, and in partnership with Connecticut Passive House, are pleased to offer *Passive House Initiative* to support workforce development and help transform the energy efficiency and building construction industries in Connecticut.



For more information, please visit
EnergizeCT.com/passive-house or email
PassiveHouseTrainingCT@icf.com

BROUGHT TO YOU BY

EVERSOURCE



PROUD SPONSORS OF



Take energy efficiency to a new level

Residential New Construction Passive House Multi-family buildings with five units or more



PASSIVE HOUSE INCENTIVE STRUCTURE FOR MULTI-FAMILY (5 UNITS OR MORE)				
Incentive Timing	Activity	Incentive Amount	Max Incentive (Per Unit)	Max Incentive (Per Project)
Pre-Construction	Feasibility Study ¹	Up to 100% of Feasibility Study Costs	N/A	\$5,000.00
	Energy Modeling ²	75% of Energy Modeling Costs (Before 90% Design Drawings)	\$500.00	\$30,000.00
		50% of Energy Modeling Costs (90% Design/50% Construction)	\$250.00	\$15,000.00
Post Construction	Certification ³	Up to 100% of Certification Costs	\$1,500.00	\$60,000.00

1. Feasibility Study will require documentation in the form of a Feasibility Study report and invoice from the Passive House Consultant

2. Incentives will only be awarded prior to 50% Construction Drawings for Passive House projects. No incentives will be granted after 50% Construction Drawing set.

3. Certification may be either through PHIUS, PHI, or EnerPHit certification offerings.

Next steps you can take...

Contact your Energy Efficiency Representative or

Go to [EnergizeCT.com](https://energizeCT.com) or call 1-877-WISE USE for more details.

EVERSOURCE

PROUD SPONSORS OF
energize CT
CONNECTICUT

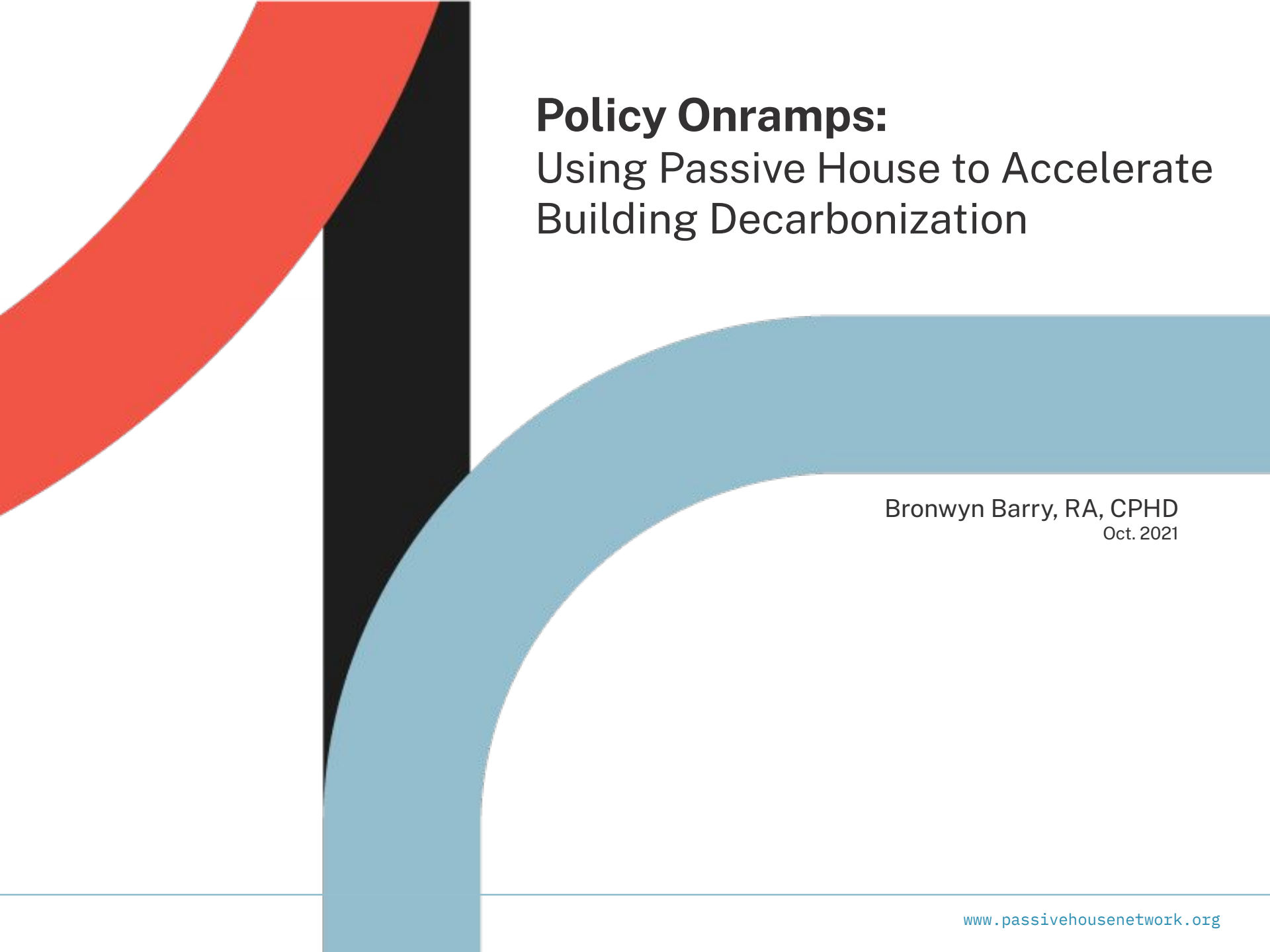
BROUGHT TO YOU BY

EVERSOURCE



PROUD SPONSORS OF

energize CT
CONNECTICUT



Policy Onramps: Using Passive House to Accelerate Building Decarbonization

Bronwyn Barry, RA, CPHD
Oct. 2021

**We must rapidly transition
from this..**



to this!

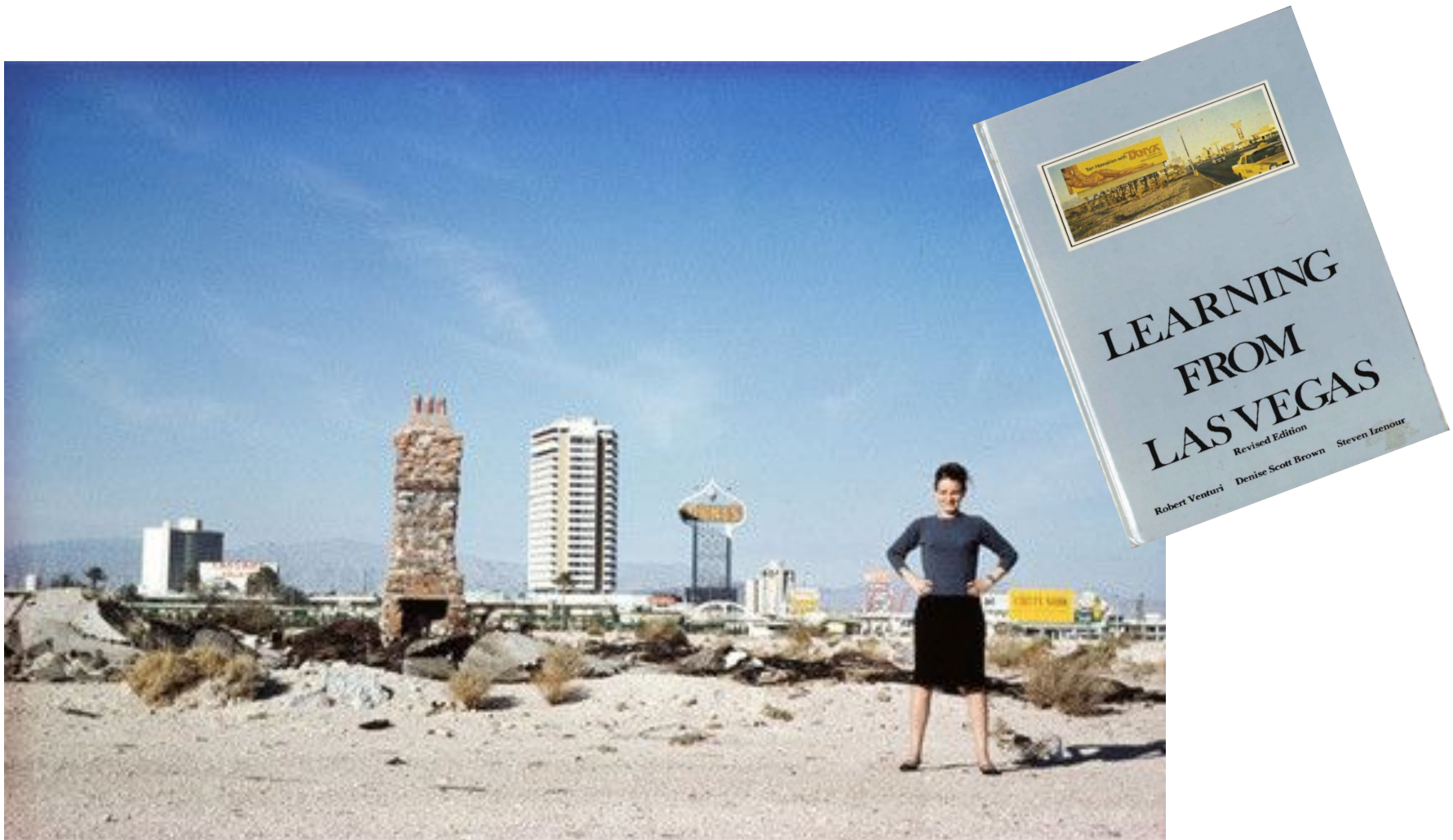


Image Credit: Copyright NAPHN 2019, based on illustrations by B.Barry

FORGET LAS VEGAS!



The Passive House Network



LEARNING FROM VANCOUVER!



The Passive House Network

“[Passive House] is where buildings are going and we will work with people who want to volunteer and go beyond what we require of them — way beyond,” he said. “We will partner with them. We will share the risk, we will share the learning and we will provide expertise where we know it exists.”

