

CWRU Green Bag Lunch

***Green & Sustainable Homes
Today and Tomorrow***



Sustainable Home Design

- *Durability - Make it to last 300 years or more*
- *Flexibility - Change the plan with lifestyle changes*
- *Affordability - Responsive to the cost of ownership*
- *Beauty - No one will take care of an ugly building*

Fail on any of these points and the home will be left behind

20th Century Green Evolution



What Is Your Footprint?

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Population x Energy Demand = World Impact on Non-Renewable Resources

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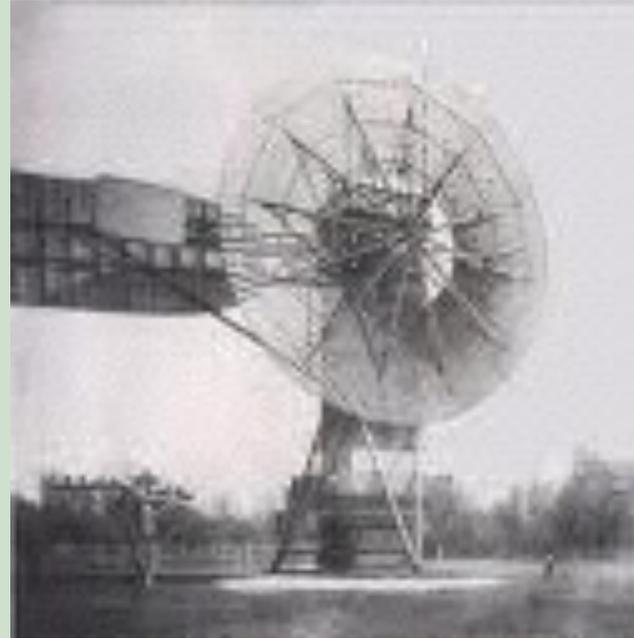
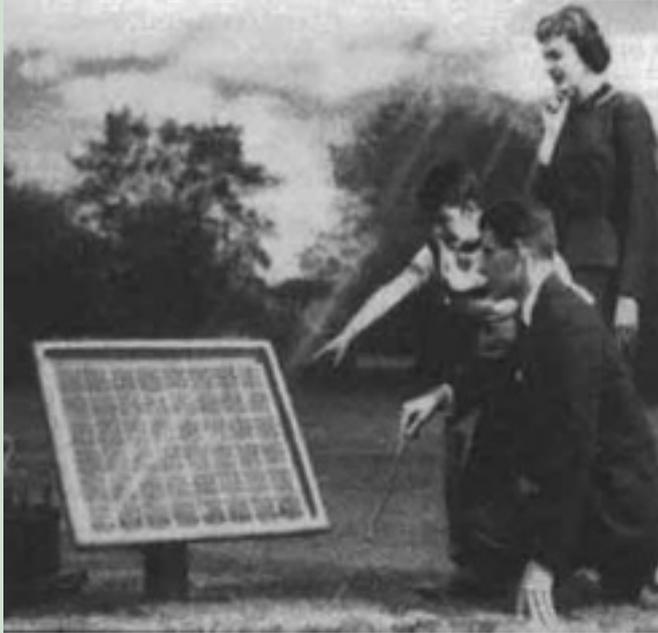
In the 1970s what changed??

The Cost of ENERGY

The cost of that cold beer and hot shower got expensive.

We Looked For Energy Solutions!

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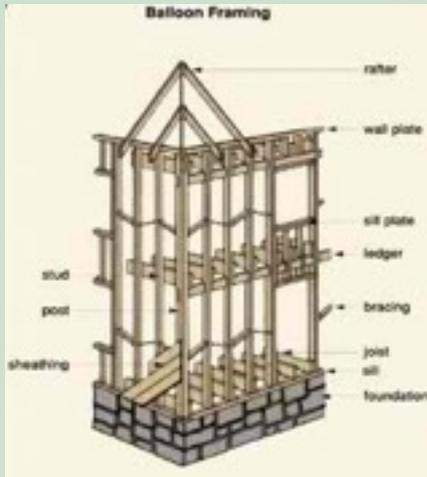
*Solar & Wind Technology Grew
From A Dream To An Industry*

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*Site Orientation And Sun-Tracking
Were Added To The Design Criteria*

