

PASSIVE HOUSE

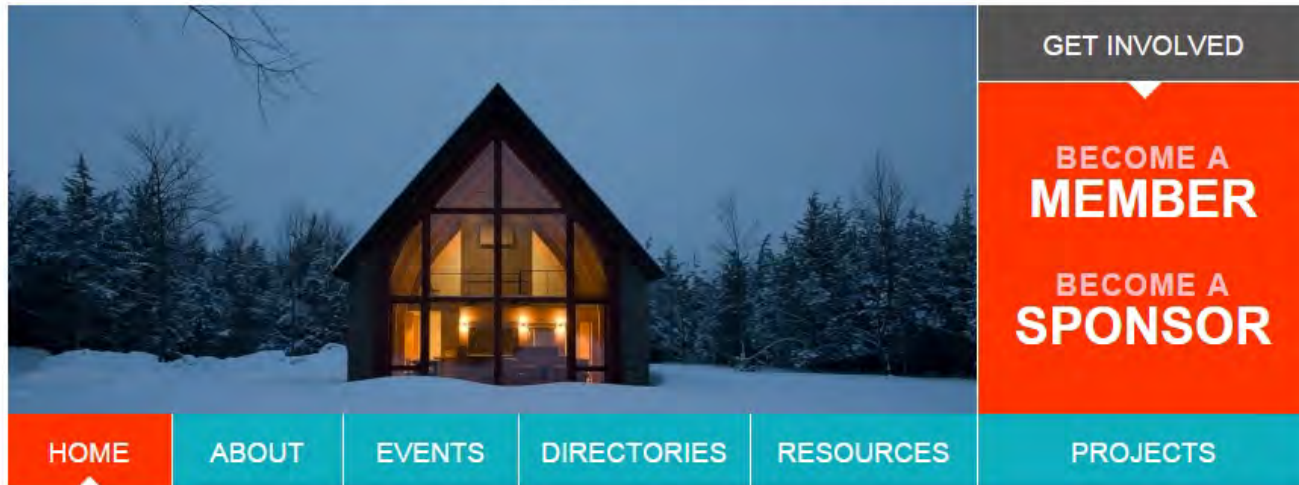
an introduction & case study



Ken Levenson

PassivXperimental

Marshall Sohne & Hernan Galvis



What is NYPH?

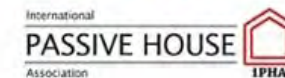
Formed in 2010, NY Passive House (NYPH) is working to promote a healthy, comfortable and energy-efficient built environment through the promotion of the Passive House building standard. NYPH is an independent not-for-profit organization that facilitates the exchange of information and experiences, among local, national and international practitioners of the Passive House building standard.



Join us for the **11th International Passive House Days** and get a first hand experience of the many advantages Passive Houses offer in the New York region!

www.nypassivehouse.org

IN ASSOCIATION WITH



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PASSIVE HOUSE CONCEPT

To **reduce** our buildings' **operational energy demand** to an **optimized extent** through **passive measures** and components.

- airtightness
- continuous insulation
- heat recovery ventilation
- solar heat gains
- solar shading
- incidental internal heat gains.



