

Greater Portland Landmarks & Maine Preservation



Considerations in Managing Your
Downtown Building Efficiently

2014

Presented by

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Landmarks' Service to the Greater Portland Region

- | Preservation Services
- | Library Resources
- | Portland Observatory
- | Workshops
- | Books
- | Public Issues Advocacy
- | Website and Observer



Greater Portland Landmarks
93 High Street, Portland

- | **2015 Old House Trade Show**
- | Please join us!

Maine Preservation: Statewide Advocate

- | Mission: ...to promote and preserve historic places, buildings, downtowns and neighborhoods, strengthening the cultural and economic vitality of Maine communities.
- | Field Service Program
- | Revolving Fund
- | Preservation Easements
- | Tax Credit Projects

233 W. Main St., Yarmouth, ME



Sustainable Downtowns: Why Preservation Matters

- | Streets and Neighborhoods
- | Economic Benefits
- | Future Landmarks



Program Outline

- q Operational Considerations –
Managing the Business Envelope
Costs
- q Financial Leveraging
- q Energy Efficiency in Older/Historic
Buildings

Operational Considerations – Managing the Business Envelope Costs

Fixed Costs

- | Debt Service – Current Best Option
- | Local Property Taxes – Have you thought of this?
- | Insurances – Incentives for managing risk (NTHP)
- | Maintenance – Quality Materials = Longevity

Incentives for Lowering Insurance Costs

- | DO maintain your building in conformance with the local and state building codes
- | MUBEC & IEBC offer provisions alternatives for National Register – listed historic buildings
- | Flood Insurance – Subsidies available if NR-listed

Incentives for Lowering Insurance Costs - continued -

- | Sprinkler systems
- | Balloon-framed buildings – installing fire stops
- | Fire separation – isolating uses
- | Fire, Smoke & CO detection / alarm systems

Incentives for Lowering Insurance Costs - continued -

| Electrical

DISCONNECT ALL LIVE
KNOB & TUBE WIRING

OR...



Maintenance

- | Roofs
- | Drainage
- | Windows & Doors
- | Exterior Masonry or Siding
- | Flues, Chimneys and DW Vents & Mech. Systems

Financial Leveraging

Historic Rehabilitation Tax Credits (45%)

Requirements:

- | Listed in the National Register of Historic Places
- | 25%; 30% State of Maine
- | 20% Federal
- | Must Exceed Adjusted Basis or \$5000

Why Energy Efficiency Matters

- | **43% of US carbon footprint** from operating buildings
(NOT including producing and transporting building materials)
- | Takes **82 years** for a new green home to recover carbon expended during construction and demolition (MIT)
- | Sustainable: Repair, Reuse and Recycle
- | Reduce Annual Operating Costs
- | Maintain Property Value



Approach to Energy Efficiency

- | Tier 1: Initial Investigations & Low-Cost Solutions
- | Tier 2: Air Sealing & Insulation
- | Tier 3: HVAC Improvements Requiring Professional Guidance
- | Evaluations and thank you for coming!

Energy Efficiency Priorities

- | ENSURE BUILDING IS IN GOOD REPAIR and WATERPROOF; MOISTURE & VENTILATION are MANAGED
- | GO FOR LOW HANGING FRUIT – including AIR SEALING & BEHAVIOR CHANGES
- | INSULATE THE ATTIC; ADD STORM WINDOWS
- | IMPROVE HVAC SYSTEMS LAST; CHANGE ENERGY SOURCE

Tier 1: Initial Investigations



Going Through the Structure I: Understanding The Building As A System



The Building Envelope

- Moisture Transfer
- Heat Transfer
- Air Infiltration
- Mechanical System
- Electrical Systems

Principles of Building Performance

The Pressure Barrier

For every cubic foot of heated air that leaves through the top, a cubic foot of cold, unconditioned air must enter through the lower regions of the home.



Boosting U-Values with
higher R-Values



The Thermal Barrier

Before you start...

Evaluate your building:

- Structural Analysis
- Test Moisture & Water & Air Quality
- Building Performance Modeling & Energy Audit

Seek Certified or Licensed Professionals

The Energy Audit....

- All Aspects of the Building Envelope
- Mechanical Systems and Distribution
- Whole House and Spot Moisture Ventilation
- Blower Door Testing (Thermal Imaging Optional)
- Prioritization of Improvements
- Payback and Durability



Building Performance and Durability are Related



Add Rooftop Dampers to Reduce Heat Loss Through Chimneys When Not in Use



Start in the Attic



How Much Insulation?



Is the insulation evenly distributed?



Is the access sealed and insulated?

What's Happening at Roof Penetrations?



Is the Attic Open to Wall Systems Below?

These long chase ways were sealed with the paper bags from the original cellulose



This vent pipe acts as a “chimney”

Poorly vented bath fans can lead to moisture problems and mold



What's Happening in the Basement?



