Traditional Building Seminar, Kilkenny, October 22nd

Knowledge, Training & Understanding Deep Energy Renovations of Traditional Buildings.

Peter Cox

Managing Director of Carrig Conservation International

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conservation international

CARRIG conservation international | Research

CARRIG conservation international | Energy Conservation

Peter Cox, Managing Director
Dr Caroline Engel Purcell, Head of Research

Some Carrig Projects

Introduction

We have been involved in the following studies

- Fraunhofer Institute of Building Physics
- CEN Technical Committee 346 – WG 8 which delivered EN16883:2017
- 2010 Climate Change and it's Effect on Heritage
- Vulnerability Atlas for Heritage Sites in Wexford
- Gap Analysis of Deep Energy Retrofit Skills & Training
- 10 Module CPD Course on the above
- Understanding Carbon in the Built Environment
- Future of our Past

Introduction

What I will cover in my talk:

- A Short Background
- Our Experience
- Gap Analysis in Deep Retro Fit Skills & Knowledge
- New CPD Course
- Understanding Carbon in the Built Environment
- Worst Case Scenario

Location: Monastery Benediktbeuern

Fraunhofer IBP

Benediktbeuern

The Building: Alte Schäfflerei / *Old Cooperage*

Front view of the building before renovation.

Fraunhofer IBP

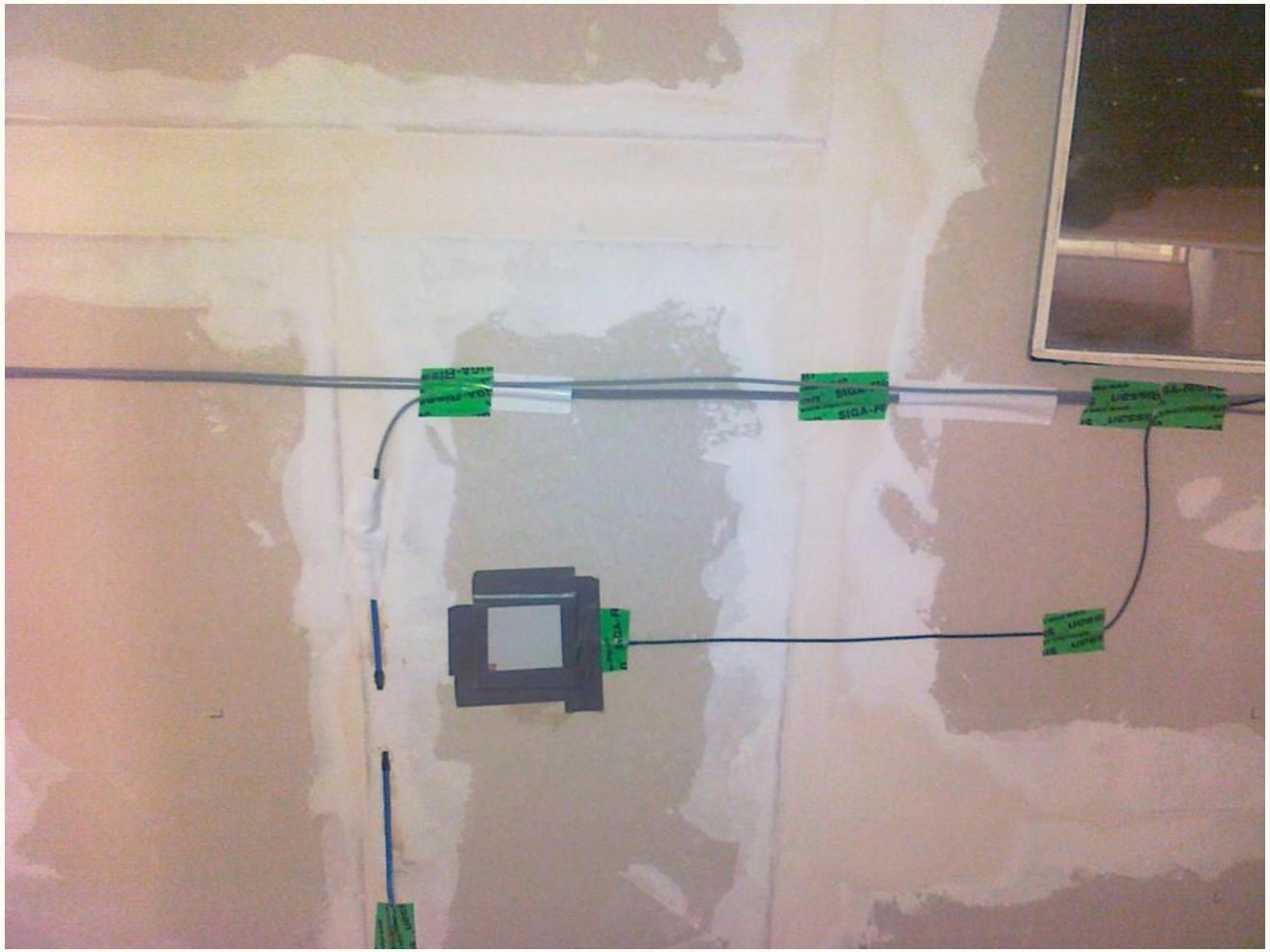
Fraunhofer-Zentrum für energetische Altbausanierung und Denkmalpflege Benediktbeuern

