BUS GoCircular

“Training Pack” - Ireland

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101033740

Shaping a Circular Sustainable Future

Module 1

INTRODUCTION TO CIRCULAR ECONOMY IN CONSTRUCTION

Circular Economy in the Construction Industry Summary

Through this module the learner will gain an understanding of what the Circular Economy is in a general sense and what the benefits and barriers are in order to implement this today. They will explore the current situation within Europe and internationally in relation to the Circular Economy and further explore how this relates to the construction industry.

Click here to discover the module! You will need internet connection.

MODULE 1 - P1

Duration
4 hours

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More cases studies of circular design in Materials, waste, energy & water

Click here to discover the module! You will need internet conexion.

MODULE 1 - P2

Duration
2 hours

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Duration
2 hours

Module 1

WORKSHOP

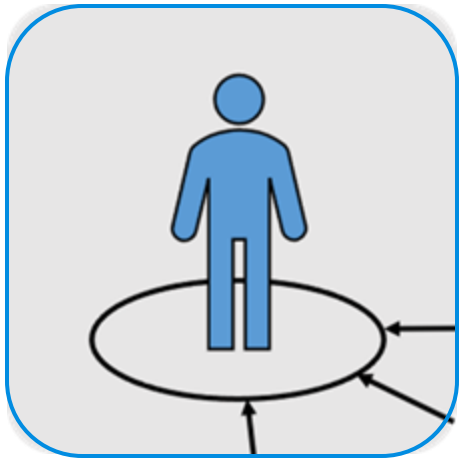
Exercise 1 and 2

WORKSHOP MODULE 1

This workshop serves as a summary and evaluation method of what has been learnt in Module 1 - Introduction to the Circular Economy: Basic strategies to implement circularity in your company. It can be carried out in three modes:

In groups

Divide in groups of 3 or 4, depending of the participating people and realise the workshop. Then, share your ideas with the others teams and debate with one's are the more complete and accurate for the same project.



Individual

Also can be implemented individually and then be shared each exercise with the manager and/or partners to compare ideas and learn from other's partners creativity.

All the team

Another idea is to conduct this workshop together, choosing a team leader to write down or draw all the ideas shared in common by the whole team, generating more discussion.

Exercise 1: Find out where the opportunities are for your organisation

Here is an overview of the different principles. They are not limiting, you can find or create more strategies based on these principles. Take a look around.

Then, are there any principles in which you see opportunities? How can the different key principles be applied in your project? Sketch out at least one of the five reflections below on a building, product or system develop in your company:

Roadmap

- Take a new (or existing) project in mind (has to be the same for all the people implementing the workshop or by groups)
- Read the five reflexions to start the debate of how this project can be designed/build to be fit for the future?
- Develop your ideas (don't be afraid to draw!) of one of the five reflexions **TIME: 90 minutes**

Key principle	Strategy group	Description
	Regenerative materials	Use of bio-based, reusable, non-toxic and non-critical materials for products.
	Regenerative water	Replace fresh water with rain water or sea water and take measures for efficient water use.
	Regenerative energy	More efficient use of energy, preferably renewable and electric.
	The lifespan of products in use maximize	Upgrade, repair, and maintain products while they are still in use.
	The lifespan of products after use	Return of products, products and parts a second life after the end of their useful life.
	The lifespan of organic products maximize/ optimize	Ensuring that organic products are properly managed and stored.
	Value waste streams- closed loop	Reuse, repurposing and recycling of waste streams within the same industry.
	Valorize waste streams- open loop	Reuse, repurposing and recycle waste streams within other industries.
	Recovery energy from waste	Recovering energy from waste or generating fuels and energy from waste streams.
	Design from waste	Designing products to reduce waste (material, water, energy) during production and use.
	Cyclable design	Designing products to allow multiple uses and lifecycles of a product and its materials.
	Design for sustainability	Designing products that are built to last and to ensure longer use.
	Collaboration with the industry	Collaborate with industry peers to create shared value and identify synergies.
	Cooperation between customers and consumers	Involving and guiding customers and consumers to ensure circular use of products.
	Cooperation between governments	Collaborating with the government on circular policies and programs
	Internal cooperation	Collaborate internally to guide employees and share more knowledge between internal departments
	Cooperation in the community	Involving the local community where facilities or offices are established.
	Product business models	Delivering products to consumers through business models that require a guarantee maximum value
	Business models for services	Delivering services to customers through business models that ensure maximum value.
	Data and insights	Use technologies to collect and analyze data to understand resource use
	Digital platforms	Using online platforms to connect stakeholders and improve information sharing.
	Education and learning plans	Integration of the beginnings of circularity into the primary, secondary and tertiary curriculum and providing training in the workplace.
	Knowledge management	Establish definitions and create frameworks to support the understanding of circularity in different contexts and maintain coherent systems for sharing, processing and storing data.
	Research and development	Research and facilitate new technological developments to support the transition to a circular economy.
	Communication and awareness-raising	Awareness raising and information campaigns on circular economy strategies and impact in different contexts.

Think about the extraction of materials. What materials/construction solution are needed? Where do they come from? Can its origin be renewable and low-impact material? Can you include reused materials or recycled content?

1

2

3

Think about the design, use and products of your project. Is it future-proof like flexible, adaptable and can be dismantled to be easy to repair and accessible to installations? Are the unions removable, modular solutions, all layers accessible?

Flexible:

Adaptable:

Dismantle:

Think about the construction/ production of your project. What processes will be used and how can these be minimise? How are you going to manage the waste and where you are going to process it? locally?

1

2

3

Think about the use of your building. How can energy and water demand and consumption be minimised? Which measure or systems you have to implement? And maximise biodiversity?

Energy

Water

Biodiversity

Think about the disposal of your building. What happens to the building after it reaches the end of its life? Can be dismantled and reusable/recyclable by materials? Who will manage it?

Hipothesys 1

Hipothesys 2

Hipothesys 3

On the hunt for circular targets. Are you aware of your organisation's circular targets?

An organization's strategy is the practical plan through which the organization's objectives are realized. What does circularity mean for your organization? What are the focal points? What is the focus on and what is not? For instance, does the organization focus on reducing waste or on integrating processes?

Without targeted objectives anchored in the strategy, there is no need to carry out actions on circularity. After all, business activities beat strategy. That is why it is so important to give circularity a place in the strategy and set clear objectives. This way, everyone in the organization can and must contribute to a circular organization.

Exercise 2 about your organisation's circular targets

- How is circularity included in your organisation's strategy? For example, is it a general theme briefly mentioned or is it woven into the objectives? Look it up!
- What is your organization's overarching circular ambition?
- How do you feel about the objectives? Can you contribute to the objectives in your work? Are the objectives being acted upon enough?
- What should your organisation still focus on? Can you translate to specific actions?

TIME: 30 minutes

EXTRA MATERIAL

Click here to discover extra material for reading and watching of this Module! You will need internet conexion.

MORE INFO

Shaping a Circular Sustainable Future

Module 2

Case Study: Circularity Retrofit of Convent building, Tulla, Co. Clare, Ireland

INTRODUCTION TO CIRCULAR ECONOMY IN CONSTRUCTION

Through this module, trainees will be introduced to the Circular Economy and existing building renovations.

Trainees will be shown the possibilities and opportunities of Retrofits, Upgrades, Repairs and Maintenance.

Duration
2.5 hours

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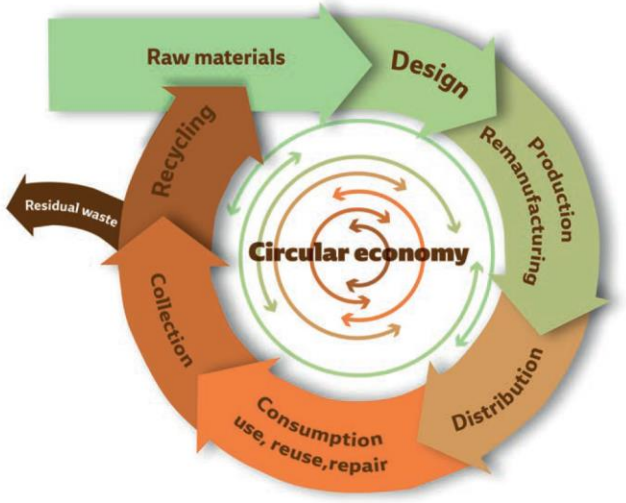
Introduction to Circular Economy

- The circular economy, as a new model of production and consumption, emerged as a **more sustainable alternative to the linear economy**.
- The objective of the circular economy is to achieve more efficient and resilient production and consumption systems, that **minimize the use of natural resources and preserve the ones they use within continuous cycles, maintaining or improving their value.**



Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

What is A Circular Economy?

In the current economy, we take materials from the Earth, make products from them, and then they become waste. In a Circular Economy, we try to stop waste being produced.

The circular economy is based on three principles, driven by design:

- Eliminate waste and pollution
- Circulate products and materials (at their highest value)
- Regenerate nature

It is underpinned by a transition to renewable energy and materials. A circular economy decouples or breaks the link between economic activity and the consumption of finite resources. It is a resilient system that is good for business, people and the environment.