Sean Pander
Green Building Manager
City of Vancouver, BC

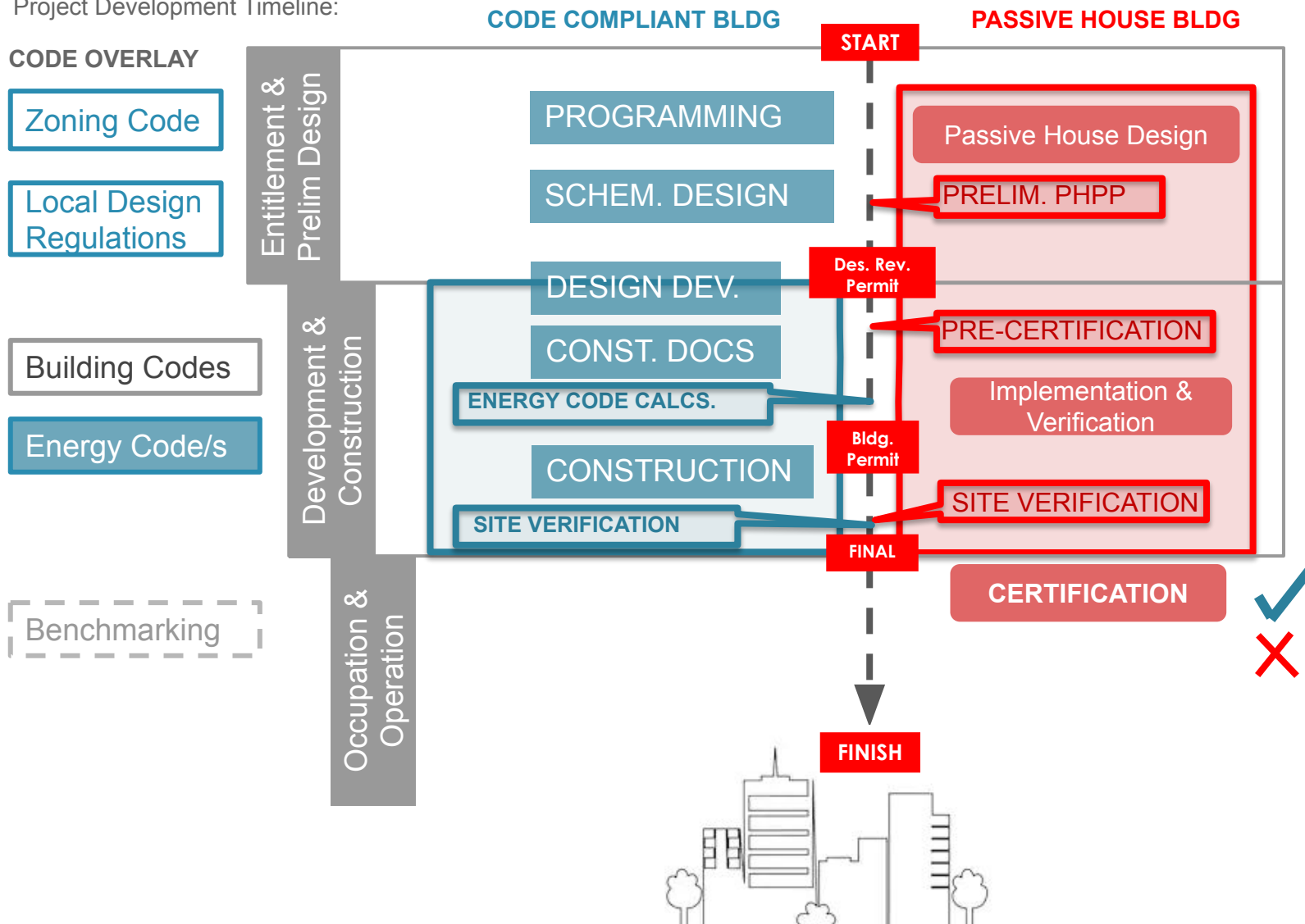


DECARBONIZATION POLICY IS A SYSTEM!



The Passive House Network

Project Development Timeline:



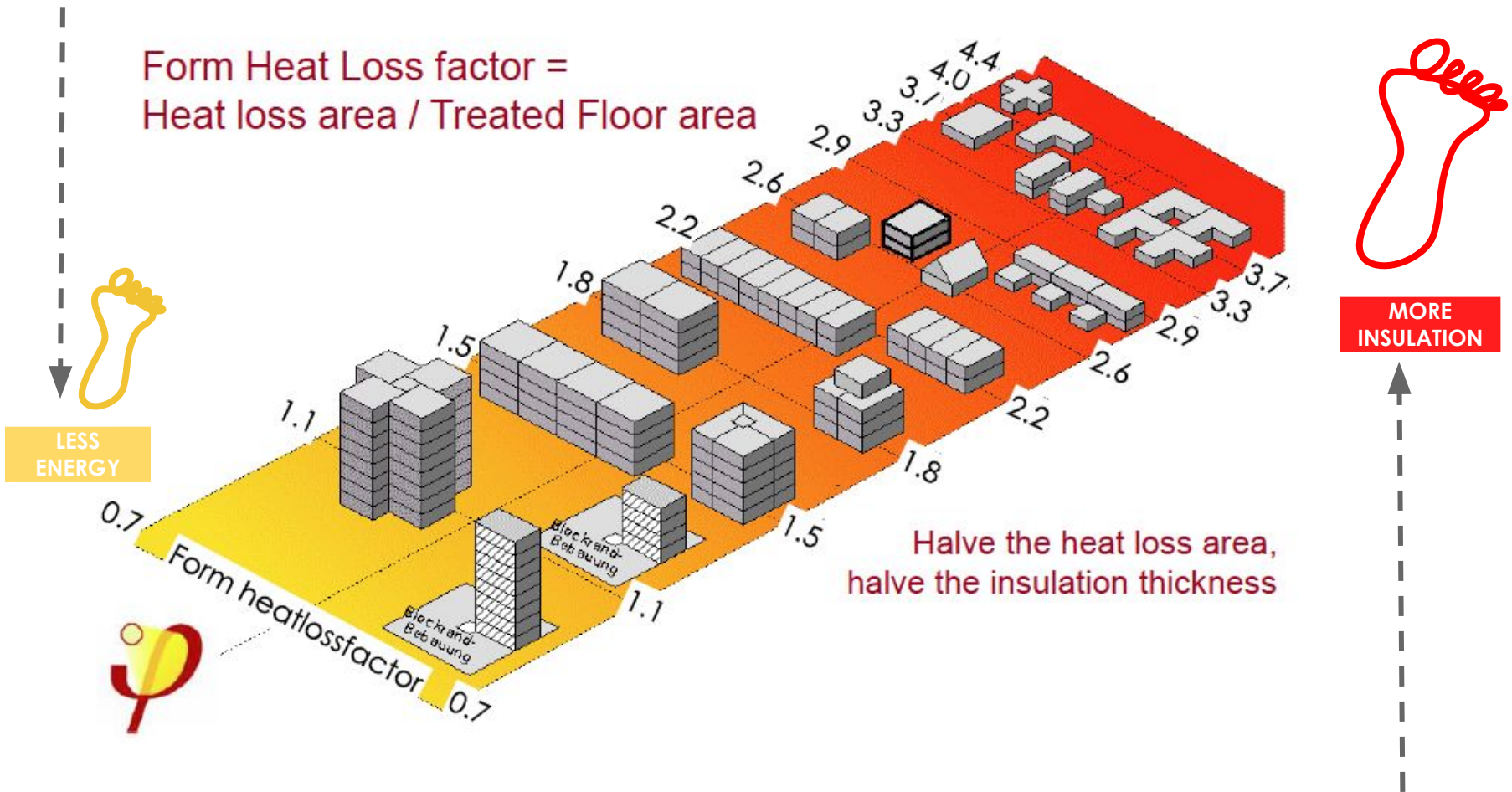
ZONING HAS A HUGE CARBON FOOTPRINT!



The Passive House Network

Zoning Code

Form Heat Loss factor =
Heat loss area / Treated Floor area

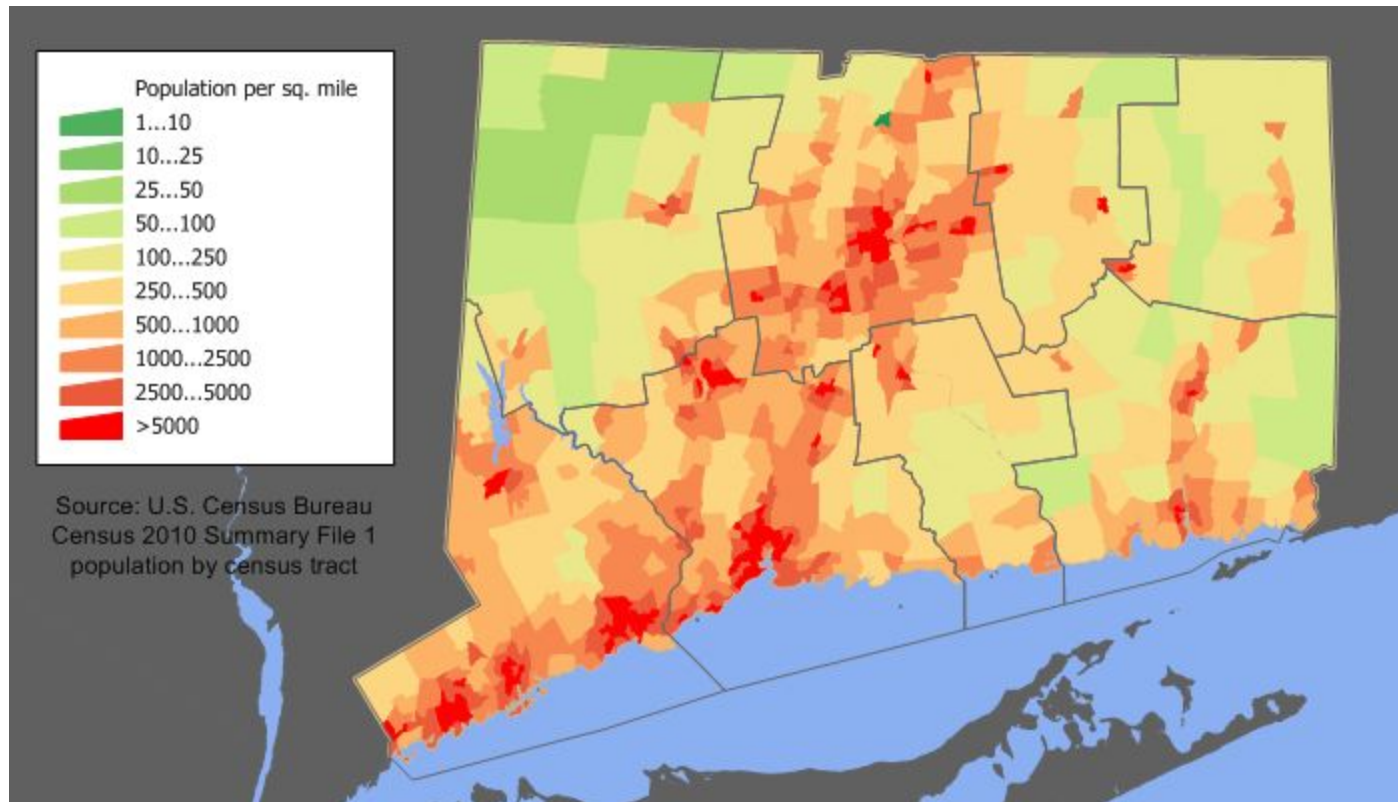


SOURCE: AECB Carbonlite training slide posted on Pinterest & Connecticut map: Wikimedia Commons

Support Better Land Use | Zoning



The Passive House Network



GREEN ZONING MATTERS!

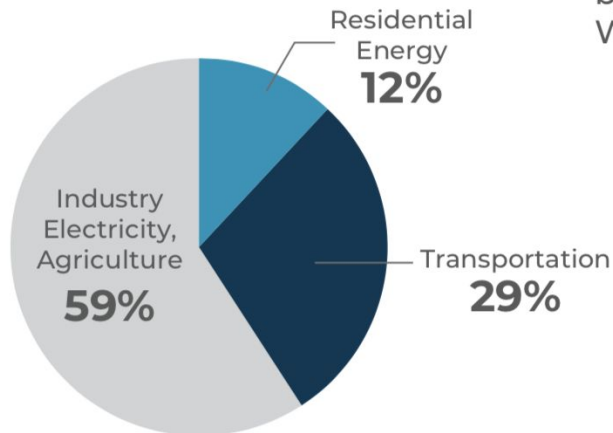


The Passive House Network

“How can cities that have green building codes have zoning bylaws that protect low-density single family housing? “

– Lloyd Alter, TreeHugger

US CO₂ Emissions



Reduction of CO₂ Emissions by Doubling Population Weighted Density

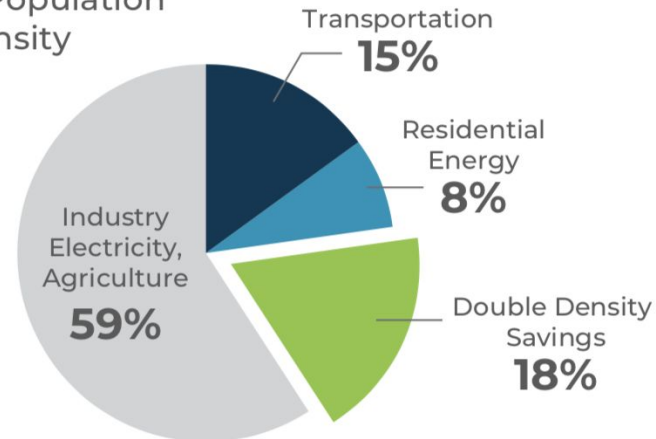


Figure 1: Reduction of U.S. CO₂ emissions by doubling population weighted density. Image by author.