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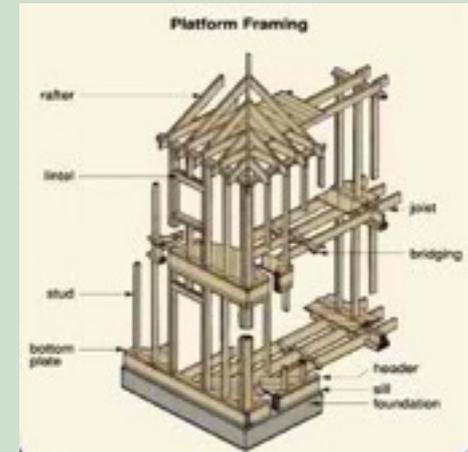


BALLOON
FRAMING
Before 1860



STICK BUILDING

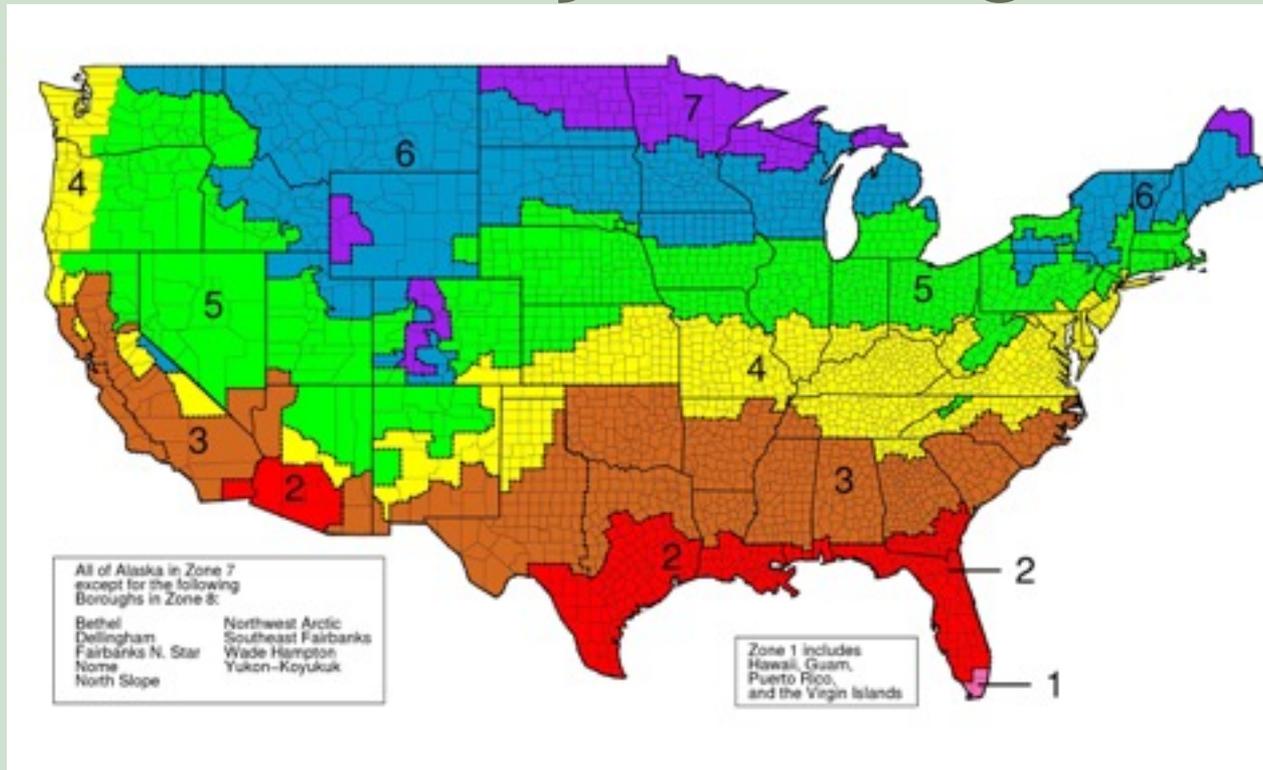
The way we build homes today is the same as we built over 150 years ago. We deliver thousands of small pieces to a site and build it all outside.