Kopfbau der Alten Schäfflerei

Fraunhofer IBP

Benediktbeuern

Benediktbeuern



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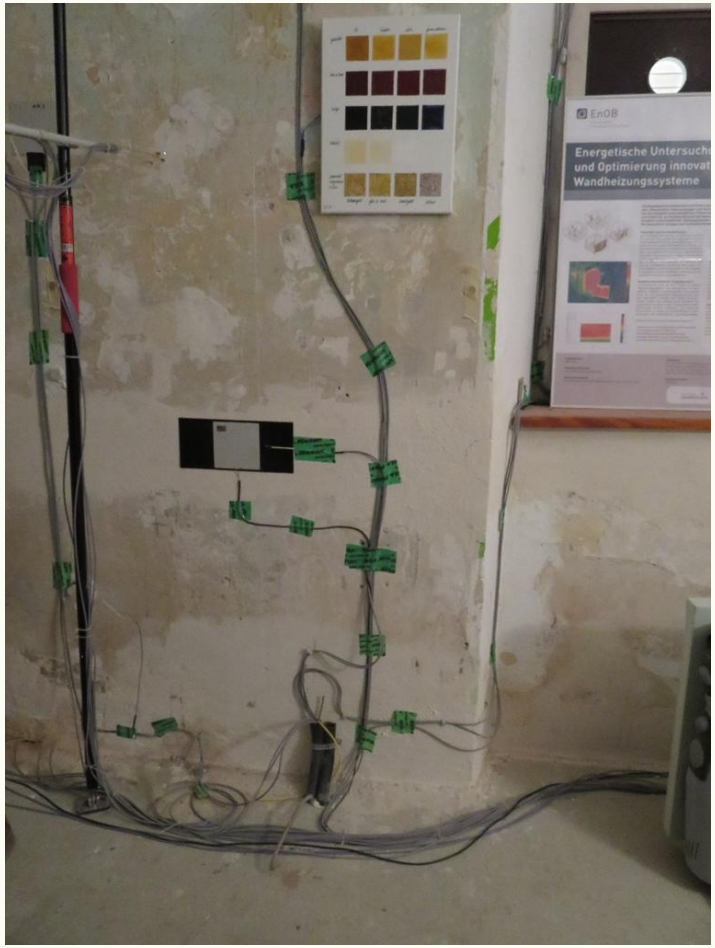

Building Typologies

Deep Energy Renovation of Traditional Buildings

Addressing knowledge gaps and skills training in Ireland

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Navigatin
Gaps in R
Practice

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.

March 2018

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2.4 Understanding Traditional Buildings

2.4.1 Building Physics and Hygrothermal Behaviour

Nearly all buildings constructed in Ireland from medieval times up until 1940 were constructed using traditional methods[94], but what is a 'traditional' building? According to the 2010 DEHLG Advice Series publication *Energy Efficiency in Traditional Buildings*, traditional buildings in Ireland primarily consists of those built with solid masonry walls of brick or stone, often originally finished with a lime-based render, single-glazed timber or metal windows, and a timber-framed roof clad in slate, tiles, copper or lead. Solid masonry walls do not contain an air-filled cavity but were instead often filled with small stones or lime mortar. Brick walls were finished internally with a lime-based plaster while rubble walls were finished both internally and externally with a breathable lime-based plaster that allowed internal moisture to escape through the walls.