Source: NAPHN 2019 Policy Resource Guide



Green Zoning

Accelerating Smart Growth
in Single Family Zones

by Matt Hutchins
CAST architecture

SUPPORT LOW CARBON DESIGN: KISS!



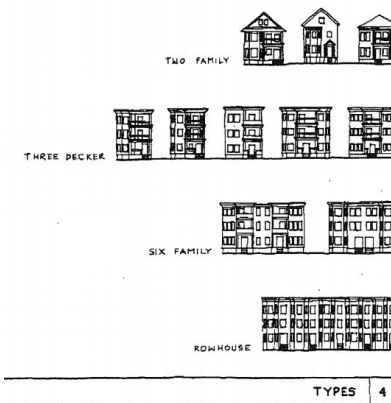
The Passive House Network

Local Design Regulations



EDUCATE PLANNING
DEPARTMENTS ON
THE COST AND
CARBON IMPACT OF
EXCESS
ARTICULATION!

KEEP IT SIMPLE



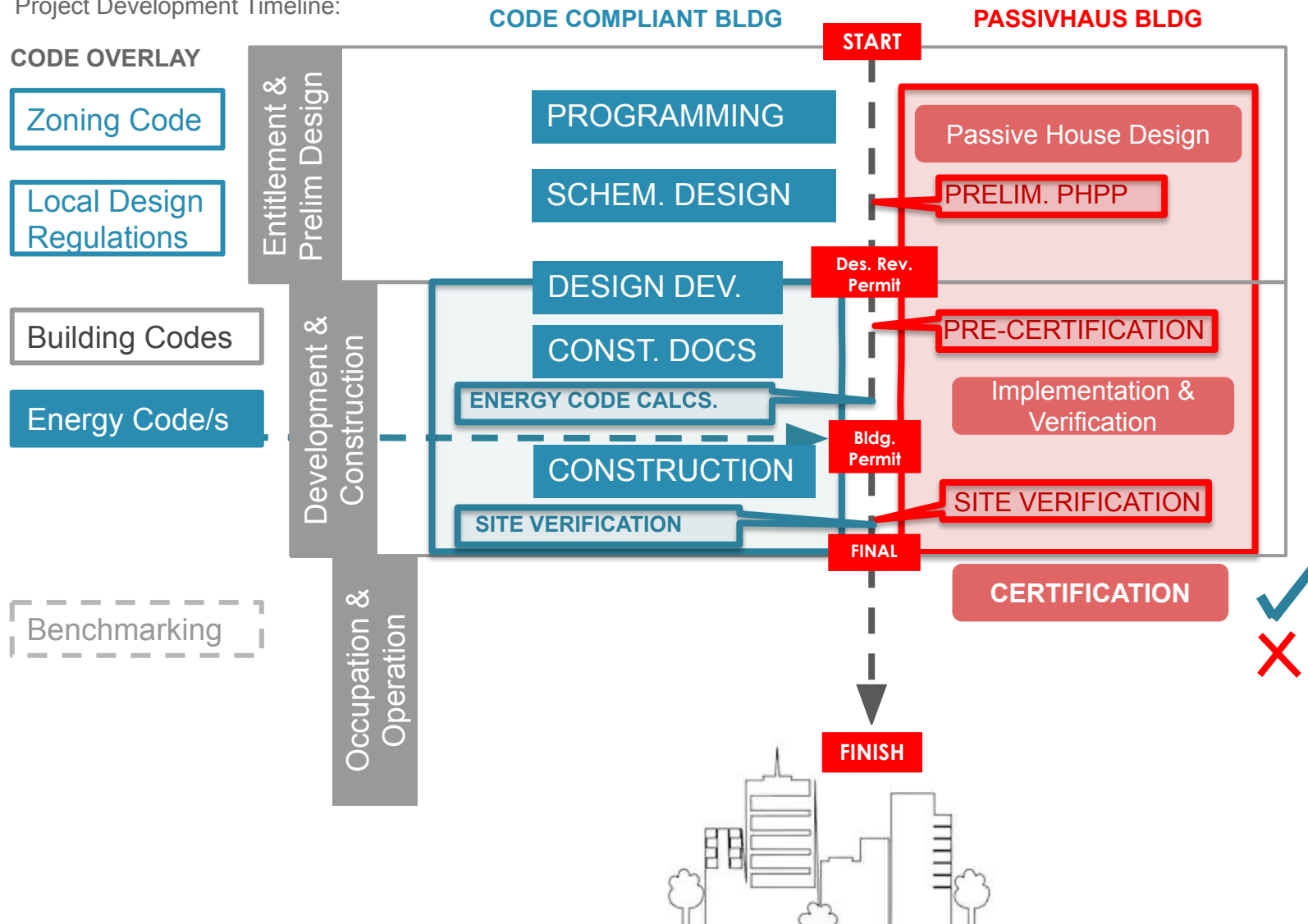
SOURCE: <http://www.bostonplans.org/getattachment/645eb59a-b372-40fd-a861-0b7ddd7be84c>

DECARBONIZATION POLICY IS A SYSTEM!



The Passive House Network

Project Development Timeline:



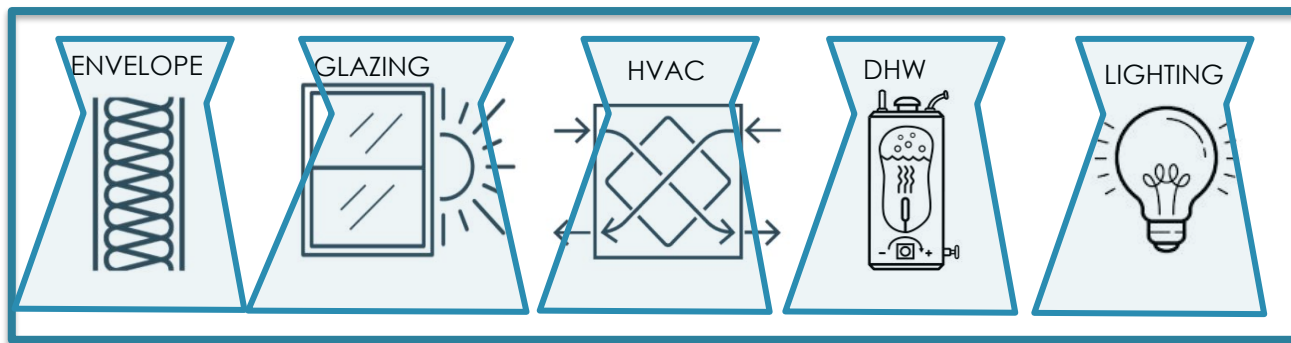
ENERGY CODE DEVELOPMENT STRUCTURE



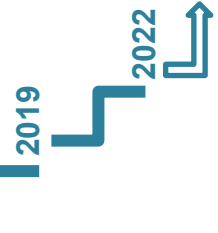
The Passive House Network



Goal : Cost Effective Energy Efficiency



MOVING TARGET ?



AIR SEALING



THERMAL BRIDGES



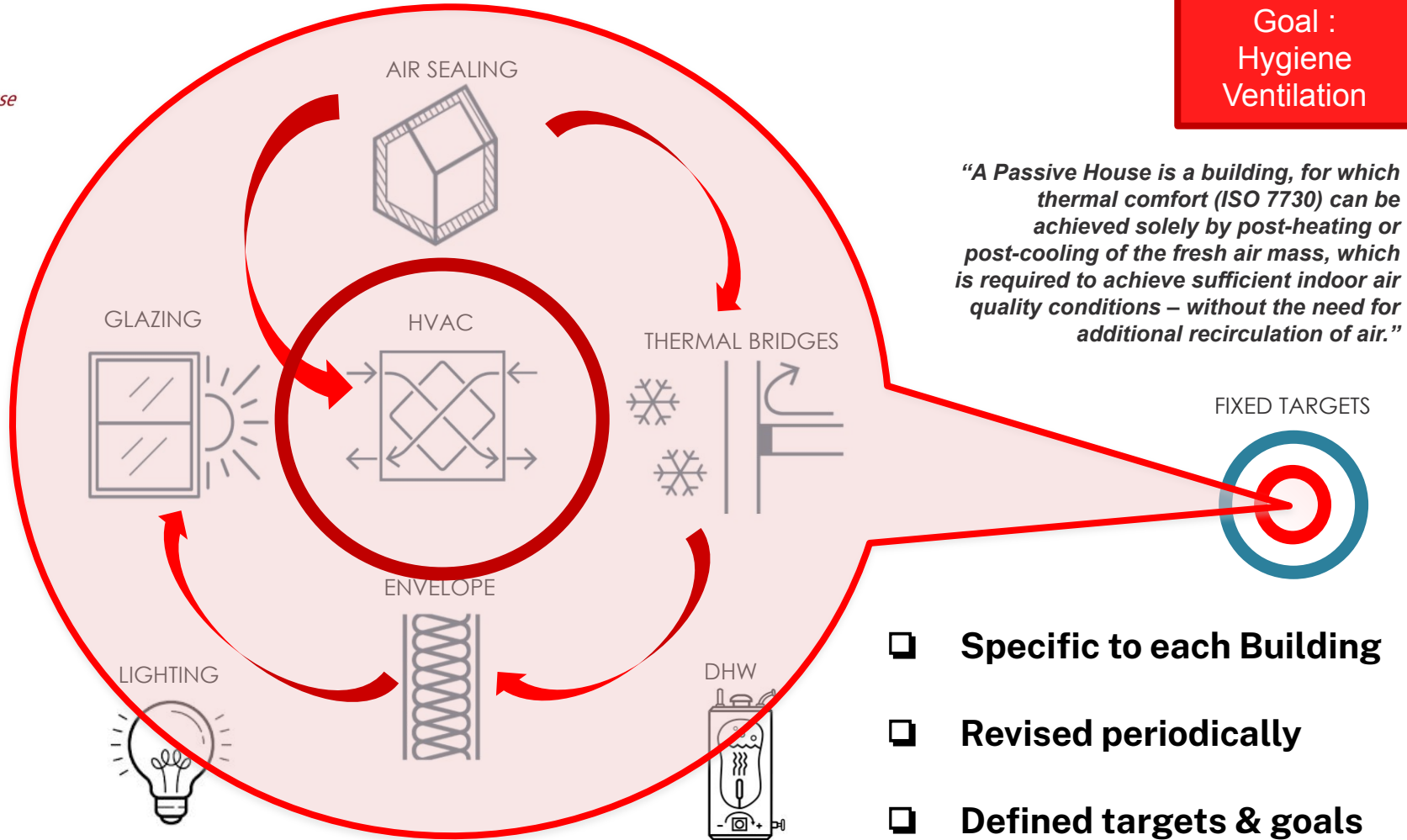
- ❑ % > Benchmark Building
- ❑ 3-year update cycle
- ❑ No finite end goal