PLATFORM
FRAMING
After 1860

Off-Site Panelization And Modular Construction Improved Economics

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Climature Zones Were Recognized

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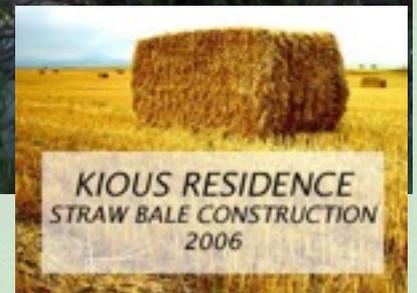


OUR CLIMATE ZONE 5

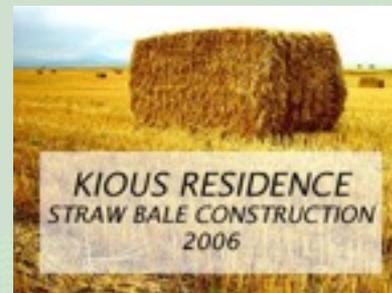
Our Region Has Specific Climate Features That Make Designing With Nature A Challenge

- ***Very Cold Winters***
- ***Hot Humid Summers***
- ***Lake Effect Wind & Snow***
- ***West Side of Alleghany Mountains***

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PH Design: The Concept

Passive: Low Tech but High Performance



New York State's First Passive House

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PH Design: The Concept



Passive House Design Requirements:

Reduce demand for energy by improved thermal envelope and reduced energy lighting sources

- *The building must be designed to have an annual heating demand as calculated with the Passive House Planning Package of not more than 15 kWh/m² per year (4746 btu/ft² per year) in heating and 15 kWh/m² per year cooling energy OR to be designed with a peak heat load of 10W/m²*
- *Total primary energy (source energy for electricity and etc.) consumption (primary energy for heating, hot water and electricity must not be more than 120 kWh/m² per year (3.79×10^4 btu/ft² per year*

Reduce air leaks in the building envelope by sealing

- *The building must not leak more air than 0.6 times the house volume per hour ($n_{50} \leq 0.6$ / hour) at 50 Pa (N/m²) as tested by a blower door.*

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*The Cleveland Museum
of Natural History*

