The Sponsors of Energize Connecticut, and in partnership with Connecticut Passive House, are pleased to offer *Passive House & All-Electric Homes 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)

<table>
<thead>
<tr>
<th>Incentive Timing</th>
<th>Activity</th>
<th>Incentive Amount</th>
<th>Max Incentive (Per Unit)</th>
<th>Max Incentive (Per Project)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Construction</td>
<td>Feasibility Study¹</td>
<td>Up to 100% of Feasibility Study Costs</td>
<td>N/A</td>
<td>$5,000.00</td>
</tr>
<tr>
<td></td>
<td>Energy Modeling²</td>
<td>75% of Energy Modeling Costs (Before 90% Design Drawings)</td>
<td>$500.00</td>
<td>$30,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50% of Energy Modeling Costs (90% Design/50% Construction)</td>
<td>$250.00</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>Post Construction</td>
<td>Certification³</td>
<td>Up to 100% of Certification Costs</td>
<td>$1,500.00</td>
<td>$60,000.00</td>
</tr>
</tbody>
</table>

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](http://EnergizeCT.com) or call 1-877-WISE USE for more details.
The future of high-performance, all-electric homes starts here.
<table>
<thead>
<tr>
<th></th>
<th>Level 1</th>
<th>Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Family (Detached Dwellings)</td>
<td>Multifamily (Attached Dwellings)</td>
</tr>
<tr>
<td>Total UA Alternative Compliance or HERS Index Score</td>
<td>Total UA ≥ 75% better than 2021 IECC or HERS Index Score ≤ 55</td>
<td>Total UA ≥ 15% better than 2021 IECC or HERS Index Score ≥ 45</td>
</tr>
<tr>
<td>Heat pump for space heating</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Space Conditioning</td>
<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Connectivity &amp; Controls</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Heat pump for water heating</td>
<td>Required</td>
<td>Optional</td>
</tr>
<tr>
<td>Hot Water Distribution</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Envelope Infiltration Rate (ACH)</td>
<td>ACH50 ≤ 2.5</td>
<td>CFA &gt; 850 ft²: ACH50 &lt; 4.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CFA &lt; 850 ft²: ACH50 ≤ 5.0</td>
</tr>
<tr>
<td>Duct Leakage Rate (CFM)</td>
<td>2021 IECC code minimum requirements</td>
<td>All ductwork must be located in conditioned space</td>
</tr>
<tr>
<td>Balanced Ventilation Systems</td>
<td>Optional</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HR/ERV (≥70% SRE / ≥40% TRE)</td>
</tr>
<tr>
<td>Induction Cooking</td>
<td>Optional</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric Vehicle Readiness</td>
<td>Required</td>
<td>Required</td>
</tr>
</tbody>
</table>

### All-Electric Home Incentive Structure

<table>
<thead>
<tr>
<th></th>
<th>Level 1</th>
<th>Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Family</td>
<td>$7,500</td>
</tr>
<tr>
<td></td>
<td>Single Family Attached</td>
<td>$3,000</td>
</tr>
<tr>
<td></td>
<td>Multifamily</td>
<td>$1,500</td>
</tr>
</tbody>
</table>

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

Go to EnergizeCT.com or call 1-877-WISE USE for more details.

Brought to you by

Eversource

Proud sponsors of
Since 1972, Steven Winter Associates, Inc. has been providing research, consulting, and advisory services to improve the built environment for private and public sector clients.

Our services include:

- Energy Conservation and Management
- Decarbonization
- Sustainability Consulting
- Green Building Certification
- Accessibility Consulting

Our teams are based across four office locations:
New York, NY | Washington, DC | Norwalk, CT | Boston, MA

For more information, visit www.swinter.com
Why air seal?
Air Seal to... Save Energy
Air Seal to... Overcome Stack Effect
Air Seal to... Overcome Stack Effect

Source: David Keefe
Vermont Energy Investment Corp.
Air Seal to ... Reduce Moisture Drive

Source: Southface
Air Seal to... Control Sound/Smell Transfer
Air Seal to ... Stop Flame/Smoke Spread
Air Seal to... Improve Occupant Comfort
Air Seal to... Stop Pest Migration
Air Seal to... Satisfy Code / Certifications
How and where does air leakage occur?
How does air leakage occur?

Air leakage requires 2 things:

1. An opening
   - Cracks
   - Small holes
   - Large holes
   - Permeable material

2. A driving force
   - Wind
   - Stack effect
   - Mechanicals
Where does air leakage occur?
How can we control leakage and provide sufficient air sealing?
Where Leakage Occurs...