PASSIVE HOUSE STANDARD STRUCTURE



The Passive House Network

Passive House Development Structure:



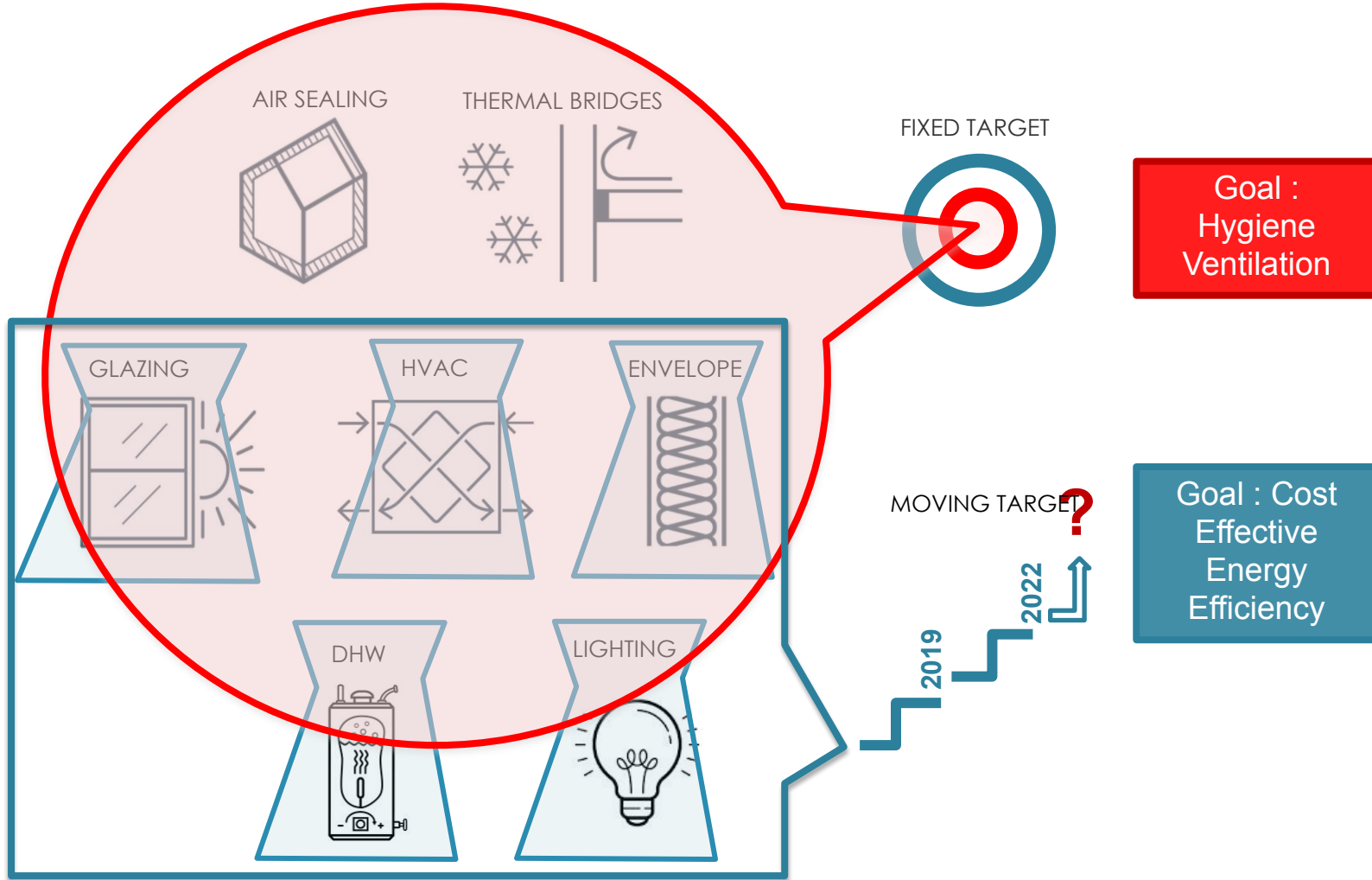
Source: https://passipedia.org/basics/the_passive_house_-_definition

CAN THESE FRAMEWORKS BE MERGED?



The Passive House Network

Passive House and Typical Benchmark Energy code overlay:

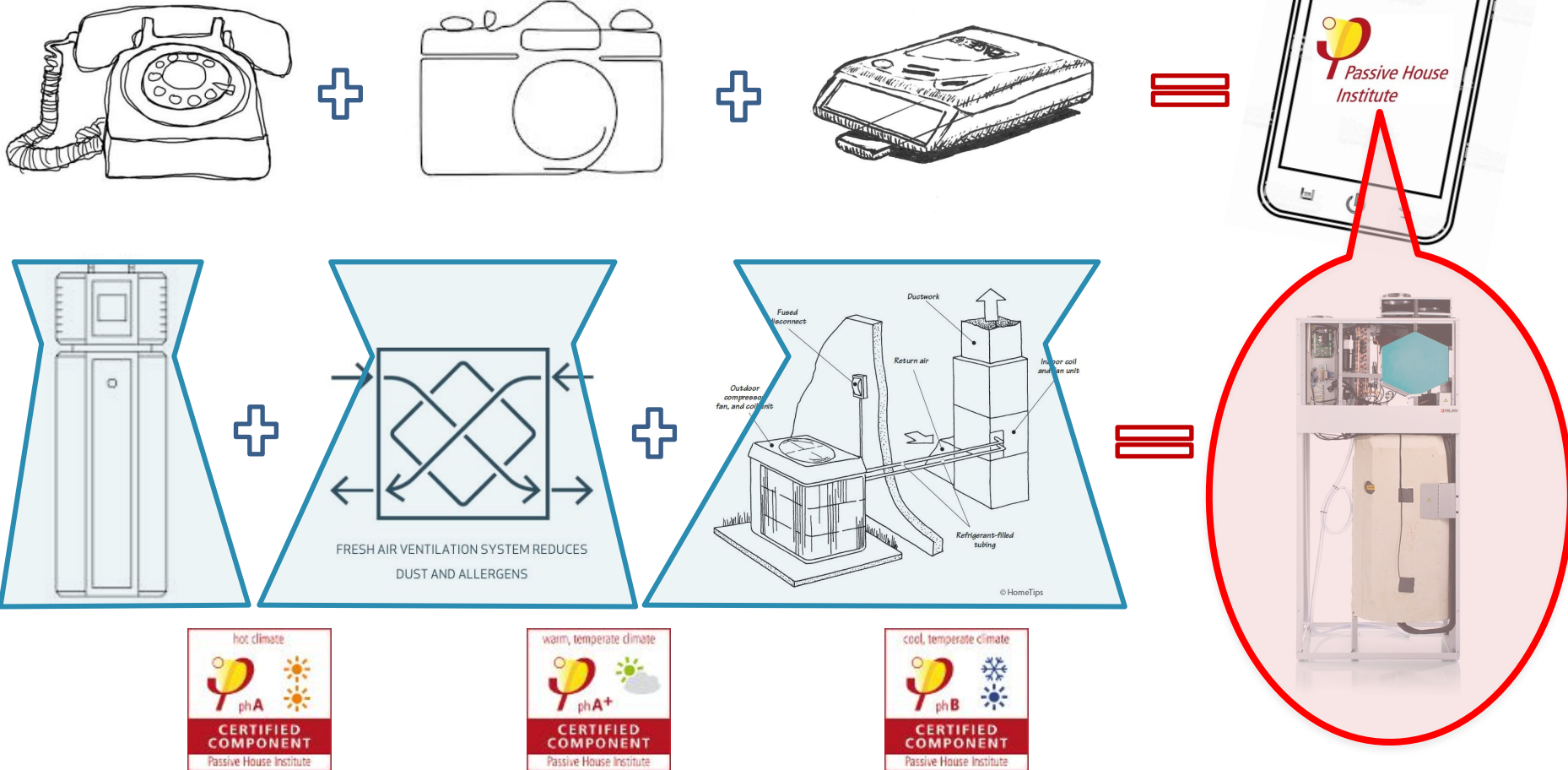


HARNESS THE POWER OF PASSIVE HOUSE!



The Passive House Network

WHY NOT UTILIZE PH TO DRIVE HIGH PERFORMANCE BUILDING PRODUCTS...?
AND WHY NOT DO THE SAME FOR POLICY?!



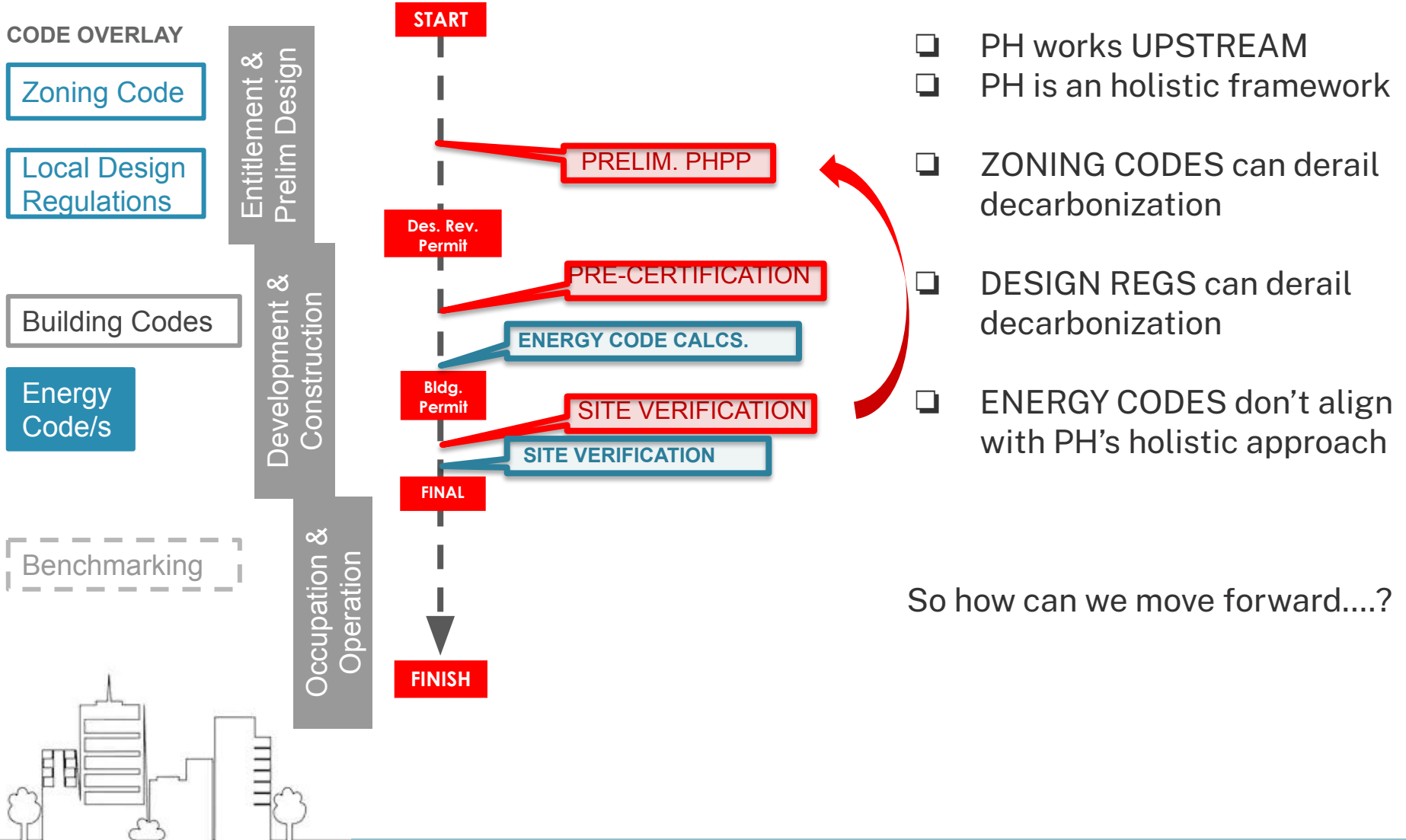
LEARN MORE: https://passivehouse.com/03_certification/01_certification_components/02_certification_criteria/02_certification_criteria.htm

RECAP WHAT WE'VE COVERED...