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Building Envelope Design

Roof Insulation

- Typical - 6"
- SmartHome - 24" R-75

Wall Insulation

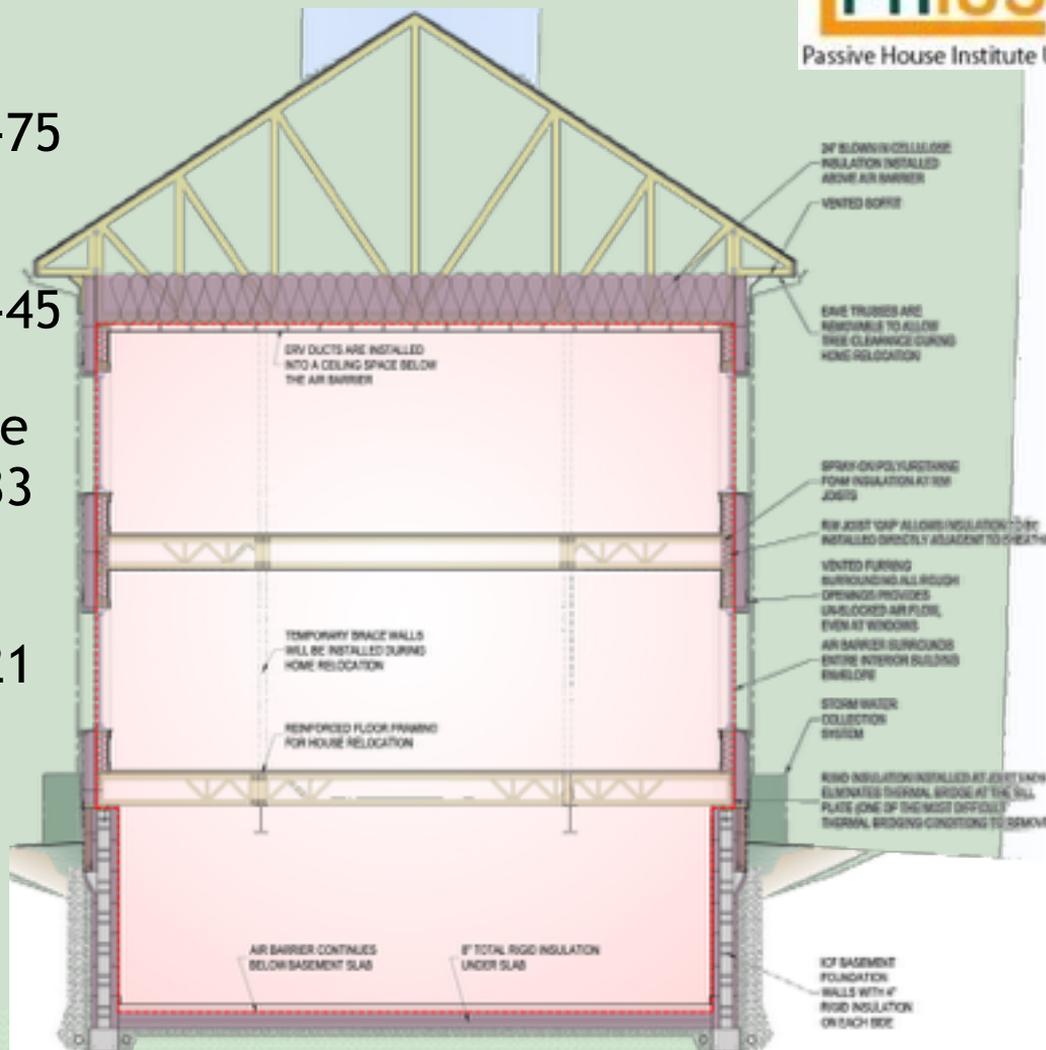
- Typical - 3 ½"
- SmartHome - 12" R-45

Basement wall

- Typical - ½" or none
- SmartHome - 8" R-33

Under Basement floor

- Typical - none
- SmartHome - 8" R-21



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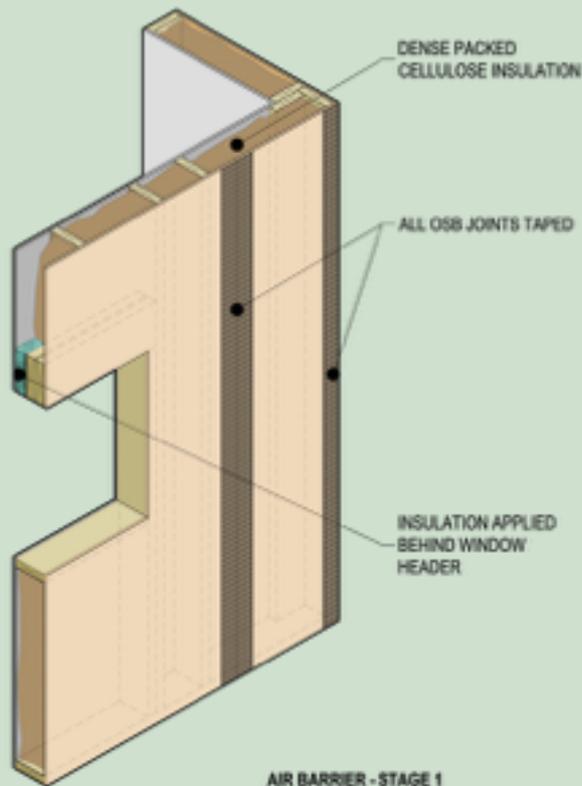
Building Envelope Design



