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Retrofitting of Traditional Buildings

This is one of a series of occasional Guidance Notes published by The Institute of Historic Building Conservation (IHBC). IHBC Guidance Notes offer current and recent guidance into topics that we consider crucial to the promotion of good built and historic environment conservation policy and practice. The Notes necessarily reflect knowledge and practice at the time they were developed, while the IHBC always welcomes new case examples, feedback and comment to research@ihbc.org.uk for future revisions and updates. This is a revised version of that originally published in June 2019.

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Introduction

1. Buildings are and will continue to be under pressure to be made more energy efficient and whilst this is sensible, experience to date suggests that risks of unintended consequences are common.

2. This guidance intends to provide an outline on the most appropriate approach, which is a holistic one. It also provides comment on competencies and new publications by the British Standards Institution (BSI) on retrofit.

3. Note that this guidance applies to traditional buildings with and without statutory protection as well as modern buildings with statutory protection with some limitation.

4. For more on the legislative and policy context, and sources of advice, see the IHBC's Guidance Note on Climate Change and Older Buildings – key sources

General Approach

5. The approach is as generally outlined in BS 7913: 2013: Guide to the conservation of historic buildings.(1) This means that individuals must be sufficiently competent in what they do.

6. It is essential that those involved understand that retrofitting is not the first thing to think of when considering how to make a building more energy efficient and therefore this guidance covers more than just retrofit. First of all try and get the original building fabric to perform as the best it can with appropriate maintenance and repair as well as providing it with appropriate use. After which,

it is essential to start with the easy things first and then work up to those things which are more difficult and costly. The overall approach is described in the article *Energy efficiency of traditional buildings* published in 2016.(2)

7. The approach to retrofitting traditional and historic buildings up to the design stage was described in the special 'green' edition of Context (3), which also contains a number of useful articles on the subject. Here the stages are described in the form of guidance and are also taken up to the implementation, post occupancy evaluation and auditing which is part of a quality management process.

Stages

8. Assess significance (as detailed in BS 7913: 2013) – this can later be used to inform decision making in 14 and used in 16.

9. Undertake a condition survey that will include assessing the construction and especially focuses on any issues with moisture.(4) A building pathological approach shall be taken involving the collection of environmental data (e.g. Relative Humidity, Temperature, Absolute Humidity) and searches for the cause of problems. Include issues concerning the healthy occupancy of the building.

10. Assess the use of the building and noting the number of occupants. Assess the moisture produced from the activities noted and compare to the normal sensible activities and the moisture produced from them.

11. Undertake an energy efficiency assessment and production and an energy performance certificate (EPC). For dwellings this would in most situations mean using RdSAP and for non-domestic buildings options include SBEM.(5)

12. From 9 and 10 above assess activities required that will make improvements to energy efficiency and healthy occupancy and conclude with a list of recommendations (e.g. repairs, use issues).

13. List the works recommended from the EPC (noted in 11). This must first of all involve checking the accuracy of the EPC and determining whether the recommendations are feasible and sensible (noting 8 and 9).

14. Consider the recommendations from the EPC involving the use of the free to access online STBA (6) retrofit guidance wheel and conclude with a list of works and retrofit measures. Note that the online tool only covers retrofit.

15. With the conclusions from 14. above, carry out a cost benefit analysis with the concluded recommendations. This process shall be holistic but also consider information on both payback and realistic life expectancy of the measures and works.

16. Undertake heritage impact assessments (HIA's) (as detailed in BS 7913: 2013) making use of the significance values ascertained from 8. If a significance analysis was not undertaken at 8, then it shall need to be undertaken here. The HIA will measure the impact of the proposals from 15. above and develop means of mitigation. This process to include the noting of other alternatives and detailing why they were rejected. If a Conservation Plan is in place, follow the

Conservation Policies contained therein, and supplement with HIA's as necessary.

17. If the concluded works and measures from 16. above are altered, then HIA's shall be repeated until a satisfactory outcome can be achieved.

18. Undertake a specification non-compliance risk assessment and determine means of mitigating risks as described in BS 7913. High / medium risks – mitigate through membership schemes *(e.g. Trustmark in respect of dwellings)* if they are deemed sufficiently robust or 'risk management' ensuring that the means of subsequent quality auditing is considered at this stage.

