PASSIVE HOUSE FACT SHEET (pg 1 of 2)

INTRODUCTION

The Passive House Standard is the highest building efficiency standard in the world, with the promise of reducing the energy consumption of buildings by up to 80% while providing superior comfort and air quality – all at minimized additional upfront cost.

HISTORY & ORIGINS

The Passive House (”Passivhaus”) concept was developed in Germany in the early 1990s by Professors Bo Adamson of Sweden and Wolfgang Feist of Germany. Drawing on Super-insulated and Passive Solar ideas from North America and “Low Energy” European building standards, the concept of a building that could be practically constructed to maintain a comfortable interior climate without conventional heating or cooling systems was devised, tested and proven. The Passive House remains comfortable without large "active" mechanical systems, hence the term "Passive."

In 1996, Dr. Feist founded the Passivhaus Institut in Darmstadt, Germany, to develop and promote the standard. Since then, more than 15,000 Passivhaus buildings have been constructed worldwide. The first Passive House in North America was built in Urbana, Illinois, in 2003 by German architect Katrin Klingenberg. Klingenberg established the Passive House Institute US (PHIUS) in Urbana with builder Mike Kernagis, and in January 2008, PHIUS was authorized by the Passivhaus Institut in Darmstadt as the official certifier of Passive Houses in the US.

CONCEPT

Passive House is a building approach that relies on a combination of energy efficiency, passive solar, and internal heat gains to eliminate the need for a conventional HVAC system. The concept is implemented through stringent performance standards for air tightness and energy consumption, and verified with a field tested energy modeling program, the “Passive House Planning Package” (PHPP). The energy consumption limits are developed through extensive research on climate change imperatives, economic feasibility, building durability, occupant comfort, and indoor air quality.

A Passive House is a very well insulated, virtually airtight building that is primarily heated by passive solar and internal heat gains from occupants, cooking, bathing, electrical equipment, etc. Control of summer heat through shading, window orientation and passive ventilation helps to limit the cooling load. Any backup heating or cooling demand is provided by an extremely small source instead of a conventional HVAC system. A heat/energy recovery ventilator provides a constant supply of tempered, filtered fresh air. Using this “fresh air” heating and cooling system not only saves space conditioning costs by “recycling” indoor energy, it also provides excellent indoor air quality and consistent comfort.

WHY PASSIVE HOUSE?

High Performance =

- **Cost Effective**
- **Healthy Environment**
- **Comfortable Environment**
- **Quieter Environment**
- **Reduced Resource Consumption**
- **Increased Durability**
- **Increased Value**
- **Increased Safety**
- **Functional**
- **Beautiful**
- **Measurable Proven Performance**

ECONOMICS

The economic principle behind Passive House is the realization of a concept by Amory Lovins of the Rocky Mountain Institute to reduce construction costs through energy efficient design. By dramatically increasing the energy efficiency of a building, the HVAC system can be downsized to the point that the mechanical cost savings significantly offset the efficiency investment. This efficiency “sweet spot” is a basis for the Passive House performance standard and the key to its financial feasibility.

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BENEFITS

• Low energy use: Up to 90% less heating/cooling energy use, 60-80% overall energy savings
• High Quality Indoor Air: Controlled ventilation for a continuous, consistent supply of fresh air
• Comfortable Indoor Temperature: 20ºC/68ºF (no setbacks) in winter, night cooling in summer
• Operational and Construction Savings: Vastly reduced utility bills; elimination of conventional HVAC system; much smaller solar systems required to reach zero energy; durable, tight building shell for lower maintenance, etc.
• Proven Sustainability: 15,000+ buildings worldwide, some zero and even positive energy.

PERFORMANCE CRITERIA

• Maximum Heating or Cooling Energy: 15 kWh/m2 (1.4 kWh/ft2 or 4800 Btu/ft2) per year
• Maximum Total Source Energy: 120 kWh/m2 (11 kWh/ft2 or 38,000 Btu/ft2) per year
"Source Energy" includes the energy required to produce and deliver energy to the site, and can be offset with solar thermal and other measures. Photovoltaics cannot be used to directly offset this energy, but are recognized as advantageous from an electrical generation standpoint.
• Maximum Air Leakage: 0.6 air changes per hour at 50 Pascals (ACH50), ~0.03 ACHNAT

APPROACH

• Accurate climate- and site-specific energy modeling with PHPP
• Superinsulation (project specific)
• Elimination/mitigation of thermal bridges (insulation gaps)
• High performance windows and doors (project specific)
• Optimized passive solar design (solar gain in winter, shading in summer)
• Airtight shell with mechanical ventilation and heat recovery ("recycles" 8-15 times the energy used for ventilation)