How Much
Insulation?

Where is it?

What
Condition
is it in?

Are There Holes into Crawlspace or Occupied Spaces Above?



Dirty Insulation = Air Flow



Architecture in Maine:

How your building was constructed affects *its energy performance*



Greater Portland Landmarks

Structure: Typical 19th / 20th C. Wall & Roof Construction - to 1960

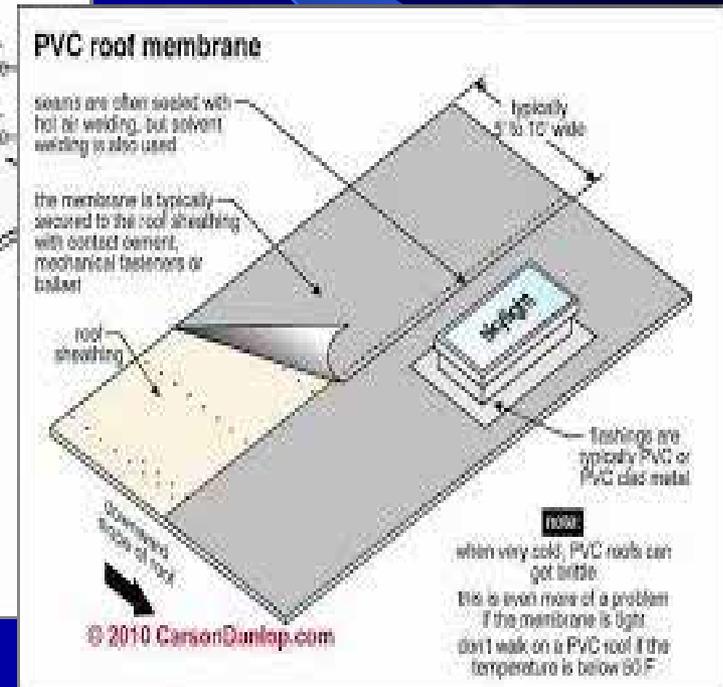
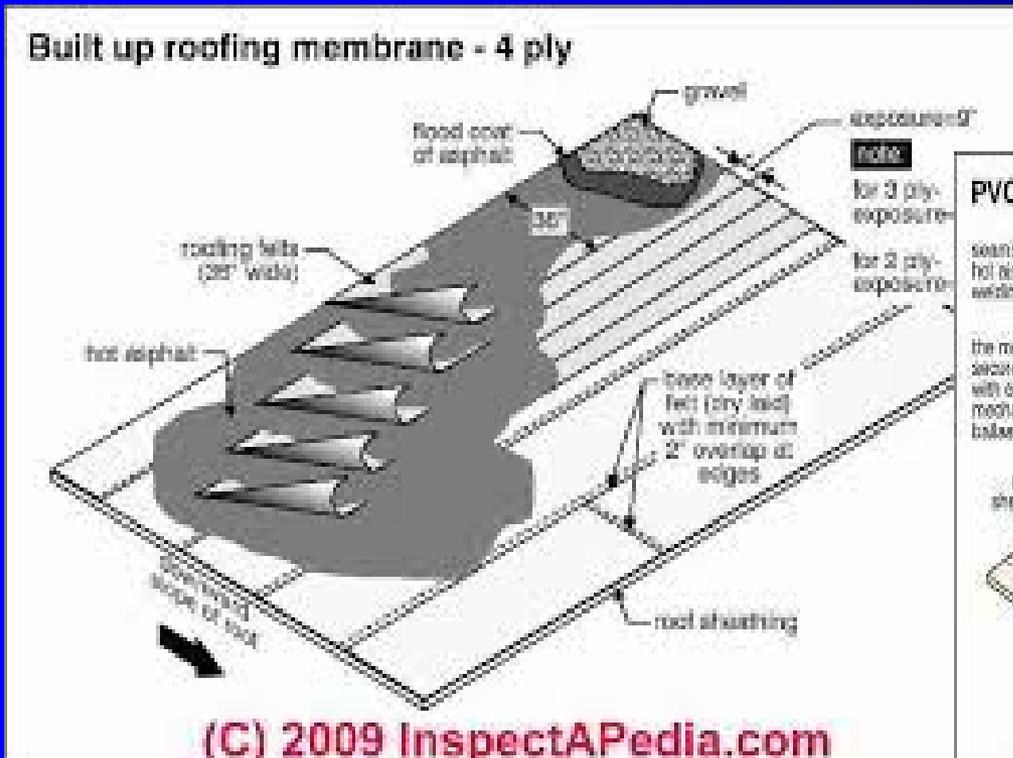
1. Load-Bearing Masonry & Curtain Wall