Source: https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview

The Circular Economy requires a new approach in the following areas:

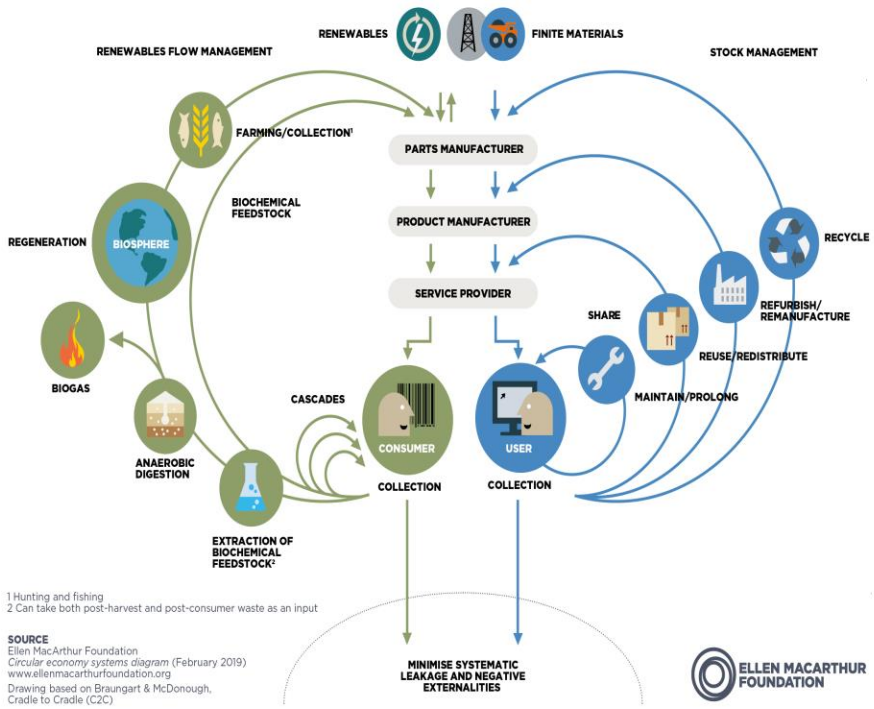
- the design of products and services
- management and market models
- how to convert waste into resources
- national regulations
- the commitment of citizens to change their consumption habits

Two of the main goals of the BUS-GoCircular project are:

- the improvement of the reputation of the construction sector
- attracting more women and youth to circular skills professions

And:

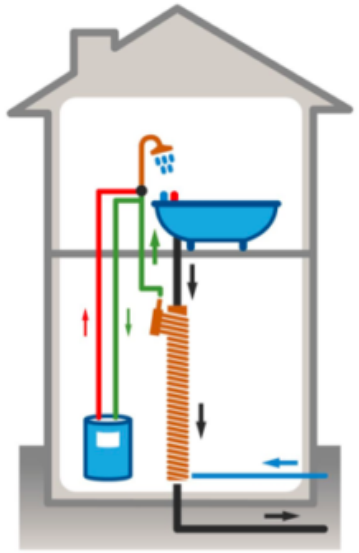
Construction & the Circular Economy



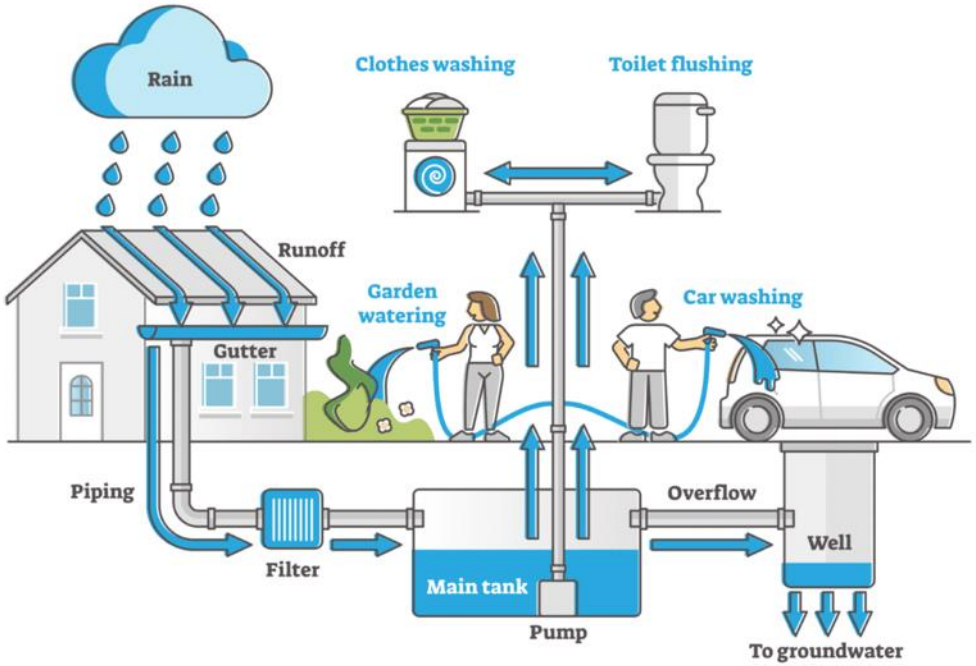
- Green roofs
- Multifunctional facades and interior partitions
- Sustainable materials strategies: low impact, renewable, recycled, local
- Measures that optimize material use to strive for material efficacy
- Material creation and innovation
- Non-toxic materials
- Prefabrication, modular
- Life Cycle Analysis methodology and practice (LCA)
- Waste management: sorting and recovering (reuse, recycling, energy use)
- Circular economy regulations and possibilities
- Design for deconstruction and adaptability
- Repair, maintenance, rehabilitation
- Renewable thermal energy systems
- Renewable electricity energy systems

Water & the Circular Economy

- Water efficiency systems
- Grey water systems
- Rainwater harvesting systems
- Heat recovery systems



Source: https://www.thegreenage.co.uk/tech/waste-water-heat-recovery-systems/



Source: https://sacleanwater.com/rainwater-harvesting-systems/

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Additional Aspects of the Circular Economy

- Incorporating digital technology for sustainability
- 3D printing for material impact reduction
- Energy efficiency with passive strategies
- Energy efficiency with active strategies
- Smart solutions to installations
- Second-hand sale of products through marketplaces or services
- Modern Methods of Construction
- Rethinking the business model: Creating joint value between companies

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Climate Change and Building Stock

- In 2010, the world's buildings accounted for 32% of global final energy use and 19% of all greenhouse gas (GHG) emissions.
- If we continue as usual the projections for use of energy in buildings globally could double or even triple by 2050.
- Even if emissions are immediately stopped, temperatures will remain elevated for centuries to come, due to the effect of greenhouse gases in the atmosphere from previous human impact.

Source: Fit-to-NZEB: Ecology & Sustainability

Cnoc na Gaoithe Cultural Centre,
Tulla,
Co. Clare

The centre was built as a convent in 1883 and closed in 1998. in 2011 it was handed over to the Tulla community, then renovated and developed into an Irish music and cultural centre. An extension was built in 2019 which incorporates a communal kitchen which required no fabric upgrades. The total usable floor area is 361m² consisting of a reception area, practice rooms, exhibition rooms, study rooms, the communal kitchen, a chapel, bathrooms, and six bedrooms upstairs for guests to stay.

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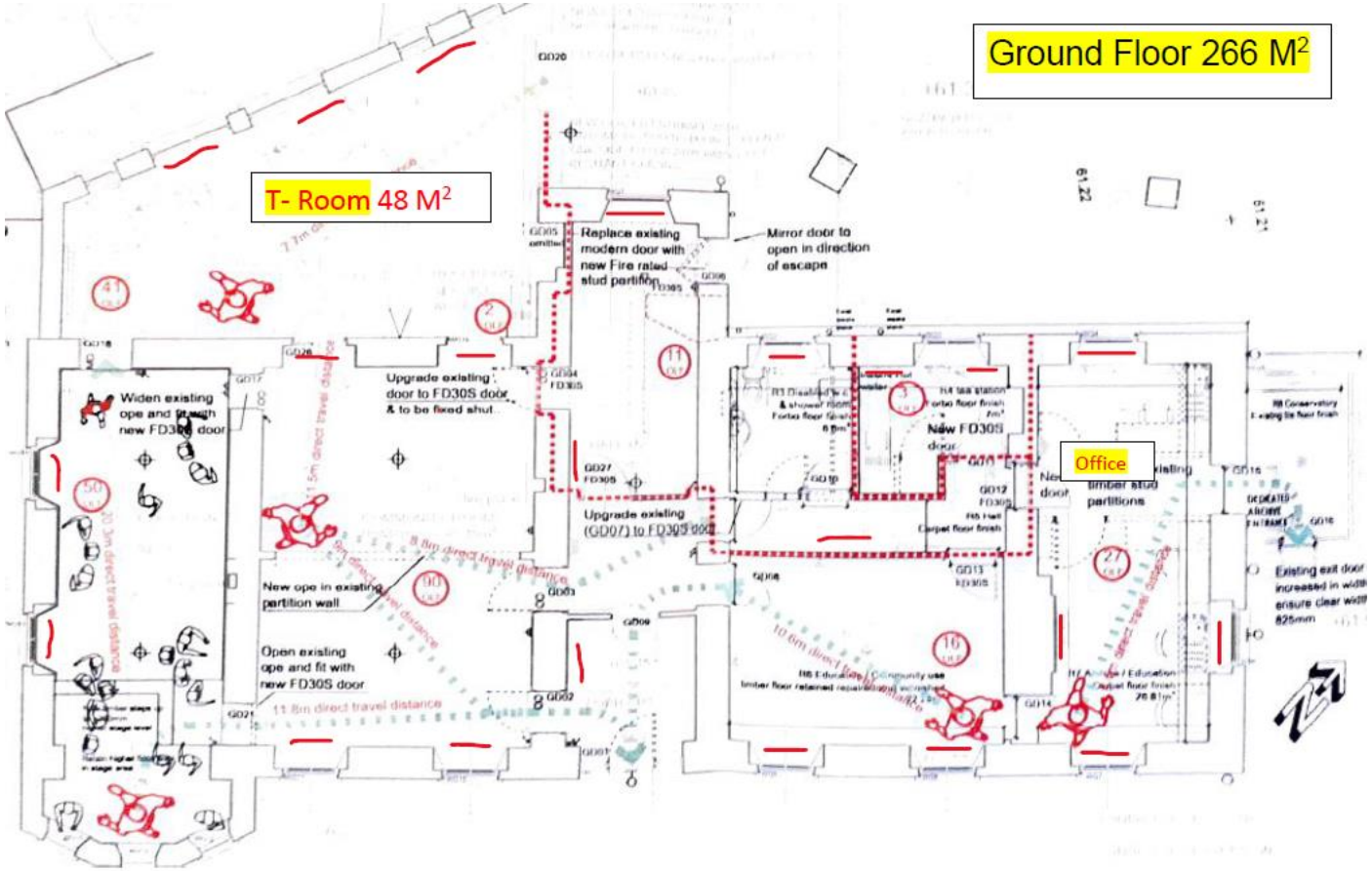

The Building is Detached, two-storey, seven-bay, stone, rendered convent building 1883, having segmental headed window and door openings with timber pilaster doorcase and single-bay, single storey, canted bow window to left ground floor with moulded architraves

