

# Energy efficiency – making real and effective improvements

**Richard Oxley**

Oxley Conservation



# Energy efficiency – making real and effective improvements

Richard Oxley  
Oxley Conservation

- **Greening your Victorian Home**
  - -The Victorian Society-
  - November 2008

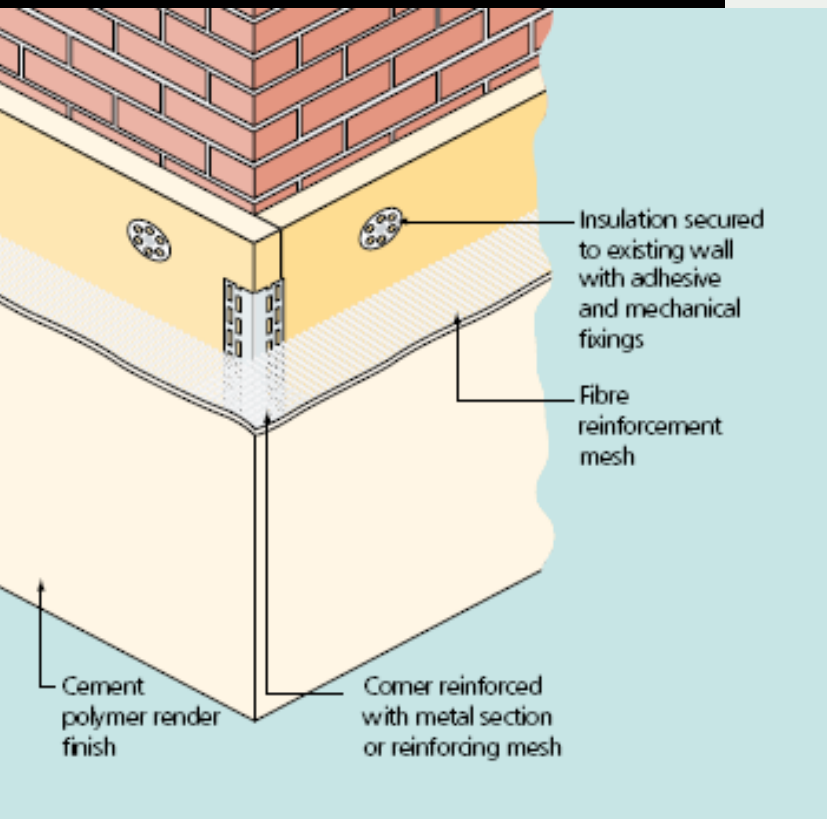
To avoid  
low  
emission



leave at  
next exit

- How do you make an existing building energy efficient?













• **STOP!**

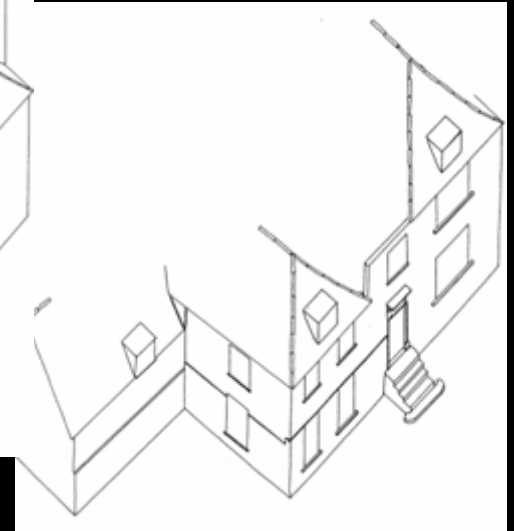
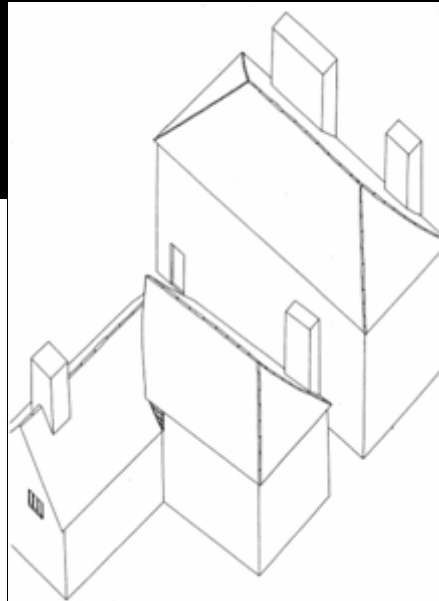
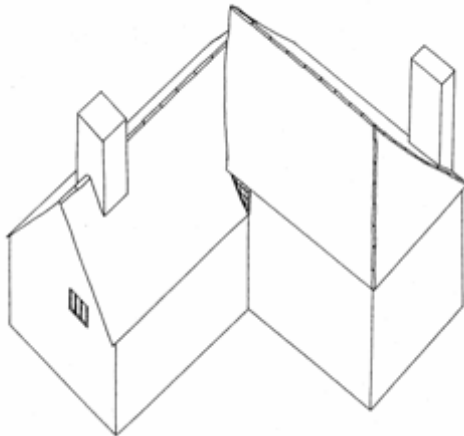
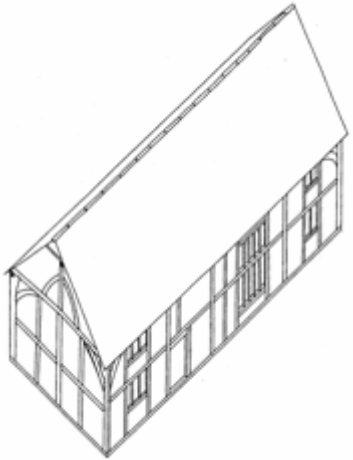
• **ARE WE MAKING REAL AND  
EFFECTIVE  
IMPROVEMENTS?**