- Brick
- Stone (Rubble & Ashlar, Brownstone, Sandstone)
- Hollow Clay Tile & Concrete Block
- Wrought Iron / Steel Frame & Structural Glass
- Reinforced Concrete & Pre-Stressed Beam & Panels

2. Timber and Wood Frame

- Log / Solid Wall
- Post & Beam
- Plank or Board Wall
- Balloon Frame & Platform Frame

Typical Flat, Built-Up Roof

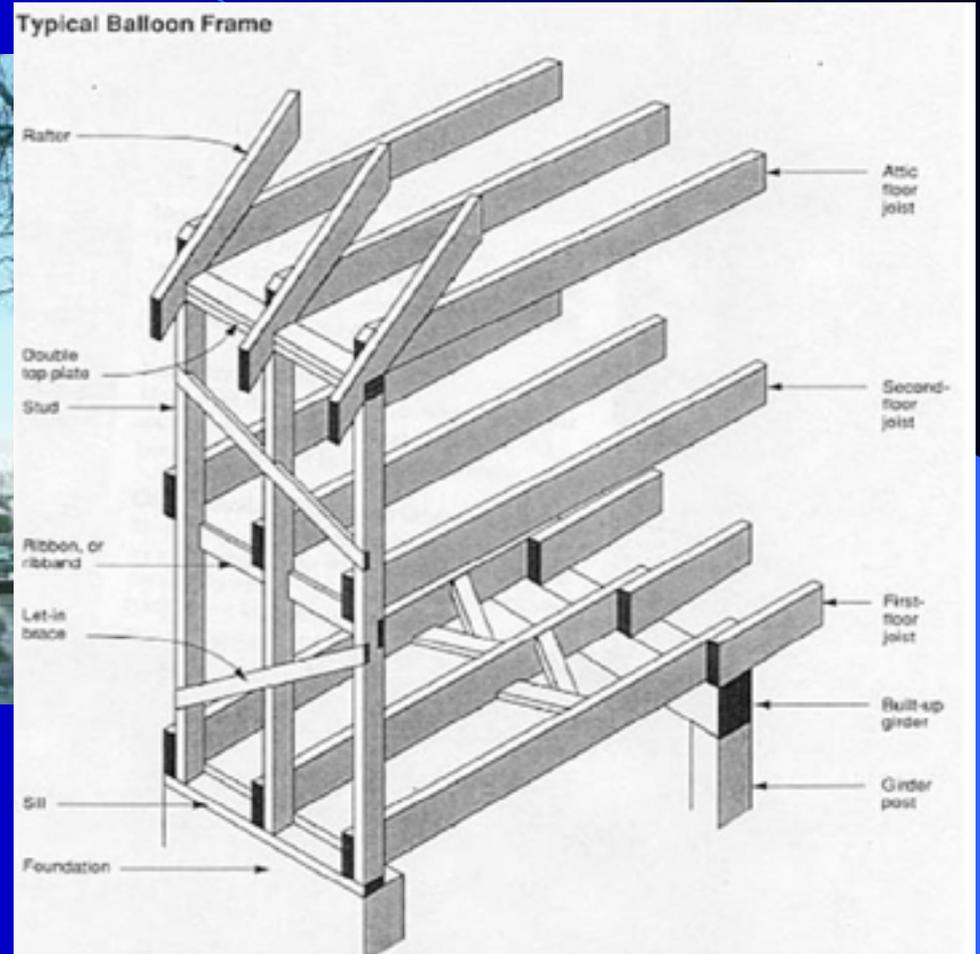


Brick 3-Wythe Wall

- | Typical Brick Masonry Construction
- | Outer Wythe: Veneer, often without Wire Ties
- | Susceptible to water penetration
- | Maintain Wall Dry/Warm!

