Guidelines for improving the energy performance of Traditional and Historic Buildings

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IEA-SHC TASK 59 Annex 76

Peter Cox

President ISCES+CC
CEN/TC 346
Conservation of cultural heritage

WG-8
Conservation of cultural heritage — Guidelines for improving the energy performance of Historically, Architecturally and Culturally Important Buildings
What is a standard?

• A standard is a document containing specifications or recommendations in relation to products, systems, processes or services.

• A standard can be used for guidance or be a more strict specification

• Standards, unlike legislation, are essentially voluntary in application unless called up into legislation or cited as part of a contract.
The working group

- Around 45 members
- 12 countries
- Convenor: Norway – Marte Boro
- Editorial task group

Richard Ansdell: The Fight For The Standard
Work plan

Pre-adoption

Informal enquiry

Activation

CEN Enquiry

Final draft

Final vote

National Mirror groups

2011

2017
Scope

• This European Standard provides guidelines for sustainably improving the energy performance of historic buildings, e.g. historically, architecturally or culturally valuable buildings, while respecting their heritage significance.

• The use of this standard is not limited to buildings with statutory heritage designation, it applies to historic buildings of all types and ages.

• This European Standard presents a normative working procedure for selecting measures to improve energy performance, based on an investigation, analysis and documentation of the building including its heritage significance.
General recommendations

1. Principles of building conservation
2. Qualification requirements
3. Sustainable management of historic buildings
4. Existing building envelope and technical systems
5. User behaviour
Qualification requirements

• A multidisciplinary approach in close cooperation with the owners and users of the building.

• The relevant heritage authorities shall be involved in accordance with national practices and legislation.

• The project team shall have the general architectural and technical qualifications required for any refurbishment project as well as documented knowledge of and experience in work with historic buildings.

• The project team shall be scaled to suit the complexity of the project. For less complex projects and for minor interventions the project team may be reduced provided that it still covers the range of expertise needed.
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Procedure

“This European Standard presents a normative working procedure for selecting measures to improve energy performance”
Initiating the planning process

• Assemble a qualified team
• Coordinate with general plans for general maintenance
• Site visit
• Early dialogue with all stakeholders
• Routines for documentation and communication
• Economic resources shall be identified at an early stage in the project.
• However, the district perspective should be kept in mind.
Specifying the objectives

• technical compatibility;
• heritage significance of the building and its settings;
• economic viability;
• energy;
• indoor environmental quality;
• impact on the outdoor environment;
• aspects of use.
Deciding if improvement of energy performance is required

Targets

Present status of the building

Stop or go?
Assessment and selection of measures for improving energy performance

1. compile a long list of measures
2. exclude inappropriate measures
3. assess remaining measures
4. select packages of measures
5. assess in relation to targets
In order to allow for an overall assessment, a five-level scale is proposed. The results are summarized in a table based on the categories and criteria as shown in Table 2. This method should not be seen as a mechanical tool that provides an answer; rather it is meant to allow for a transparent assessment and the interdisciplinary dialogue that is needed to identify the interventions that best meet the requirements of the building in question. An example of a table with assessments is shown in Annex B.

Table 2 — An assessment scale

<table>
<thead>
<tr>
<th>Assessment scale</th>
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</thead>
<tbody>
<tr>
<td>High risk</td>
<td>Low risk</td>
</tr>
<tr>
<td>Assessment category</td>
<td>Assessment criteria</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------</td>
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<tr>
<td>Technical compatibility</td>
<td>hygrothermal risks</td>
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<td></td>
<td>structural risks</td>
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<td></td>
<td>corrosion risks</td>
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<td>salt reaction risks</td>
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<td></td>
<td>biological risks</td>
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<td></td>
<td>reversibility</td>
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<td>Heritage significance</td>
<td>material impact</td>
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<td></td>
<td>visual impact</td>
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<td></td>
<td>spatial impact</td>
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<td>Economic viability</td>
<td>capital costs</td>
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<td></td>
<td>operating costs, including maintenance costs</td>
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<td></td>
<td>economic return</td>
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<td></td>
<td>economic savings</td>
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<tr>
<td>Energy</td>
<td>energy performance and operational energy demand: primary energy rating (total)</td>
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<td></td>
<td>primary energy rating (non-renewable)</td>
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<tr>
<td></td>
<td>primary energy rating (renewable)</td>
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<td></td>
<td>energy saving</td>
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<td></td>
<td>embodied energy, life cycle energy demand</td>
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<tr>
<td>Indoor environment</td>
<td>indoor environmental conditions suitable for</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment category</th>
<th>Assessment criteria</th>
<th>Measure 1</th>
<th>......</th>
<th>Measure n</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>building content preservation</td>
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<td>indoor environmental conditions suitable for building fabric preservation</td>
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<td></td>
<td>indoor environmental conditions suitable for achieving good occupant comfort levels</td>
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<td></td>
<td>emission of other harmful substances</td>
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<tr>
<td>Outdoor environment</td>
<td>green house gas emissions, from measures implemented and operation</td>
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<td></td>
<td>emission of other harmful substances</td>
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<td></td>
<td>water consumption</td>
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<td></td>
<td>natural resources</td>
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<tr>
<td>Aspects of use</td>
<td>influence on the use of the building</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
And finally....