photo credit: sgbuild.com

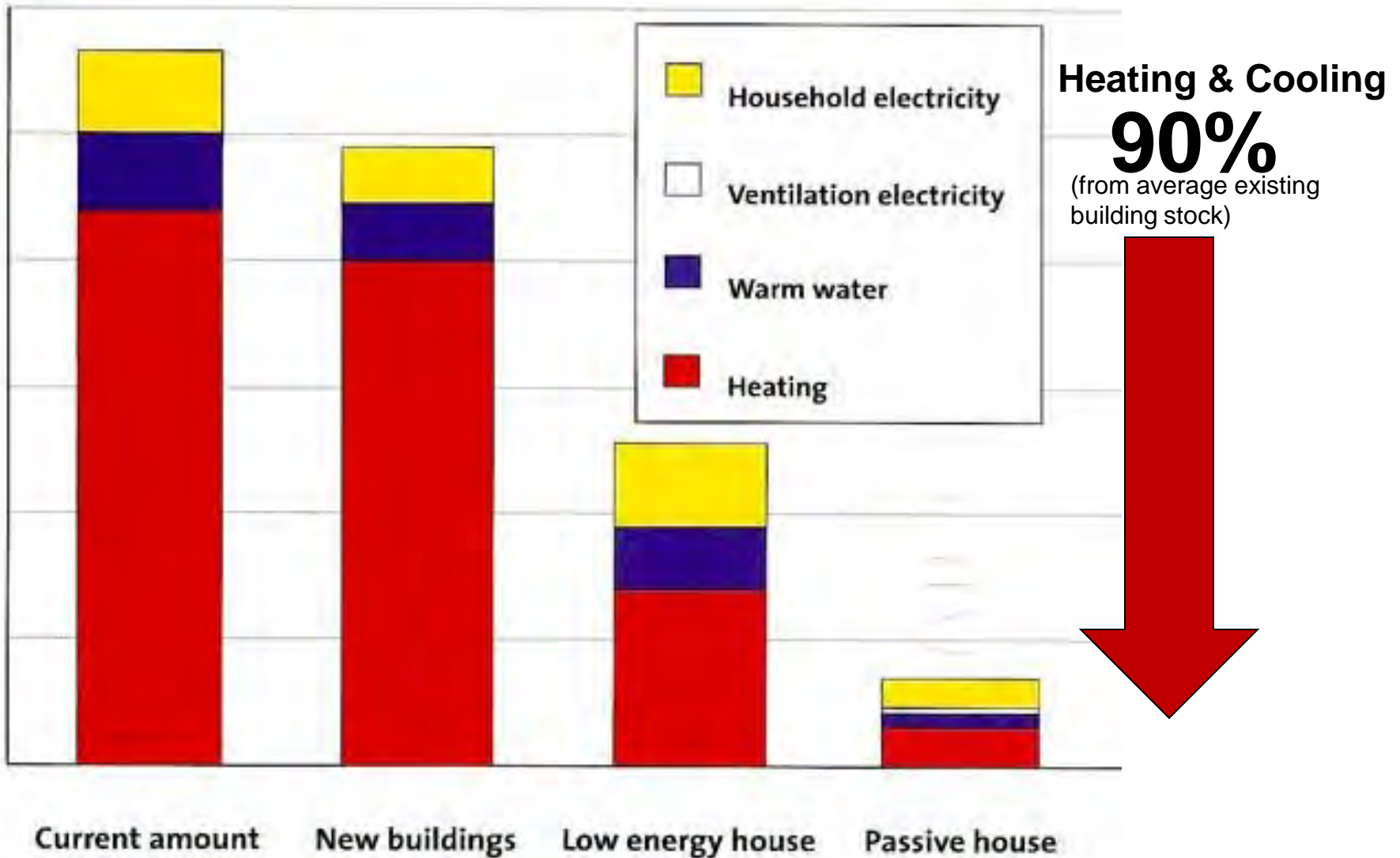
GADGETS ARE SECONDARY



PASSIVE HOUSE COMFORT



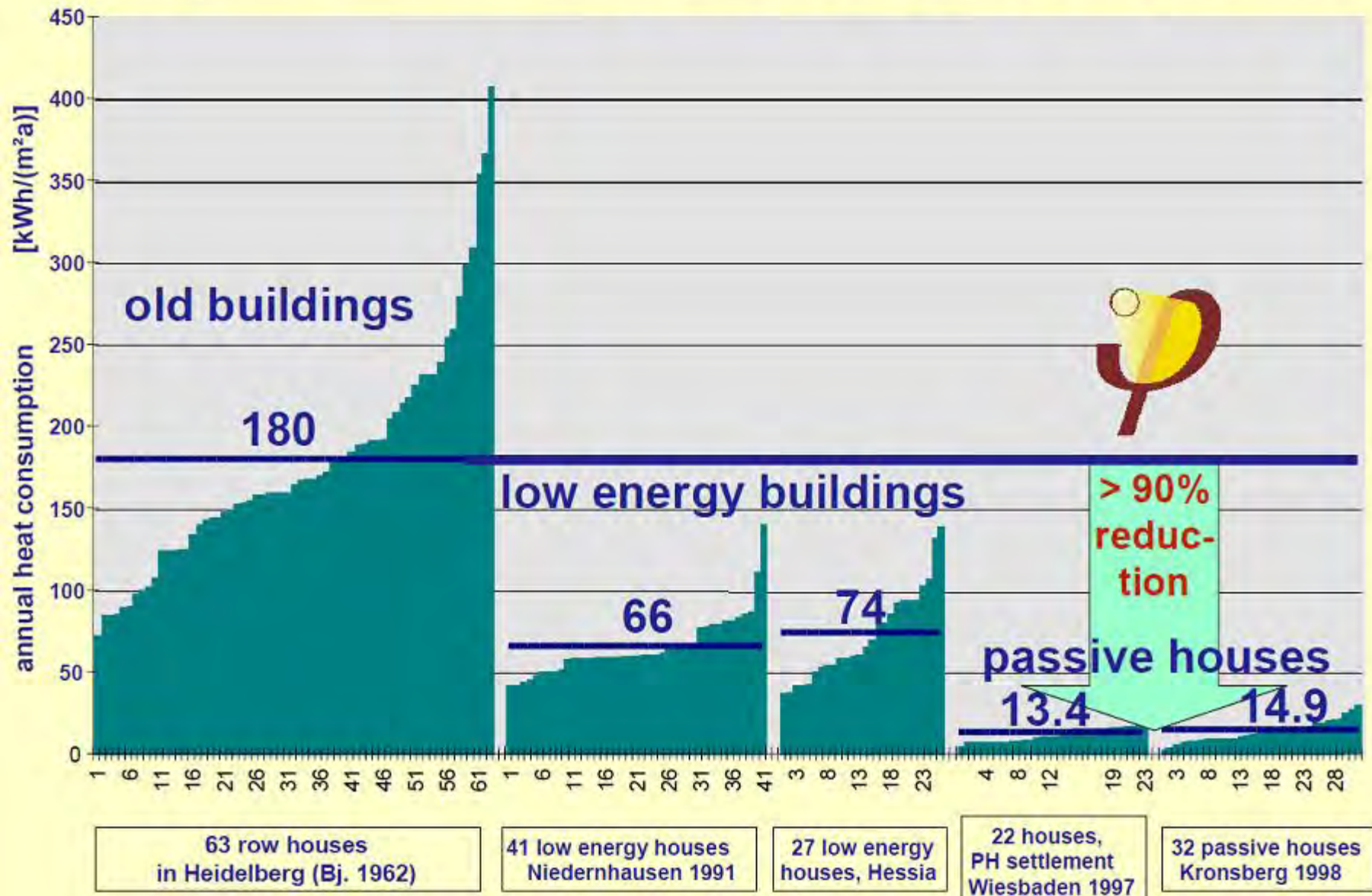
BIG ENERGY REDUCTION



INTEGRATED COMFORT

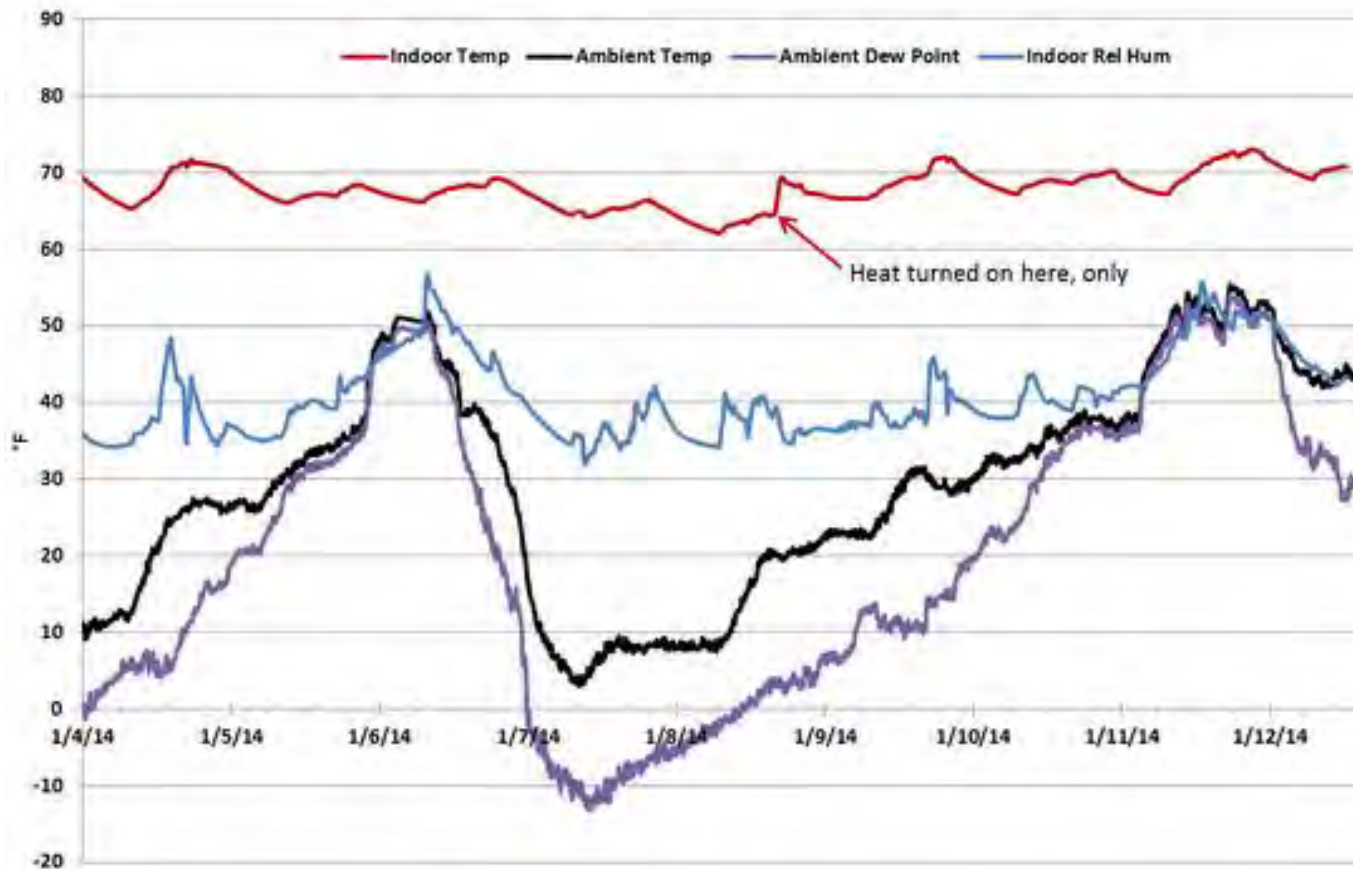
- **Thermally: no drafts**
- **Quiet: outside noises vanish**
- **Healthy: best indoor air quality**
- **Resilient: shelter-in-place**
- **Affordable: cash positive, security**
- **Predictable: for optimal integration**

occupants influence: the average is important



POLAR VORTEX EXAMPLE

Living Room Temperature & Humidity
During January 2014 "Arctic Vortex"



CLEAR ABSOLUTE TARGETS

- Airtightness: **0.6 ACH50** (never too airtight)
- Heating/Cooling Energy: **4.75 kBTU/sf*yr**
- Primary Energy: **38.0 kBTU/sf*yr**