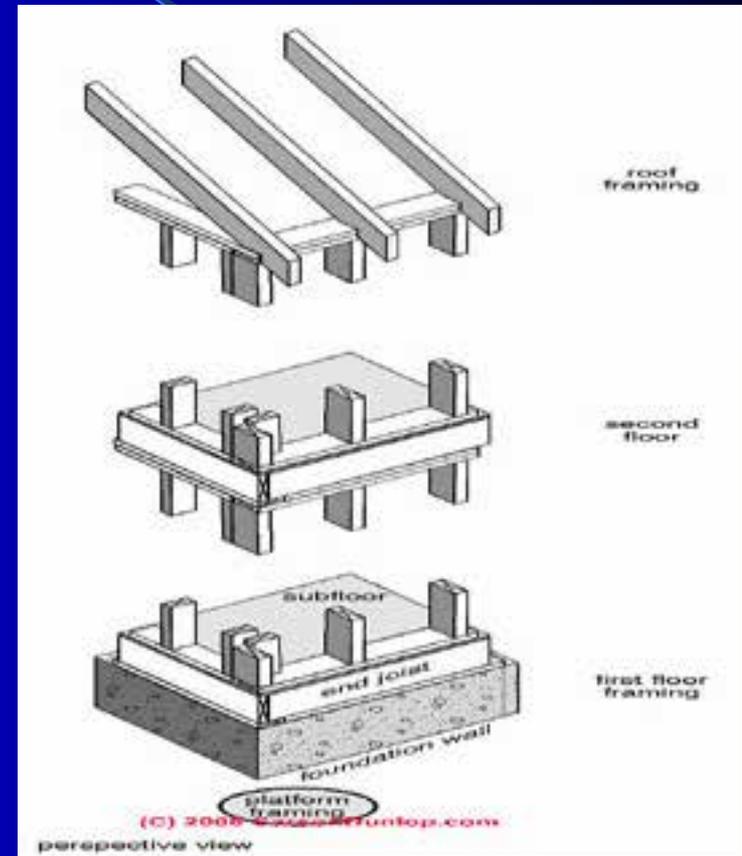


Wall Types: Balloon-Framing



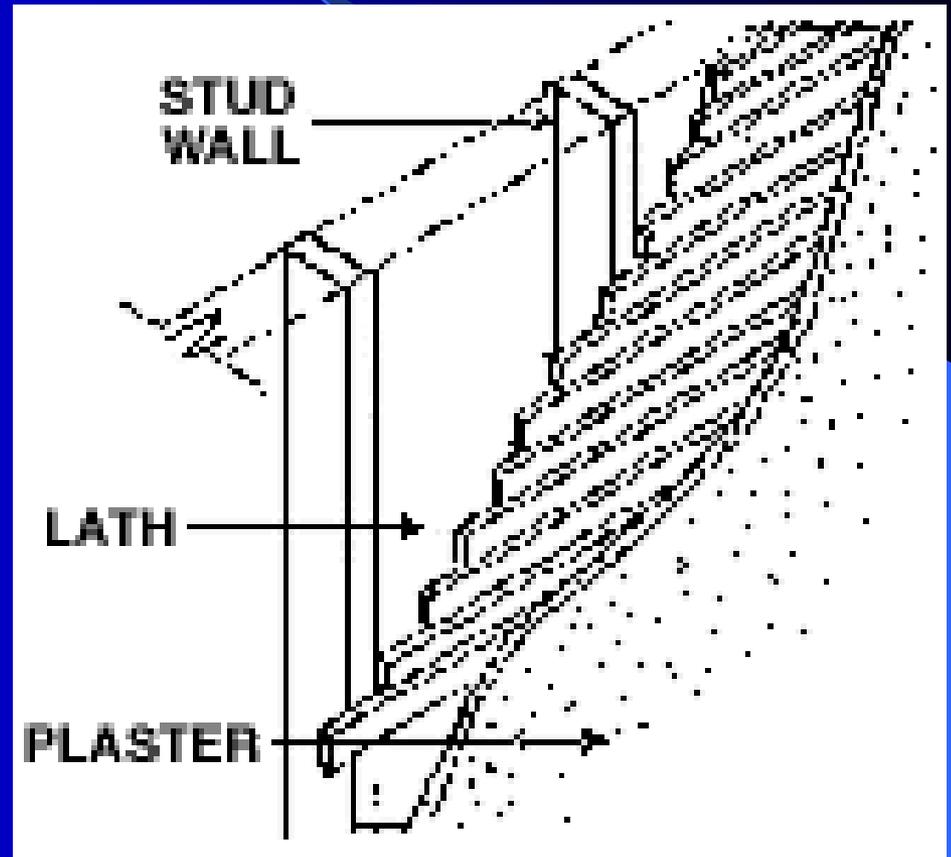
Wall Types: Western Platform

- | c.1900 appeared in East
- | Conventional Method
- | Now
- | Each Floor Independent & Acts as Fire & Heat-Loss Stop at Stud Cavities
- | 2 x 4 & 2 x 6 Construction
- | Fastenings: Wire Nails



Shared Features: Wall Finishes

- | Interior Wall Finishes:
Plaster or Paneled
- | Wooden / Wire Lath
- | Studs or Nailers set in
Masonry
- | Dead Air Space –typ.
1” – 4”
- | No Vapor Barrier



Wall & Roof Types Perform Differently & Affect Energy Solutions

- | Rate of Heat Loss
- | Rate of Heat Gain
- | Moisture & Water Vapor Transmission
- | Rates of Expansion & Contraction
- | Location of the Dew Point within the Wall