**Ambient vs. Adiabatic**

Detached: ~100% ambient exposure

Attached: 16% ambient exposure

All air leakage matters!
How to control leakage... **Minimize enclosure area**

Testing metric:
Volume (ACH50) vs.
Enclosure area (CFM50/SF)

Equal volume & floor area

9% more enclosure area
How to control leakage... Simplify enclosure area

18 corners

4 corners
How to control leakage... Know your priorities
How to control leakage... Know your approach
How to control leakage... Seal perimeter of unit

(PLAN VIEW)

EXTERIOR / CORRIDOR

A. SEAL PENETRATIONS

APT.  APT.

B. SEAL DRYWALL TO FRAMING
How to control leakage... Think like water
How to control leakage... **Seal drywall enclosure**

- **A. Seal perimeter of panel to drywall**
- **B. Install foam weatherstripping on panel door**
- **A. Seal plumbing penetrations through drywall/subfloor**
- **B. Seal box to drywall**
- **C. Seal wire penetrations**
- **Option: (Outlets only)**
  - Install "Safe Plate Covers"
- **A. Seal sleeve to framing**
- **B. Seal sleeve to drywall**
- **A. Seal sleeve to drywall**
- **B. Seal sleeve to drywall**
- **A. Seal duct to drywall**
- **A. Seal millwork to drywall**
- **B. Seal between diffuser/ register and drywall**
How to control leakage...

- Choose details/specs specific to each project
- Require unit-by-unit testing, not guarded or whole-building
- Max. 0.30 cfm/SF of enclosure - or as required by compliance path
- Be specific:
  - Gaps <1/4” - use caulk; gaps >1/4” use - foam
  - Use appropriate sealants (e.g. low-VOCs, high-temp, low-expanding, fire-rated, etc.)
  - Clean out cracks before applying sealant (e.g. compressed air, vacuum, damp cloth, etc.)
- Consider new products (elastomeric sealant, tape)
How to control leakage... Own it!
Design Exercise
Define the enclosure
Seal bottom of wall

**Notes:**

A. Intent: reduce leakage between wall cavity and apartment

B. Intent: reduce leakage between wall cavity and outdoors

A. Option: apply drywall adhesive to framing BEFORE installing drywall

A, B. Option: self-leveling subfloor (i.e. gypcrete)

C. To be installed in addition to sealant between the plate and slab

D. Same intent as item B

**Responsibilities:**

Framing: B, C, D

Drywall: A
Seal between levels + penetrations

Notes:

A, C. Intent: reduce leakage between floor and wall cavities

B. Intent: reduce leakage between wall cavity and apartment

B, C. Option: self-leveling subfloor (i.e. gypcrete)

E, H. Intent: reduce leakage between floor and wall cavities

E. Continuous seal of the rim/band joist to sheathing, if a TJI joist seal at top and bottom

F, G. Includes ducts, pipes, wires, etc.

H. Option: apply drywall adhesive to framing

Responsibilities:

Framing: A, C, D, E
Drywall: B, H
Mech/Elec/Plumb: F, G

(SECTION VIEW)

A. SEAL BOTTOM PLATE TO SHEATHING

B. SEAL GWB TO BOTTOM PLATE

C. SEAL BOTTOM PLATE TO SUBFLOOR

D. SEAL BAND JOIST TO SUBFLOOR

E. SEAL BAND JOIST TO SHEATHING

F. SEAL ALL PENETRATIONS

G. SEAL ALL PENETRATIONS

H. SEAL TOP PLATE TO GWB
Seal top of wall

Notes:
A, B. Intent: reduce leakage between unconditioned attic and wall cavities
A. Option: apply drywall adhesive to framing BEFORE installing drywall ("screw & glue")
C. Options:
   - Sheathing with seams sealed (i.e. ply wood or rigid foam board)
   - Fluid-applied/adhesive membrane on sheathing (i.e. Grace / Henry products)
D. Typically drywall

Responsibilities:
Framing: B, C
Drywall: A, D
Isolate interior partitions
Isolate interior partitions

**Notes:**
A, B. Intent: reduce leakage between exterior/corridor wall and demising wall/interior partition
A. Includes ducts, pipes, wires, etc.
B. Option: apply drywall adhesive to framing BEFORE installing drywall

**Responsibilities:**
Drywall: B
Mech/Elec/Plumb: A
Isolate interior partitions

Demising / Interior Wall at Exterior / Corridor Wall

Notes:

A, B. Intent: reduce leakage between exterior / corridor wall and demising wall / interior partition