19. Design works and measures incorporating risk management requirements, as necessary. This shall include the establishment of quality management processes agreed between all parties (e.g., contractors, designers, clerk of works) and incorporate inspection and test plans (ITP's). A useful article is *Managing Risks in Building Conservation Projects*. (7)

20. Works and measures implemented, and risk management methodology adopted throughout as necessary through to completion to includes ITP's.

21. Post occupancy evaluation which shall include an assessment of the building against the information and data recorded during initial condition survey described at 9.

22. Audit scheme specification compliance as noted in 18 and 19. This is an independent process and shall include analysis of the records (e.g. ITP's) supplemented with inspections. This can be undertaken throughout the project and on completion.

BSI Publications PAS 2030 and PAS 2035 for domestic buildings (8) – to be noted

23. *PAS 2035: 2019: Retrofitting dwellings for improved energy efficiency – Specification and guidance* is the overarching standard specification for retrofitting dwellings of all types and ages. It is a product of the Each Home Counts review and has been prepared to guide all government-supported projects including those under the Energy Company Obligation (ECO). PAS 2035 does not take a totally holistic approach, in that its scope is on retrofit and not the other means by which to make homes more energy efficient. This makes it difficult to follow the 'stages' described above and therefore the recommendations of the IHBC in this guidance document.

24. Retrofitting traditional buildings needs to be risk based. PAS 2035 is not totally risk based as it advocates a 'fabric first' approach on most occasions, but provides the option of taking a totally risk based approach for traditional buildings only.

25. In PAS 2035 risks are based upon a risk matrix.

26. *PAS 2030: 2019 Specification for the installation of energy efficiency measures (EEM) in existing dwellings and insulation in residential park homes* is

implemented alongside PAS 2035 and it is a requirement for Retrofit Installers to follow.

27. There is a requirement to follow BS 7913: 2013 in PAS 2035. This includes significance analysis and heritage impact assessments. However, for non-designated traditional buildings, this is extremely light touch and largely a tick box exercise.

28. PAS 2035 stipulates several roles each with particular requirements in terms of memberships, training and qualifications. These are as follows:

- Retrofit Assessors: These assess the condition of the building, its use and the suitability of measures recommended from the energy performance certificates (RdSAP). A requirement for training and qualifications in energy efficiency and retrofit (Level 3 Award) (9) only for buildings with special protection.
- Retrofit Co-ordinators: Specialist project managers who have overall responsibility. They can perform other roles where others are not appointed. They are qualified by way of achieving a Level 5 Diploma in Retrofit Co-ordination and Risk Management. This does not cover traditional and historic buildings. The Retrofit Co-ordinators are also Retrofit Evaluators (see below).
- Retrofit designers: Design the retrofit installations. In most circumstances where non-designated traditional buildings are concerned, they need to be a member of a building conservation competency scheme, but at the lowest level in such schemes. Alternatively, they can hold a Level 3 Award qualification in the energy efficiency and retrofit of traditional buildings. Where the building has statutory protection, this membership of the building conservation competency scheme has to be at the highest level.
- Retrofit Evaluators: Evaluates the effectiveness of the retrofit installation. A requirement for training and qualifications in energy efficiency and retrofit (Level 3 Award), except in the lowest risk category. These are Retrofit Co-ordinators.

29. PAS 2035 nevertheless contains useful details and sets out training, qualification and membership requirements which are not perfect, but sets out a benchmark, which provides guidance on the minimum requirements which should be ideally adopted for all retrofit.

BSI Publication PAS 2038 for non domestic buildings (8) – to be noted

30. *PAS 2038: 2021: Retrofitting non-domestic buildings for improved energy efficiency – Specification*, is the overarching standard specification for retrofitting non-domestic buildings of all types and ages. PAS 2038 does not take a totally holistic approach, in that its scope is on retrofit and not the other means by which to make buildings more energy efficiency. This makes it difficult to follow the 'stages' described above and therefore the recommendations of the IHBC in this guidance document.