Traditional buildings require sufficiently thick external walls to ensure that drying cycles occur before atmospheric moisture reaches the internal wall face. It is essential that all materials and finishes, including mortars[95] and renders[96], used on traditional walls are porous to allow this natural transfer of moisture to occur. Basic guidance on the detriment of non-porous materials like cement is provided in the HES Inform Guide *Lime and Cement Mortars in Traditional Buildings*[97]

The 2007 Conservation Advice Series publication *Maintenance: A Guide to the Care of Older Buildings* also provides a brief overview for homeowners on how old buildings work and how to deal with three common types of damp: rising, penetrating and condensation.[98]

Under the Intelligent Energy Europe TABULA Project (2009-2012), a study of common Irish residential building typologies and their typical energy and thermal properties was developed into an

Advice Series: Energy Efficiency in Traditional Buildings (2010)

Advice Series: Maintenance - A Guide to the Care of Older Buildings (2007)

HES Technical Advice Note 15: External Lime Coatings on Traditional Buildings (2001)

HES Short Guide 6: Lime Mortars in Traditional Buildings (2014)

HES INFORM Guide: Lime and Cement Mortars in Traditional Buildings (2016)

[94] *Advice Series: Energy Efficiency in Traditional Buildings* (2010), Dublin: Department of the Environment, Heritage and Local Government. Available at: https://www.chg.gov.ie/heritage/built-heritage/architectural-heritage-advisory-service/advice-for-owners/. p 5.
[95] Snow, J. and Torney, C. (2014) *Short Guide 6: Lime Mortars in Traditional Buildings.* Edinburgh: Historic Environment Scotland.
[96] Newsom, S., Gibbons, P. and Brown, S. (2001) *Technical Advice Note 15: External Lime Coatings on Traditional Buildings*, Edinburgh: Historic Environment Scotland. Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=33c274be-9e98-49d5-9b24-a5c200f9c7bb.
[97] Mitchell, D. D. and Torney, D. C. (2016) *INFORM Guide: Lime and Cement Mortars in Traditional Buildings*, Edinburgh: Historic Environment Scotland. Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=9410b4db-0fbb-41e4-ba8d-a59500f5618d.
[98] Donnelly, J. (2007) *Advice Series: Maintenance - A Guide to the Care of Older Buildings*, Dublin: Department of Culture, Heritage and the Gaeltacht. Available at: https://www.chg.gov.ie/heritage/built-heritage/architectural-heritage-advisory-service/advice-for-owners/.

ENERGY RENOVATION & MOISTURE-RELATED RISKS

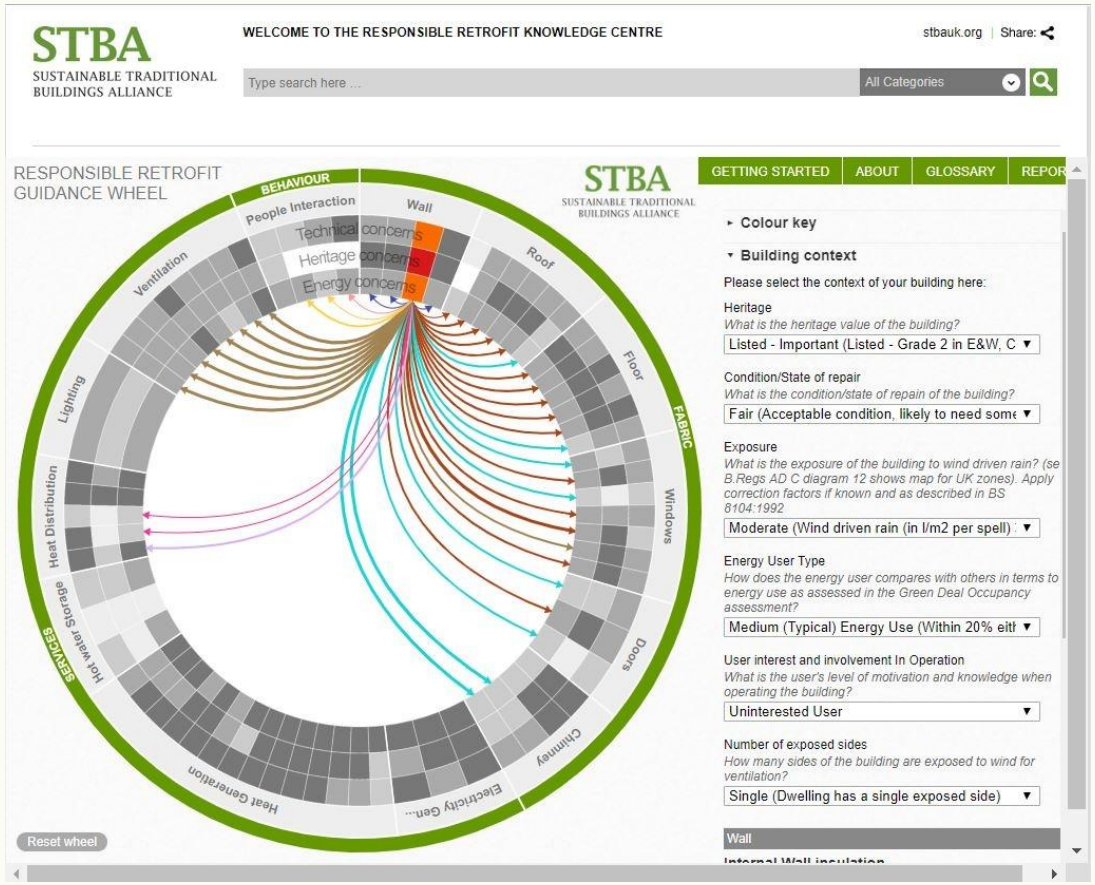
- **Reputable Information Sources**
- UK Centre for Moisture in Buildings (UKCMB)
- Building Research Establishment (BRE)
- Sustainable Traditional Building Alliance (STBA)
- Society for the Protection of Ancient Buildings (SPAB)
- Historic Environment Scotland (HES)
- Historic England (HE)

