COST ESTIMATE REPORT

TYPICAL COSTS OF RETROFITTING MEASURES TO IMPROVE ENERGY RFFICIENCY OF EXISTING BUILDINGS AND THE INSTALLATION OF MICROGENERATION TECHNOLOGY IN BATH & NORTH EAST SOMERSET AREA

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1.0 Introduction

1.1 This estimate report has been prepared upon the instruction of Bath and North East Somerset Council pursuant to a brief dated 15 February 2011, with requirements as follows:

1.1.1 Aims of the study

- To provide ball park costs for installing energy efficiency measures and micro-generation technology in existing buildings in Bath and North East Somerset for a range of building typologies.
- Identifying risks associated with implementing the measures
- Identifying opportunities for cost savings by implementing the interventions at scale

1.1.2 Detailed requirements

- 18 listed measures to be assessed for six building typologies: Pre-1700, Georgian (1700-1840), Victorian & Edwardian (1840-1919), inter war (1920-39), 1945-1964 and post-1964
- Risks associated with the measures
- Savings/ associated costs of whole building approach and neighbourhood scale intervention

2.0 Departures from Original Brief

2.1 In the course of the consultation, several departures were made from the original brief as follows.

2.1.1 Key risks

The assessment of such implications requires a technical expertise in the behaviour and performance of materials and buildings which falls outside the area of expertise of the Quantity Surveyor and so this requirement was removed from the QS brief. Comments on risk would be made by the Architect.

2.1.2 House Typologies

The original intention to study six house typologies was amended to five. The original categories of Inter War (1920-39), 1945-64 and post 1964 were merged into two 20th century categories as listed in 3.1 below.

2.1.3 Measures to be assessed

The initial list of 18 measures was amended from 18 to 30, in line with the jhcconsulting Schedule (Appendix 2 hereto).

2.1.4 Cost savings for interventions at Scale

Discussion of this aspect at the initial meeting concluded that it was unlikely that any conclusive findings would emerge due to a number of factors including the following:

- That projects on a scale would need to be undertaken by a larger contractor and so although there might be economy of scale savings in the work, there would be additional overhead and management costs compared to a smaller contractor working on a building by building basis.
- There were different interpretations of 'at scale'. If, for example, fifty buildings in one street were treated as one project, the cost would be different to fifty houses at different isolated locations around the city.

- Some of the measures proposed could be undertaken on a DIY basis at minimum cost. A large scale project would tend to rule out DIY work.
- There would be indirect costs associated with neighbourhood-scale projects including temporary rehousing and moving costs, whereas small scale works could be undertaken as houses became vacant.
- Working at scale would not be a feasible option for all house typologies.

Based on these considerations, this part of the brief was not pursued.

3.0 Methodology

3.1 The following information was prepared by jhcconsulting architects limited for the purposes of preparing estimated costs:

- A schedule of typical retrofitting measures (Appendix 2 hereto)
- Plan and section drawings of the five house typologies as follows:
  - 17th Century cottage
  - 18th Century townhouse
  - 19th Century/ Edwardian villa
  - Early 20th Century Semi-detached
  - Later 20th Century modern detached

3.2 The exercise was further informed by discussion with jhcconsulting at various stages during the consultation and the input of specialist suppliers and contractors contacted during the course of costing research.

3.3 An assessment of the cost for introducing each of the retrofit measures was established for each house typology based on quantities measured from the drawings (e.g. areas of wall insulation) and costs taken from previous projects or, where these were not available, from pricing guide books (e.g. Spon's) or specific information from specialist suppliers and contractors.

3.4 Costs were generally assessed on the basis of work being undertaken by a builder or specialist contractor but where a measure was considered sufficiently straightforward the cost of a DIY installation was also assessed.

3.5 Some consideration was given to whether a lifetime cost or annual maintenance cost could be established to enhance the information provided for each measure but this proved to be problematic due to the lack of information concerning the anticipated life and recommended maintenance regime for many of the proposed measures. Further design and technical information will be required if this part of the exercise is to be further pursued in the future.

3.6 The costs were presented in spreadsheet format (Described in Section 5 below) with the intention that the details would underlie and inform the Supplementary Planning Document (i.e. that relevant data could be extracted from it), rather than be published in full as part of it..

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4.0 Outline descriptions of house typologies