• Implementation
  – General advice

• Documentation
  – Specific to historic buildings

• Assessment
  – Targets met?
  – Early assessment: functionality, need for adjustments
  – Long term (periodic) assessment: performance
Process

Initiating the planning process (6)

Building survey and assessment (7)

Specifying the objectives (8)

Deciding if improvement of energy performance is needed

Assessment and selection of measures for energy refurbishment (10)

Compile along list of measures (10.3)

Exclude inappropriate measures (10.4)

Assessment of remaining measures (10.5)

Selection of packages of measures (10.6)

Assessment of packages in relation to targets (10.7)

Decision

Outcome

Building documentation

List of targets

If no need – end of process

Long list of measures

Short list of measures

Packages of measures

Proposed measures
BS EN 16883:2017

Conservation of cultural heritage. Guidelines for improving the energy performance of historic buildings

Status: Current  Published: June 2017

Price
£190.00

Member Price
£95.00

Become a member and SAVE 50% on British Standards. Click to learn more
International standards and guidelines

- ASHRAE Energy Guidelines for Historical Buildings
- International Scientific Committee on Energy, Sustainability, and Climate Change
- Conservation of cultural heritage — Guidelines for improving energy performance of historic buildings
IEA SHC Task 59 / EBC Annex 76
Renovating Historic Buildings
Towards Zero Carbon
IEA is an autonomous agency established in 1974. The IEA carries out a comprehensive programme of energy co-operation among 29 advanced economies.

The IEA organises **Technology Collaboration Programmes**. TCP are independent, international groups of experts that enable governments and industries from around the world lead programmes and projects on a wide range of energy technologies and related issues.
Countries from all over the world have joined together under the forum of SHC to share information and transfer experience in order to support good policy development in the field of solar thermal energy.

The Programme's work is enhanced through collaboration with other IEA Programmes (Energy Conservation in Buildings Programme, Photovoltaic Power Systems Programme, and SolarPACES Programme) and solar trade associations.
Task 59 / Annex 76

Deep Renovation of Historic Buildings towards lowest possible energy demand and CO2 emission (NZEB)

Operating agent: Alexandra Troi, Eurac research

Task within the IEA SHC programme
Collaboration with IEA EBC programme on “moderate level”

Start: September 2017
End: February 2021
There is a need e.g. in Europe.
There is a need
In the last 10 years a shift in paradigm could be observed from
from “don’t touch our buildings”
to “let’s find the right solutions together”

Examples
• ICOMOS scientific committee
• Standardisation initiative from Heritage TC in CEN
Definitions / scope

- **Historic buildings** according EN 16883 all buildings with elements “worthy of preservation” which can be buildings of all types & ages, not just listed/protected buildings.

- **NZEB** according IEA SHC Task 40 | EBC Annex 52 as equalized energy balance is reached by bringing together architectural design, energy efficiency and local use of renewable.

- **Lowest possible energy demand**—heritage value as constraint, but not only, additional parameters like comfort & economic feasibility.

- **Solar renovation** as a holistic approach, reducing the energy demand and providing energy from the sun (daylight, passive & active solar).
Holistic approach – Solar renovation

1) REDUCE DEMAND
2) PROVIDE FROM SUSTAINABLE SOURCES

Whole range of solar!
- Daylighting
- Passive solar energy
- Solar thermal
- Photovoltaics
- Hybrid
Target audience

- Architects and consultants
- Building owners & users
- Developers and contractors
- Policy makers
- National heritage authorities
- Craftsperson & construction industry
- Educational bodies
Proposed Task Structure

A. Knowledge Base
B. Multidisciplinary planning process
C. Conservation compatible retrofit solutions
D. Demonstration and dissemination
A – Knowledge Base

Task lead: e7 / Austria

Based on Task 37 and Task 47 experience

BUT moved to database → filters, searchable

Target audience: Architects

3ENCULT, EFFESUS, P-RENEWAL, 4RinEU, SparaochBevara, RIBUILD, GründerzeitmitZukunft, SINFONIA, HIE, hBAT\textsuperscript{ec}, national projects AT/DK,/NZ ...

Contributions from you?
D – Knowledge Transfer & dissemination

Task lead: Historic Environment Scotland / UK

Online communication and dissemination activities
- Website (regularly updated) and project flyer
- News (at least two per year)
- Audio-visuals & webinars

Onsite communication and dissemination activities
- Touring exhibition
- Participation in stakeholder events (min. 1 per participating country)
- Workshop series in conjunction with the six-monthly expert meetings and relevant conferences (EEHB 2018, Docomomo2018, ICOMOS 2019, EEHB 2020 etc.)
- Contribution to policy events (in at least 3 countries)

Scientific & professional Communication
- Scientific papers, Articles in trade magazines
Partners & programmes
Deep Energy Renovation of Traditional Buildings

Addressing Knowledge Gaps and Skills Training in Ireland

The Sustainable Energy Authority of Ireland
The Heritage Council
Carrig Conservation International, Ltd.
ICOMOS Ireland National Scientific Committee on Energy, Sustainability and Climate Change (NSCES+CC)

Author
Caroline Engel Purcell, PhD Arch, MSc Arch Cons, BA Arch

NSCES+CC Steering Committee
Colm Murray, The Heritage Council; Peter Cox, ICOMOS International Scientific Committee on Energy, Sustainability and Climate Change and Carrig Conservation International Ltd.; Leila Budd, Carrig Conservation International Ltd.; Deirdre McDermott, Vice President of ICOMOS Ireland.

Key Outcomes

1. Discussion with Sean Armstrong, Senior Advisor – Building Standards, DHLG about the forthcoming revision of Part L and TGD L

2. SEAI is using this report to inform the deep energy renovation of traditional buildings as part of its Deep Retrofit Pilot Programme

3. Reapplied for SEAI RD&D H2020 funding to develop this report into a 10-module CPD training course for architects, engineers and building surveyors in Ireland

Available for free download from the Heritage Council, the ICOMOS International Open Archive and Carrig Conservation

March 2018