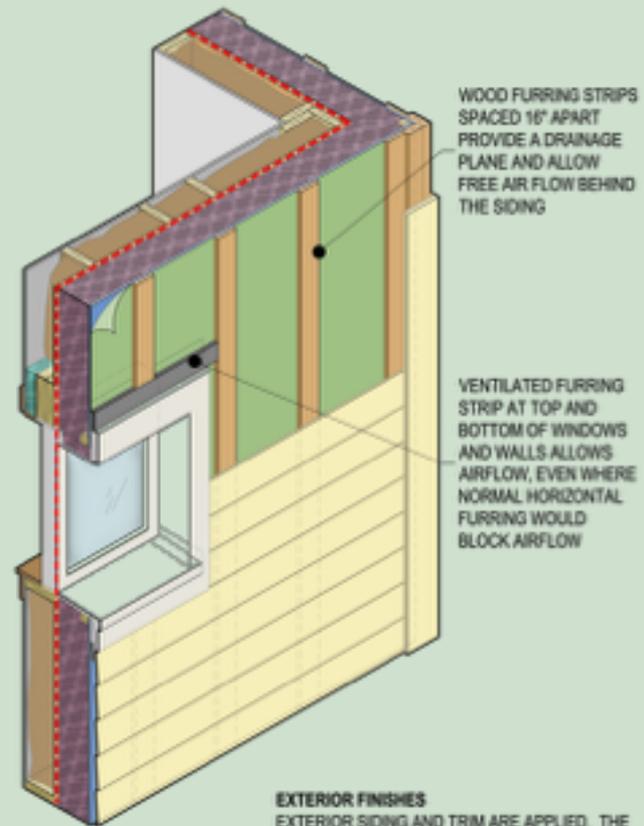
*Off-Site Panelized Wall
Construction*

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Building Envelope Design

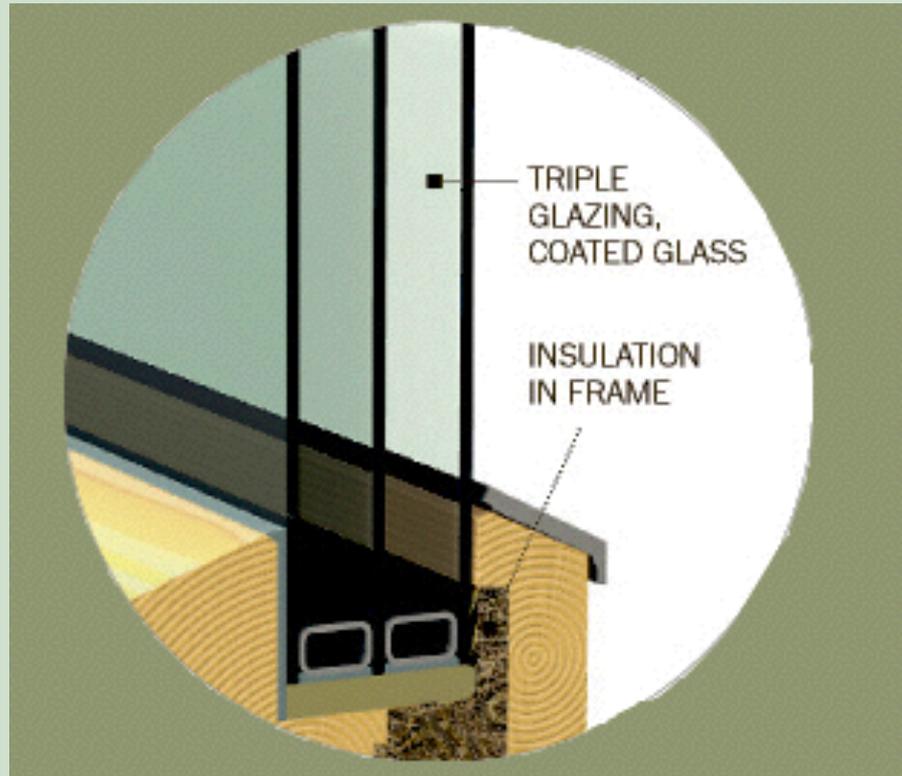


AIR BARRIER - STAGE 1
STUD FRAMING IS INSULATED AND OSB SKIN IS APPLIED TO THE OUTSIDE FACE. ALL OSB JOINTS ARE TAPED AND SEALED.



EXTERIOR FINISHES
EXTERIOR SIDING AND TRIM ARE APPLIED. THE DESIGN OF THE EXTERIOR MATCHES THE ARCHITECTURAL CHARACTER AND STYLE OF THE OF THE ADJACENT HOMES