http://www.ukcmb.org/resources/Outputs

Reputable Information Sources

- **Historic Environment Scotland (HES)**
  - Technical Reports, Technical Advice Series & Refurbishment Case Studies
  - Little, J., Ferraro, C. and Arregi, B. (2015) *HES Technical Paper 15: Assessing Risks in Insulation Retrofits using Hygrothermal Software Tools - Heat and Moisture Transport in Internally Insulated Stone Walls*
- **Historic England (HE)**
  - Energy Efficiency and Historic Buildings series*:*
    - *How to Improve Energy Efficiency (2018)*
    - *Insulating Solid Walls (2016)*
  - Research Report Series*:*
    - *Hygrothermal Modelling of Shrewsbury Flax Mill Maltings*
    - *External Wall Insulation in Traditional Buildings - Case Studies of Three Large-scale Projects in the North of England*
- **Sustainable Traditional Building Alliance (STBA)**
  - May, N. and Sanders, C. (2017) *Moisture in Buildings: An Integrated Approach to Risk Assessment and Guidance*
  - *STBA Responsible Retrofit Wheel* (2017; adapted for France 2018)

Measuring risk vs benefit of energy renovation options
(Historic England, *How to Improve Energy Efficiency*, 2018)



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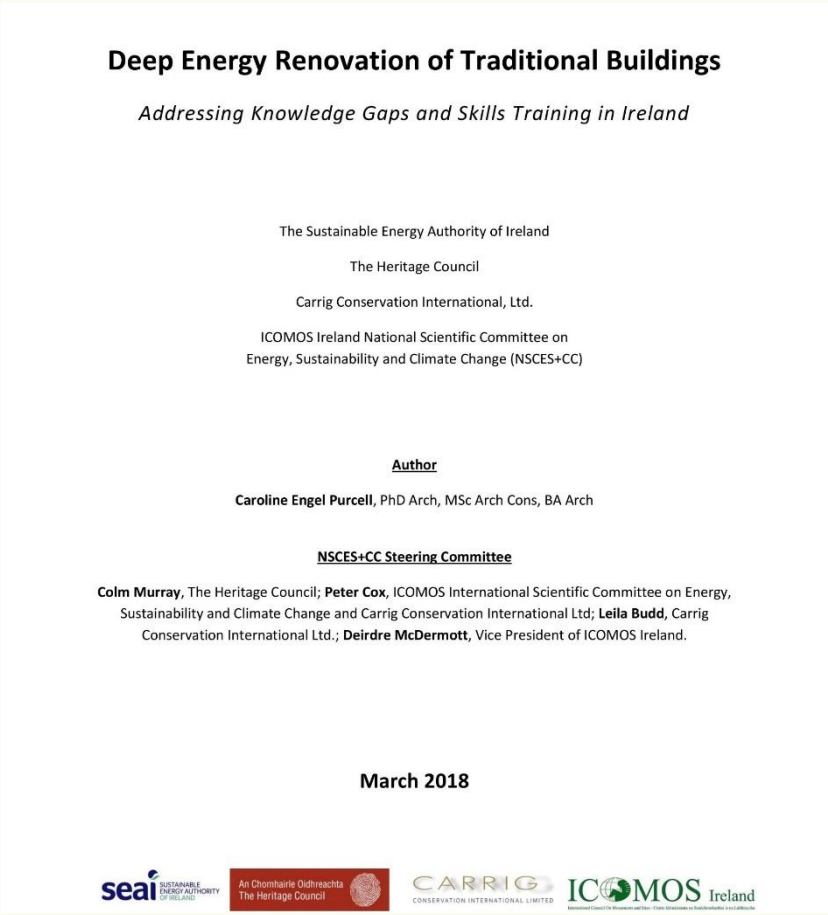
Deep Energy Renovation of Traditional Buildings
Addressing Knowledge Gaps and Skills Training in Ireland