**Blowerdoor
Test**

WE CAN DO BETTER, TODAY



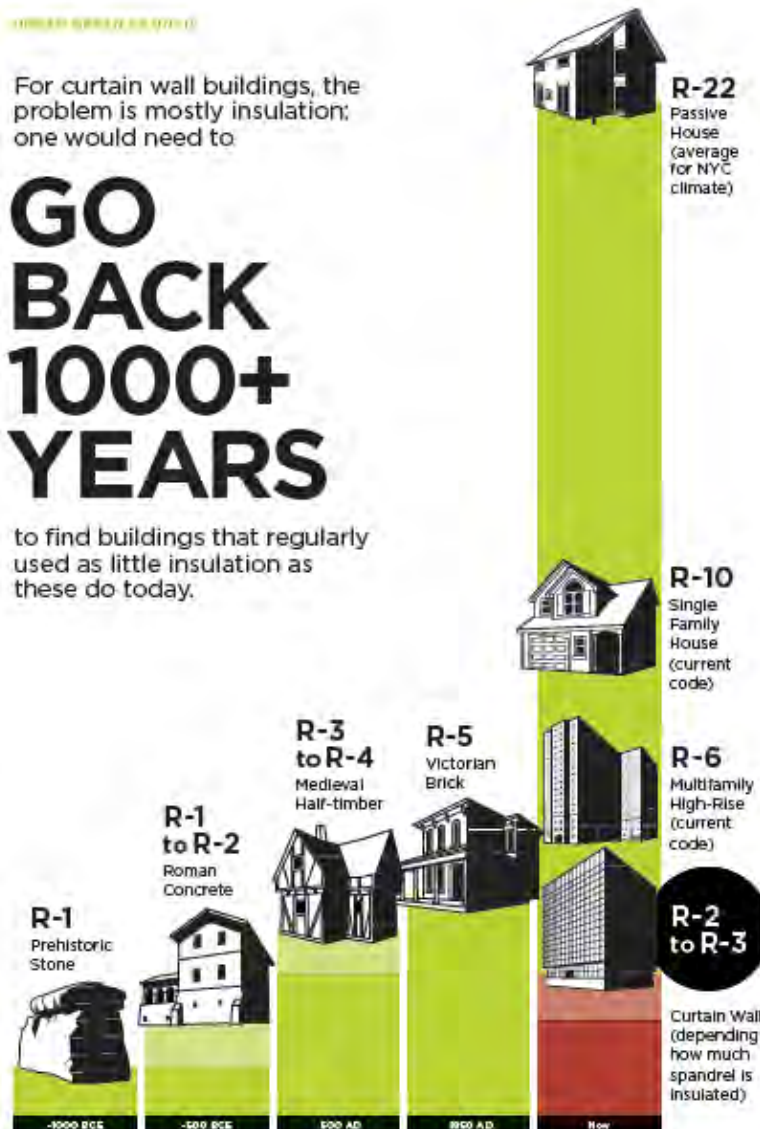
CLIMATE BLOWTORCH

CLIMATE BLOWTORCH

For curtain wall buildings, the problem is mostly insulation; one would need to

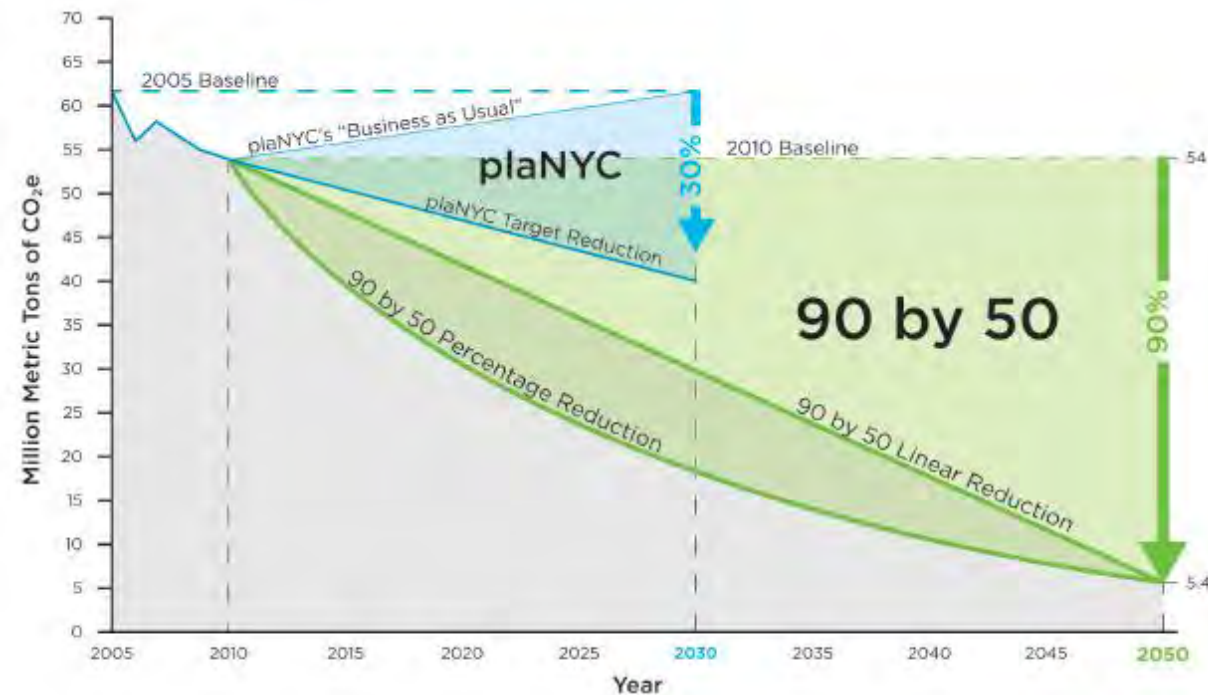
GO BACK 1000+ YEARS

to find buildings that regularly used as little insulation as these do today.