- **WHERE DO WE START?**

- UNDERSTAND
- THE
- BUILDING

- UNDERSTAND THE BUILDING
- BEFORE MAKING
- ANY IMPROVEMENTS

- Understand the building
  - History of construction, modification and use



- Understand the building
  - Cultural significance

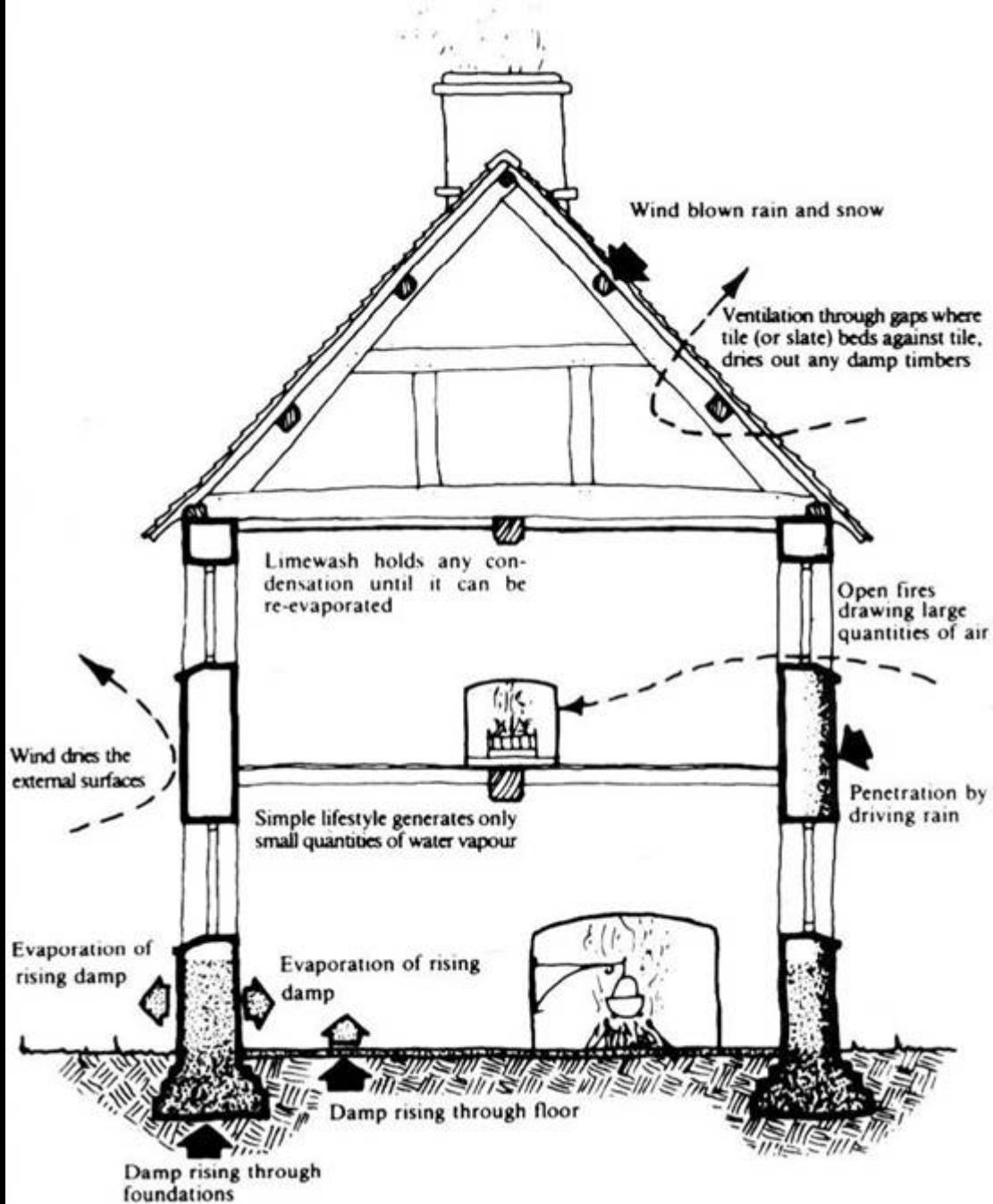




- Understand the building
  - Protected Status



- Understand the building
  - History of construction, modification and use
  - Cultural significance
  - Protected Status
  - Performance
    - Intended performance
    - Changes in intended performance

















- Lessons learnt from building conservation:
- Damage caused by well-intentioned repairs and improvements
- The need to adopt an informed approach
- The need to understand the building

- Understand the building
  - Condition
    - Need for repair creates opportunities for improvements in energy efficiency to be made



- Understand the building
  - Alteration, extension, change of use &/or dramatic events
    - Creates opportunities for improvements in energy efficiency to be made





- Understand the building
  - History of construction, modification and use