Contracting Authority: Sustainable Energy Authority of Ireland (SEAI)
Partner: The Heritage Council



Deep Energy Renovation of Traditional Buildings

Addressing Knowledge Gaps and Skills Training in Ireland

The Sustainable Energy Authority of Ireland

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Author

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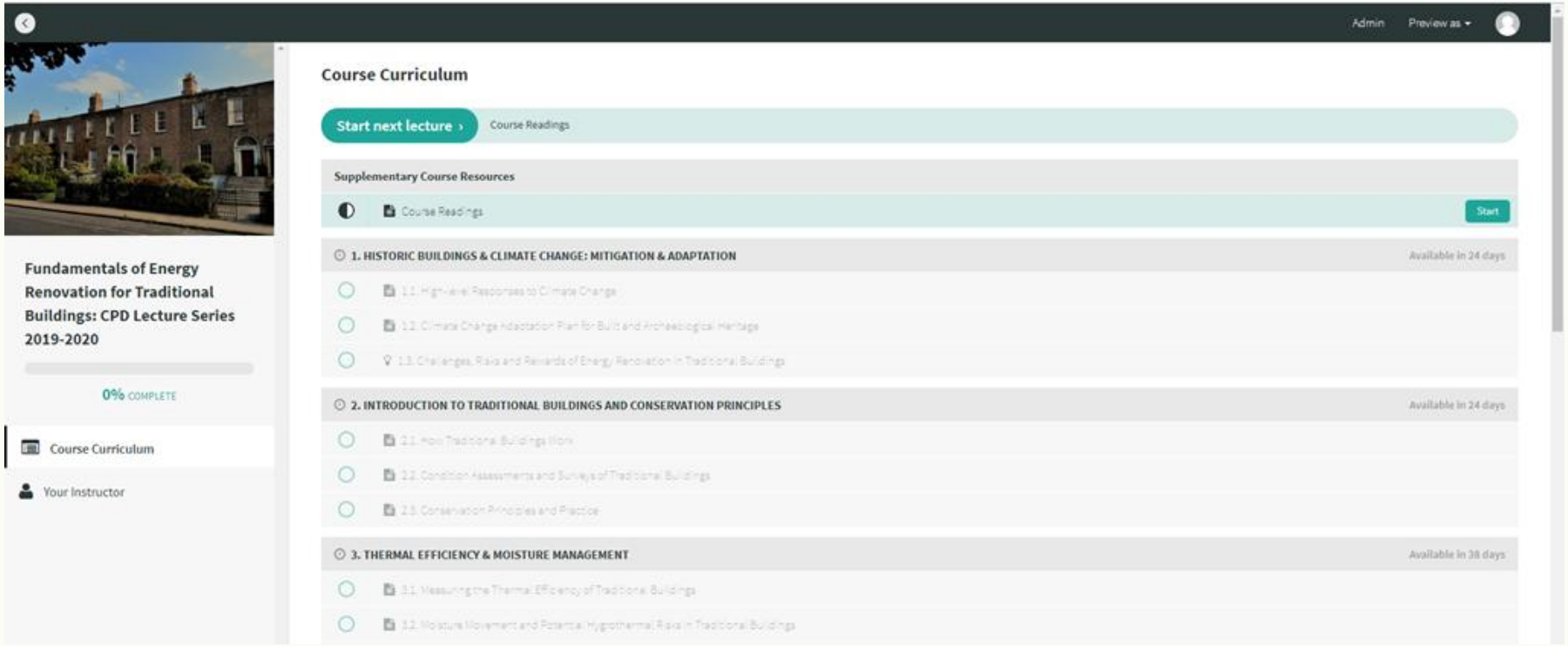
March 2018