The Passive House Network

Project Development Timeline:

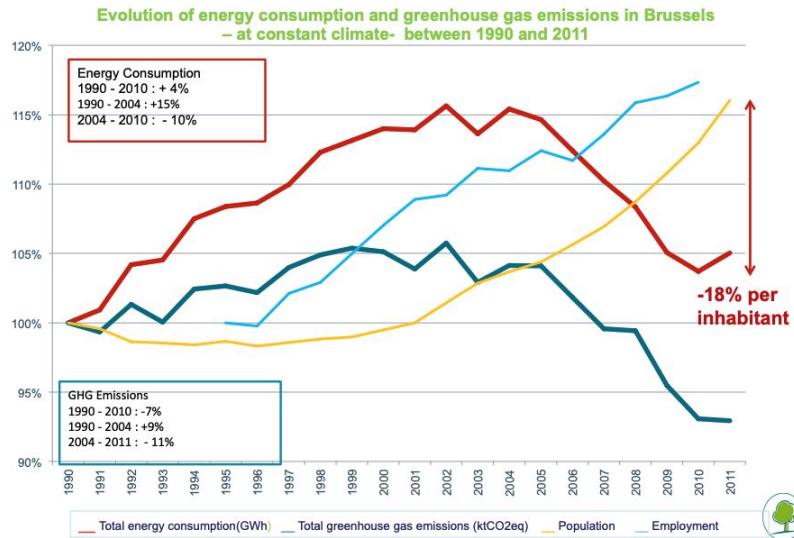


FOLLOW THE LEADERS!



The Passive House Network

Near Zero Energy Building strategy:
a success story started from scratch in 2004



1. Identified a clear end goal
2. Provided training & support to industry to aim for that goal
3. Promoted the front runners
4. Changed the code (once the market was ready.)

Source: [Brussels Environment, Joke Dockx](#)

What Vancouver Did:



The Passive House Network

- Climate Emergency Action Plan
- Greenest City Action Plan
- Zero emissions buildings
 - Build a Passive House
 - Building catalyst tools
 - Multi-family building energy resources and programs
- Zero Waste 2040
- Climate Change Adaptation Strategy
- Neighbourhood Energy Strategy
- How we are greening City operations



Build a Passive House

How to get Passive House certification

Passive House certification is a quality assurance process that determines whether a project meets all of the requirements of the Passive House standard.

It confirms that the building has been designed to achieve high levels of occupant comfort and energy performance.

The primary criteria for achieving Passive House certification:

- **Space Heat Demand:** Maximum 15 kWh/m²a or heating load maximum 10 W/m²
- **Air Tightness:** Maximum 0.6 ACH @ 50 Pa (pressurizing and depressurizing)
- **Total Primary Energy Renewable (PER):** Maximum 60 kWh/m²a

Learn more about the [Passive House standard](#) and [certification process](#).

Passive House in Rezoning

All rezoning applications submitted after May 1, 2017, will be required to meet near zero or low emissions buildings. This requirement can be met by constructing to the Passive House standard.

Read more details in the [Green Buildings Policy for Rezoning - Process and Requirements Bulletin](#) (319 KB).

Passive House in Zoning

We are continually working to

Benefits of a Passive House

A Big Bold Idea

The City of Vancouver Sets a Target and Maps the Path

by Chris Higgins



1. Removed barriers to
Passive House

2. Added incentives to
increase Passive House
uptake

3. Developed their own
Passive House pilot projects

Source: <https://vancouver.ca/green-vancouver/build-a-passive-house.aspx>

What Vancouver Did:



The Passive House Network

▸ Greenest City Action Plan

▸ **Zero emissions buildings**

Build a Passive House

Building catalyst tools

Multi-family building energy resources and programs

▸ Zero Waste 2040

▸ Climate Change Adaptation Strategy

▸ Neighbourhood Energy Strategy

▸ How we are greening City operations



Zero Emissions Buildings

A zero emissions building (ZEB) is highly energy efficient and uses only renewable energy.

We plan to transition to zero emissions buildings in all new construction by 2030. To achieve this, we're setting limits on emissions and energy use in new buildings, and will reduce these limits over time.

Review:

- [Zero Emissions Building Plan](#)
- [Development bylaws, policies, and guidelines](#)
- [Vancouver Building Bylaw \(VBBL\)](#)
- [Resources](#)

What energy will zero emissions buildings use exactly?

[Learn more about our strategy to achieve 100% renewable energy in all buildings by 2050.](#)



[Build a Passive House](#)

Learn if your project meets all of the requirements of the Passive House standard.



[Building catalyst tools](#)

Learn how zero emissions buildings can be eligible for a 5% increase in floor space ratio.



[Multi-family building energy resources and programs](#)

Depending on its size, your multi-family building may be eligible for a range of utility programs, incentives, and rebates.

Vancouver's Zero Emissions Buildings

Accelerating Passive House Uptake



Sean Pander
City of Vancouver

1. Developed & adopted a **Zero Emissions Buildings Plan**

2. **Trained 100 city staffers** in Passive House principles & certification

3. **Subsidized trainings** for professionals and trades by 50%

Zero Emissions Policy:

<https://guidelines.vancouver.ca/Z001.pdf>

Zoning Incentives Policy:

<https://bylaws.vancouver.ca/bulletin/Z001.pdf>

Source: <https://vancouver.ca/green-vancouver/zero-emissions-buildings.aspx#zero-emissions-building-plan>

THE B.C. ENERGY STEP CODE

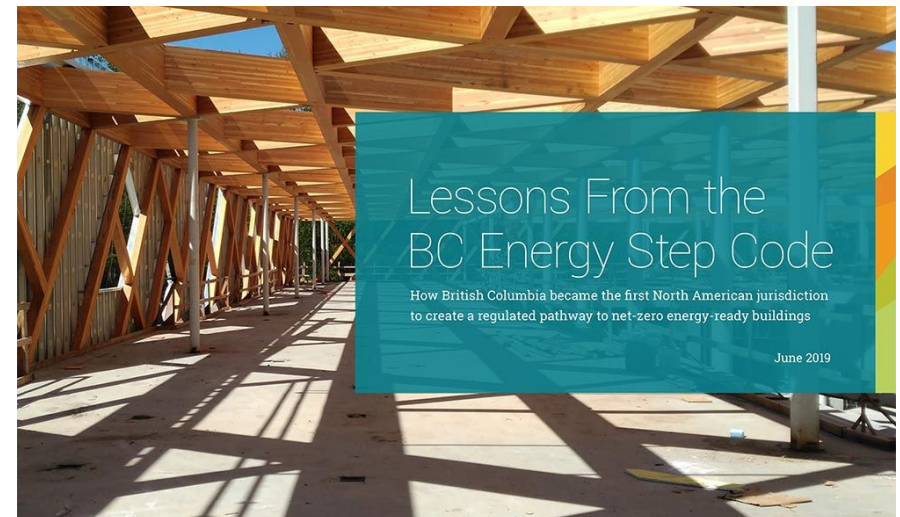
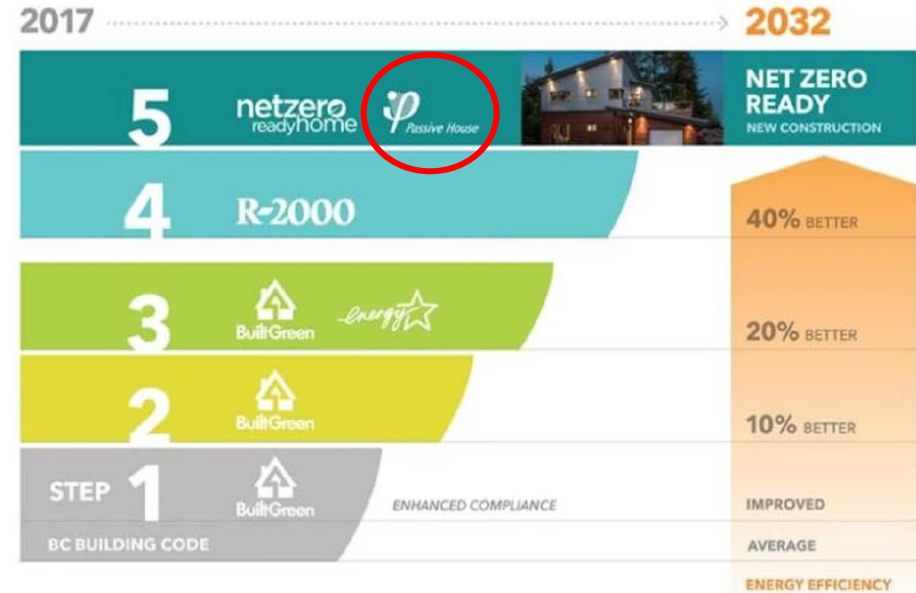
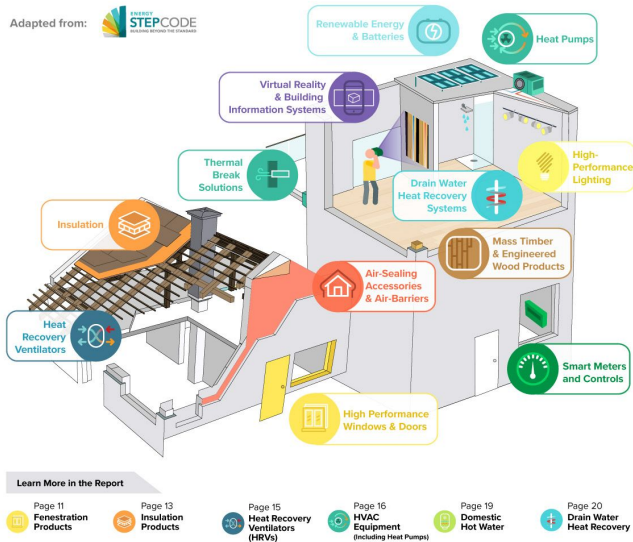


The Passive House Network



Figure 1: Definition of Lower and Upper Steps by building type (Part 9 and Part 3)

Adapted from: ENERGY STEP CODE



SOURCE: <https://energystepcode.ca/>

WHO ELSE IS GOING THIS DIRECTION?



The Passive House Network

CITY OF VANCOUVER Jobs and careers 3-1-1 Guides


Green Vancouver Your government About Vancouver Parks, recreation, and culture Home, property, and development People and programs Streets and transportation Doing business

Find city information, services and more...