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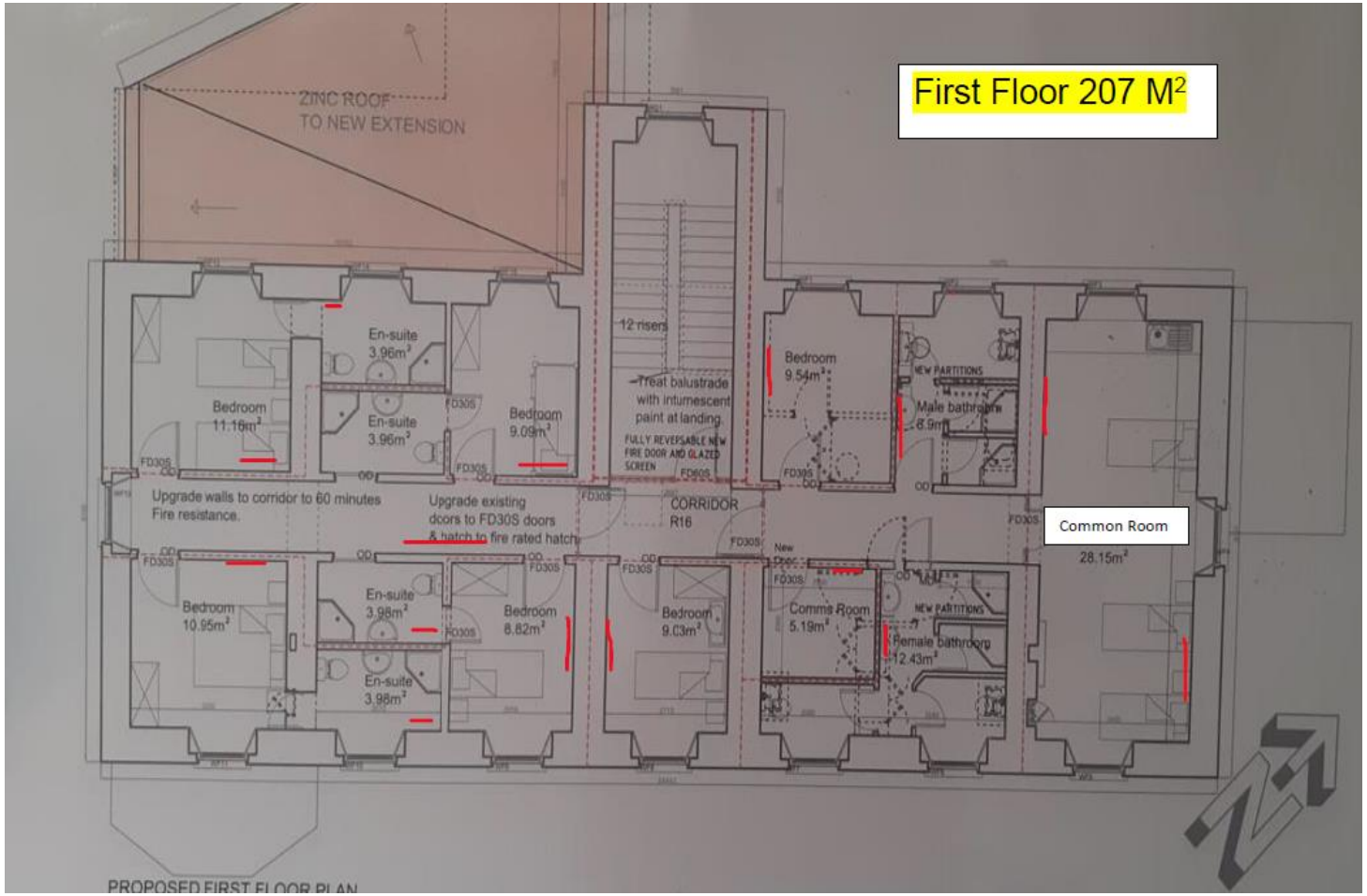

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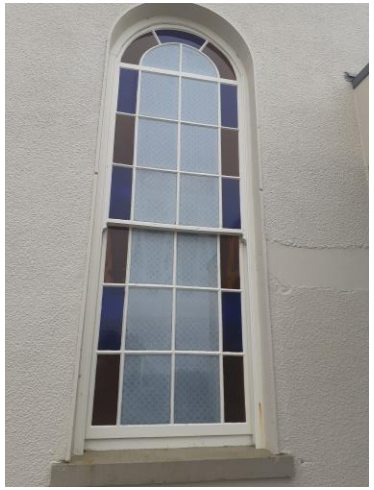
Building Survey



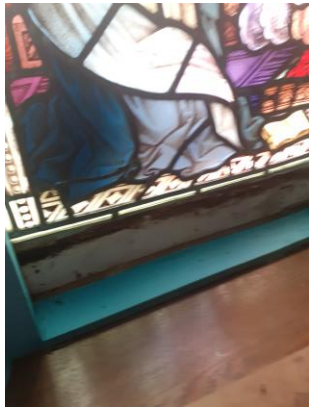
Existing Windows
& Doors

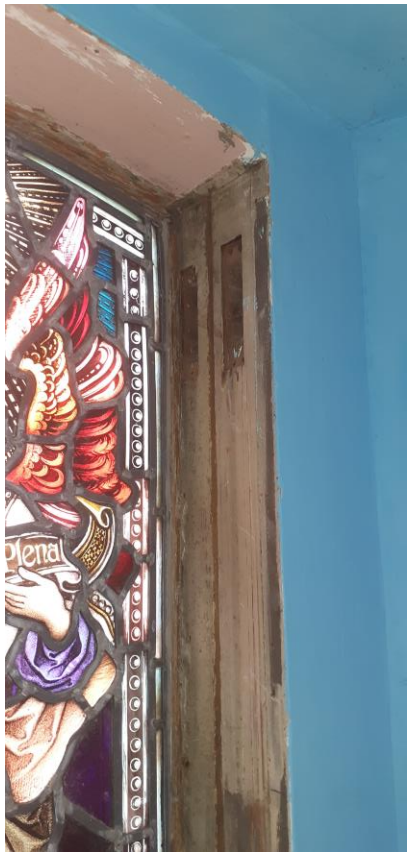
Building Survey

Chapel walls:

- **Damp**
- **Mould**
- **Cold air infiltration from basement**
- **Leaking Chapel roof**

Building Survey





Chapel original Stained-glass windows:

- frames rotten
- glass in disrepair

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- Some air vents in basement plastered over outside- reopened to ventilate

- Basement insulation wet and falling down.

- Attic Insulation was disturbed and piled in heaps due to works

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Building Survey

Current heating system- 2
x 60 KW oil boilers

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Contractors

Henry Mellott
MELLOTT WINDOWS LTD
Castlebar Road,
Ballinrobe
Co Mayo

Kevin O'Leary
Mid-West Lime
Newmarket On
Fergus Co.
Clare

Installed new high quality double-glazed sashes

Renovation

- Retained original aesthetics
- Repaired frames
- Air sealed

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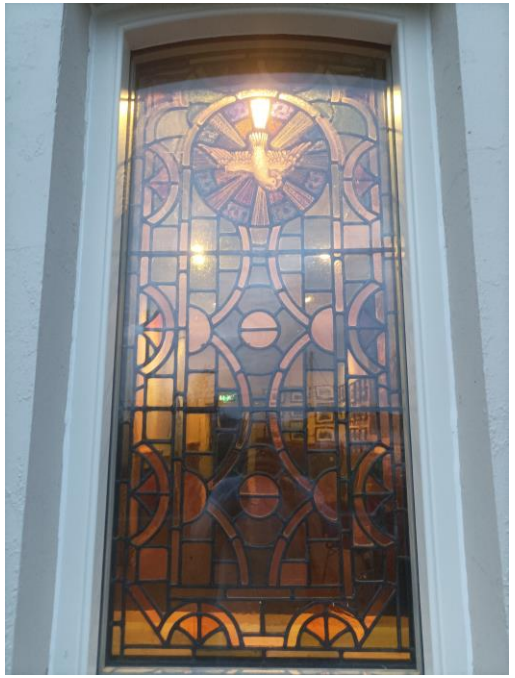


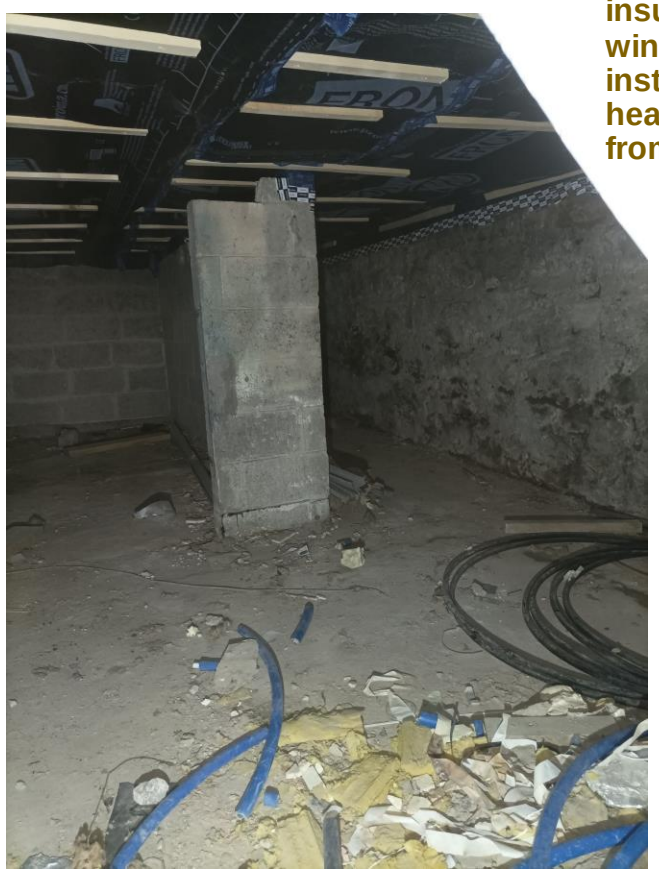
Refurbished and repaired stained glass
inserted new high quality double-glazed windows and fixed stained glass to frame fixed internally to showcase