  - Cultural significance
  - Protected Status
  - Performance
  - Condition
  - Planned alteration, extension or change of use
  - Thermal performance/Performance in use

- Thermal performance/Performance in use
  - Traditional buildings are highly individual

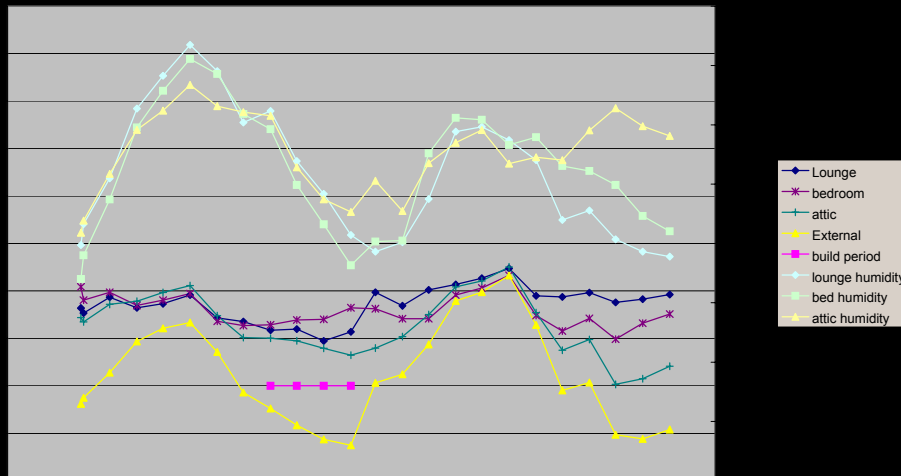


- Thermal performance/performance in use

Data Logging

Fuel bills

Fan pressurisation tests



# • Thermal performance/performance in use

## Thermal imaging Dampness testing



Manor Farm, South Stoke:  
North Elevation.



Fourteen thermographic images have been stitched together and overlaid on the photo.

The close-studded timber frame is clearly defined.



The likely positions of the timber frame elements, based on the thermographic survey are shown overlaid on the photograph.

Evidence for the possible box-framing to the east of the main gable is very faint, and is shown hatched.

Manor Farm, South Stoke: West Elevation



There is no evidence of any timber frame surviving within the west elevation. There is a very faint indication that the tie beam and collar of the roof truss have been retained within the masonry.