RAISE THE BAR

ADDRESSES CLIMATE CRISIS

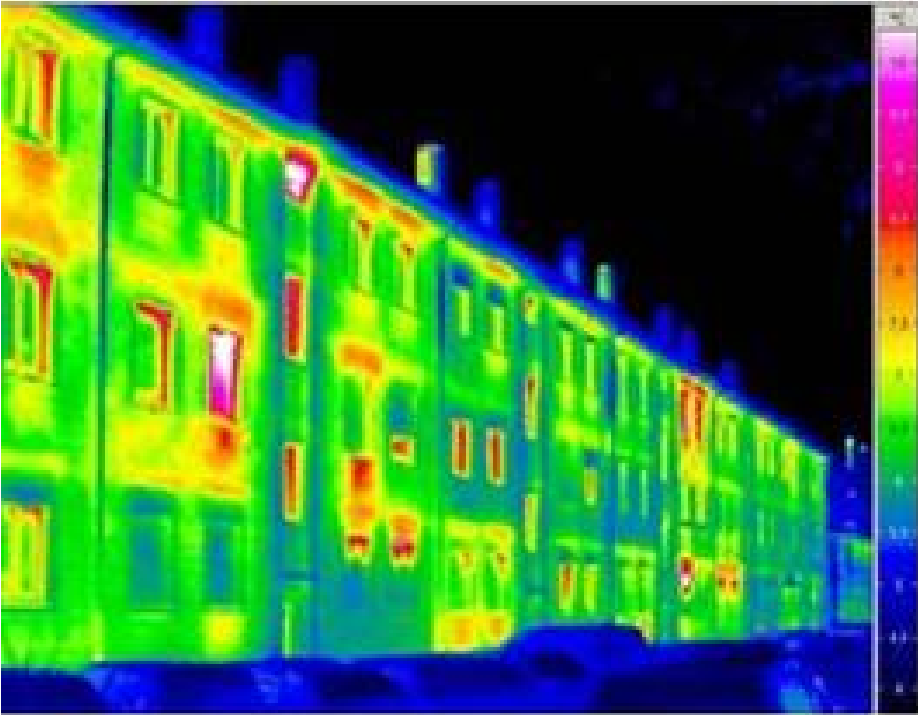


Credit: Urban Green Council, 90 by 50



Credit: NYC Mayor Bill de Blasio

A PARADIGM SHIFT



INEFFICIENT & UNCOMFORTABLE

TO



VERY EFFICIENT & HIGH COMFORT

FIRST PASSIVE HOUSE: 1990



QUALITY ASSURANCE

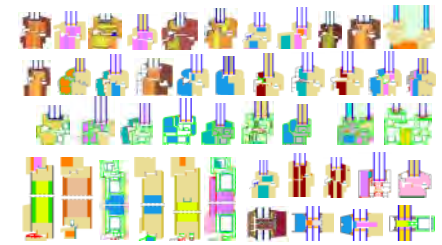
Energy Model
Methodology



Trained
Professionals



Certified
Components

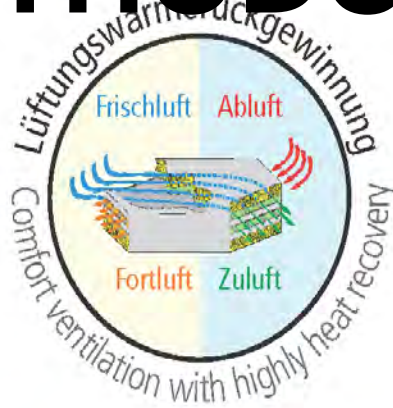


Quality Assured
Certified
Passive House

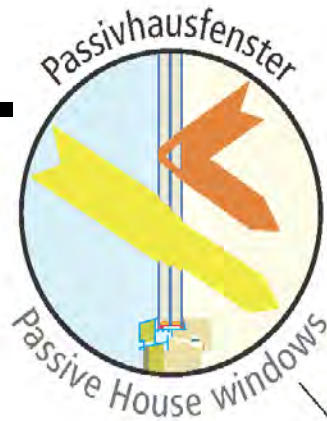


A METHODOLOGY

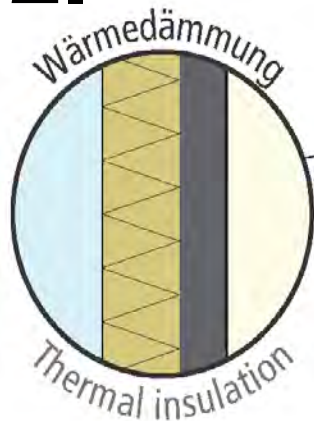
