US building impacts

72% electricity consumption

39% energy use

38% CO₂ emissions

40% raw materials

30% waste output

14% potable water use
US building impacts

- 72% electricity consumption
- 39% energy use
- 38% CO₂ emissions
- 40% raw materials
- 30% waste output
- 14% potable water use
LAURA BLAU AIA LEED BD&C® AP
CPHC (Certified Passive House Consultant)
CPHB (Certified Passive House Builder)
CPHD (Certified Passive House Designer pending)
MArch, BArts
Principal BLUPATH

BLUPATH is an award winning architecture and design firm focusing on high-performance building design. blupath.us
KEVIN DAVEY
CPHD (Certified Passive House Designer pending)
BArch
Intern Architect at BLUPATH

BLUPATH is an award winning architecture and design firm focusing on high-performance building design. blupath.us
CHRIS HANSON, LEED AP
CPHD (Certified Passive House Designer)
MS Ed

Hanson Fine Building & Preservation – est. 1986, is a locally-based, full-service general contracting firm that implements sustainable building practices in all of its projects – from the preservation of older homes and historic structures to the construction of new homes and structures. We look for ways to reduce waste during the construction process through adaptive re-use and to reduce operational costs after owner-occupancy by utilizing energy-efficient building technologies.
JUAN LEVY, LEED AP
CPHD (Certified Passive House Designer)
MArch, MA Civil Engineering

Philadelphia-based design and construction firm that crafts exceptionally beautiful, comfortable and functional places to live and work, both as adaptive re-use projects and new construction. We build to exceed today’s standards of sustainability and anticipate tomorrow’s, applying the most effective tools and techniques building science has developed.
LEARNING OBJECTIVES

1. Learn the importance of a qualified team of Passive House trained builders, engineers and professionals.

2. Understand assets and penalties of makeup air ventilation or other energy budget design decisions.

3. Apply case study examples of best practices and lessons learned.

4. Understand the importance of problem solving during the design and built process.
AGENDA

1. Project Description: context, site, goals, program, challenges.

2. Describe the process of assembling a team and lessons learned.

3. Describe highlights and challenges and how they were resolved with case study examples.

4. Discussion and Q & A.
ITALIAN MARKET PASSIVE HOUSE
PROJECT DESCRIPTION

ITALIAN MARKET, PHILADELPHIA, PA
ITALIAN MARKET PASSIVE HOUSE

PROJECT DESCRIPTION

FORMER 7-UP WAREHOUSE
ITALIAN MARKET PASSIVE HOUSE

PROJECT DESCRIPTION

FORMER 7-UP WAREHOUSE
ITALIAN MARKET PASSIVE HOUSE
PROJECT DESCRIPTION

PROPOSED SOUTH ELEVATION
ITALIAN MARKET PASSIVE HOUSE

PROJECT DESCRIPTION

2,250 SF
3 BEDROOM
2.5 BATH
1,800 SF GARAGE
FRONT & REAR DECKS
NET ZERO READY
HEATING DEMAND 4.37 KBTU/SF/YR
COOLING DEMAND 4.13 KBTU/SF/YR

PROPOSED SOUTH ELEVATION
ITALIAN MARKET PASSIVE HOUSE
PROJECT DESCRIPTION

AERIAL VIEW
ITALIAN MARKET PASSIVE HOUSE

PROJECT DESCRIPTION

DAY & NIGHT
ITALIAN MARKET PASSIVE HOUSE
PROJECT DESCRIPTION

LIVING ROOM FROM MEDIA ROOM BALCONY
ITALIAN MARKET PASSIVE HOUSE

PROJECT DESCRIPTION

MASTER BEDROOM
ITALIAN MARKET PASSIVE HOUSE

PROJECT DESCRIPTION

MASTER BATHROOM
ITALIAN MARKET PASSIVE HOUSE
ENERGY MODELING

PHPP VS WUFI
ITALIAN MARKET PASSIVE HOUSE
ENERGY MODELING

Average R-Values

Roof:
R = 93.6 hr.ft².F/BTU
U = 0.011 BTU/hr.ft².F

Walls (Exposed):
R = 49.7 hr.ft².F/BTU
U = 0.02 BTU/hr.ft².F

Windows:
R = 7.3 hr.ft².F/BTU
U = 0.137 BTU/hr.ft².F

Garage Ceiling:
R = 50 hr.ft².F/BTU
U = 0.02 BTU/hr.ft².F

Slab on Grade:
R = 20 hr.ft².F/BTU
U = 0.05 BTU/hr.ft².F

Walls (Party):
R = 17.2 hr.ft².F/BTU
U = 0.058 BTU/hr.ft².F

AVERAGE R-VALUES
ITALIAN MARKET PASSIVE HOUSE
CONSTRUCTION PROCESS 1/4

HANSON FINE BUILDING & PRESERVATION
ITALIAN MARKET PASSIVE HOUSE
SKINNING THE AIR SEALING CAT

Air Barrier Detail @ Garage Ceiling & Existing Masonry Wall
Before

Air Barrier Detail @ Garage Ceiling & Existing Masonry Wall
After

FUTURE FIT BUILDERS – AIR SEALING SPECIALISTS
ITALIAN MARKET PASSIVE HOUSE
SKINNING THE AIR SEALING CAT

IS OSB AIRTIGHT?