The second floor window has been reduced in size and the masonry between the



# • Thermal performance/performance in

use

## Occupant feedback

- Analyse usage patterns
- Survey user experiences
  - Staff / residents / visitors
- Compare to other buildings
- SBEM / SAP models



- What is an appropriate improvement?
- Beware of trying to achieve the unachievable
- Base targets on an understanding of the building
- Do not rely on common misconceptions
- Bespoke solutions - avoid standard solutions



- The implications of making improvements:

- Change in performance
- Balancing reduced ventilation and the need for old buildings to “breathe”



© Paul Jennings

Don Bull

- Air tightness:
- The general removal of odour and moisture 8 litres/second/person, or 0.4 achr at normal domestic occupancies
- Modern airtight homes can reach 0.4 achr
- A Victorian house with leaky timber ground floor is often 1.6 achr
- Possible target for traditional dwellings 0.8 achr allows the same amount of air for the building as the occupants

- Historic and traditional buildings need ventilation:
  - to preserve the fabric
  - to maximise evaporation of moisture
  - to maintain an acceptable equilibrium
- Excessive or poorly thought-out draught proofing could lead to:
  - mould growth
  - associated health problems for the occupants
  - the conditions for fungal decay and insect attack

- Repairs provide opportunity to make improvements



- Make improvement more cost effective

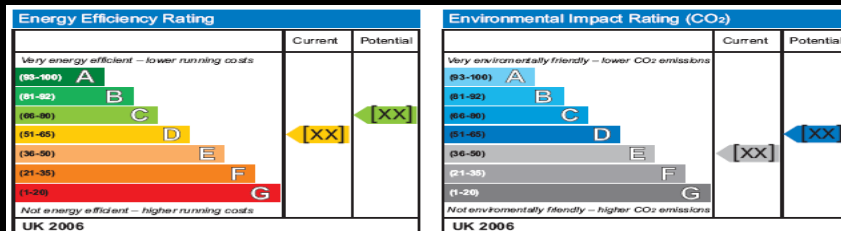


- Start with:
  - Lighting
  - Heating boilers & controls
  - Loft insulation
- Simple and relatively effective
- Are not in conflict with old buildings
  - Appearance
  - Performance



• Critical to make improvements that are:

- Appropriate
- Effective
- Real



- Critical to make improvements that:
  - achieve actual reductions in CO<sub>2</sub>

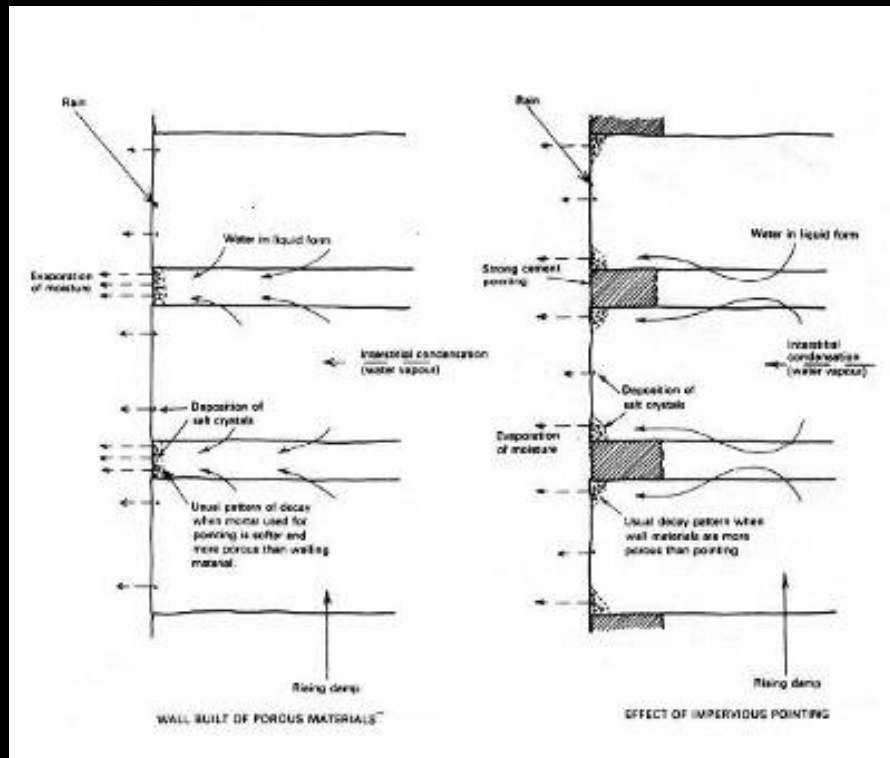


- Need to measure
  - Before
  - During – improve effectiveness
  - After – measure if actual gains made
  - What lessons can be learned?
  - Share information – successes and failures
  - Allow real and effective improvements to be made

- The need to understand the building
- Construction
- Solid wall insulation
  - Predicted targets rely on the insulation of solid walls
  - Need to understand changes in performance



- External solid wall insulation
  - Protection from driving rain
  - Separation from solar heat and drying wind
  - Change in performance understood?