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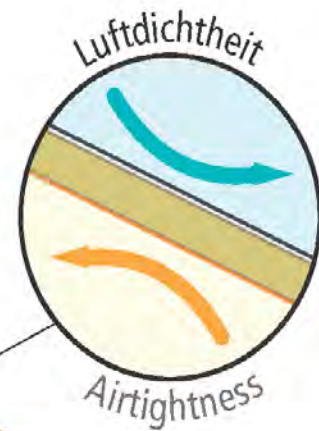
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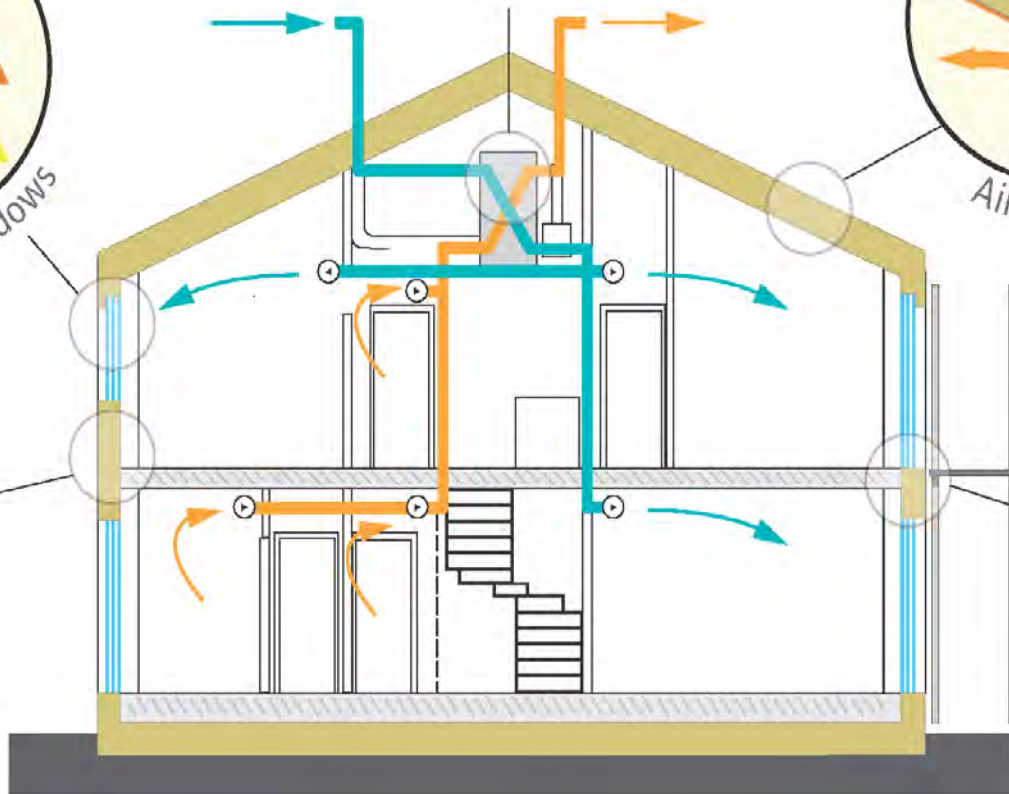
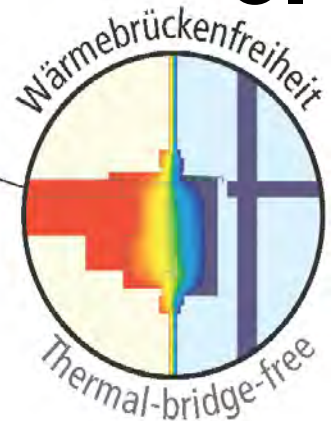
2.



1.



3.



IT'S GLOBAL

from **AUSTRIA**

to **CHINA**



OVER 50 PASSIVE HOUSES COMPLETE OR UNDERWAY IN NYC REGION

AND EVERYTHING IS POSSIBLE



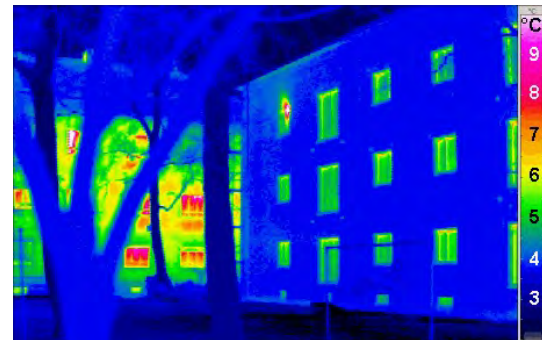
**Apartment Buildings, Swimming Pools, Offices,
Healthcare Centers, Schools, Homes, Courts, Prisons,
Factories, Hospitals, Sport Halls, Stores,
Laboratories, New Construction, Historic Retrofits¹⁸**