	17th Century Cottage	18th Century Townhouse	Victorian/Edwardian Villa	Early 20th Century	Later 20th Century
General Arrangement					
Nr of Floors	2	5	2	2	2
Nr of habitable rooms	4	10	6	6	5
Total floor area	116m2	288m2	143m2	96m2	86m2
External wall area	187m2	250m2	163m2	94m2	163m2
Roof area (on slope)	116m2	90m2	94m2	62m2	66m2
Nr of Windows	8	16	8	8	8
Nr External doors	2	4	2	2	2
Nr of fireplaces	2	10	3	2	0
Specification					
External Walls	450mm solid limestone	450mm solid limestone	225mm solid brick	275mm brick/brick cavity wall	275mm brick/block cavity wall
Roof coverings	Stone slate	Welsh slate	Clay tile	Clay tile	Concrete tile
Ground floor	Stone flag on earth	Stone flag on earth (basement)	Suspended timber generally; solid tiled on limecrete in hallway and kitchen	Suspended timber generally; solid tiled on limecrete in hallway and kitchen outshoot	Concrete, uninsulated
Upper floors	Timber suspended, oak or elm boards	Timber suspended, oak or elm boards	Timber suspended, softwood plain edged boards	Timber suspended, softwood tongued and grooved boards	Timber suspended, softwood tongued and grooved boards
Finishes	Lime plaster generally to walls; timber lath and lime plaster generally to ceilings	Lime plaster generally to walls; timber lath and lime plaster generally to ceilings; ornate and dado wall panelling in principal rooms	Lime plaster generally to walls; timber lath and lime plaster generally to ceilings; cornices in principal rooms	Lime plaster generally to walls; timber lath and lime plaster generally to ceilings	Gypsum plaster to walls; plasterboard and plaster to ceilings
Windows	Metal leaded casements in stone surrounds; single glazed	Timber sliding sashes; single glazed	Timber sliding sashes; single glazed	Timber casements; single glazed	Timber casements; single glazed

5.0 Explanation of Cost Matrix

5.1 General Arrangement

One matrix table is presented for each house typology. Each matrix table is arranged so that the intervention measures are listed vertically and the cost information related to each measure read off horizontally.

5.2 Installation and Maintenance/ Renewal

5.2.1 The cost information is divided into two elements. The costs beneath the 'Installation' heading relate to the initial installation costs. The 'Maintenance/Renewal' costs represent an annualised ongoing cost for maintaining the measure (i.e. servicing, cleaning, repairing) together with its eventual replacement cost at the end of its life.

5.2.2 The Maintenance/Renewal cost element of the exercise was an extension of the original brief but quickly ran into a number of difficulties, including, in most cases, lack of information regarding the life of a given product. A number of assumptions were made to allow the calculation to proceed, but as it stands, the exercise is more an exploration of where the matrix could be further developed with further technical/design input, rather than a finished product

5.3 Contractor/ DIY

5.3.1 Some of the intervention measures are considered suitable for a competent DIY-er to install and so the table provides for alternative costs according to whether the work is undertaken by a contractor or a householder.

5.3.2 The DIY costs assume purchase of materials only – from sources such as a chain DIY store or on-line store. It is assumed that the DIY-er will already have the required tools. Where a measure is not considered suitable for DIY, no cost s given and the item is shaded in grey.

5.3.3 The Contractor costs include labour and materials costs, adjusted for discounts, wastage on materials and overheads and profit. It is assumed that charges for small plant/ tools are assumed to be included within the costs. Larger items of plant (e.g. scaffolding) are priced separately for each intervention measure. It is assumed that works will be undertaken by a small builder for general work and specialist contractors where proprietary systems or products require approved installers. Where specialists are employed, it is assumed that this is on the basis of a separate contract, rather than as a sub-contract to the general builder.

5.4 Field headings: quantity/ materials/labour/ rate

These field headings appear beneath the main 'Contractor'/ 'DIY' headings. Using the loft insulation item as an example, the information contained in these fields is as follows. The Quantity column identifies the number of square metres of insulation required in the building. The Rate column provides the cost per square metre and the Amount column the total cost for the building (Quantity x Rate). The Rate is calculated from the Materials and Labour columns, which give the amount of labour hours and material cost per square metre.

5.5 Item descriptions

Each item in the jhcconsulting schedule appears in the matrix table as a heading in bold lettering. Beneath each heading are the various items that are measured and valued to arrive at the total cost for that item. Beneath Item 3.2 (DIY draughtproofing), therefore, are listed the rubber seals (for the windows), brush-type seals (for the doors), sundry consumables and

delivery cost (assuming on-line purchase) – each quantified and priced. The MS Excel version of the matrix can be 'collapsed' and 'expanded' to hide/reveal this detail, as required.

6.0 Notes, assumptions and exclusions

6.1 Generally

- The costings in the exercise are based on a series of standard model buildings. Costs for actual buildings will vary according to size, nature, location, orientation and condition. Of the building.

- It is assumed that prior to intervention measures being installed, the building is in good structural and decorative order with all relevant maintenance routines up to date.

- The intervention measure are costed on the basis of each being undertaken as a stand-alone project. It is possible that if several items were combined into a single project, or a whole-house approach were taken, savings would be achieved.

- It is assumed that the intervention measures described would be undertaken in the order proposed in the jhcconsulting schedule. For example, that draught proofing and insulating would precede boiler replacement (the sizing of the boiler being based on improvements to the thermal performance of the building having already been achieved).

- Many of the measures considered in the exercise include work involving techniques and technologies which are either new or uncommon and so there is a relative paucity of market cost information. .It is likely that tender prices for such work may vary significantly due to the inexperience of contractors with specific materials/ techniques until such measures become more commonplace as the market develops.

- It is expected that as markets mature and installation of such measures become commonplace, costs will decline.

- Works would be commissioned on the basis of competitive quotations submitted by reputable builders/ contractors who are competent to undertake the work.