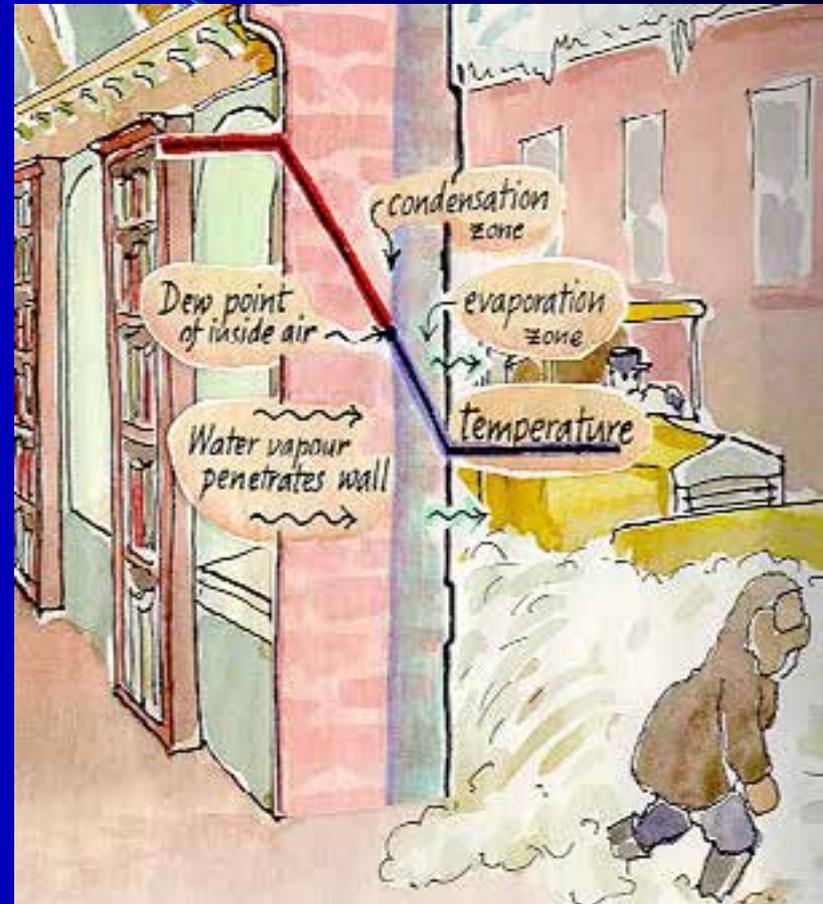
Going through the Building: II Superstructure Analysis & Treatment

- | Moisture Management & IAQ
- | Air Sealing of Building Envelope
- | Insulating Historic Buildings
- | Windows & Doors

Interior Moisture Management

Understanding Dew Point

Moisture Levels 35%+/-?



(C) 2008 InspectAPedia.com

Excess Moisture Symptom



Check Dryer Vents and Bath Fan Vents



Clogged Dryer Vents & Bath Fan Vents = (\$\$\$)



Moisture Management Priorities

Goal: Reduce production & retention of Water Vapor

Passive:

- | Ridge, Soffit and Gable Vents
- | Apply Vapor Barrier to Basement Floor
- | Paint Interior Surfaces of Exterior Walls

Mechanical:

- | Exhaust Fans
- | Humidistats
- | Air-to-Air Heat Exchanger

Tier 2: Projects of Moderate Investment

Air Sealing the Exterior Wall

First: Exterior Features & Surfaces Shedding Water Properly?

- | Openings Admitting Wind-Driven Water?
- | Clapboards or Shingles loose or missing?
- | Gaps or Daylight at Sill?



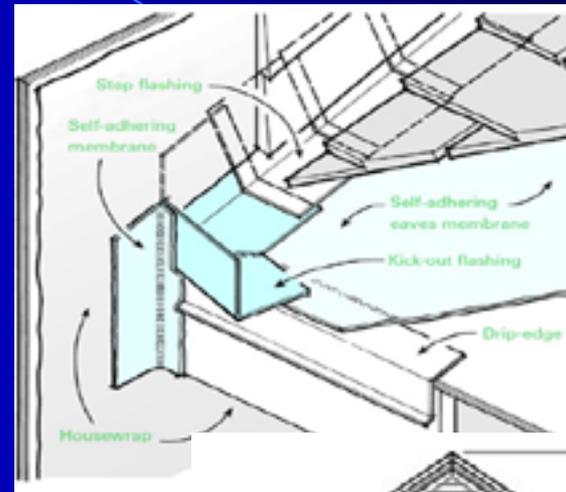
Rainwater Management: Exterior Walls

Masonry:

- | Maintain Mortar Joints
- | Caulk Frame Openings

Wood-Frame Buildings:

- | Caulk Corner Boards
Window Frames, Trim
- | Maintain Clapboarding,
Water Table
- | Maintain Exterior Paint