Home > Green Vancouver > Zero emissions buildings > Build a Passive House

Green Vancouver

- Greenest City Action Plan
- Renewable City Action Plan
- Zero emissions buildings
 - Build a Passive House**
 - Building catalyst tools
 - Multi-family building energy resources and programs
- Zero Waste 2040
- Climate Change Adaptation Strategy
- Climate Emergency Response
- Neighbourhood Energy Strategy
- How we are greening City operations



Build a Passive House

How to get Passive House certification

Passive House certification is a quality assurance process determines whether a project meets all of the requirements of the Passive House standard.

It confirms that the building has been designed to achieve occupant comfort and energy performance.

The primary criteria for achieving Passive House certification are:

- Space Heat Demand: Maximum 15 kWh/m²a or heating maximum 10 W/m²
- Air Tightness: Maximum 0.6 ACH @ 50 Pa (pressurizing/depressurizing)
- Total Primary Energy Renewable (PER): Maximum 60 kWh/m²a

Learn more about the [Passive House standard](#) and [certification process](#).

City of Vancouver General Info:

<https://vancouver.ca/green-vancouver/build-a-passive-house.aspx>

British Columbia,
CANADA

NYC Housing Preservation & Development 311 Search

NYC Housing Preservation & Development

About Renter Owner **Developer** Vendor Community Sec. 8

Passive House

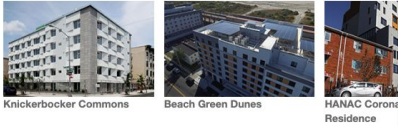
About Passive House

Passive House is a high performance building standard developed by the Passive House Institute (PHI) originally in 1990 and by the Passive House Institute US (PHIUS) in 2009. Buildings certified to Passive House standards reliably provide reduction in energy heating and cooling of up to 90%, and up to 75% reduction in overall energy use, existing buildings. It focuses on passive measures and building components such as airtightness and heat recovery to provide tenants with superior quality residences increasing long term viability for building owners through lower utility bills.

Residents benefit from great indoor air quality, comfortable and even temperature reduced energy bills and acoustically superior homes from reduced noise attenuation neighbors and street noise.

HPD Passive House Projects

HPD has completed a number of Passive House projects and have many others in construction or in development. See some of our built projects below.



Knickerbocker Commons Beach Green Dunes HANAC Corona Residence

NYC General Info:

<https://www1.nyc.gov/site/hpd/development/passive-house.page>

NEW YORK STATE

Residential New Homes and Renovations Initiative

D.P.U. 18-110 – D.P.U. 18-119
Three-Year Plan 2019-2021
October 31, 2018
Exhibit 1
Page 44 of 209

Passive House Incentives		
Incentives	Recipient	Details
Modeling Subsidy	Owner	Cost-share of Warme Und Feuchte Instationar or Passive House Planning Package modeling costs or early feasibility study
Design Team Incentive	Architect, Design Team	\$/kWh and \$/therm incentives for projects achieving precertification and certification (if applicable)
Design Charrette	Architect, Design Team	Sustainability charrette incentive in either Programming and Schematic or Design Development design phases, directed to design team lead
Certification Subsidy	Owner	Adder per multi-family unit for achieving PHIUS or PHI certification
Performance Incentive*	Owner	\$/kWh and \$/therm incentives for savings where projects are performing more efficient than the User Defined Reference Home for the residential portion and Mass Save baseline for the commercial spaces.

*The PAs are actively working to include infiltration incentives for High Rise buildings to better quantify performance savings. The PAs and DOER are committed to changing the process by which savings are claimed to be a more whole building performance based approach for the Passive House offer. The PAs and DOER will work expeditiously with EM&V to pursue this change using Passive House certification modeling tools to quantify savings.

Statewide Coordination

A working group of residential and commercial sector experts from each Program Administrator collaborate to oversee the Low-Rise and Master-Metered/High-Rise implementation strategies with the statewide lead vendor. The lead vendor provides the direct field implementation.

The lead vendor is responsible for developing and deploying training, education, and outreach efforts, as well as tracking and reporting program activity to each Program Administrator. The lead vendor has principal responsibility for recruiting and enrolling projects. Many Program Administrators maintain additional account representatives and field personnel that also help support project recruitment and maintain relationships with the target market and allies. HERS raters, as noted above, play a key role in the Low-Rise path for recruiting and enrolling projects.

MassSave Program:

44 <http://ma-eeac.org/wordpress/wp-content/uploads/Exh.-1-Final-Plan-10-31-18-With-Appendices-no-bulk.pdf>



MASSACHUSETTS

What NYSERDA Did:

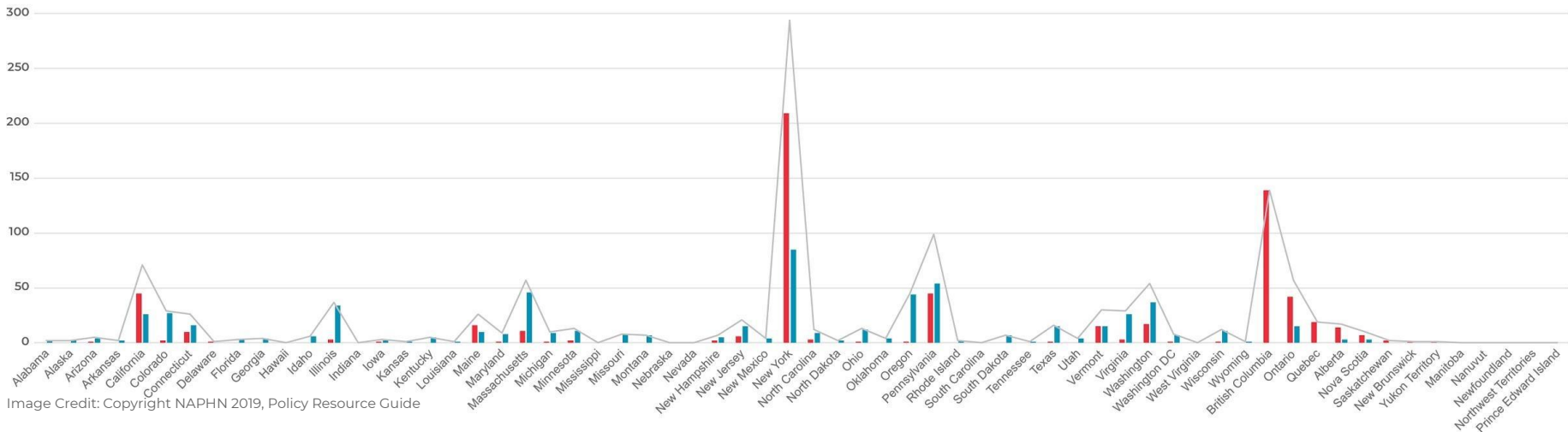


The Passive House Network

- ❑ 2014-2015: Allocated \$200K towards Professional & Trades training subsidies
- ❑ Trained 571 Passive House Consultants and Tradespersons
- ❑ 2017: Was able to include Passive House certification as a requirement in the RFP for a city-owned affordable housing project



North America's Certified Passive House Professionals
by State & Province c.2017



Utility Programs

NYSERDA's Strategic Grant Funding

by Bronwyn Barry
Passive House BB

Image Credit: Copyright NAPHN 2019, Policy Resource Guide

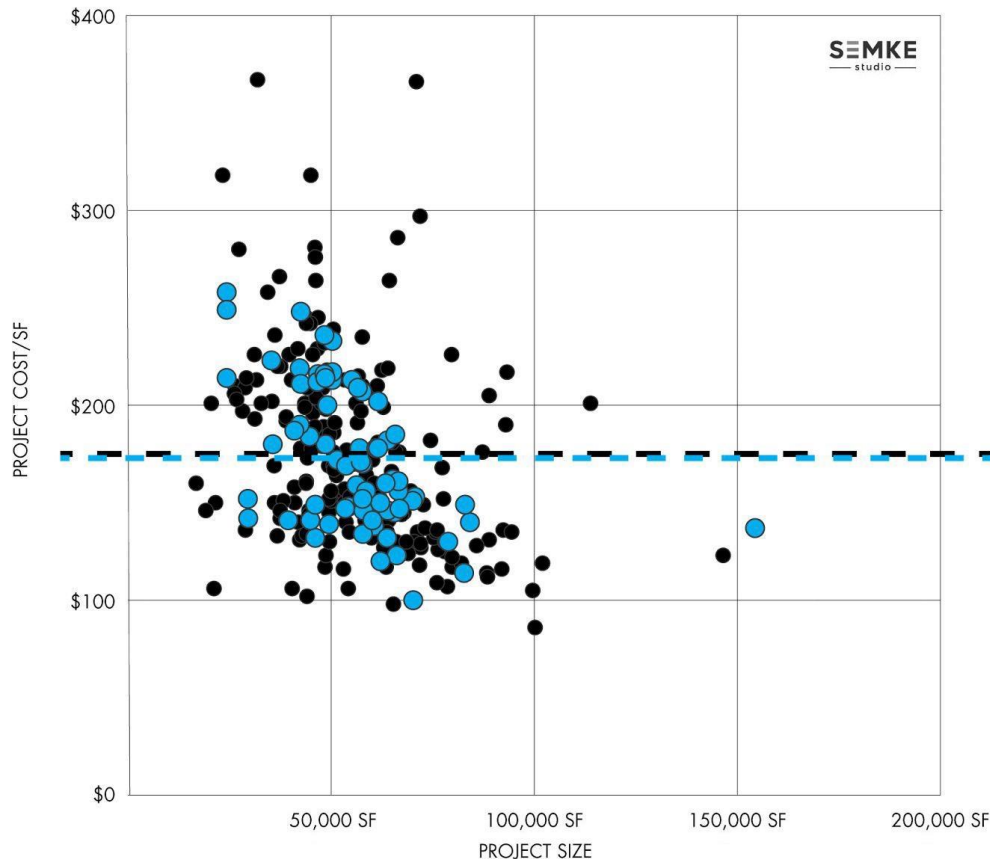
Source: <https://drive.google.com/file/d/1x49Xmev6aaqfG-XDhzvq4TfbdTqhv0a/view>

What PHFA Did:



The Passive House Network

268 Proposals to Pennsylvania Housing Finance Agency (2015-2018)



DATA SOURCE: Pennsylvania Housing Finance Agency

Source: <https://drive.google.com/file/d/1x49Xmey6gaafG-XDhzvq4TfbdTqhvi0a/view>

Low Income Housing Tax Credits

The Sleeper Simulant Policy



by Zachary Semke
Semke Studio

- Granted 10 extra points for applicants willing to pursue Passive House
- Tracked the costs to build all projects over 3 years
- Found the Passive House projects came in LOWER \$/SF

What New York City Did:

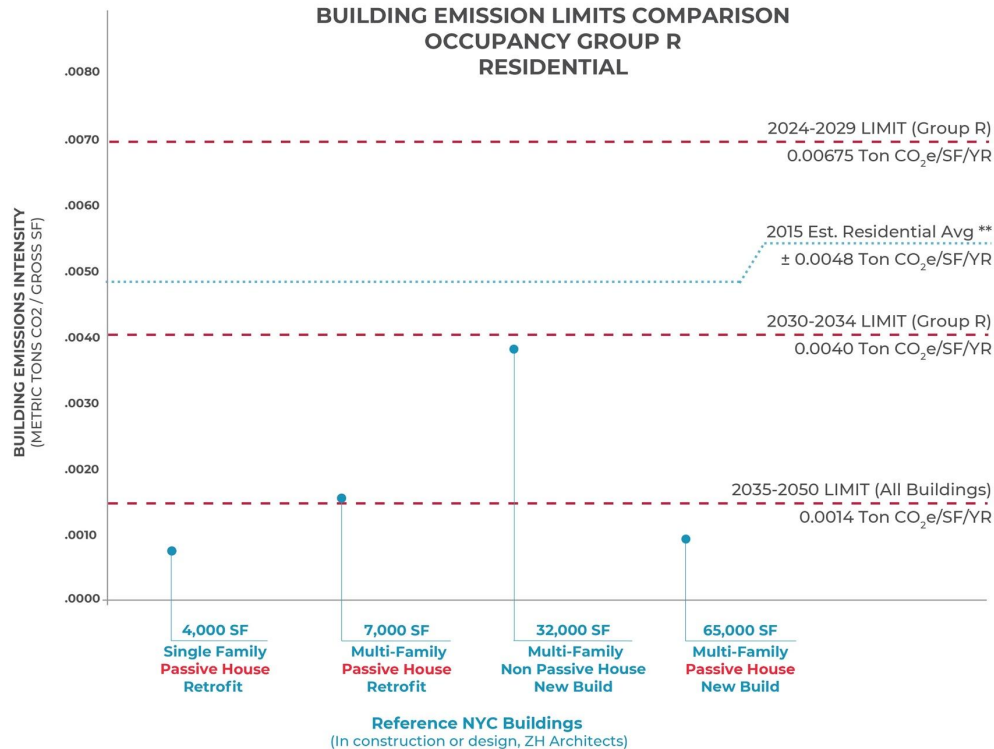


The Passive House Network



by Stas Zakrzewski
ZH Architects

BUILDING EMISSION LIMITS COMPARISON OCCUPANCY GROUP R RESIDENTIAL



** Residential Average based on data from Mayor's office of sustainability, inventory of New York City's Greenhouse Gas Emissions, April 2017 and NYC MAP Pluto data on residential square footage totals for NYC

NYC's Climate Mobilization Act

A brief history

- ❑ Passed a 'Climate Mobilization Act' that requires large, **EXISTING buildings** meet specific carbon emissions targets
- ❑ Targets decrease over time
- ❑ **Affects new buildings** as they must comply as soon as they are completed
- ❑ Levies **large fines** on owners whose buildings don't comply

Source: <https://drive.google.com/file/d/1x49Xmев6qaafG-XDhzvq4TfbdTqhvi0a/view>

What PHCA has done:



The Passive House Network



Title 24, Parts 6 and 11
Local Energy Efficiency Ordinances

**2019 Cost-effectiveness Study:
Low-Rise Multifamily Residential New
Construction Addendum –
Passive House Equivalency Analysis for
2019 Energy Efficiency Ordinances**

Prepared for:
Kelly Cunningham
Codes and Standards Program
Pacific Gas and Electric Company

Prepared by:
Frontier Energy, Inc.
Misti Bruceri & Associates, LLC

Reaching for a Passive House Code

California's Nascent Adoption Journey

by Steve Mann
Home Energy Services

- ❑ **Confirmed Passive House Planning Package (PHPP) energy model outputs** via the ASHRAE 140 protocol
- ❑ Initiated a **Low-Rise Multifamily Study** to compare Passive House with current code
- ❑ Worked with Santa Monica to initiate a **REACH CODE** Cost-Effectiveness Study

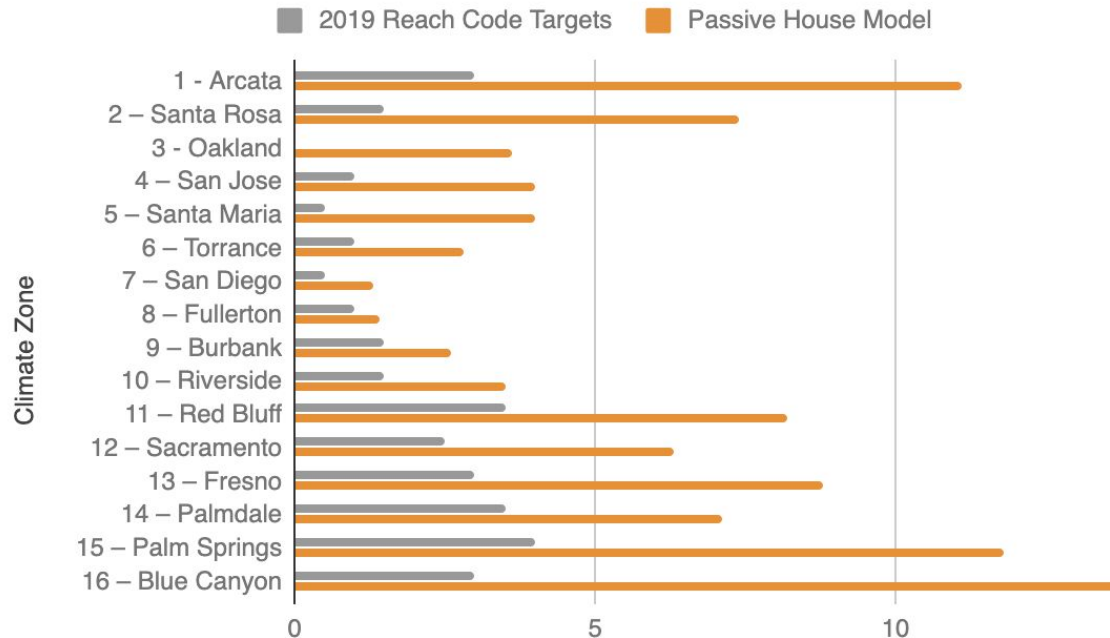
Source: <https://drive.google.com/file/d/1x49Xmev6aaqfG-XDhzvq4TfbdTqhvi0a/view>

What PHCA Did:



The Passive House Network

All-Electric Passive House Reach Code EDR Margin



All-Electric EDR Margin			
	2019 Reach Code Targets	Passive House Model	% Improvement
1 - Arcata	3	11.1	270%
2 - Santa Rosa	1.5	7.4	393%
3 - Oakland	0.00	3.6	NA
4 - San Jose	1	4	300%
5 - Santa Maria	0.5	4	700%
6 - Torrance	1	2.8	180%
7 - San Diego	0.5	1.3	160%
8 - Fullerton	1	1.4	40%
9 - Burbank	1.5	2.6	73%
10 - Riverside	1.5	3.5	133%
11 - Red Bluff	3.5	8.2	134%
12 - Sacramento	2.5	6.3	152%
13 - Fresno	3	8.8	193%
14 - Palmdale	3.5	7.1	103%
15 - Palm Springs	4	11.8	195%
16 - Blue Canyon	3	13.8	360%

- ❑ Confirms Passive House efficiency is a **SIGNIFICANT IMPROVEMENT**
- ❑ Supports Electrification
- ❑ Adds the missing push for Efficiency
- ❑ **NEEDS A CHAMPION CITY**

Source: <http://passivehousecal.org/news/case-passive-house-low-rise-multifamily-reach-code-delivers-results>

SUMMARY



The Passive House Network



1

Identify the Leaders



and build lanes for them to safely thrive within....

SUMMARY



The Passive House Network

Aim High 



1

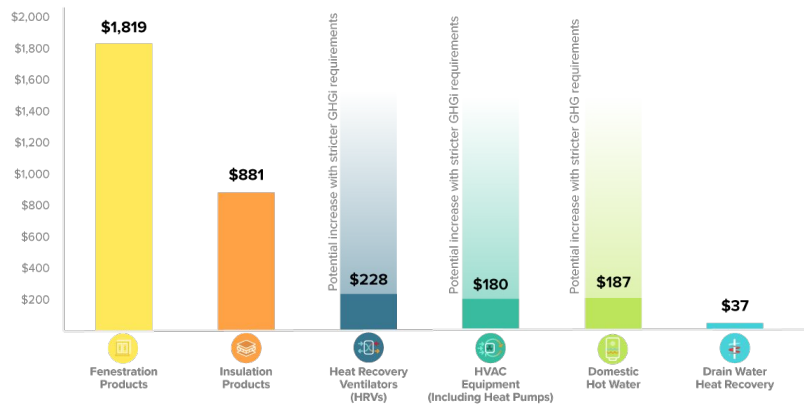
Identify the Leaders

2

Set a Clear Target

and watch manufacturers step up to supply the demand....

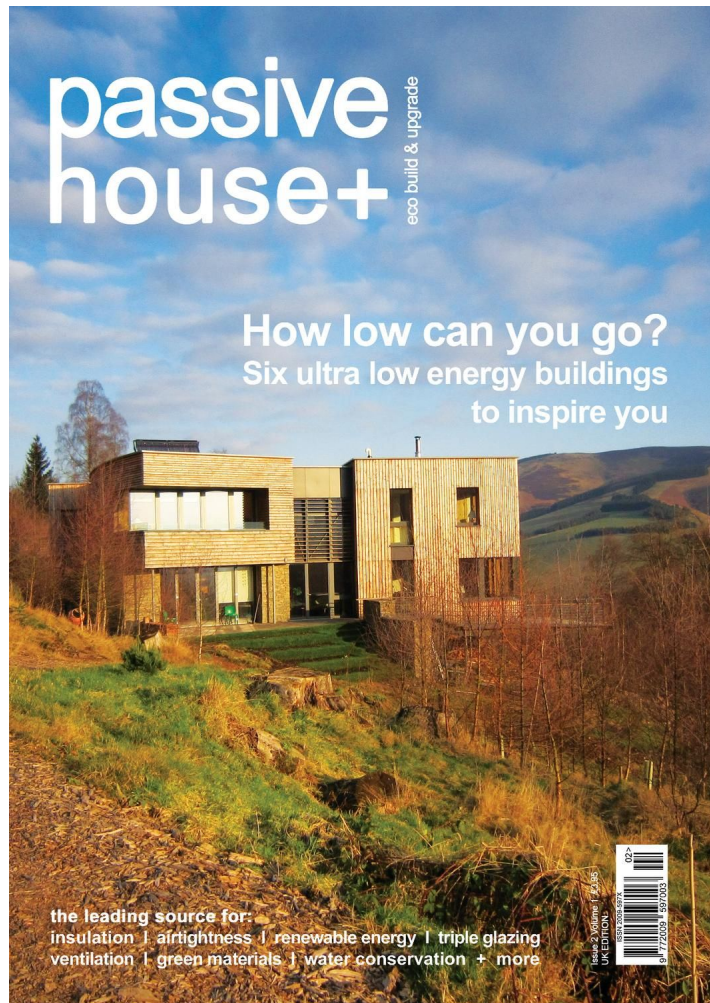
Source: <https://www.vancouvereconomic.com/research/green-buildings-market-research/>



SUMMARY



The Passive House Network



1

Identify the Leaders

2

Set a Clear Target

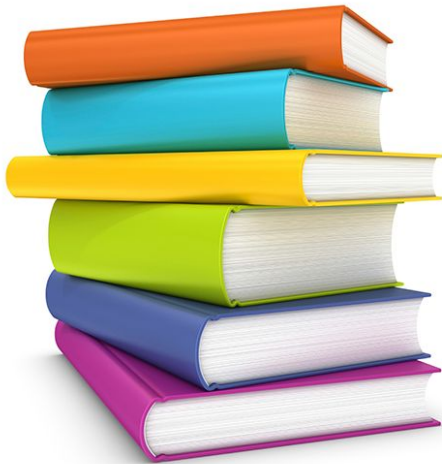
3

Promote and Celebrate Success

and make it easier to improve regular code adoption.