FUTURE FIT BUILDERS – AIR SEALING SPECIALISTS
ITALIAN MARKET PASSIVE HOUSE
MIGRATING MANIFOLDS, SUB PANELS, WATER HEATERS

1st Floor Mech. Rm Before

PEX Manifold relocated to Coat Closet

HPHWH & Subpanel relocated to Laundry Room

REDUCED PENETRATIONS & DWH PIPE LENGTHS
ITALIAN MARKET PASSIVE HOUSE

TESTING OUT

MAX Duct Leakage allowable:

122 CFM @ 25 Pascals

Air tightness allowable:

0.6/HR @ ACH50

Test at Rough-in:

55 CFM @ 25 Pascals

Air tightness at rough-in:

0.5 1/HR @ ACH50

David Berg Duct Tightness Test

Future Fit Blower Door results
ITALIAN MARKET PASSIVE HOUSE
THE ART OF SHADING

Ver 1: Steel Tubes & Wood Slats
Ver 2: Steel Tubes & Laser cut panels
Ver 3 Concept: Simplified Design

Ver 3 Design: Laser Cut Pattern using Honeymoon Photos

Ver 3 Structure: Steel Tubes & Angles attached w/ mending plates

POINT B FABRICATION & JEAN GAJARY PE
ITALIAN MARKET PASSIVE HOUSE
THE ART OF SHADING

POINT B FABRICATION
ITALIAN MARKET PASSIVE HOUSE
THE ART OF SHADING

Ver 3 Design Options:
Laser Cut Pattern using
Honeymoon Photos

POINT B FABRICATION
ITALIAN MARKET PASSIVE HOUSE
STEEL ELEGANCE @ SOUTH WINDOW WALL

Window Beam Before

Window Beam After

ENGINEER #1
JEAN GAJARY, PE
ITALIAN MARKET PASSIVE HOUSE
STEEL ELEGANCE @ SOUTH WINDOW WALL
ITALIAN MARKET PASSIVE HOUSE
STEEL ELEGANCE @ SOUTH WINDOW WALL
ITALIAN MARKET PASSIVE HOUSE
WINDOWS: CHECK TWICE (OR THRICE), ORDER ONCE…

Window Order before

Window order after

DON’T RUSH IT, CHECK IT AND RECHECK IT!
ITALIAN MARKET PASSIVE HOUSE
WINDOWS: CHECK TWICE (OR THRICE), ORDER ONCE…

Window Order before

Ug = 0.106 Btu/hr/sq/ft F
SHGC = 0.494
VT = 0.709

Window order after

Ug = 0.26 Btu/hr/sq/ft F
SHGC = 0.36
VT = 0.52

DON’T RUSH IT, CHECK IT AND RECHECK IT!
ITALIAN MARKET PASSIVE HOUSE
STEEL FRAMING

S B I STEEL WORKS
ITALIAN MARKET PASSIVE HOUSE
STEEL BLOOPERS

First Floor Structure  Second Floor Structure  W16x26 Penetrating Thermal Envelope!

SECOND FLOOR "BACKGROUND" WAS OUTDATED
ITALIAN MARKET PASSIVE HOUSE
SEQUENCING = COST EFFECTIVE AIR SEALING

Drawings called for plywood bucks

Carpenters installed TJI bucks, causing a ½” gap at each intersection

FOLLOW THE DRAWINGS – NO SUBSTITUTES
ITALIAN MARKET PASSIVE HOUSE
BENEFITS OF A PASSIVE HOUSE TRAINED TEAM

• Engineers are conservative, thus skeptical.
  - Untrained engineers resist basic PH strategies.
  - Inexperience with PH energy model inputs—big problem.

• Architects cannot train engineers, they can:
  - Set overall goals,
  - Understand overarching principals,
  - Ask good questions,
  - Access options and direct decision-making.
ITALIAN MARKET PASSIVE HOUSE

BENEFITS OF A PASSIVE HOUSE TRAINED TEAM

• Contractors are practical and seek clarity.
  - Untrained contractors learn by doing and seeing.
  - First attempts = necessary learning curve.
  - Colleagues teach each other, Team Buy-in Must!

• Architects can help train contractors, they can:
  - Respect if a must.
  - Ask good questions, engage and listen.
  - Coordination meetings are so important.
  - Acknowledge challenges and success.
ITALIAN MARKET PASSIVE HOUSE

THE "A" TEAM
ITALIAN MARKET PASSIVE HOUSE
WHERE ARE WE NOW?

September 13 Progress
ITALIAN MARKET PASSIVE HOUSE
WHERE ARE WE NOW?

September 13 Progress
RESOURCES

**PHIUS** Passive House Institute US
passivehouse.us

**PHAUSS** Passive House Alliance US
phaus.org

**PHI** Passive House Institute (Germany)
passiv.de/en/

**iPHA** International Passive House Association
passivehouse-international.org

**NAPHN** North American Passive House Network
northamericanpassivehousenetwork.com

**ZERO ENERGY READY HOMES**
energy.gov/eere/buildings/zero-energy-ready-home
RESOURCES

BEVAN LAWSON PE, STRUCTURAL
   bevanlawsonpe.com/

JEAN GAJARY PE, STRUCTURAL
   jgajary@hotmail.com

MARK ULRICK, PE, MEP
   markulrick.com/

BAUKRAFT, PE, MEP
   baukraft.com/

FOURSEVENFIVE High performance bldg supply,
   foursevenfive.com

WORLD CLASS SUPPLY High performance bldg supply,
   worldclasssupply.com
RESOURCES

HANSON FINE HOME BUILDING
hansonfinebuilding.com/

FUTURE FIT/ EPIPHYTE BUILDERS LLC,
futurefitbuilding.com/

BILL HENKEL CONTRACTING
bhcroofing.com/

BEST CHOICE PLUMBING,
bestchoiceplumbing.com/

ATB ELECTRICAL,
atbelectricinc@msn.com

POINT B FABRICATION
pointbdesign.com/
RESOURCES

blupath.us

BLUPATH

INSPIRING DESIGN FOR PLACES TO THRIVE