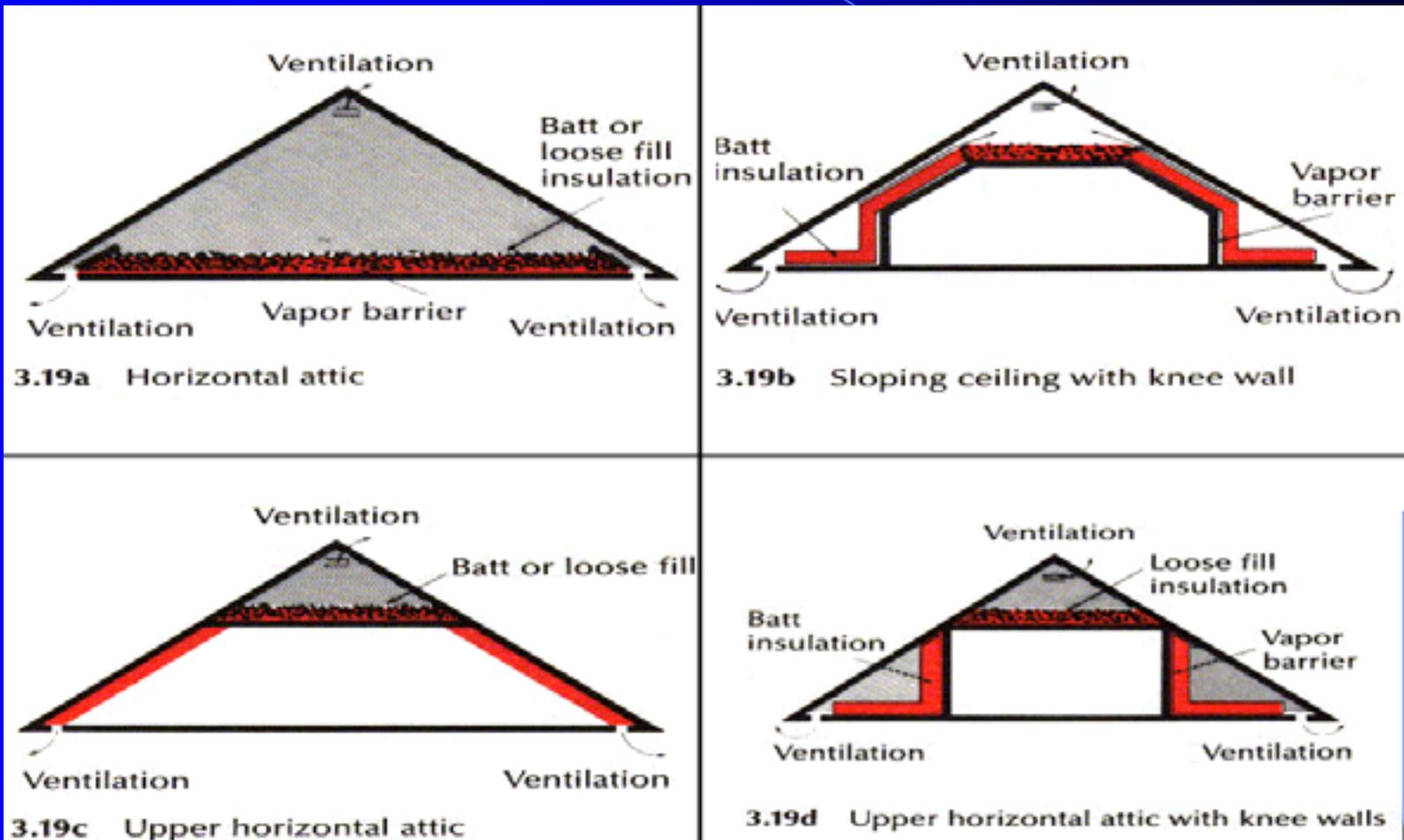
Exterior Wall Priorities

- | Goal: Reduce Wall Heat Loss before introducing Insulation
- | Caulk/Paint all Cracks, Gaps, Nail Holes
- | Seal all Utility Penetrations
- | Seal Interface at Mud Sill & Foundation
- | Paint One Wall per Year / Monitor Performance

Target Areas for Air-Sealing Interiors

- | Drafts (50% Rule)
- | Cracked Plaster
- | Doors and Windows
- | Broken Sash locks & Missing Weather-stripping
- | Clothes Dryer and Exhaust Fan Vents
- | Pipe Penetrations from Basement
- | Leaky Forced Hot Air Ducts

Cap Insulation: Insulating the Attic



Exterior Wall Insulation ?