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND
An Chomhairle Oidhreachta The Heritage Council
CARRIG CONSERVATION INTERNATIONAL LIMITED
ICOMOS Ireland

Fundamentals of Energy Renovation for Traditional Buildings: CPD Course

- Developed in conjunction with the Heritage Council
- Attendance fees subsidised by SEAI
- 5 lecture days from November 1st 2019 to January 31st 2020
- Continuing Professional Development (CPD) credits provided by Royal Institute of the Architects of Ireland (RIAI) and Engineers Ireland (EI)

Fundamentals of Energy Renovation for Traditional Buildings: CPD Course



Attendees will be supported by an online resource with suggested readings, speaker presentations and practice quizzes to test knowledge and comprehension.

Modules (2 per day):

1. HISTORIC BUILDINGS & CLIMATE CHANGE: MITIGATION & ADAPTATION
2. INTRODUCTION TO TRADITIONAL BUILDINGS AND CONSERVATION PRINCIPLES
3. THERMAL EFFICIENCY & MOISTURE MANAGEMENT
4. UPGRADING BUILDING SERVICES & INTEGRATING RENEWABLE ENERGY SOURCES
5. LOW-RISK, HIGH-IMPACT ENERGY RENOVATION WORKS
6. SOLID WALL INSULATION
7. COMPLYING WITH BUILDING REGULATIONS & TAKING A BALANCED APPROACH T O RE N OV AT ION
8. PROJECT COORDINATION AND RISK MANAGEMENT
9. REDUCING THE ENERGY PERFORMANCE GAP
10. DEALING WITH KNOWLEDGE GAPS AND UNCERTAINTIES IN PRACTICE

Fundamentals of Energy Renovation for Traditional Buildings: CPD Course

An Chomhairle Oidhreachta
The Heritage Council

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***Fundamentals of Energy Renovation for Traditional Buildings: CPD Lecture Series* 2019-2020**

Lecture Topics

The following 10 modules will be delivered over the 5 days of the lecture series (2 modules per day).

1. Historic Buildings & Climate Change: Mitigation & Adaptation

1.1. High-level responses to climate change – *Peter Cox, Carrig Conservation International Ltd.*
1.2. Climate Change Adaptation Plan for Built & Archaeological Heritage – *Dr Cathy Daly, University of Lincoln*
1.3. Challenges, risks and rewards of energy renovation – *Chris Morgan, Scottish Ecological Design Association*

2. Introduction to Traditional Buildings and Conservation Principles

2.1. How traditional buildings work – *Carl Raftery, Dublin City Council*
2.2. Condition assessments and surveys of traditional buildings – *Frank Keohane, Chartered Building Surveyor*
2.3. Conservation principles and practice – *Jacqui Donnelly, Dept of Culture, Heritage & the Gaeltacht*

3. Thermal Efficiency & Moisture Management

3.1. Measuring the thermal efficiency of traditional buildings – *Joseph Little, Technical University Dublin*
3.2. Moisture movement and potential hygrothermal risks – *Colin King, UK Centre for Moisture in Buildings*
3.3. Case Study: New Court, Trinity College, Cambridge – *Dr Caroline Rye, Archimetrics Ltd.*