Insulated walls with bio-based natural materials:

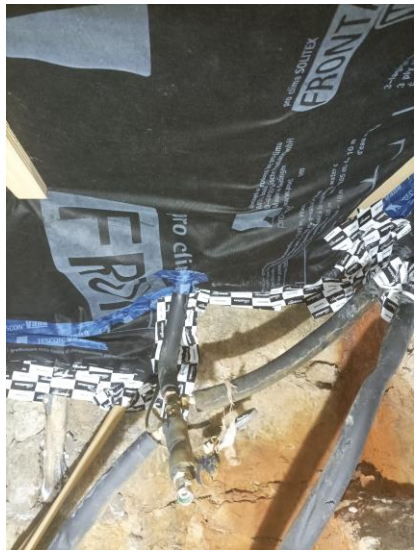
- Cork lime plaster
- Wood based insulation
- Lime Skim coat finish

All breathable

Renovation complete



Dried out reinstalled & added insulation where required. Added wind tight membrane below, installed to reduce infiltration and heat loss and moisture ingress from basement



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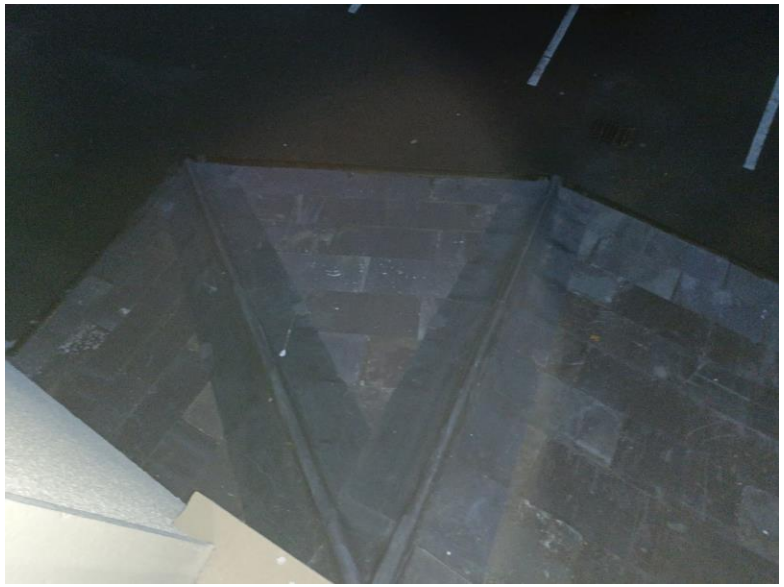

- We repaired lead flashing and installed a high-quality breather membrane to eliminate wind driven rain ingress, as High Moisture content in walls indicated not just a condensation issue.
- After repairs the wall began to dry out

- Attic insulation not removed as usually is- compacted and added to increased depth from 120mm to 300mm. Improved airtightness & U-Value to 0.127 W/m^{2}K

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- Two Ecoair 3-18 Pro KW pumps were fitted to work in cascade rather than fit a very large heat pump
- The heat requirement was calculated to ensure the heat pumps were compliant

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- Fossil fuel use was removed.
- The centre buys renewable electricity and will be installing PV panels in future

- Windows repurposed as material for a local green-house & reused in heritage windows in Dublin

- All plaster rubble stripped from walls was reused locally as filling for new paths. So reduced new quarried stone materials required

Cnoc na Gaoithe Cultural Centre,

PERFORMANCE

BER B2

Energy Value	CO_2 emission
116.16	14.87
$kWh/m^2/yr$	$kgCO_2/m^2/yr$

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Next Steps

Rainwater Harvesting for:

- flushing toilets
- supplying washing machines
- watering plants

which will reduce footprint of potable water use.

PV System with battery storage and EV charger that can reduce the use of the building.
Supply green energy for EVs and when excess is being generated: supply heat pump to rise heating levels and hot water to set-points

Will be first EV charger in Tulla!

Self-Assesment Quiz-

scan QR Code

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Post Recording Survey-

scan QR Code

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Feedback:

Building is much more comfortable now:

- Collaboration and Knowledge sharing
- implemented Circular Economy principals
- Adhering to Conservation and building regulations
- Will be using as a case study site visit for students in future

Thank-You for listening!

Any Questions?

Please Contact: Benny.McDonagh@tus.ie

Shaping a Circular Sustainable Future

Module 3

Traditional Buildings
Building Regulations & SR54

Traditional Buildings
Building Regulations & SR54

The aim of this module is to provide the relevant knowledge of the Current Building regulations and **The Standard Recommendation (S.R.) 54** which provides technical guidance on the energy efficient retrofit of the building fabric and services, the application of retrofit measures on a whole dwelling basis, general building physics and the management of retrofit projects.

Duration
2.5 hours

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Welcome

At present, about 35% of the EU's buildings are over 50 years old and almost 75% of the building stock is energy inefficient. At the same time, only about 1% of the building stock is renovated each year.

'Provide all with a certain level of choice between different options- but don't overwhelm with too many'

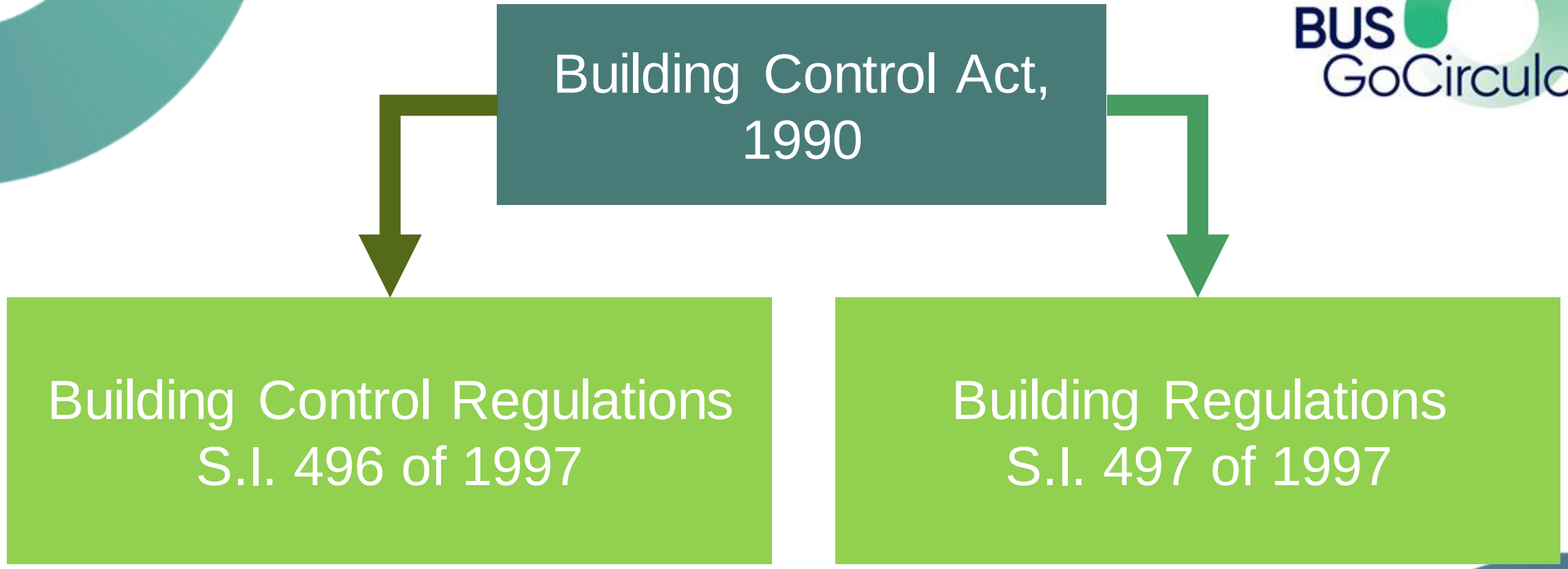
TUS
Technological University of the Shannon: Midlands Midwest
Ollscoil Teicneolaíochta na Sionainne: Lár Tíre Iarthar Láir
www.tus.ie

Introduction to Building Regulations & SR54

- **Irish Buildings Regs**
- **NZEB Renovation**
- **Standard Recommendation: 2014 & A2: 2022**

At present, about 35% of the EU's buildings are over 50 years old and almost 75% of the building stock is energy inefficient. At the same time, only about 1% of the building stock is renovated each year.

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final



Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Regulatory framework

Revised Energy Performance of Buildings Directive (2018/844/EU)

- Amendments to Part L of the **Building Regulations** (relating to the conservation of fuel and energy in dwellings) give effect to the European Union (Energy Performance of Buildings) Regulations 2019 which transposed the Directive into Irish law.
- The Directive requires that where major renovations (defined as a renovation where more than 25% of the surface envelope of the building undergoes renovation) are carried out on a building, the building should achieve a cost optimal energy performance at building level insofar as is technically, functionally and economically feasible. The cost optimal energy performance level is equivalent to a B2 BER.

National Building Regulations

- Are in place and are under the remit of the Department of Housing, Local Government and Heritage (DHLGH). The minimum performance requirements that a dwelling must achieve are set out in the second schedule to the building regulations. Part L: Conservation of Fuel and Energy – Dwellings concerns building regulations for the refurbishment of residential buildings as per the European Union (Energy Performance of Buildings) Regulations (S.I. 292 of 2019 and S.I. 393 of 2021).

Energy Efficiency Directive (EU) 2018/2002

- The Energy Efficiency Directive sets out what is expected of Members States to improve the energy efficiency of their economy and society. The measures to give effect to the Directive are set out in Ireland's **National Energy Efficiency Action Plans** (NEEAP).
- The NEEAPs have since been incorporated into the **National Energy and Climate Plans**. Further elaboration on policies and measures to deliver on objectives of the Directives can be found in **Ireland's Long Term Renovation Strategies** and in the **Public Sector Energy Efficiency Strategy** (2017) and most recently in the **Climate Action Plan 2021** (CAP).