- | Insulation Options Available: (See Handout)
- | Heat Loss through *Exterior Walls only 15%*

Considerations:

- | Reversibility?
- | Vapor Barrier?
- | Internal Wall Insulation – Negative Impacts
- | Altering the Dew Point within the wall?
- | Dislocation of Window/Door Trim
- | Cost

Exterior Wall Insulation (Contd)

Generally Not Recommended

- | Rigid Foam or Sprayed-On Insulation may alter Dew-Point Location, freezing moisture-laden Exterior Face Brick
- | May interfere with Electrical & Plumbing runs
- | Significant Interior Finishes may be lost

Insulating the Basement Walls after Addressing Moisture Issues



Insulating Options for Basement Walls



Managing Heat Loss at Windows

- | Historic Windows = Asset
- | Quality: Old Growth Wood
- | Technology: Simple
- | Repairable: By Design
- | Service Life: 150+ years if Maintained
- | Evolutionary Capability



Window Reparability

- | Simple Construction:
- | Mortise & Tenon, Locust Pegs
- | Splicing Options:
Dutchman; Epoxy
Consolidants
- | Milling New Components
- | Re-Fastening



Improving Window Performance

- | Storm Windows
- | Efficiency Ratios
- | Exterior
- | Interior

- | Other: Re-Glazing with IG Glass
- | Low-E Storms



Exterior Storm Windows

- | MonRay Inc.
- | www.monray.com

- | Allied Windows, Inc
- | www.alliedwindow.com

- | Traditional Wooden Storms



Interior Storm Windows

- | Storm Window Options:
- | Interior: Innerglass Window Systems
- | Magnetic Systems
- | DIY Temporary Storms



Other Window Improvement Options

- | Spring-Bronze Weather-stripping
- | Vinyl Jamb Liners
- | Retrofit Double-Glazing
- | Insulating Weight Pockets
- | Awnings



Tier 3: Projects Requiring Professional Guidance

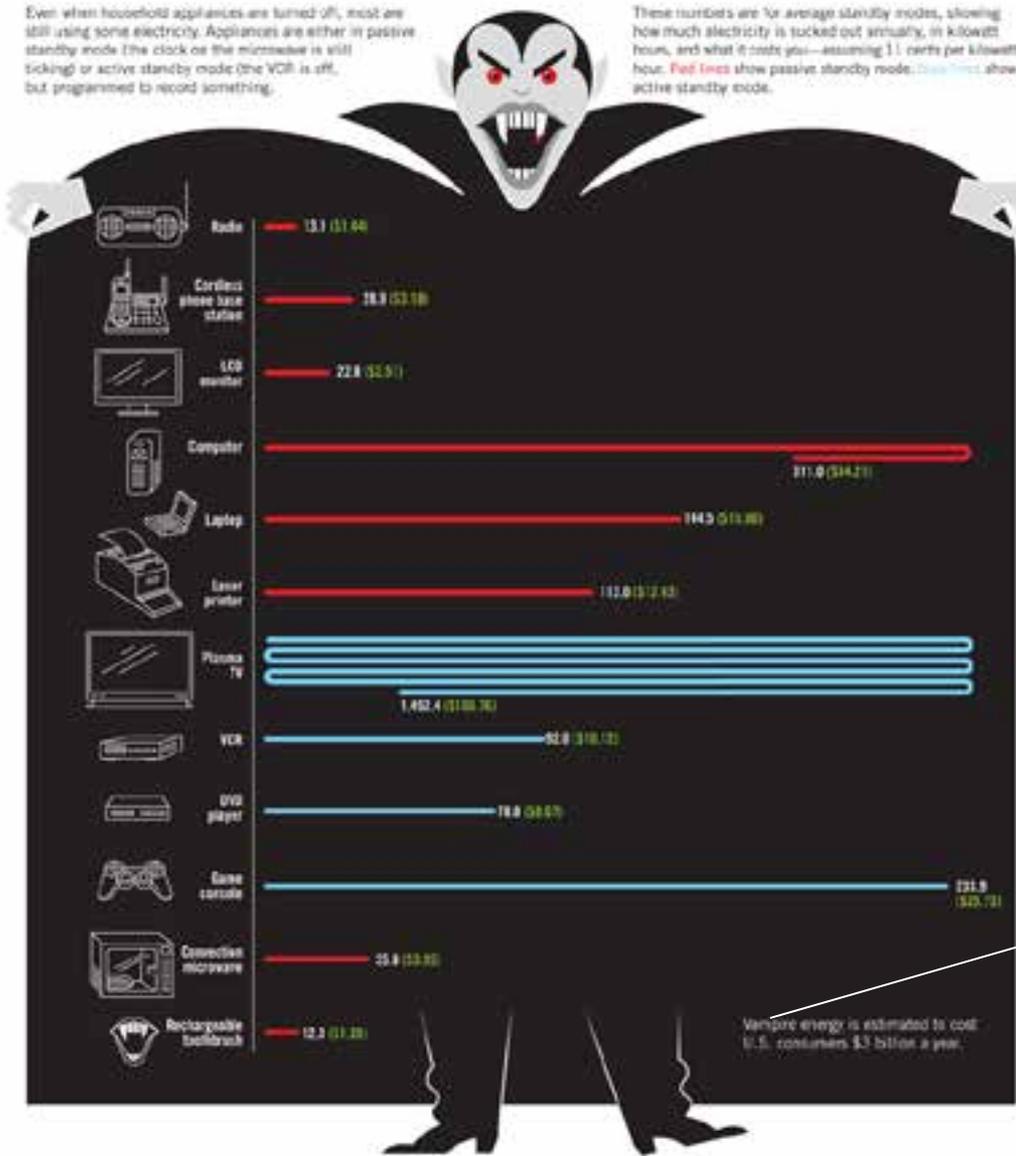
- | Heating, Cooling & Ventilation Systems
- | Renewable Energy Installations