- The builder/ contractor would have reasonable access to the site, suitable space available for storage and free use of electricity and water.

- The costings for each item consider only the works described and exclude any consequential work that may prove necessary such as structural strengthening or alterations and redecoration.

6.2 Cost sources

A list of cost sources is included with the matrix tables. In the main, costs have either been built up from first principles (labour and materials) or have been sought from specialist suppliers/ contractors based on the drawings of the model buildings. Other items, where design detail is undeveloped ore data was not available to allow a specialist to provide a cost estimate have been based on budget allowances based on experience on previous projects or in discussion with the specialist concerned.

6.3 VAT

- The costings generally include VAT at the prevailing rates: 20% generally and 5% for energy saving materials (as designated by HMRC). Where a building is listed, measures which

constitute 'alterations' (as defined by HMRC) and which have been given listed building consent will be subject to zero rating. It is assumed that the 17th and 18th Century model buildings are listed.

- It should be noted that the benefits of zero rating and reduced rating will only be fully realised where a VAT registered contractor undertakes the work. Where work is undertaken by a non-VAT-registered contractor or on a DIY basis, it will not be possible to recover the VAT paid on the purchase of materials.

6.4 Specification/Scope

- The costs for loft insulation assume work only to the areas where access is readily achievable, without the need to remove structures or finishes to gain access. The following areas are not therefore included:
  - 17th Century cottage; the lower part of the roof slope, beneath the collar (where the lath and plaster finish will be applied directly to the underside of the rafters); the single storey outshoot at ground level where it assumed there is no loft access.
  - 18th Century townhouse: the lower part of the mansard roof forming the external wall (where the lath and plaster finish will be applied directly to the inside face of the rafters). This element is however considered as part of the internal insulation to the external walls.
  - 19th Century villa: the roofs to ground floor bay windows; the area of flat roof
  - Early 20th Century semi: the roofs to bay windows
  - Late 20th Century detached: the roof to the front porch
- The exercise does not take into account various initiatives by government, energy companies and others to install energy saving measures such as roof insulation. Prices quoted for such works are subject to special offers (e.g. by energy suppliers), cross subsidy and other pricing distortions and cannot be relied upon to be available at all times.
- The measures described are costed on the basis that they are undertaken as part of an iterative and strategic process. For example, the sizing (and therefore cost) of the replacement boiler assumes that the measures to improve air-tightness and thermal efficiency of the building will also be undertaken or are already in place.
- The costings for the 18th Century townhouse exclude treatment (e.g. thermal insulation) of the undercroft area.
- The costing for the woodburning stove on the late 20th Century house assumes installation of a stainless steel external flue.
- The costings for thermal shutters are on a budget basis only. The design of these needs to be developed.
- Further assumptions are stated against individual items in the costing spreadsheets.

6.5 Inflation

The costings are based at mid-2011 and make no allowance for price inflation.

6.6 Professional fees

Some measures may require professional design input. The cost of this is excluded.

7.0 Limitations of the exercise

7.1 As stated earlier, the costings are based upon a series of generic models. It is likely that costs for real buildings will vary widely according to the nature, location, condition and arrangement of structures and building services and assumptions made in the modelling. This is not, however, wholly a function of the fact the buildings are models: many of these limitations would apply even if real buildings had been used in the assessments. It does mean though that the presentation of the figures needs to be carefully considered, such as placing the various measures into cost bands: e.g. less than £100, £100-£500, etc.

7.2 A number of the measures described are very much site specific and so definite costings could not be established. Examples include splitting heating systems into zones and ground source heat pump installations. For others, further design work is required, e.g. the thermal shutters. In all such cases, a budget allowance has been made or assumptions have been made upon which a costing can be derived.

7.3 The models reflect a series of buildings which have been assumed to have been more or less unaltered since construction. In reality, most buildings have been subject to change through their lifetimes and so elements of two or more of the model typologies may exist in a single building or earlier modernisations may mean that measures cannot be applied as indicated or without complication or undoing previous work.

7.4 Some measures were not applicable to some building types and these are noted in the matrix table and highlighted in grey shading.

8.0 Potential future development

8.1 The measures described represent in many cases one of various alternative specifications that might be employed in any given situation, potentially at significantly different cost. It would be possible to extend the scope of the exercise to study a variety of different specifications to encompass the range of possible costs.

8.2 As noted in 5.2.2, the figures presented for maintenance and renewal costs could be further developed.

8.3 An issue which was discussed but could not be developed within the scope of this exercise was the potential payback period for the retrofit measures described. There would be many variables within such an assessment – not least the construction and orientation of the building and the behaviour of the occupant. Nevertheless, it is anticipated that just such assessments will need to be made as part of the proposed Green Deal embodied in the Energy Bill introduced into the UK parliament in December 2010. The Government has not yet determined the method of calculating payback, but once this is established, it may be beneficial to include such data alongside the cost information.

8.4 The costings represent very much a snapshot in time of methods, technologies and markets that will all develop; and potentially quite rapidly. Any printed publication may well become obsolete within a relatively short period of time and it may prove beneficial to consider a web-based publication that can be updated on a regular basis. This may become particularly relevant when the Green Deal is launched.

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