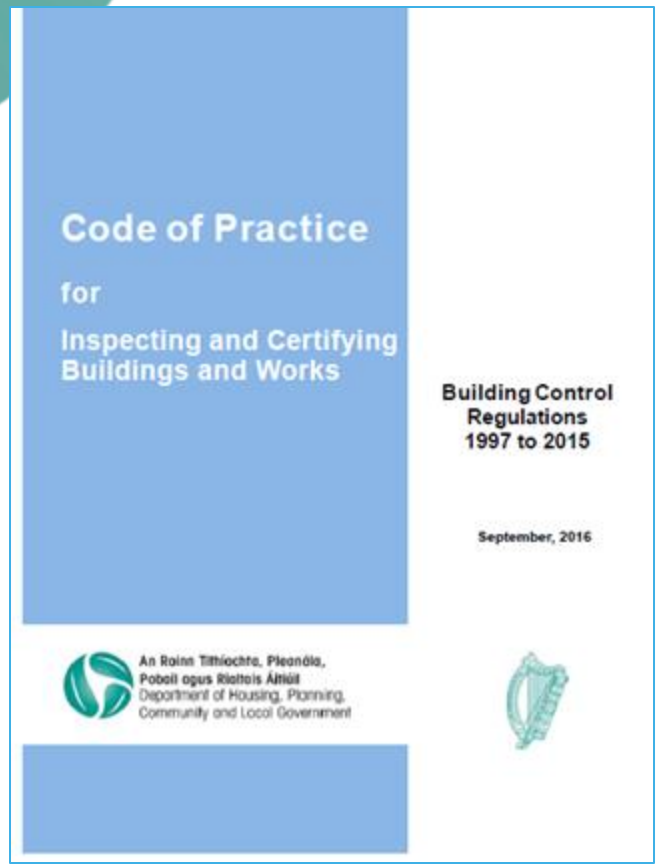
S.R. 54:2014 & A1:2019 (NSAI)

- Code of practice for the energy efficient retrofit of dwellings. This Standard Recommendation has been developed by DECC, the SEAI and the National Standards Authority of Ireland in conjunction with the Building Research Establishment to provide guidance on the energy efficient retrofit of dwellings.
- NSAI standards for heat pumps/Updating SR54.
- *SEAI Domestic Technical Standards and Specifications*

The **minimum** performance requirements that a building must achieve are set out in the second schedule to the Building Regulations. These requirements are set out in 12 parts (A to M)

- Part A – Structure
- Part B – Fire Safety
- Part C – Site Preparation & Resistance to Moisture
- Part D –Materials & Workmanship
- Part E – Sound
- Part F – Ventilation
- Part G – Hygiene
- Part H – Drainage & Wastewater Disposal
- Part J – Heat Producing Appliances
- Part K – Stairways, Ladders, Ramps & Guards
- Part L – Conservation of Fuel & Energy
- Part M – Access & Use

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final



The nominated Assigned Certifier must be a registered professional (Chartered Engineer, Chartered Building Surveyor or Registered Architect) with relevant experience and competency in relation to complex construction projects. The duties and responsibilities of the Assigned Certifier at each stage are detailed in the "Code of Practice for Inspecting and Certifying Building and Works 2016".

Assigned Certifier is not needed for retrofitting unless structural alterations or extension over 40 m^2

The certification of measures by installers are sufficient

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Building Regulations apply to:

- New buildings
- Material alterations and extensions
- Repair or renewal likely to effect structural integrity
- Material change of use
- New or replacement of services, fittings and equipment where Parts G, H or J impose a requirement
- ***Major Renovations.***

• Article 9(2) of the Building Regulations 1997 (as amended) prescribes that

• **no works shall be carried out to a building which would cause a new or greater contravention in the building of any provision of Building Regulations.**

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

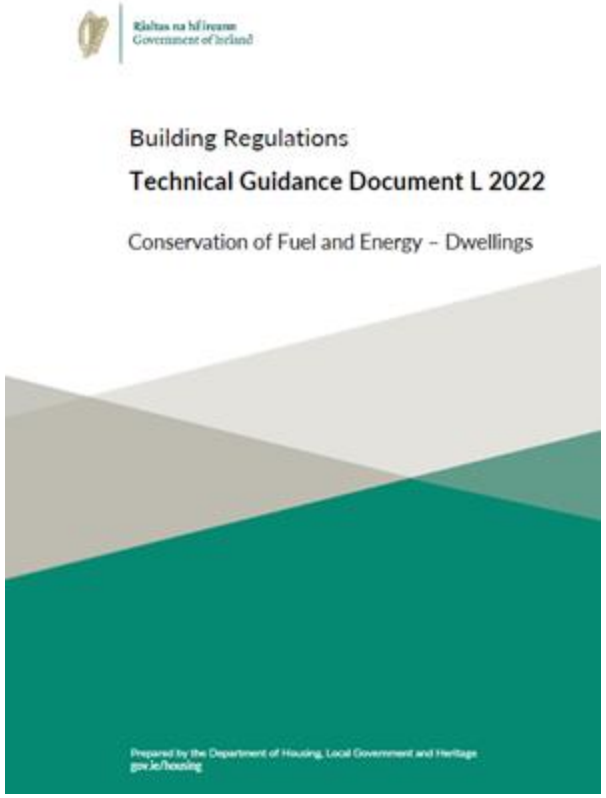
New Buildings

Nearly Zero Energy Building:

Is a building that has a very high energy performance.

The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or near as possible

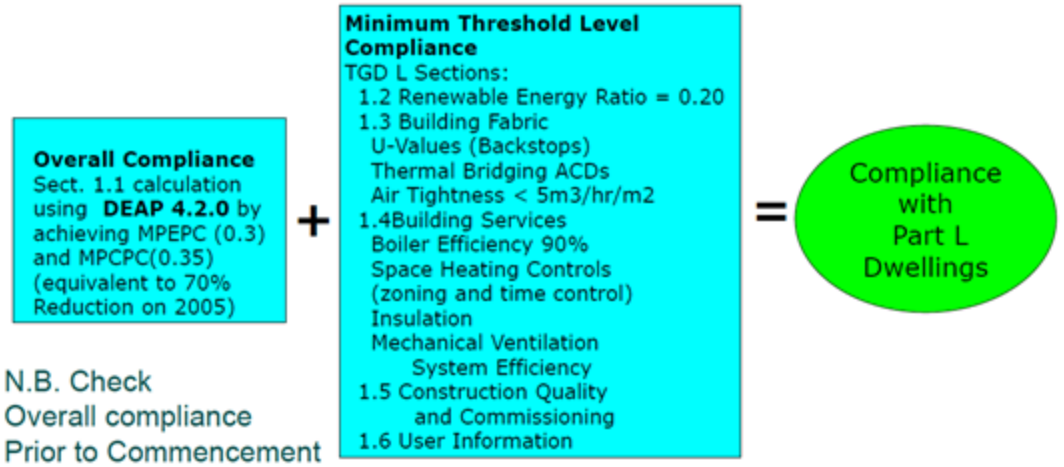
Outlined in the Energy Performance of Buildings Directive Recast (EPBD Recast) 2010/31/EU of 19th May 2010.



Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

New Buildings

Achieving compliance with 2022 Part L Dwellings



Heat loss through thermal bridging is accounted for in terms of a default Y-value or 'thermal bridging factor' Ψ in W/mK
The Ψ -value allowed is either 0.08 W/mK where the ACDs are used, or 0.15 W/mK for all other dwellings.

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

NZEB homes are 70% more energy efficient and emit 70% less carbon dioxide than those built in 2005

The progression to improved energy performance since 2005 of dwellings is summarised in Table 1.

Year	2005	2008	2100	2018
Energy Improvement %	Baseline	40%	60%	70%
Primary Energy Consumption (KWh/m^2/yr)	150	90	60	45
CO2 Emission Rate (KgCO_2/m^2/yr)	30	18	12	10
Maximum Permitted Energy Performance Co-efficient (MPEPC)		0.6	0.4	0.3
Maximum Permitted Carbon Performance Co-efficient (MPCPC)		0.69	0,46	0.35
BER	B3	B1	A3	A2

Table 1.0: Improved energy performance since 2005

Not only is the compliance of the energy consumption required but to demonstrate NZEB compliance as calculated in the SEAI DEAP BER software, all new dwellings in Ireland must not exceed a maximum permitted energy performance co-efficient (MPEPC) of 0.302 and not exceed a maximum permitted carbon performance co-efficient (MPCPC) of 0.35.

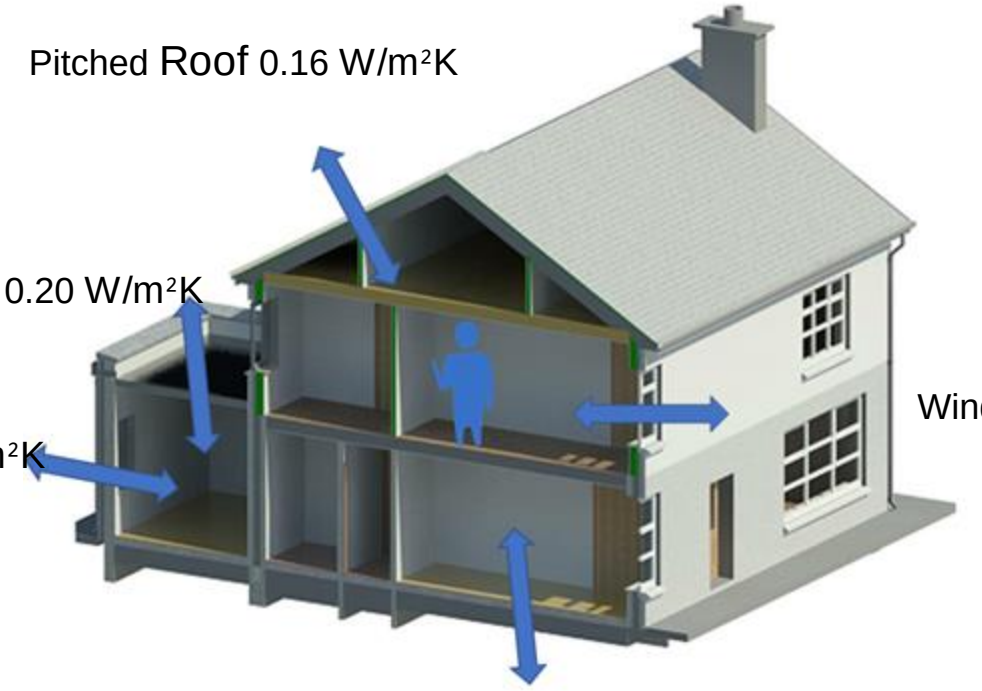
Renewable Energy Ratio (RER) of 0.20: 20%
A significant level of energy provision from renewable energy technologies

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

New Buildings

NEW BUILD DWELLINGS: TYPICAL U VALUES IN IRELAND

W/m²K



Airtightness test must be carried out on all new dwellings a result 5 $m^3/h/m^2$ is the minimum upper limit. This can be Passive ventilation.