Vampire Energy

Even when household appliances are turned off, most are still using some electricity. Appliances are either in passive standby mode (the clock on the microwave is still ticking) or active standby mode (the VCR is off, but programmed to record something).

These barbies are for average standby modes, showing how much electricity is sucked out annually, in kilowatt hour, and what it costs you—assuming 11 cents per kilowatt hour. **Red lines** show passive standby mode. **Blue lines** show active standby mode.



Understand Where the Electricity Goes...

Vampire energy is estimated to cost US consumers \$3 billion a year.

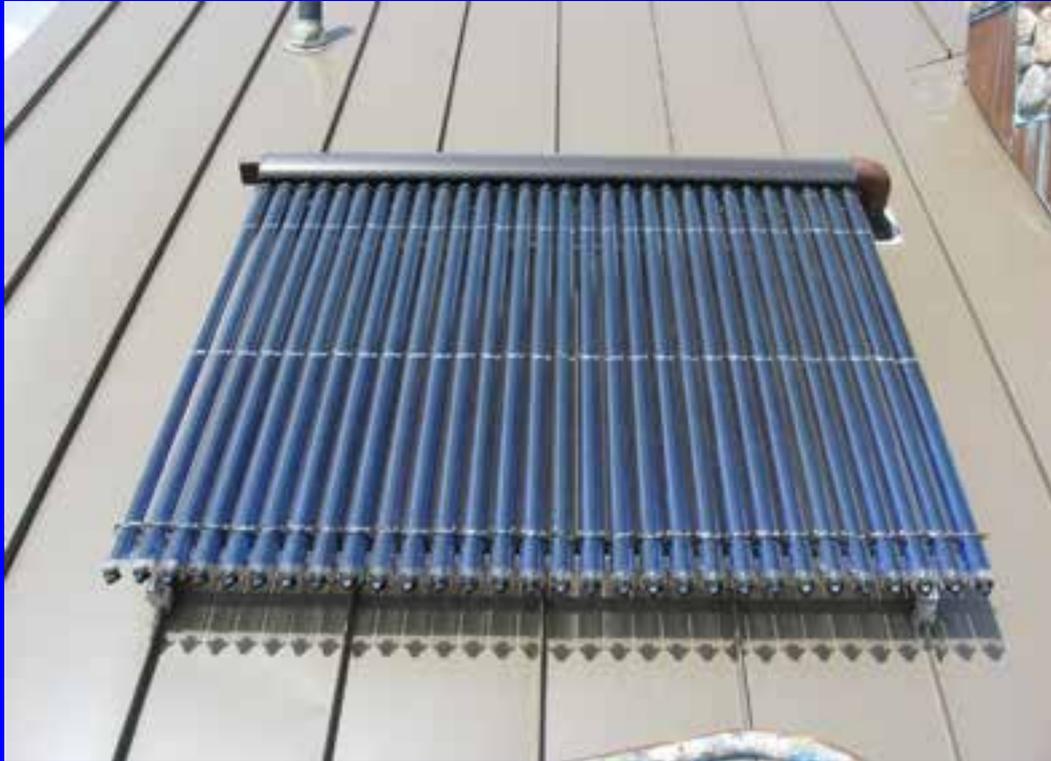
Measure Your Electricity



Add Alternative Energy



Add Alternative Energy



Evacuated Tube Solar Hot Water Panel



Dual Coil DHW Storage Tank



Community Solar Farm (CSF) ReVision Energy

www.revisionenergy.com

Greater Portland Landmarks

Other Sources:

Efficiency Maine

Maine Preservation

Greater Portland Landmarks
Preservation Services

MIAQC

MABEP

For More Information

- | www.energycymaine.com
- | www.energystar.gov
- | www.unitil.com
- | www.dsireusa.org

Resources

- | *The Energy Efficient Old House*
Anne Stephenson, Ph.D., LEED AP, BPI
Greater Portland Landmarks 2012

- | Maine Preservation: *Guidelines for Improving Energy Efficiency in Historic Buildings* (2012)
http://mainepreservation.com/wp-content/uploads/2011/04/MainePreserv_5.pdf

Any Questions ?

Contact Information

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