4. Upgrading Building Services & Integrating Renewable Energy Sources

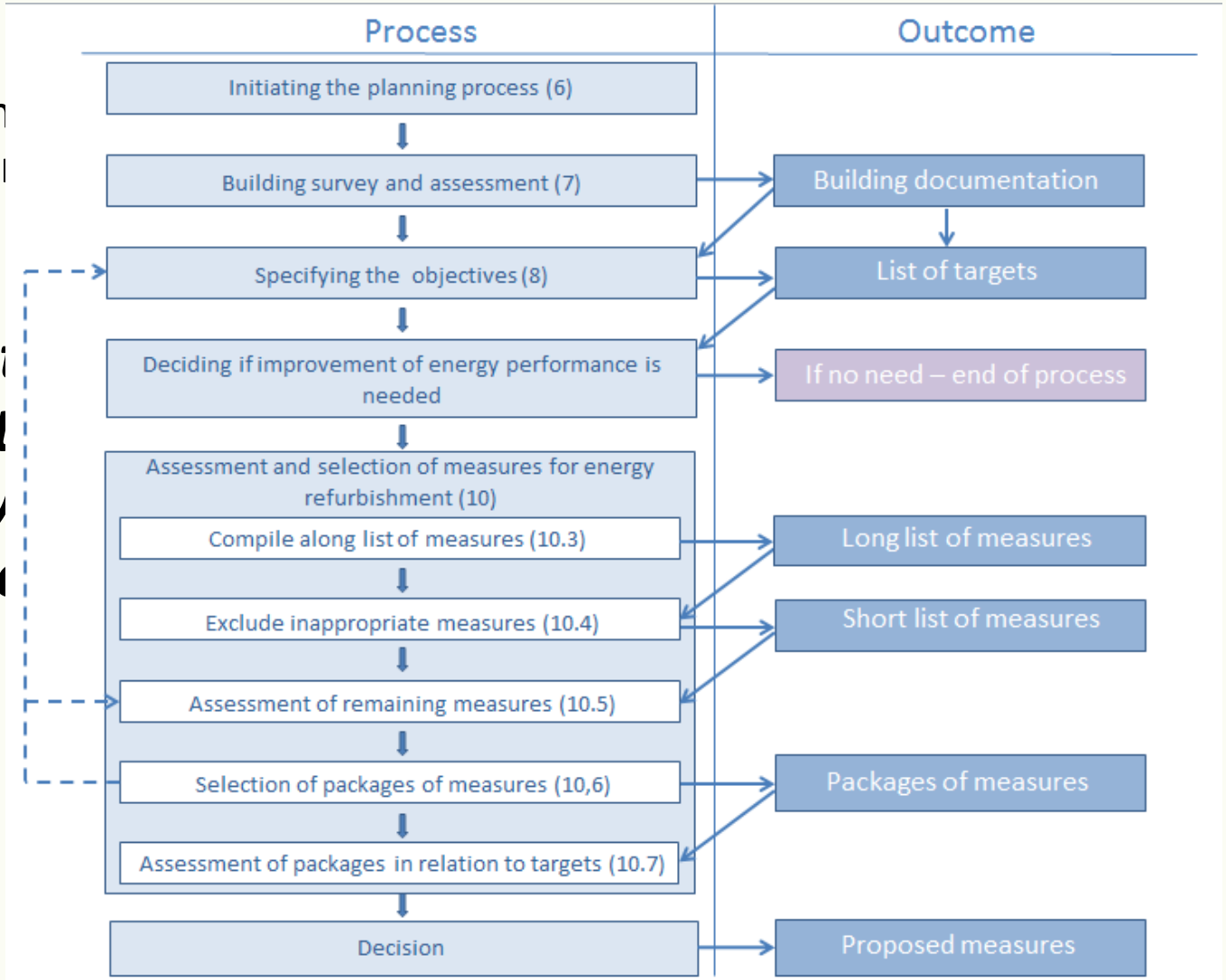
4.1. Introduction to low carbon energy sources and heating solutions – *Lis O'Brien, Limerick Institute of Technology*
4.2. Managing the design of mechanical and electrical installations – *Edith Blennerhassett, ARUP*
4.3. Case Study: Decarbonising National Trust Properties – *Keith Jones, UK National Trust*

Speakers from Ireland, UK and Europe:

- *Dr. Cathy Daly*
- *Chris Morgan*
- *Keith Jones*
- *more examples...*

This is a little known
Standard or Guideli

***Guidelines for
Retrofit of Hist
Architecturally
Culturally Imp
Buildings.***



Social Housing in Preston, UK

Deep Energy Renovation Of Traditional Buildings

What not to do

Deep Energy Renovation Of Traditional Buildings

Deep Energy Renovation Of Traditional Buildings

Internal Conditions within 7 Years

Deep Energy Renovation Of Traditional Buildings

Closer to Home

Sustainable Development Goals

We Need to Stop This.

We Hope to Get to This.

Thar tion.