

2.3 Energy Efficiency of Traditional Buildings - Knowledge, Skills and Competencies

Prof. John Edwards

Energy Efficiency of Traditional Buildings
- knowledge, skills & competencies



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Retrofit defined

"add (a component or accessory) to something that did not have it when manufactured"

Oxford dictionary on-line

Energy efficiency defined

"used to describe things that use only as much energy as is needed without wasting any"

on-line dictionary

2

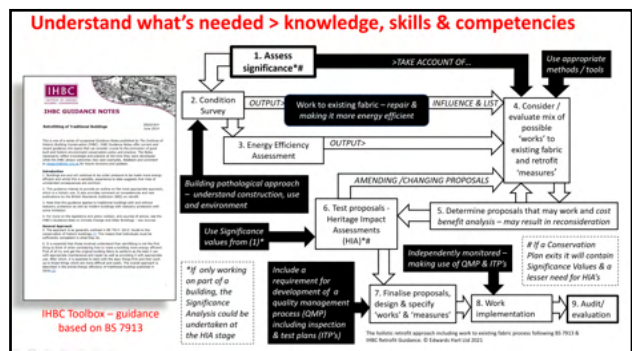
Should we be holistic?

Its not just about retrofit!

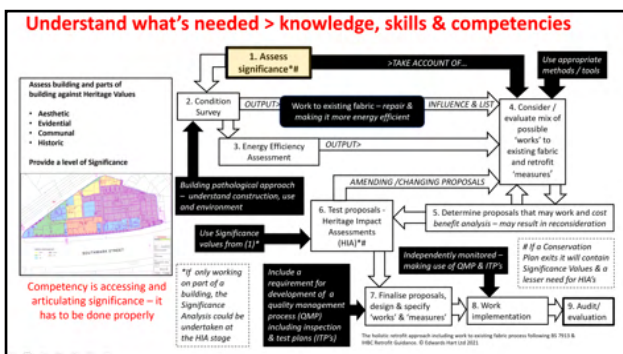
....."The most effective way of ensuring energy efficiency and sustainability is to keep buildings in good repair so that they last as long as possible, do not need replacement and do not suffer from avoidable decay that would require energy and carbon to rectify. They should provide occupancy in an efficient manner, involving minimal production of carbon and use of energy without harming significance, the physical performance of the fabric. Using natural ventilation and light, and proper temperature and humidity control for individual rooms are ways of minimizing energy usage that respect the building's material characteristics"

BS 7913: 2013, Section 5.3.1

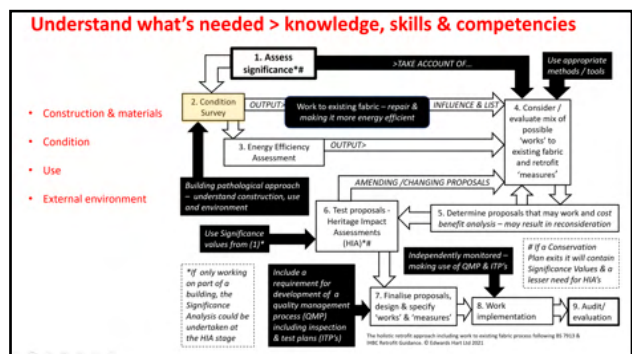
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Understand what's needed > knowledge, skills & competencies

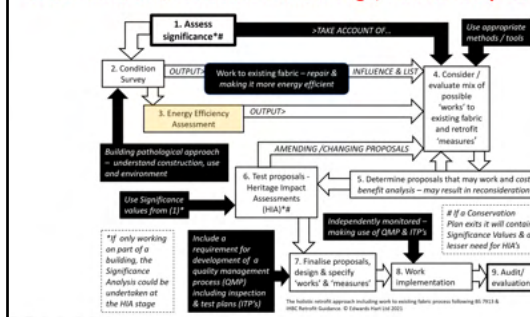
Condition Survey – quality of outcome determined by

1. the **type of building survey**: the choice between a purely visual inspection or a proper building pathological analysis
2. the **equipment used**: this can range from a simple electric moisture meter to a range of surveying equipment that can test the strength of materials, analyse the source of moisture and record true moisture levels and environmental conditions.
3. the **competence of the surveyor**: **professionally qualified** surveyor or not - **conservation accredited /certified** or not

A need for qualified and competent surveyors – BS 7913 calls for 'accreditation'

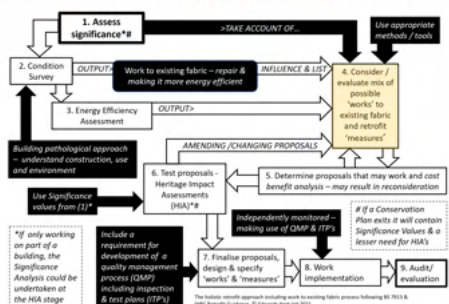
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Understand what's needed > knowledge, skills & competencies