A Passive House Case Study

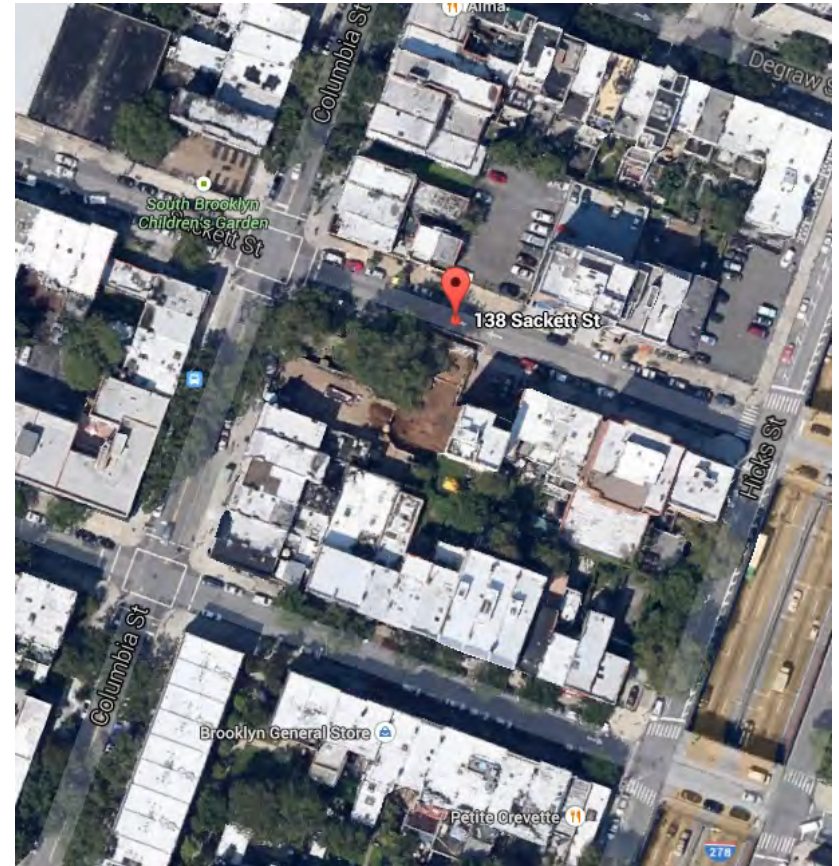
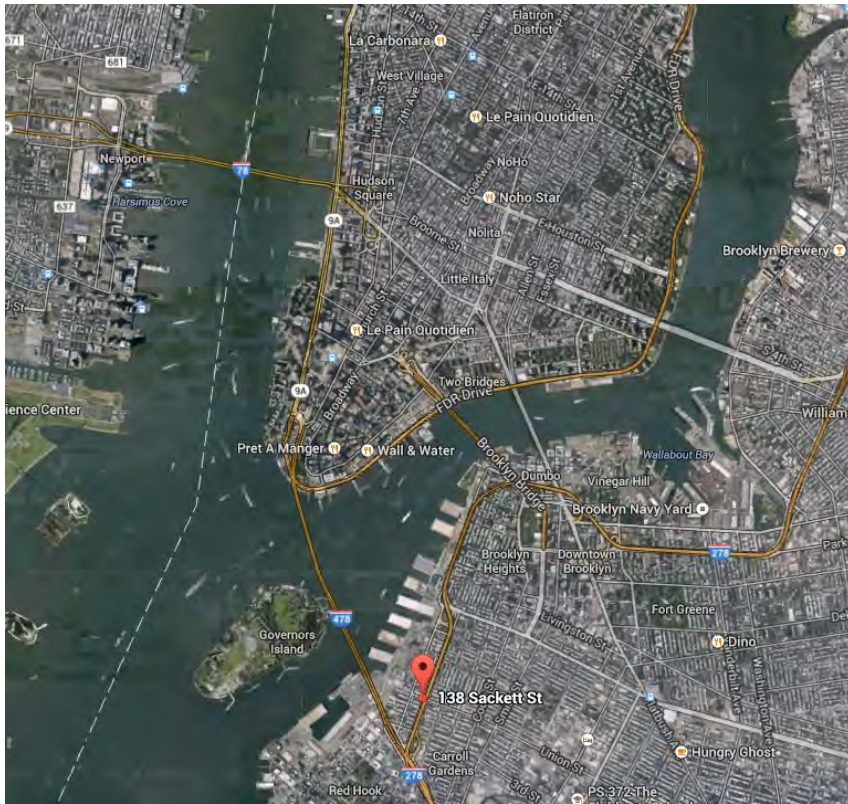


PasivXperimental

- **History**
 - 20+ condo projects
 - Industrial & commercial projects too
 - Design/build firm
- **Passive House**
 - 2008 got interested
 - 2010 training for team
 - 2010 Dresden conference
 - 2011 Innsbruck conference
- **Why Passive House?**
 - Simplified solutions
 - Energy independence
 - Product differentiation
 - Clear metrics
 - Fun & interesting