*When a figure of 3 $m^3/h/m^2$ is reached mechanical ventilation is required

Nearly Zero Energy Building

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Material alterations, extensions of buildings and repair & renewal

- **‘Material Alteration’** describes an alteration, where the work or part of the work carried out by itself would be the subject of a requirement of Part A (Structure), B (Fire Safety) or M (Access and Use) of the Second Schedule to the Building Regulations 1997 (as amended).

*Note: **Part M does not** apply works in connection with extensions to and material alterations of existing dwellings, **provided that such works DO NOT create a new dwelling.**

- **Repair or Renewal** means works of maintenance or restoration of a routine nature relating to:

1. The keeping of a building in good condition or working order, or
2. The return of the fabric of the building to its original condition

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Material alterations, extensions of buildings, Repair & Renewal

- **With regard to material alterations, extensions of buildings and repair and renewals, Article 11 of S.I. No. 497 of Building Regulations 1997 (as amended) applies to:**

a) All works in connection with the material alteration or extension of an existing building

a) Every part of a building affected by such works referred to in Paragraph (a) above but only to the extent of prohibiting any such works **which would cause a new or greater contravention**, in such a building, of any of the provisions of the Building Regulations

a) Any repair or renewal likely to affect the structural integrity of the building or building element that is being repaired or renewed

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Material alterations, extensions of buildings and repair & renewal

- **In addition, Part L (Conservation of Fuel and Energy)*:**

a) Shall apply to renewal works to existing buildings involving the **replacement of external doors, windows and roof lights**;

a) Requires that **replacement oil or gas boilers** where practicable should have a boiler efficiency of greater than 90% in dwellings as defined on the HARP database. (Condensing boilers should achieve an efficiency of > 86%).

- *For existing buildings, the applicable Requirements of Part L are covered by Section 2 of TGD L.

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Material alterations, extensions of buildings and repair & renewal

- In addition, **Part L** (Conservation of Fuel and Energy)*:

c) **Does not apply** to works (including extensions) to an existing building which is a '**protected structure**' or a '**proposed protected structure**' within the meaning of the Planning and Development Act 2000 (S.I. No. 30 of 2000).

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Elemental U-value Hygrothermal risk

Traditionally built masonry walls construction was varied combinations of stone, brick and lime-based mortar, of solid construction, sometimes with a core of lime mortar and rubble filling. These materials are porous, allowing moisture to be absorbed by the wall and later released, depending on the weather conditions.

Such walls often have timbers embedded in them and high levels of moisture, from whatever source, could create conditions that promote fungal decay or insect attack of timbers.

Because of the importance of vapour permeability in traditionally built buildings, any material being applied to the walls should be vapour-permeable and should not trap moisture, or allow condensation to accumulate, within the fabric of the wall.

Hygrothermal risk can be assessed using I.S. EN ISO 10211: 2017 in accordance with

Appendix D of TGD L.

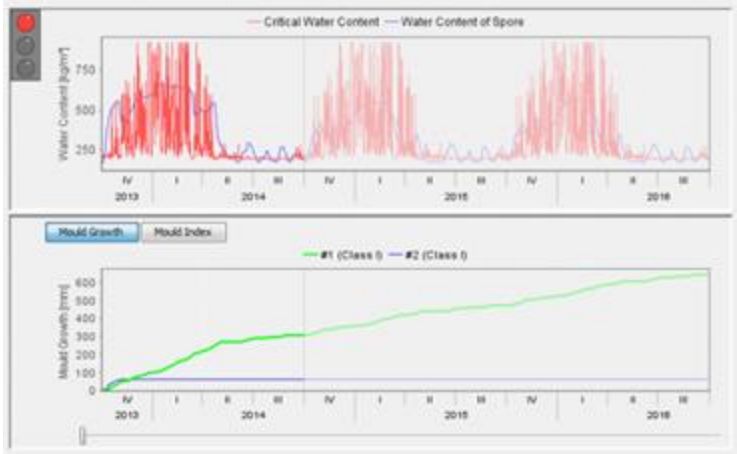
Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Avoiding the Risks: Hygrothermal modelling

Computer- assisted simulation program for heat and humidity transports (dynamic) WUFI

- Real climatic data
- Inside and outside temperature
- Inside and outside humidity
- Light absorption
- Moisture storage capability
- Capillary action

(Data of one reference year at intervals of 1 hour)



Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Material Change of Use

Potential for repurposing derelict buildings and unoccupied commercial buildings

- **Section 3(3) of the Building Control Act states:-**

- (3) In addition to the provisions of any regulations made for the purposes of subsection (1)(d), there shall be deemed to be a material change in the purposes for which a building is used if, on or after the operative day -

  - a building, being a building, which was not originally constructed for occupation as a dwelling, or which, though so constructed, has been appropriated to other purposes, becomes used as a dwelling,

  - a building, being a building, which was originally constructed for occupation as a dwelling by one family only, becomes occupied by two or more families

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Bringing Back Homes Manual for the Reuse of Existing Buildings

- Policy and Regulatory context
- Basic process which applies when an existing building is to be brought back into use for residential purposes.
- Elaborates on how the building regulations apply to three of the most common building types, that have high reuse potential.
- Case examples of successful conversions for some of the building types
- Appendices provide supplementary information on regulations, incentives, frequently asked questions).

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Provision of Services, Fittings and Equipment

- **With regard to building services, Article 12 of S.I. No. 497 of 1997 of the Building Regulations applies to:**

a) all works in connection with the provision (by way of new work or by way of replacement) in relation to a building of services, fittings and equipment where:
   —Part G (Hygiene),
   —Part H (Drainage & Waste-Water Disposal), or
   —Part J (Heat Producing Appliances)
   of the Second Schedule to the Building Regulations impose a requirement.

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

European Communities
Act, 1972

European Union
(Energy Performance of Buildings) Regulations
S.I. No. 538 of 2017 (Buildings other than dwellings)

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Major Renovations To Existing Buildings

Application of Part L (Section 0.6)

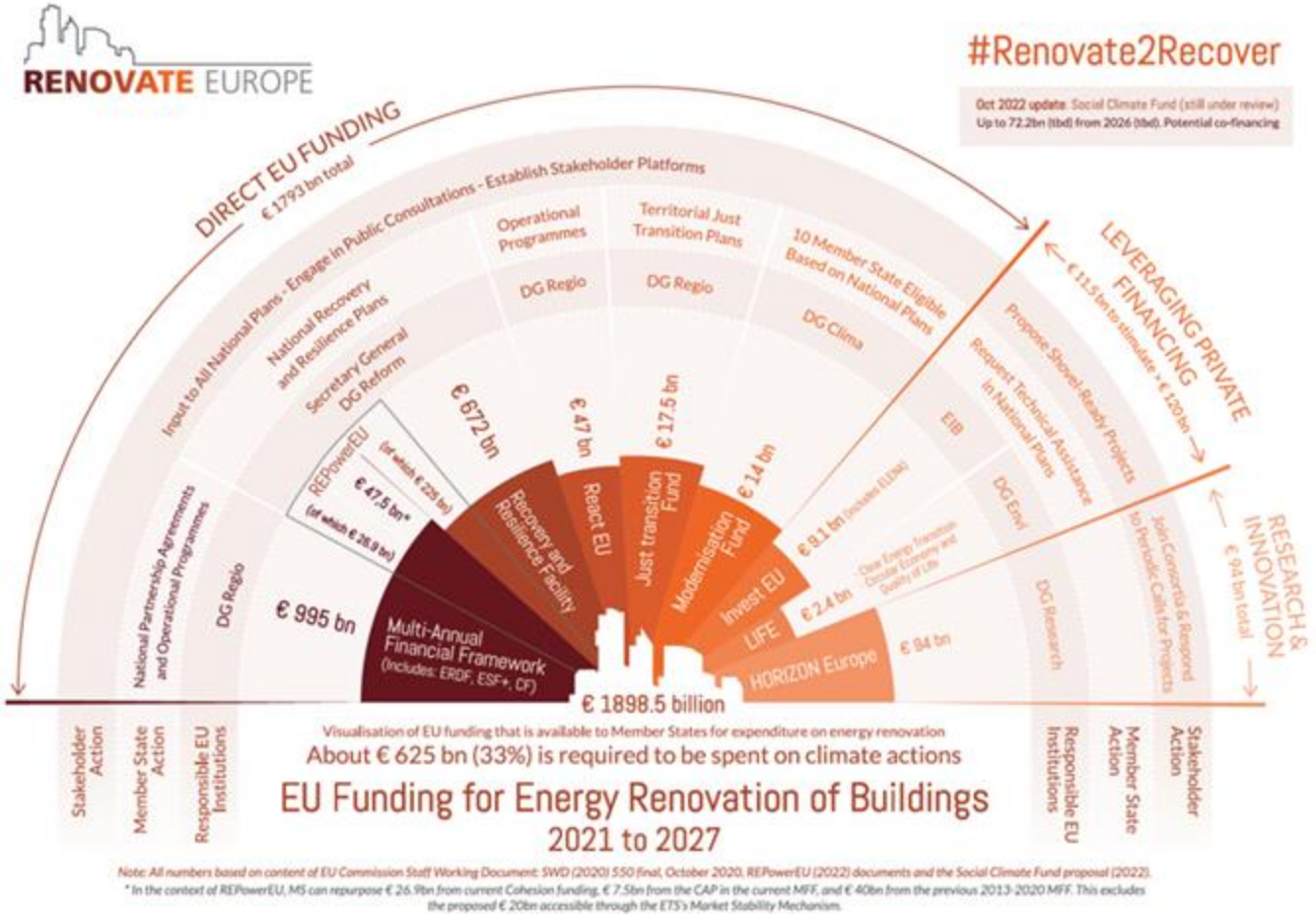
Buildings of Architectural or Historical Interest

- **0.6.1 Part L** … does not apply to works (including extensions) to an existing building which is a "**protected structure**" or a '**proposed protected structure**" within the meaning of the Planning and Development Act 2000 (No 30 of 2000).

