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
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)

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

Go to EnergizeCT.com or call 1-877-WISE USE for more details.
Policy Onramps: Using Passive House to Accelerate Building Decarbonization

Bronwyn Barry, RA, CPHD
Oct. 2021

www.passivehousenetwork.org
We must rapidly transition from this.

to this!

Image Credit: Copyright NAPHN 2019, based on illustrations by B. Barry
FORGET LAS VEGAS!
“[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!

Project Development Timeline:

CODER OVERLAY

- Zoning Code
- Local Design Regulations

Development & Prelim Design

- Entitlement & Prelim Design
- Code Compliant Building

- Design Development
- Construction Documents
- Energy Code Calculations
- Construction
- Site Verification

- Programming
- Schematic Design

- Passive House Design
- Preliminary PHPP
- Pre-Certification
- Implementation & Verification
- Site Verification

- Certification

Occupation & Operation

- Code Compliant Building
- Passive House Building

- Des. Rev. Permit
- Bldg. Permit

- Start
- Final
- Finish

- Certified Passive House

Policy Onramps: Using Passive House to Drive Decarbonization

www.passivehousenetwork.org
ZONING HAS A HUGE CARBON FOOTPRINT!

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

Halve the heat loss area, halve the insulation thickness

Source: AECB Carbonlite training slide posted on Pinterest & Connecticut map: Wikimedia Commons
Support Better Land Use | Zoning

Source: U.S. Census Bureau
Census 2010 Summary File 1
population by census tract
GREEN ZONING MATTERS!

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

– Lloyd Alter, TreeHugger

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

SUPPORT LOW CARBON DESIGN: KISS!

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

Local Design Regulations
Policy Onramps: Using Passive House to Drive Decarbonization

DECARBONIZATION POLICY IS A SYSTEM!

Project Development Timeline:

CODE OVERLAY

- Zoning Code
- Local Design Regulations
- Building Codes
- Energy Code/s

CODE COMPLIANT BLDG

- PROGRAMMING
- SCHEM. DESIGN
- DESIGN DEV.
- CONST. DOCS
- ENERGY CODE CALCS.
- CONSTRUCTION
- SITE VERIFICATION

Passive House Design

- PRELIM. PHPP
- PRE-CERTIFICATION
- Implementation & Verification
- SITE VERIFICATION
- CERTIFICATION

CERTIFICATION

- Code Compliant Bldg
- Passivhaus Bldg

START

FINISH

DES. REV. PERMIT

Bldg. Permit

Occupation & Operation

Development & Construction

Entitlement & Prelim Design

Local Design Regulations

Building Codes

Energy Code/s

CODE OVERLAY

BENCHMARKING

www.passivehousenetwork.org
ENERGY CODE DEVELOPMENT STRUCTURE

Goal: Cost Effective Energy Efficiency

- % > Benchmark Building
- 3-year update cycle
- No finite end goal
PASSIVE HOUSE STANDARD STRUCTURE

Passive House Development Structure:

- HVAC
- GLAZING
- ENVELOPE
- AIR SEALING
- THERMAL BRIDGES
- DHW
- LIGHTING

Fixed Targets:
- Goal: Hygiene Ventilation

“A Passive House is a building, for which thermal comfort (ISO 7730) can be achieved solely by post-heating or post-cooling of the fresh air mass, which is required to achieve sufficient indoor air quality conditions – without the need for additional recirculation of air.”

- Specific to each Building
- Revised periodically
- Defined targets & goals

Source: https://passipedia.org/basics/the_passive_house_-_definition
CAN THESE FRAMEWORKS BE MERGED?

Passive House and Typical Benchmark Energy code overlay:

- **Fixed Target**
  - Goal: Hygiene Ventilation

- **Moving Target**
  - Goal: Cost Effective Energy Efficiency

**Components**:
- HVAC
- Glazing
- Envelope
- Air Sealing
- Thermal Bridges
- DHW
- Lighting
HARNESS THE POWER OF PASSIVE HOUSE!

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...