A. Size of gap depends on thickness of drywall to be installed

B. Option: sheathing (at shear walls)

A, B. Similar at double walls

Responsibilities:

Framing: A
Drywall: B
Mech/Elec/Plumb: C
Isolate interior partitions

Red = sealed air barrier layer.
Blue = finished sheetrock that does not maintain an air barrier.
Think in 3D

Source: Studio 5p Partnership
Seal between levels

**Demising Double Wall - Top**
(Shafts Similar)

**Notes:**
A, B, C. Intent: reduce leakage between attic / ceiling cavity and demising wall / interior partition / shaft

A. Options:
- Expanding foam
- Plywood, drywall or rigid foam board will edges caulked

A. Mineral wool or fiberglass batts are NOT acceptable as an air barrier

C. Option: apply drywall adhesive to framing BEFORE installing drywall

**Responsibilities:**
Drywall: C
Mech/Elec/Plumb: A, B
Ceiling = top of enclosure
Seal draft-stopping
Seal draft-stopping

CEILING CAVITY BLOCKING & SEALING AT DEMISING / CORRIDOR WALL

Notes:
A, B, C. Intent: reduce leakage between the unit and adjacent spaces

Responsibilities:
Framing: A, B
Mech/Elec/Plumb: C
Seal draft-stopping
Seal penetrations

A. Seal millwork to drywall

B. Seal box to drywall

C. Seal wire penetrations

Option (outlets only): install "safe plate covers"

A. Seal plumbing penetrations through drywall/subfloor

B. Seal between diffuser/ register and drywall

A. Seal recessed light housing to drywall

B. Install foam weatherstripping on panel door
Q&A
Townhouse party walls

Typical area separation wall (2 hour rated - UL #336)
2-1" gypsum liner panels set between steel C-H studs w/ aluminum clips @ floor & ceiling, continue to underside of FRM roof sheathing. Set 2x4 studs @ 16" O.C., 1" from liner panel (ea. side) w/ 1/2" gypsum board @ interior face, fastened to studs, sills, plates & blocking w/ 6d cooler nails spaced at 4" O.C. Provide 2x blocking at all wood panel edges & seal all penetrations. Provide insulation one side only. Provide all supports per manufacturer recommendations.
Townhouse party walls
Townhouse party walls

- Provide intumescent caulk at edge of shaft liner for air sealing, each side.
- Fasten WD. sheathing to studs w/ 8d nails at 6” o.c.
- Typ. insulation
- Fasten end stud of offset wall to building stud with 16d nails at 12” o.c.
- Exp. J.T. as req’d. in brick veneer w/ lintel support
- 1” airspace
- Support brick at offset with steel lintel where support below is not possible
- TYP. ext. wall with brick
- SHEATHING
- TYP. ext. wall with brick
- 2-1” shaft liner pnl
- 1” airspace

Note: Maximum offset distance is 4'-0"
Townhouse party walls
Townhouse party walls
Townhouse party walls
Townhouse party walls
Townhouse party walls

Townhouse party walls
Townhouse party walls
Townhouse party walls
Q&A
How do we evaluate air sealing during construction?
Field Evaluation of Air Sealing

1. Pre-drywall
   - Visual inspection (diagnostic tools if necessary)

2. Final
   - Blower door & visual inspection
Pre-drywall Field Evaluation... Visual Inspection
Pre-drywall Field Evaluation... Use Checklists

IECC 2009 Table 402.4.2
L-H MF Mid-Rise EA alternative compliance
Final Field Evaluation... Blower Door
Final Field Evaluation... Guarded vs. Unguarded
Final Field Evaluation... Guarded vs. Unguarded

- Guarded:
  - Energy

- Unguarded:
  - Energy
  - Moisture
  - Fire/smoke
  - Comfort
  - Noise
  - Smells
Field Evaluation... Corrective Measures
Evaluation Exercise
Air Sealing – Greatest Hits FAILS!
Air Sealing – Greatest Hits FAILS!
Air Sealing – Greatest Hits FAILS!
Air Sealing – Greatest Hits FAILS!
Air Sealing – Greatest Hits FAILS!
Air Sealing – Greatest Hits FAILS!
Air Sealing – Greatest Hits FAILS!
Air Sealing – Greatest Hits FAILS!

[Images of air sealing issues]
Air Sealing – Greatest Hits FAILS!
Air Sealing – Greatest Hits FAILS!
Air Sealing – Greatest Hits FAILS!
In summary...
Summary

• Understand why/how/where
• Know your target
• Detail and specify
• Inspect and test
• Communicate
• Succeed!
Thank You

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