CERTIFICATION PROCESS

• Accurate, compliant modeling with the Passive House Planning Package (PHPP)
• Third party verified blower door test, 0.6 ACH50 maximum
• Record of adjustment of ventilation system
• Declaration of Construction Supervisor
• Photographic Documentation

MORE INFORMATION

• The Passive House Institute US (PHIUS): www.passivehouse.us
• The Passivhaus Institut: www.passivehouse.com (Click on "English" for a translated site)

CONTACT

Energy Conservation WORKS

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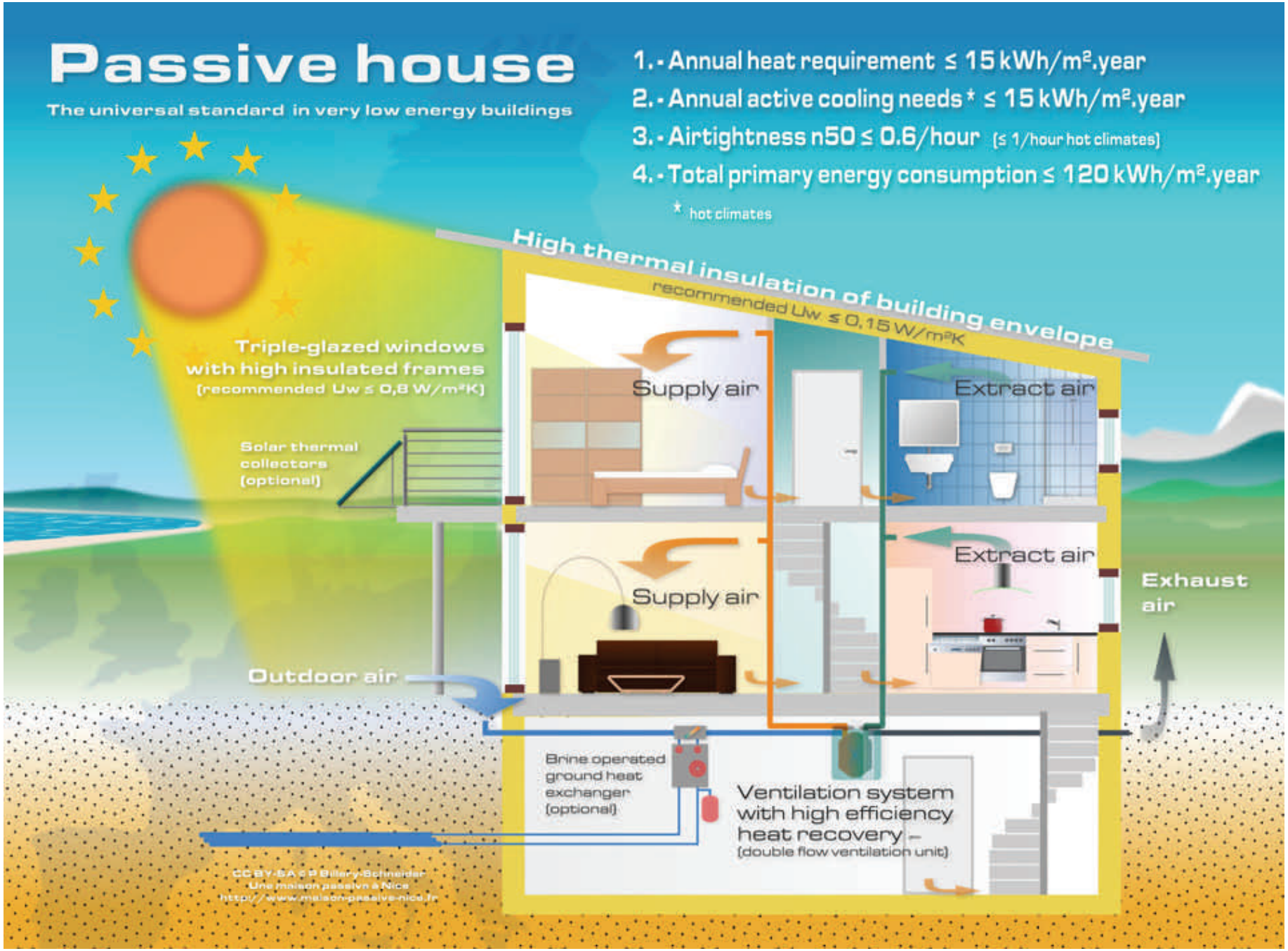
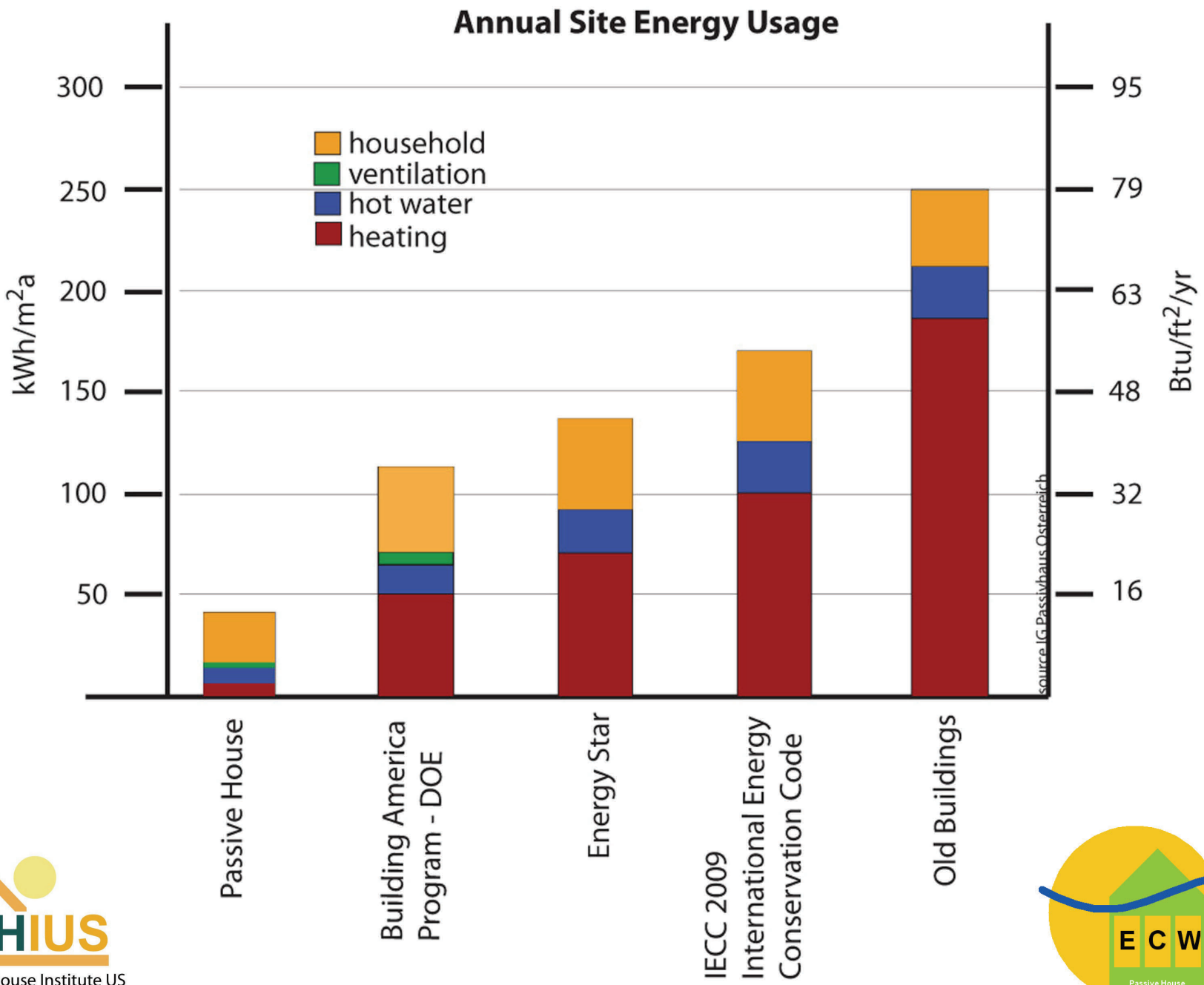
Passive House Institute US

The Passive House Standard is the most rigorous building energy standard in the world. Consultants, projects or building components that have obtained the right to carry the logo have committed themselves to design excellence and the Passive House energy performance criteria.