## • Internal solid wall insulation

- Prevention of heat loss
- External walls colder keep porous materials wetter:
  - Natural wetting from external environment
  - Greater capillarity conductivity at lower temperatures
  - Reduced rates of drying following wetting - colder surfaces have lower evaporative drying rate
- Increase frequency of exposure to frost action - accelerated deterioration



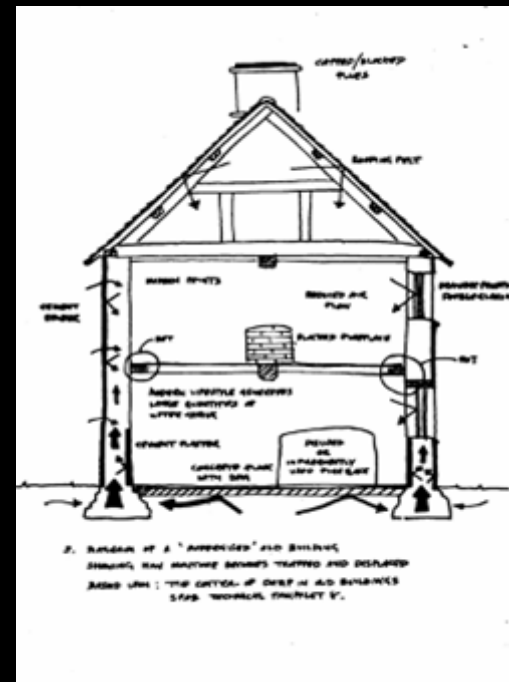
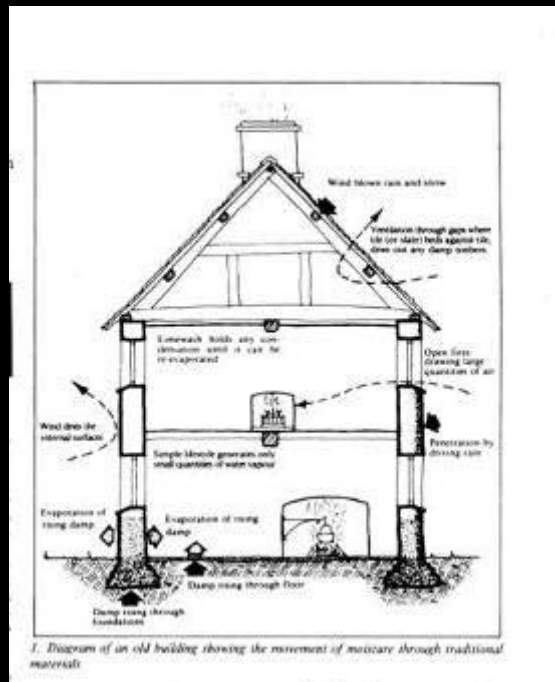
- Internal solid wall insulation

- Separation of thermal mass

- Increased need for cooling in summer months
    - Increased carbon use – not included in SAP assessment



- The need to understand the building
  - Solid wall insulation
  - Change in performance understood?



- Question assumptions:
- Initial comparisons made against RDSAP/EPC and fuel bills
  - Old buildings can perform better than predicted
- Performance in use of government department buildings
  - pre-1900 buildings most energy efficient
  - recommendation made to maximise use and refurbish pre-1900 and pre-war buildings in preference to buildings from 1940-1990

- The way forward
  - Continue process of adaptation and survival
  - Future proof not blight the buildings
  - Treat the cause not the symptoms
  - Promote environmental building conservation
  - Promote good stewardship of existing resources



- How do you make an existing building energy efficient?

- UNDERSTAND THE BUILDING

- **MAKE**
- **REAL & EFFECTIVE**
- **IMPROVEMENTS**