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Understand what's needed > knowledge, skills & competencies



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Understand what's needed > knowledge, skills & competencies

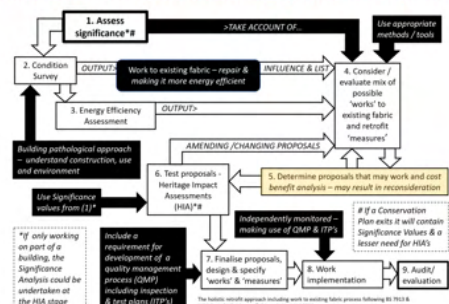
1. Check out the EPC and its recommendations
2. Assess the recommendations from the Building Survey
3. Evaluate the mix 'works' & 'measures'

Needs to be done properly by those who are competent with the requisite skill set & knowledge



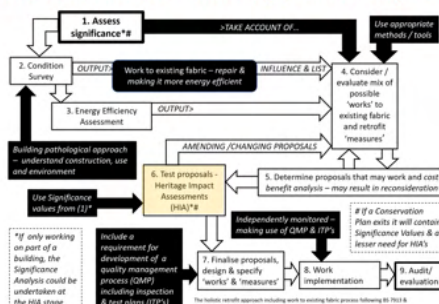
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Understand what's needed > knowledge, skills & competencies



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Understand what's needed > knowledge, skills & competencies



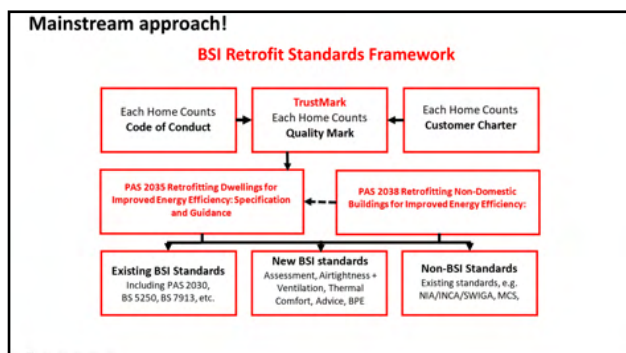
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Understand what's needed > knowledge, skills & competencies

Heritage Impact Assessment for Internal Wall Insulation

Needs to be done properly by those who are competent with the requisite skill set & knowledge – 'accredited'

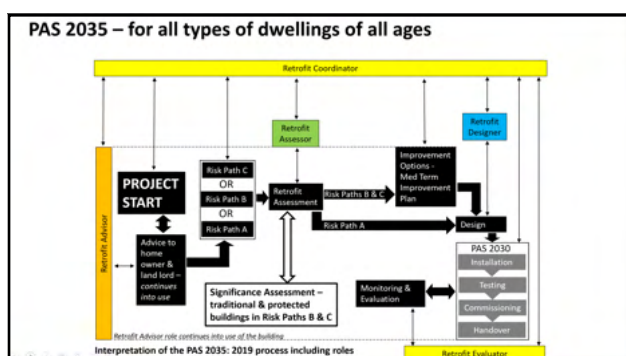
Ref	Proposal & Location	Reason for proposal	Significance	Ref / Research	Possible impact on significance	Mitigation	Other options considered	Conclusions
G	Remove modern internal plaster and existing starting boards and provide new standing joint with a ventilated cavity between it and the original walls including areas where there is bare internal brickwork. To be permeable and hygroscopic kind and if possible, re-render where they are original but otherwise with new starting boards. This follows on from the conclusions in HIA report E.	The building generally has low thermal insulation values and this proposal will have some positive impact in reducing energy consumption, reducing carbon production and improving comfort levels. D&I and other types of insulation up against the internal face is not feasible.	The modern plaster has no significance, but the original plaster and the starting boards have some significance. The bare brick walls have moderate significance.	Report sections 7.26, 7.32 and 7.33, and Energy Efficiency Report sections 3.60, 3.61, 3.62, 3.63, 3.64, 3.65, 3.66, 3.67, 3.68, 3.69, 3.70, 3.71, 3.72, 3.73, 3.74, 3.75, 3.76, 3.77, 3.78, 3.79, 3.80, 3.81, 3.82, 3.83, 3.84, 3.85, 3.86, 3.87, 3.88, 3.89, 3.90, 3.91, 3.92, 3.93, 3.94, 3.95, 3.96, 3.97, 3.98, 3.99, 4.00, 4.01, 4.02, 4.03, 4.04, 4.05, 4.06, 4.07, 4.08, 4.09, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.27, 4.28, 4.29, 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37, 4.38, 4.39, 4.40, 4.41, 4.42, 4.43, 4.44, 4.45, 4.46, 4.47, 4.48, 4.49, 4.50, 4.51, 4.52, 4.53, 4.54, 4.55, 4.56, 4.57, 4.58, 4.59, 4.60, 4.61, 4.62, 4.63, 4.64, 4.65, 4.66, 4.67, 4.68, 4.69, 4.70, 4.71, 4.72, 4.73, 4.74, 4.75, 4.76, 4.77, 4.78, 4.79, 4.80, 4.81, 4.82, 4.83, 4.84, 4.85, 4.86, 4.87, 4.88, 4.89, 4.90, 4.91, 4.92, 4.93, 4.94, 4.95, 4.96, 4.97, 4.98, 4.99, 5.00, 5.01, 5.02, 5.03, 5.04, 5.05, 5.06, 5.07, 5.08, 5.09, 5.10, 5.11, 5.12, 5.13, 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PAS 2035 – qualification and membership requirements