21st Century Building Design High Performance Windows



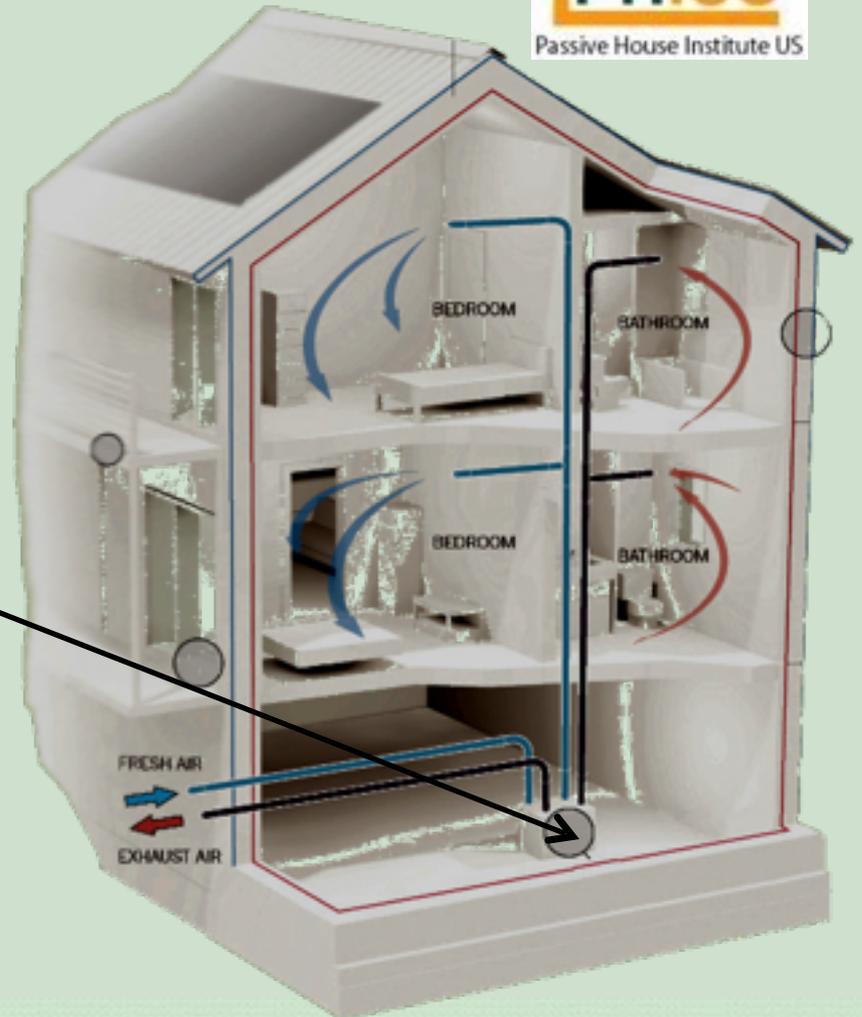
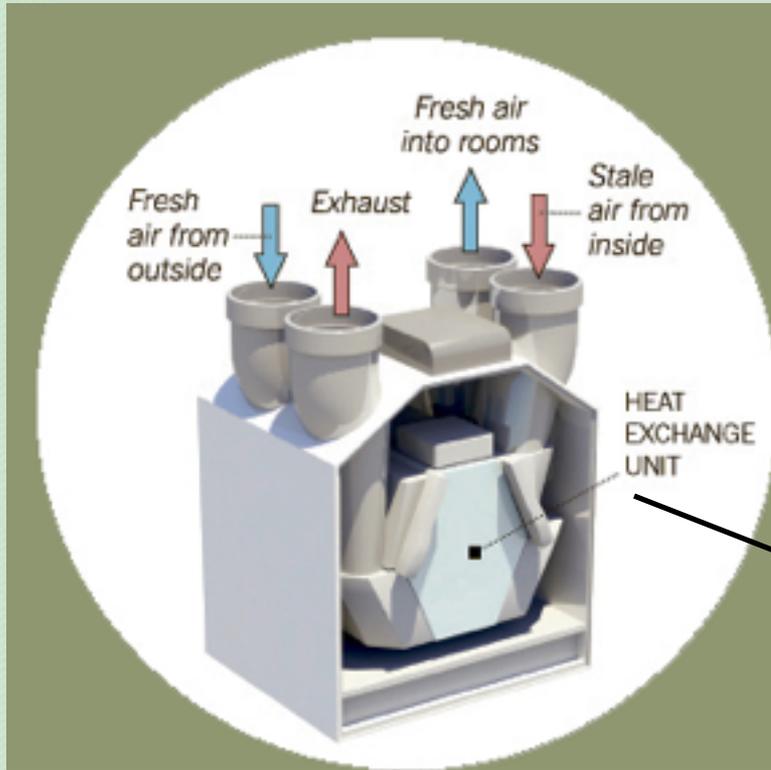
Windows

Windows are triple-glazed to minimize heat loss. Coated glass helps reflect heat back inside the house in winter and keeps some heat out in summer. The largest windows in the house face south, to take advantage of light and warmth from the sun.



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Energy Recovery Ventilation



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What's Old Is New Again



***Historic Preservation IS Sustainable –
Because The Greenest Brick
Is The Old One In The Wall!***

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What's Old Is New Again



***Historic Preservation IS Sustainable –
Durable...Flexible...
Affordable...BEAUTIFUL!***

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What's Old Is New Again



***Historic Preservation IS Sustainable –
So What About Your Home?***

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What Can You Do?



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Live With Nature



Our Future Will Be So Beautiful!