Case Study: 138 Sackett Street



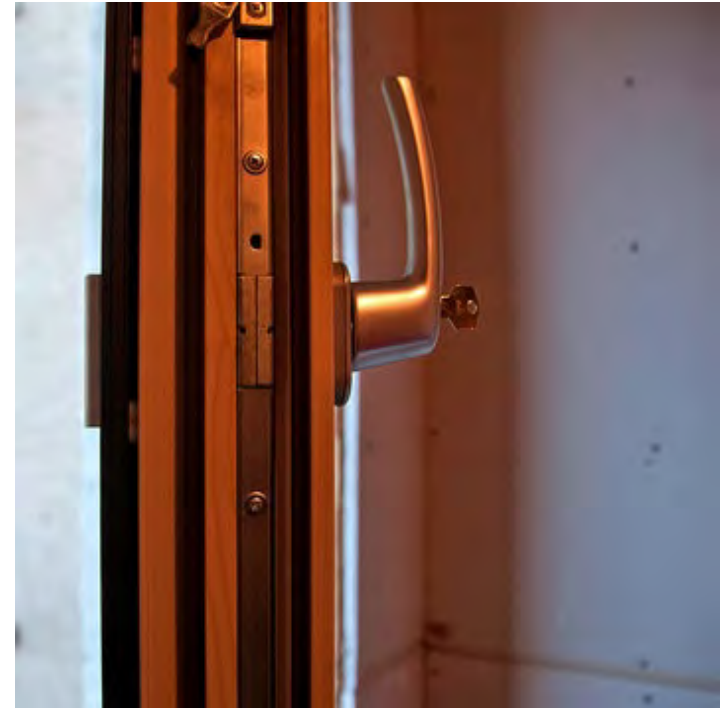
The **Basic** Numbers

- 9,897sf Gross Area
- 8 condo units
- **Costs incl. Passive House**
 - Hard costs = \$232/SF
 - Soft costs = \$50/SF
 - Land = \$151/SF
 - Total costs = \$434/SF
 - Gross sales = \$1,000/SF



Envelope/Structure (+\$95K)

- Airtightness (+\$15K)
 - Double layer airtightness
 - Liquid membranes
- Insulation (+\$30K)
 - 6” added insulation to walls
 - Added insulation at cellar and roof
- Thermal Breaks (+\$20K)
 - Stainless steel connections
- Windows & Doors (+\$30K)
 - Triple-glazed & airtight



Plumbing (-\$10K)

- No gas service or piping (-\$20K)
- Dedicated electric heat pump hot water heaters (+10K)



Mechanical (+\$30K)

- Heating and Cooling from dedicated split air-cooled heat pumps using smaller compressors (**-\$15K**)
- Substitute heat recovery ventilation for exhaust only ventilation (**+\$45K**)



Overhead/Contingency (+\$40K)

- Greater supervision & quality control (+\$40K)
- Contingency (**No Add**)



Arch/Eng/Consultants (+\$30K)

- Greater supervision & quality control (**+\$30K**)



Cost Difference

Base Case

- **Hard Costs**
 - Total \$2,141,104
- **Soft Costs**
 - Total \$464,850

Passive House Case


- **New Hard Costs (+7%)**
 - Total \$2,296,104
- **New Soft Costs (+6%)**
 - Total \$494,850



Going to Market

- **Negatives**

- Brokers & Public largely ignorant of PH.



138 SACKETT

[Home](#) [Residences](#) [Passiv Standard](#) [Locale](#) [Floorplans](#) [Availability](#) [Contact](#)

WHAT IS A PASSIV HOUSE?

It's an environmentally responsible design standard that minimizes energy use consumption by effectively reducing traditional heating and cooling system loads, while the apartments are kept at a year-round comfortable temperature.

This is achieved with the design and implementation of a continuously insulated and airtight and thermal bridge free envelope, including Triple Glazed Doors and Windows, coupled with the use energy efficient appliances and the use of a system of interior and exterior air exchange (HRV/ERV) which retains conditioned temperatures within the units from inbound and outbound streams. A 'passive house' uses only a fraction of the energy consumed by traditional heating and cooling systems.

138 Sackett is one of the first few multi-family buildings in Brooklyn to implement the principles of a 'passive house.'

For more information visit: <http://www.passivehouse-international.org/>. The brochure on the site might be of particular interest.

See what the NYT has to say about 138 Sackett:

- 'Zero-Energy' Construction Crosses the Ocean
- Aiming for Truly Sustainable Buildings

A Passiv House Comparison:

Thermal Performance as seen through an Infrared Camera



Photo credit: www.SGBUILD.com



Illustration by Eco Design Consultants

PassivHaus Principles

- 1 Good solar orientation & compact form**
Specific space heating demand $\leq 15 \text{ kWh/m}^2\text{yr}$ or Heating load $\leq 10 \text{ W/m}^2$
- 2 High comfort levels**
 $\leq 4.2^\circ\text{C}$ surface temperature difference
- 3 Low primary energy**
 $< 120 \text{ kWh/m}^2\text{yr}$
- 4 Ventilation with >75% heat recovery**
Electricity demand max. 0.45 Wh/m^3
- 5 Airtight thermal envelope**
 $< 0.6 \text{ ach} - 1 \text{ m}^2/\text{h/m}^3 @ 50 \text{ Pa}$

Going to Market

- **Positives**

- Quality is evident and appreciated
- Healthy living
- Exceeds expectations
- Value is less risky
- Positive legacy



Projected Operating Costs

- **Conservative Metrics for Offering**
 - Approx \$280/mo for all utilities. (Calc Actual <\$100/mo)
 - Buying comfort & efficiency. **Economic benefit a bonus.**



FIND OUT MORE

NYPH

www.nypassivehouse.org

naphn
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www.naphnetwork.org

International

PASSIVE HOUSE

Association



www.passivehouse-international.org



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