Level 3 Award – Energy Efficiency & Retrofit of Traditional Buildings

Requirements for the Level 3 Award Qualification in Energy Efficiency and Retrofit of Traditional Buildings in PAS 2035:2019: Retrofitting dwellings for improved energy efficiency

Role	Retrofit Advisor	Retrofit Coordinator	Retrofit Assessor	Retrofit Designer	Retrofit Evaluator
Requirement	No	Yes, but only if undertaking the Retrofit Evaluator role - all risk paths	Yes, for Risk Paths B and C when the building is protected, e.g. conservation area	No, but it is an option for some individuals in order to undertake retrofit in Risk Path C, if they are not Retrofit Coordinators	Yes, for all risk paths
Clause numbers		A.5.2 and A.2.3	A.2.3	A.4.3, A.4.5 and A.2.3	A.5.2 and A.2.3
Desirability	Yes, as advice on maintenance is a requirement and therefore should have an appropriate understanding, especially if the Retrofit Assessor does not hold the Level 3 Award qualification.	Yes, as the Retrofit Coordinator has overall responsibility and therefore should have an appropriate understanding, especially if the Retrofit Assessor does not hold the Level 3 Award qualification.	Yes, as the Retrofit Assessor must undertake a condition survey which does not make this as necessary as in other roles. However, it might still be beneficial for some	As designers are members of a building conservation certification scheme it does not make this as necessary as in other roles. However, it might still be beneficial for some	Note the Retrofit Evaluator is a Retrofit Coordinator

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PAS 2035 – qualification and membership requirements

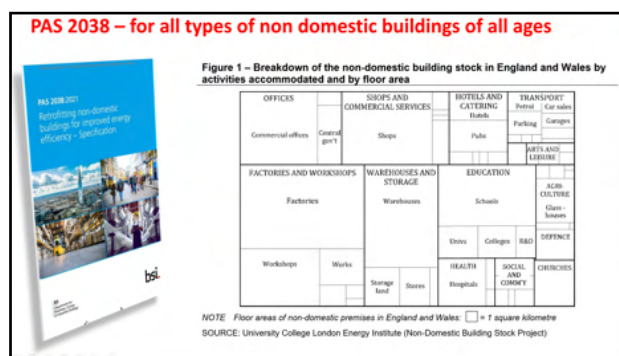
Will they achieve these objectives?

- Improve functionality and durability of buildings
- Improve the comfort and well-being of occupants
- Improve energy efficiency
- Reduce environmental impact
- Protect and enhance architectural heritage
- Minimise the 'performance gap'
- Avoid unintended consequences

(BSI Retrofit Standards Framework)

bsi.

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PAS 2038 – for all types of non domestic buildings of all ages



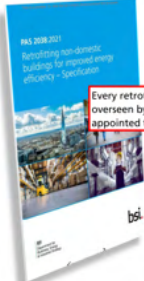
- A process with 'standards'
- No risk paths
- PAS 2035 for domestic like buildings
- Fabric first – NO
- **Competencies and professional memberships**
- Implementation PAS 2030
- Evaluation
- Over 1,000 square metres – Log books and ITP's
- Older buildings differentiated



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PAS 2038 – for all types of non domestic buildings of all ages

Retrofit Lead Professional



Every retrofit project compliant with this PAS shall be overseen by a Retrofit Lead Professional, who shall be appointed to that role by the client.

The following qualifications are examples that are considered to be appropriate; other available equivalents are also permissible. The following list is not exhaustive and qualifications required will depend on the nature of the project:

- Non-Domestic Energy Assessor (NDEA, Level 4 or 5) – for activities specified in Clauses 5 to 8 only;
- Display Energy Certificate (DEC) Assessor – for activities specified in Clauses 5 to 8 only;
- Architect or Chartered Architect;
- Chartered Architectural Technologist;
- Chartered Builder or Chartered Construction Manager;
- Chartered Building Services Engineer;
- Chartered Building Surveyor;
- Chartered Quantity Surveyor – for cost advice and activities specified in Clause 6 only;
- Construction Project Manager (Level 6); or
- Chartered Planning Consultant – for activities specified in Clause 10 only.