Passive house
The universal standard in very low energy buildings
1.- Annual heat requirement ≤ 15 kWh/m².year
2.- Annual active cooling needs* ≤ 15 kWh/m².year
3.- Airtightness n50 ≤ 0.6/hour (≤ 1/hour hot climates)
4.- Total primary energy consumption ≤ 120 kWh/m².year
* hot climates
High thermal insulation of building envelope
recommended Uw ≤ 0,15 W/m²K
Triple-glazed windows
with high insulated frames
(recommended Uw ≤ 0,8 W/m²K)
Solar thermal
collectors
(optional)
Supply air
Extract air
Supply air
Extract air
Exhaust
air
Outdoor air
Brine operated
ground heat
exchanger
(optional)
Ventilation system
with high efficiency
heat recovery –
(double flow ventilation unit)
CC BY-SA © Billery-Schneider
Une maison passive à Nice
http://www.maison-passive-nice.fr



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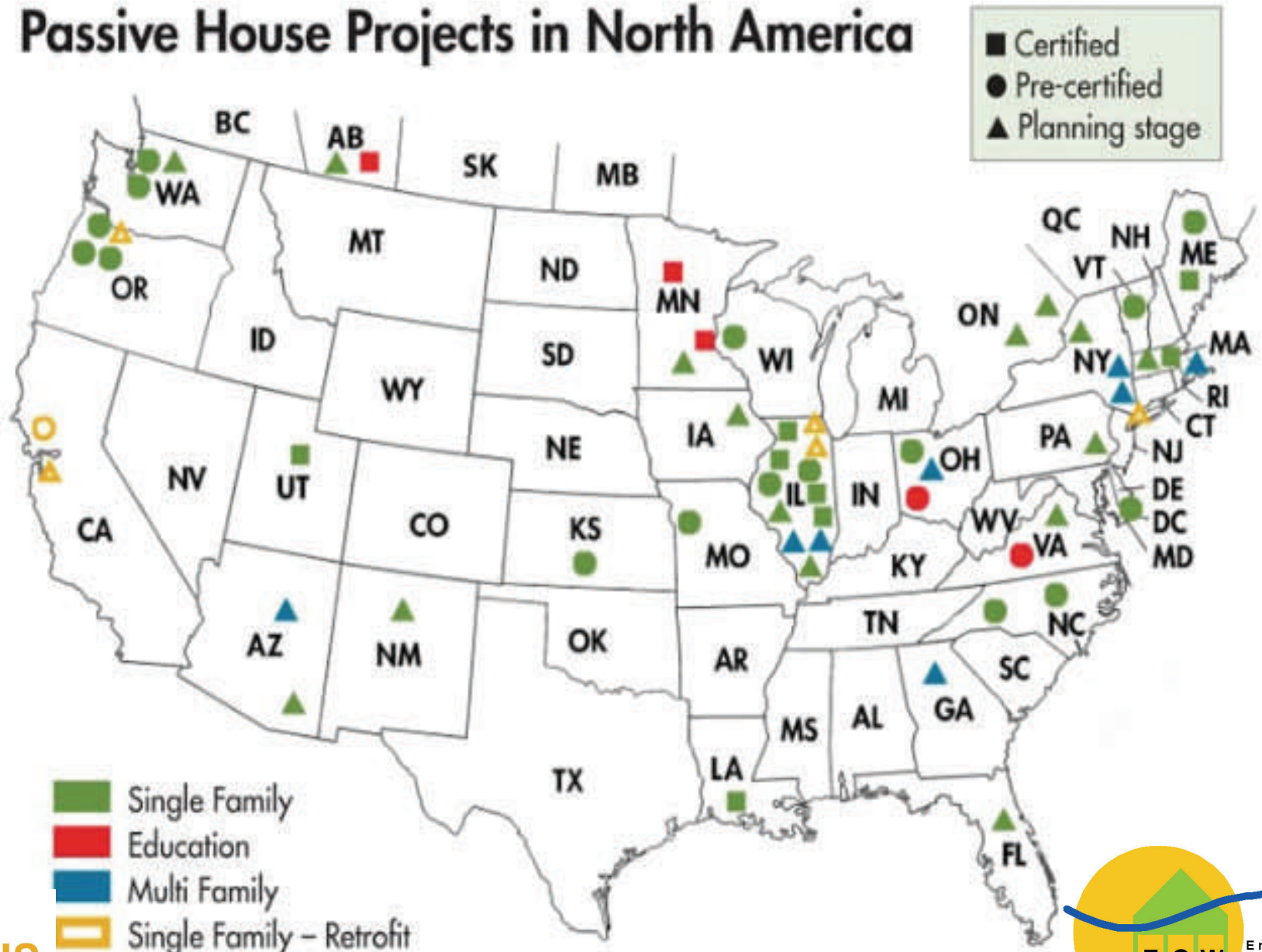
Passive House Projects in North America



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