- **Code Overlay**
  - Zoning Code
  - Local Design Regulations
  - Building Codes
  - Energy Code/s

- **Development & Construction**
  - Entitlement & Prelim Design
    - Start
    - Prelim. PHPP
    - Des. Rev. Permit
    - Pre-Certification
    - Energy Code Calcs.
    - Bldg. Permit
    - Site Verification
    - Site Verification
  - Final

- **Occupation & Operation**
  - Final
  - Finish

- **So how can we move forward....?**

- PH works UPSTREAM
- PH is an holistic framework
- ZONING CODES can derail decarbonization
- DESIGN REGS can derail decarbonization
- ENERGY CODES don’t align with PH’s holistic approach
FOLLOW THE LEADERS!

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.)

Evolution of energy consumption and greenhouse gas emissions in Brussels – at constant climate between 1990 and 2011

100% - 115% Energy Consumption
90% - 110% GHG Emissions

-18% per inhabitant

Source: Brussels Environment, Joke Dockx
What Vancouver Did:

1. Removed barriers to Passive House
2. Added incentives to increase Passive House uptake
3. Developed their own Passive House pilot projects

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](https://www.passivehouse.org) and [certification process](https://www.passivehouse.org/certification).

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.


Passive House in Zoning

We are continually working to improve the energy efficiency of our buildings.

Benefits of a Passive House

Source: [https://vancouver.ca/green-vancouver/build-a-passive-house.aspx](https://vancouver.ca/green-vancouver/build-a-passive-house.aspx)
What Vancouver Did:

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

THE B.C. ENERGY STEP CODE

Adapted from: www.energystepcode.ca/

SOURCE: https://energystepcode.ca/

Lessons From the BC Energy Step Code
How British Columbia became the first North American jurisdiction to create a regulated pathway to net-zero energy ready buildings

June 2019

Policy Onramps: Using Passive House to Drive Decarbonization
WHO ELSE IS GOING THIS DIRECTION?

City of Vancouver General Info:
https://vancouver.ca/green-vancouver/build-a-passive-house.aspx

NYC General Info:
https://www1.nyc.gov/site/hpd/developers/passive-house.page

British Columbia, CANADA

New York State

Massachusetts

Policy Onramps: Using Passive House to Drive Decarbonization

www.passivehousenetwork.org
What NYSERDA Did:

- **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

Image Credit: Copyright NAPHN 2019, Policy Resource Guide

Source: [https://drive.google.com/file/d/1x49Xmey6qagfG-XDhzvq4TfbdTghvi0a/view](https://drive.google.com/file/d/1x49Xmey6qagfG-XDhzvq4TfbdTghvi0a/view)
What PHFA Did:

- 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

Source: [https://drive.google.com/file/d/1x49Xmey6qaqfG-XDhzvq4TfbdTqhvi0a/view](https://drive.google.com/file/d/1x49Xmey6qaqfG-XDhzvq4TfbdTqhvi0a/view)

**Low Income Housing Tax Credit**

*The Sleeper Simulant Policy*

- Granted 10 extra points for applicants willing to pursue Passive House
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What New York City Did:

- 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/1x49Xmey6qaqfG-XDhzvq4TfbdTqhvi0a/view](https://drive.google.com/file/d/1x49Xmey6qaqfG-XDhzvq4TfbdTqhvi0a/view)
What PHCA has done:

- 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
**What PHCA Did:**

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

---

### All-Electric EDR Margin

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

1 Identify the Leaders

and build lanes for them to safely thrive within....
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/](https://www.vancouvereconomic.com/research/green-buildings-market-research/)
SUMMARY

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: ONRAMP 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/1x49Xmey6qaqfG-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....

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

**CODE OVERLAYS**

- Zoning Code
- Local Design Regulations
- Building Codes
- Energy Code/s
- Benchmarking

**Development & Construction**

- Entitlement & Prelim Design
- Des. Rev. Permit
- Bldg. Permit
- FINAL

**Occupation & Operation**

- FINAL ENERGY MODELING HERE
- REVISE ENERGY MODELING HERE
- REQUIRE ENERGY MODELING HERE
- VERIFY ENERGY MODELING HERE

**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
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