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PAS 2038 – for all types of non domestic buildings of all ages

Retrofit Professional Team Members



Every professional project team member shall hold at least one qualification appropriate to the role. In addition, at least one person undertaking, leading or overseeing the activities specified in Clauses 5 to 14 inclusive shall also hold at least one qualification appropriate to the role.

5 Assessment of buildings for retrofit	12 Testing, commissioning, handover, building logbook and fire testing
5.1 Requirement for assessment prior to retrofit	12.1 Testing
5.2 Scope of assessment	12.2 Commissioning
5.3 Estimate of annual energy use	12.3 Building logbook
5.4 Traditionally constructed or protected buildings	12.4 Handover
5.5 Defects revealed during assessment	12.5 Fire testing
5.6 Reporting the assessment	13 Evaluation
6 Evaluation of improvement options	13.1 The purpose and levels of evaluation
7 Agreement of intended outcomes	13.2 Basic evaluation
8 Preparation of an improvement plan	13.3 Further evaluation
9 Design and specification of retrofit work	14 Claims of compliance
9.1 Preliminary considerations and documentation	
9.2 The scope and sourcing of the retrofit design	
9.3 Design requirements	
9.4 Design documentation and handover	
10 Statutory approvals	
11 Retrofit work on site	

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PAS 2038 – for all types of non domestic buildings of all ages

Retrofit Professional Team Members



At least one member of the project team shall also be competent to provide, where necessary:

- thermal transmissivity (U value) calculations;
- condensation risk assessments (surface and interstitial);
- thermal bridging calculations in accordance with BRE IP1/06 [N1];
- thermal capacity assessments of building elements;
- whole-life costing assessments;
- whole-life greenhouse gas emissions assessments;
- energy performance estimation or simulation in accordance with BS EN 16247-2, either from fuel bills or using a recognized method compliant with the UK's National Calculation Method (NCM) for Non-Domestic Buildings [N2]; and
- radon exposure assessments.

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PAS 2038 – for all types of non domestic buildings of all ages

Retrofit Professional Team Members



4.3 Additional qualifications
Where the building to be retrofitted is of traditional construction or a protected building, then in addition to the requirements in 4.2, member(s) of the project team undertaking or leading assessment (Clause 5), improvement option evaluation (Clause 6), establishing intended outcomes (Clause 7), preparation of an improvement plan (Clause 8) or submitting or finalising applications for statutory approvals (Clause 10) shall also hold an additional qualification appropriate to the role.

Qualifications Level 3 Award – Energy Efficiency & Retrofit

4.3.2 Additional qualifications
The following additional qualifications are examples that are considered to be appropriate; other available equivalents are also permissible:

- the Level 3 Award in Energy Efficiency and Retrofit of Traditional Buildings;
- the Scottish Level 3 Award in Energy Efficiency Measures for Older and Traditional Buildings;
- the Scottish Level 6 Award in Energy Efficiency Measures for Older and Traditional Buildings;
- the Welsh Level 3 Award in Energy Efficiency Measures for Older and Traditional Buildings.

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PAS 2038 – for all types of non domestic buildings of all ages

Retrofit Professional Team Members



Where the building to be retrofitted is of traditional construction or a protected building, then in addition to the requirements in 4.2, member(s) of the project team undertaking or leading the design and specification of retrofit work (Clause 9) shall also be accredited or certified in building conservation.

Building conservation accreditation / certification for designers

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Summary - knowledge, skills & competencies are they good enough?

1. IHBC / BS7913 – ideal approach and high levels of competence insofar as BS 7913 covers a limited range of issues
2. Mainstream approach is not holistic – its only retrofit
3. Mainstream approach to dwellings lacks robustness generally
4. Mainstream approach to non domestic is better than approach to dwelling
5. Mainstream – designers to be 'accredited' / 'certified' but with caveats
6. Mainstream dwellings – little requirement for energy efficiency training concerning traditional and protected buildings
7. Mainstream non domestic - requirement for energy efficiency training concerning traditional and protected buildings is better than for dwellings
8. Project management
9. Accreditation / certification

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Conclusion – energy efficiency & retrofit of traditional buildings

If we do not have adequate knowledge, skills & competencies we are at risk of not achieving these objectives:



- Improve functionality and durability of buildings
- Improve the comfort and well-being of occupants
- Improve energy efficiency
- Reduce environmental impact
- Protect and enhance architectural heritage
- Minimise the 'performance gap'
- Avoid unintended consequences

(BSI Retrofit Standards Framework)

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