31. PAS 2038 is however, more robust than PAS 2035 and has been developed to match the normal way of developing a project to a non domestic building, with a professional team. It doesn't have the roles described under PAS 2035. Instead of a Retrofit Co-ordinator, it has a Retrofit Lead Professional.

32. PAS 2038, unlike PAS 2035 does not have risk paths

33. There are professional membership requirements in PAS 2038 but these are more flexible than PAS 2035 and there are also competency requirements for the range of activities that are part of the retrofit process.

34. There is the option not to follow PAS 2038 and to follow PAS 2035 instead if the non domestic building is small and very much domestic like in terms of building construction and building services. However, the Retrofit Co-ordinator must also be Non Domestic Energy Assessor.

35. PAS 2038 refers to BS 7913 in respect of significance analysis and heritage impact assessments, but other than that, unlike PAS 2035, it refers to *BS EN 16883: 2017: Guidelines for improving the energy performance of historic buildings'*

36. As far as the retrofit on site implementation is concerned, PAS 2038 refers to PAS 2030, but with some detail of the same kind in the document itself.

37. Unlike PAS 2035, PAS 2038 requires ITP's but only for very large buildings (over 1,000 square metres in floor area – note comments on ITP's in 19. Above.

Qualifications and Competencies

38. There is only one qualification in the energy efficiency and retrofit of traditional buildings the Level 3 Award in the energy efficiency and retrofit of traditional buildings. Whilst it is a requirement under PAS 2035 for Retrofit Assessors and Retrofit Evaluators – this means in effect Retrofit Co-ordinators as well, all those involved with retrofitting traditional buildings should obtain it. The training involved considers technical issues and heritage values into levels of significance as well as heritage impact assessments. PAS 2038 has an even greater requirement for this qualification whereby those involved or responsible for retrofit assessment (including condition survey), developing improvement option evaluations, establishing intended outcomes, the preparation of an improvement plan or making statutory consent applications will require this qualification

39. With PAS 2035 requiring designers to be members of a conservation competency scheme, for the sake of robustness, this requirement should be observed outside PAS 2035. This means that designers of retrofit work shall be a member of a conservation competency scheme and where the building is protected the category of membership shall be at the highest level. As an alternative to such membership, if the traditional building doesn't have special protection holding the Level 3 Award qualification referred to above is an alternative. The requirement for conservation competency scheme membership is more extensive under PAS2038, where the highest level of membership is

required in respect of all traditional buildings irrespective of special protection or not and here all protected buildings require this as well

Building Regulations

40. Improvements will often be necessary as a consequence of preceding planned works, known as 'consequential improvements'. In England details can be found in Part L1b section 6, in Wales Part L1b section 5 in Scotland section 6.2.8 of Technical Handbook Domestic Energy and in Northern Ireland Technical Booklet F1 paragraph 41. Whilst each country is slightly different, concessions can be granted not to undertake certain work even for non-designated traditional buildings where it is not technically feasible or effects character. It is vitally important to seek concessions where necessary.

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Endnotes

1. BS 7913: *Guide to the conservation of historic buildings*
https://www.designingbuildings.co.uk/wiki/BS_7913

2. *Energy efficiency of traditional buildings*
https://www.designingbuildings.co.uk/wiki/Energy_efficiency_of_traditional_buildings

3. *Context 149*
https://www.designingbuildings.co.uk/wiki/Retrofitting_traditional_buildings

4. *Investigation of Moisture and its Effects in Traditional Buildings*
https://environmentstudycentre.org/download/investigation-of-moisture-and-its-effects-in-traditional-buildings/

5. A reduced data version of Standard Assessment Procedure (SAP), RdSAP, is normally used for existing dwellings and options for non-domestic buildings includes Simplified Building Energy Method (SBEM).

6. Sustainable Traditional Buildings Alliance (STBA)
https://responsible-retrofit.org/wheel/

7. *Managing Risks in Building Conservation Projects*
https://www.designingbuildings.co.uk/wiki/Managing_risks_in_building_conservation_projects

8. Publicly Accessible Specifications (PAS)

9. Environment Study Centre
https://environmentstudycentre.org/courses/courses/property-facilities-management-building-surveying/energy-efficiency-measures-for-older-and-traditional-buildings/