Source: <https://issuu.com/passivehouseplus>

SUMMARY: ONRAMPS TO ADOPTION



Education

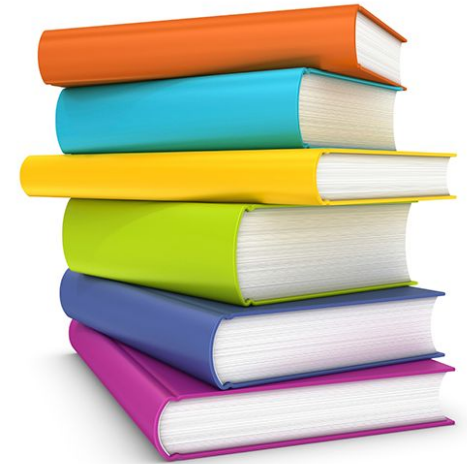


Incentives

START WITH EDUCATION

START WITH TRAINING:

1. Begin with YOURSELF (Planning & Bldg Depts.)
2. Professionals (Design, engineering, energy modeling)
3. Trades: contractors, HVAC installers, electricians

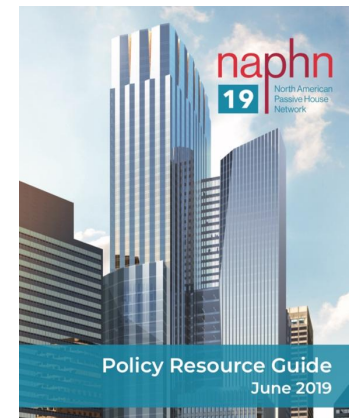


BONUS POINTS:

- ❑ Support GRANT subsidies for Passive House courses
- ❑ Host & support PH community projects & events

Example Policies:

<https://drive.google.com/file/d/1x49Xmey6gaqfG-XDhzvq4TfbdTqhvi0a/view>



FOLLOW WITH INCENTIVES

COST-NEUTRAL INCENTIVES:

1. Increased FAR for projects that target PH
2. Increased HEIGHT allowances for projects that target PH
3. UPZONING for projects that target PH
4. Promote PH on your city website

FINANCED INCENTIVES:

1. Initiate a City-Owned PH Pilot project
2. Provide incentives for Passive House pilot projects (\$\$\$ & promotion)



AND FIX YOUR CODE FRAMEWORKS!

Which option do you want?



Business
as usual

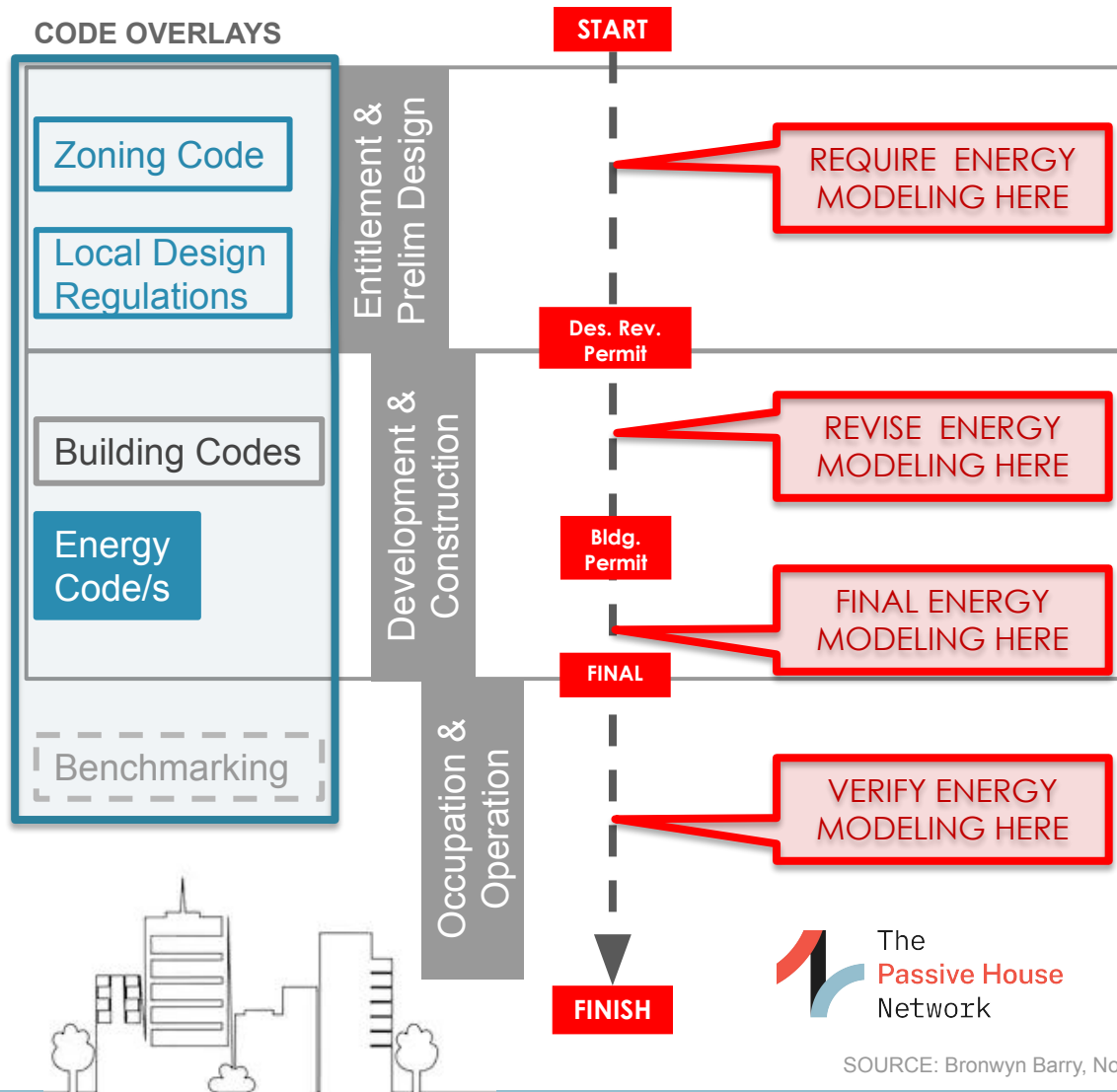


Passive
House

IN REVIEW....



The Passive House Network

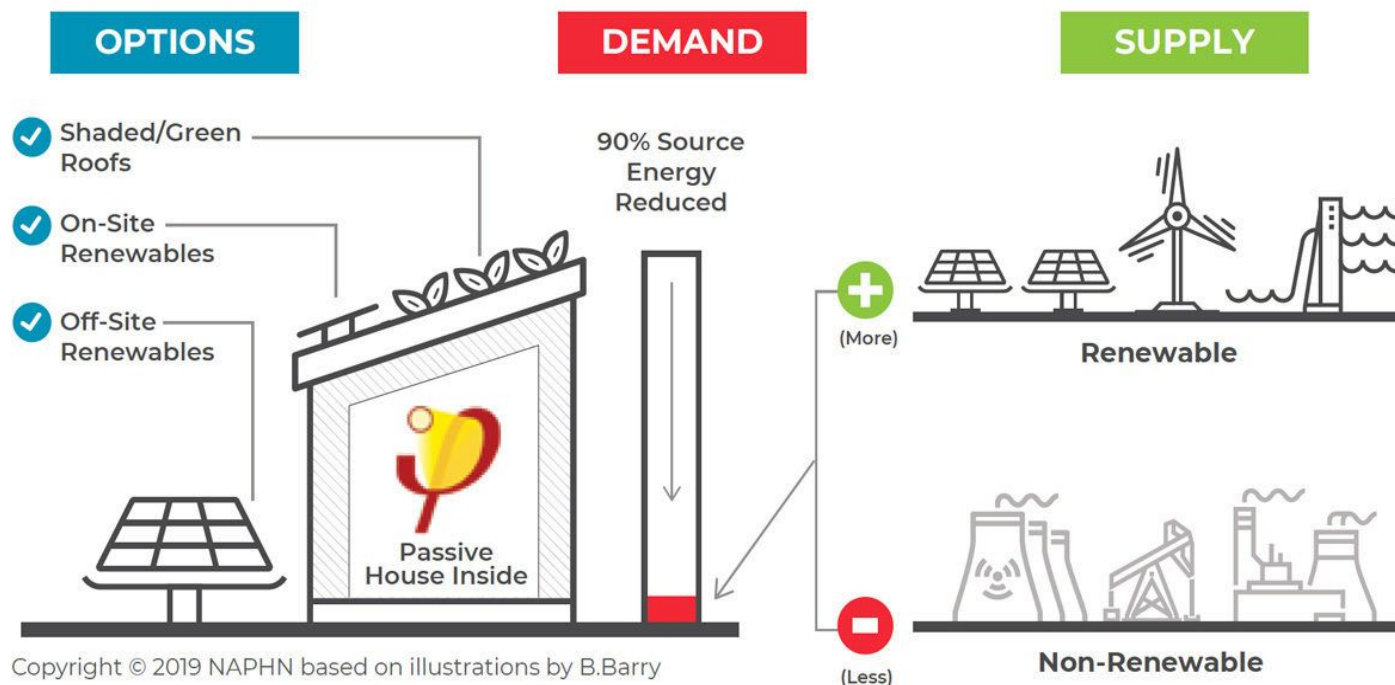


- ❑ Leverage **UPSTREAM** Policy overlays for greatest impact
- ❑ Align decarb goals & codes **VERTICALLY & HORIZONTALLY**
- ❑ Review and **REMOVE** roadblocks embedded along the **FULL DEVELOPMENT** process



SOURCE: Bronwyn Barry, North American Passive House Network

CHOOSE YOUR FUTURE.... carefully!



Bronwyn Barry, RA, CPHD

bronwyn@naphnetwork.org
@passivehouseBB

More info: NAPHN POLICY RESOURCE GUIDE

Thank You

PASSIVE HOUSE INCENTIVE STRUCTURE FOR MULTI-FAMILY (5 UNITS OR MORE)				
Incentive Timing	Activity	Incentive Amount	Max Incentive (Per Unit)	Max Incentive (Per Project)
Pre-Construction	Feasibility Study ¹	Up to 100% of Feasibility Study Costs	N/A	\$5,000.00
	Energy Modeling ²	75% of Energy Modeling Costs (Before 90% Design Drawings)	\$500.00	\$30,000.00
		50% of Energy Modeling Costs (90% Design/50% Construction)	\$250.00	\$15,000.00
Post Construction	Certification ³	Up to 100% of Certification Costs	\$1,500.00	\$60,000.00

1. Feasibility Study will require documentation in the form of a Feasibility Study report and invoice from the Passive House Consultant

2. Incentives will only be awarded prior to 50% Construction Drawings for Passive House projects. No incentives will be granted after 50% Construction Drawing set.

3. Certification may be either through PHIUS, PHI, or EnerPHit certification offerings.

Next steps you can take...
Contact your Energy Efficiency Representative or

Go to [EnergizeCT.com](https://energizeCT.com) or call 1-877-WISE USE for more details.

EVERSOURCE

PROUD SPONSORS OF
energize CT
CONNECTICUT

BROUGHT TO YOU BY

EVERSOURCE



PROUD SPONSORS OF

energize CT
CONNECTICUT

BROUGHT TO YOU BY

EVERSOURCE



PROUD SPONSORS OF



Thank You

For more information, please visit
EnergizeCT.com/passive-house or email
PassiveHouseTrainingCT@icf.com