- The application of this part may pose particular difficulties for buildings which, although not protected structures or proposed protected structures, may be of architectural or historical interest including **buildings of traditional construction with permeable fabric** that both absorbs and readily allows the evaporation of moisture.

- The aim here should be to improve the energy efficiency **as far as is reasonably practicable**.
- The work should not
  - **prejudice the character of the building** or
  - **increase the risk of long-term deterioration of the building fabric.**

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final



Renovate Europe is a communications campaign with the ambition to reduce the energy demand of the EU building stock by 80% by 2050 through legislation and ambitious renovation programmes.

Accelerating the rate of renovation is a key tool in the fight against climate change, and will deliver major benefits for people, their quality of life, and the economy.

Renovate Europe https://www.renovate-europe.eu/wp-content/uploads/2022/10/REC_E3G_Skills-brief_Final_Oct2022.pdf

Objectives of the EPBD Revision

new definitions under Article 2 which increase the ambition of renovation efforts.

The recast of the EU Energy Performance of Buildings Directive (EPBD), expected to be finalised by 2023, plans to include:

- A new ZEB standard which does not cause any on-site carbon emissions from fossil fuels;
- The inclusion of a Declaration of Global Warming Potential on Building Energy Rating Certificates
- Mandatory Whole Life Carbon (WLC) assessment at building design stage
- The introduction of Building Renovation Passports
- The introduction in legislation of Minimum Energy Performance standards for all buildings
- Mandatory installation of rooftop solar panels on all buildings, with earlier dates for public buildings
- A rescaling of the existing Building Energy Rating (BER) scale, information on which will need to be shared with the general public, construction professionals and other stakeholders.

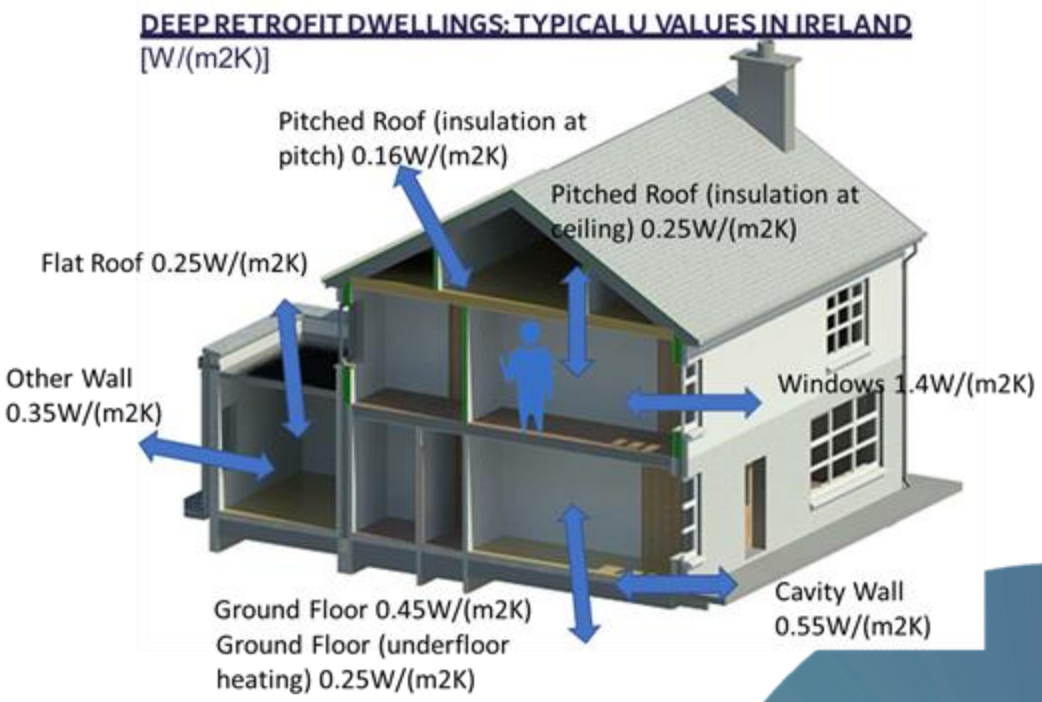
Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Major Renovations To Existing Buildings

Where more than 25 % of the surface of the building envelope undergoes renovation, the energy performance of the building or the renovated part thereof is upgraded in order to meet minimum energy performance requirements with a view to achieving a cost optimal level in so far as this is technically, functionally and economically feasible.

The surface area of the dwelling thermal envelope means ***the entire surface area of a dwelling through which it can lose heat to the external environment or the ground****, including all heat loss areas of walls, windows, floors and roof.*

The cost optimal performance level to be achieved is 125 kWh/m_2.yr when calculated in DEAP (B2).



Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Major Renovations To Existing Buildings

Table 7 - Cost Optimal Works activated by Major Renovation

Major Renovation > 25 % surface area[1,2,3,5]	Cost Optimal level as calculated in DEAP (Paragraph 2.3.3 a.)	Works to bring dwelling to cost optimal level in so far as they are technically, economically and functionally feasible (Paragraph 2.3.3 b.)
External walls renovation	The cost optimal performance level to be achieved is 125 kWh/m²/yr.	Upgrade insulation at ceiling level (roof) where U-values are greater than in Table 5 and Oil or gas boiler replacement[6] and controls upgrade where the oil or gas boiler is more than 15 years old and efficiency less than 86 % and/or Replacement of electric storage heating[7] systems where more than 15 years old and with heat retention not less than 45 % measured according to IS EN 60531.
External walls and windows renovation		
External walls and roof renovation		
External walls and floor renovation		
New Extension affecting more than 25 % of the surface area of the existing dwelling's envelope (see 2.3.6)	The cost optimal performance level to be achieved is 125 kWh/m²/yr	Upgrade insulation at ceiling level (roof) where U-values are greater than in Table 5 and Oil or gas boiler replacement[6] and controls upgrade where the oil or gas boiler is more than 15 years old and efficiency less than 86 % and/or Replacement of electric storage heating[7] systems where more than 15 years old and with heat retention not less than 45 % measured according to IS EN 60531 and Upgrade insulation at wall level where U-values are greater than in table 5.
Windows Renovation	Not applicable[4]	Not applicable[4]
Roof Renovation		
Floor Renovation		
Roof and windows renovation		
Windows and floor renovation		
Roof and floor renovation		

[1] *Where works are planned as a single project.*
[2] *Where major renovations to walls, roofs and ground floors constitute essential repairs e.g. repair or renewal of works due to fire, storm or flood damage or as a result of a material defect e.g. reactive pyrite in sub-floor hardcore, it is not considered economically feasible to bring these renovations to a cost optimal level.*
[3] *Major Renovation of external wall elements should also meet the requirements of Table 5*
[4] *It is not considered technically, functionally or economically feasible to bring the whole building to cost optimal level when replacing the surface area of these elements.*
[5] *Subject to the requirements of Table 5 for Material Alterations and window and door replacement.*
[6] *Oil or gas boiler replacement should be with a boiler or a renewable energy source with an efficiency as given in section 2.2.2.*
[7] *Replacement of electric storage heating should be with a heat generator with an efficiency as given in section 2.2.2.*

2.3.3 The cost optimal level to be achieved is:

a) An energy performance of 125 kWh/m2/yr when calculated in DEAP as set out in column 2, Table 7

Or

b) Implementing the energy performance improvements as set out in column 3, Table 7 insofar as they are technically, functionally and economically feasible

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

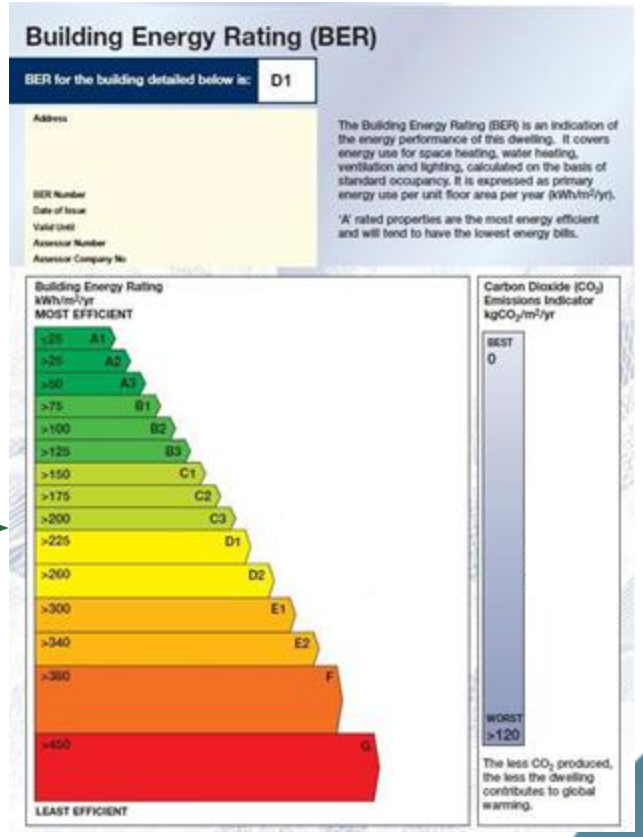
Major Renovations To Existing Buildings

Cost optimal performance defined as:

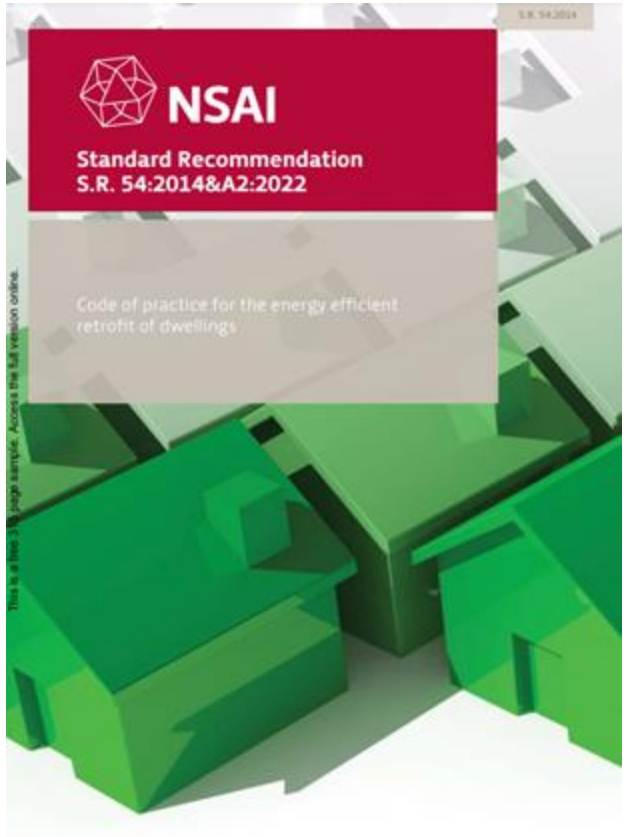
(1) **125 kWh/m².year** or less
(Equates to a B2)

(2) **Implementing performance improvements** as set out in Table 7, Part L

The BER calculation is based on the performance of elements of the external building fabric and the efficiency of installed systems for space heating, water heating and lighting.
BER assessment is carried out by a BER assessor trained and registered with the SEAI.



Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final



The Standard Recommendation (S.R.) 54 provides technical guidance on the energy efficient retrofit of the building fabric and services, the application of retrofit measures on a whole dwelling basis, general building physics and the management of retrofit projects.

The building fabric and services clauses have the following structure:

- Typical existing construction and installations;
- Appropriate retrofit measures;
- Detailed design issues for each retrofit measure;
- Detailed installation measures for each retrofit measure.

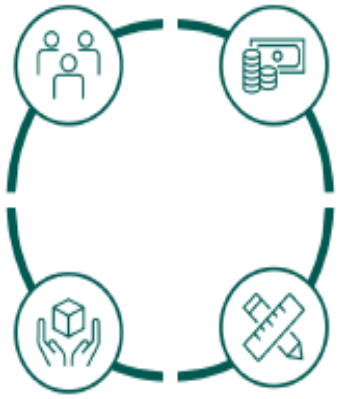
Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

The NRP is built on four key pillars as outlined in Figure 14.2 below with actions and initiatives flowing from each. Collectively, these actions will create the conditions necessary for our targets to be achieved.

Figure 14.2 – *Pillars of the National Residential Retrofit Plan*

1. Driving demand and activity

Stimulate demand by building confidence in quality, ensuring value for money and simplifying the customer journey



2. Financing & funding

Clarify Exchequer financial commitment to residential retrofit and introduce measures to make home energy upgrades more affordable for households

3. Supply chain, skills and standards

Expand the capacity of the supply chain, introduce measures to increase the number of skilled workers while maintaining quality

4. Structures and governance

Ensure that the required structures and governance arrangements are in place to drive delivery

Image Source Climate Action Plan 2021.

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Multiple Benefits of Retrofit

- Warmer and more comfortable homes
- Cheaper to run homes which helps to alleviate energy poverty
- Improved health and wellbeing, particularly for the young and elderly, through improved internal dwelling temperatures and air quality
- Improved asset values
- Reduced GHG emissions and air pollution
- Increased economic activity and high-quality jobs created throughout the country
- The ability to heat our homes using the electricity generated through renewable energy projects in Ireland

- **ROOFS**
- **WALLS**
- **OPENINGS**
- **FLOORS**

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Major Renovations To Existing Buildings- *Roofs*

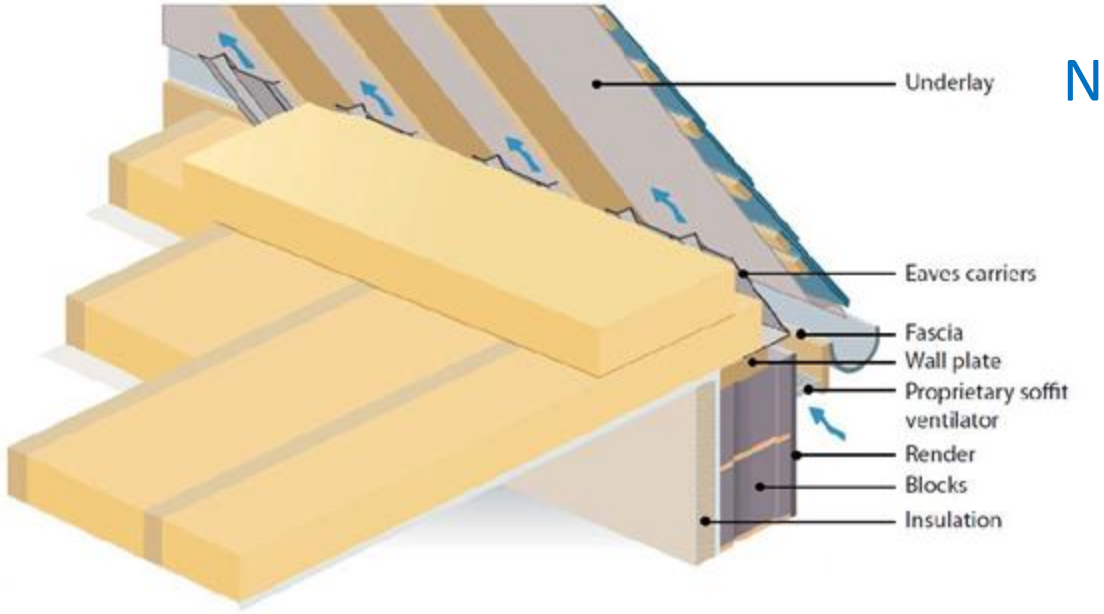


Figure 20 - Eaves ventilation showing use of eaves ventilators

Pitched Roof

Note ventilation of roof with blue arrows

Flat Roof

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Major Renovations To Existing Buildings- *Walls*

Table 18 - Selection criteria for insulation methods

	Criterion	EWI	IWI	CWI
1.	Internal disruption to occupants	No	Yes	No
2.	Reduces thermal bridging	Yes	Yes	No
3.	Retains thermal mass of building	Yes	No	Yes
4.	Reduces dwelling floor space	No	Yes	No
5.	Installation affected by external weather conditions	Yes	No	No
6.	Scaffolding required	Yes	No	Yes[a]
7.	External services (e.g. downpipes, gullies, cables, gas meter box, electricity meter box, flues, etc.) may require relocation	Yes	No	No
8.	Requires planning approval for works which materially alter exterior appearance of the dwelling	Yes	No	No
9.	Internal pipes, radiators, electrics etc. require relocation	No	Yes	No
10.	Internal skirting, architrave, fitted kitchens, wardrobes etc. require relocation	No	Yes	No
11.	Internal vapour control layer required	No	Yes	No
12.	Practical to achieve advanced U-value without combining with another system	Yes	Yes	No[b]
13.	Specification subject to wind driven rain exposure	No	Yes	Yes
14.	Impact on access provision to side of dwelling	Yes	No	No
15.	Impact on external accessibility requirements to dwelling	Yes	No	No
16.	Impact on corridor/stair widths adjacent to external walls	No	Yes	No
17.	Requires modification of eaves/gable roof line	Yes	No	No
18.	Improves external weatherproofing and appearance of building	Yes	No	No
19.	Local Authority consulted where encroaching on public footpath	Yes	No	No
a	Subject to installer's safety assessment.			
b	Advanced U-values requires a combination of methods.			

Wall Insulation Method - Big Decision

EWI = External wall insulation

IWI = Internal Wall Insulation

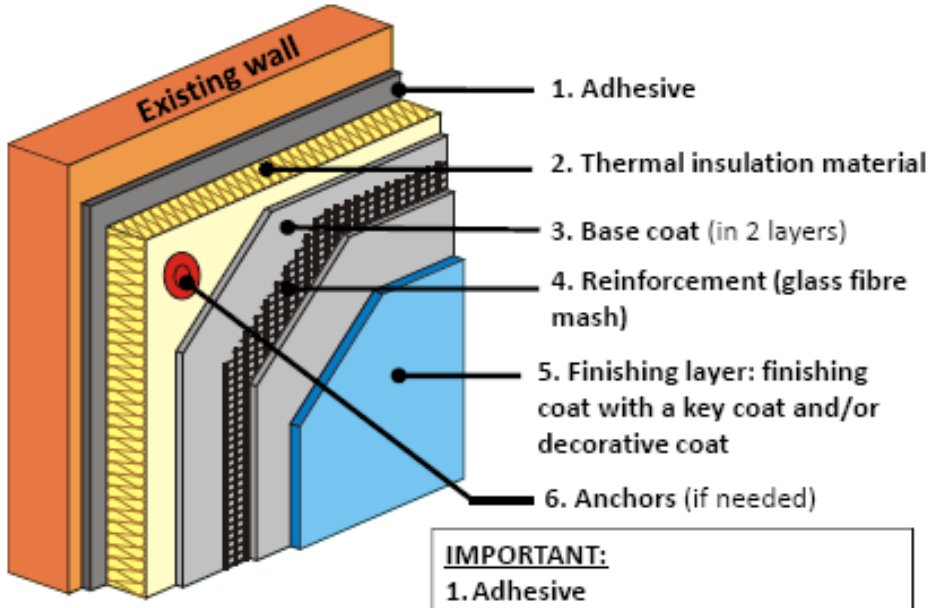
CWI = Cavity Wall Insulation

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Major Renovations To Existing Buildings- *Walls*

One of most commonly used systems for thermal enhancement of walls.

Thermal insulation material	Advantages	Disadvantages
Mineral wool	• Vapour permeable • Good reaction to fire • Good sound insulation	• 15-30% more expensive • More demanding for installation • Risk of damping
EPS-polystyrene	• Lower material price • Easier for installation • Greater choice of finishing layers	• Less vapour permeable • Weaker sound insulation • Weaker reaction to fire



Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Major Renovations To Existing Buildings- *Openings (Windows & Doors)*

A high performance window can only be as good as the install

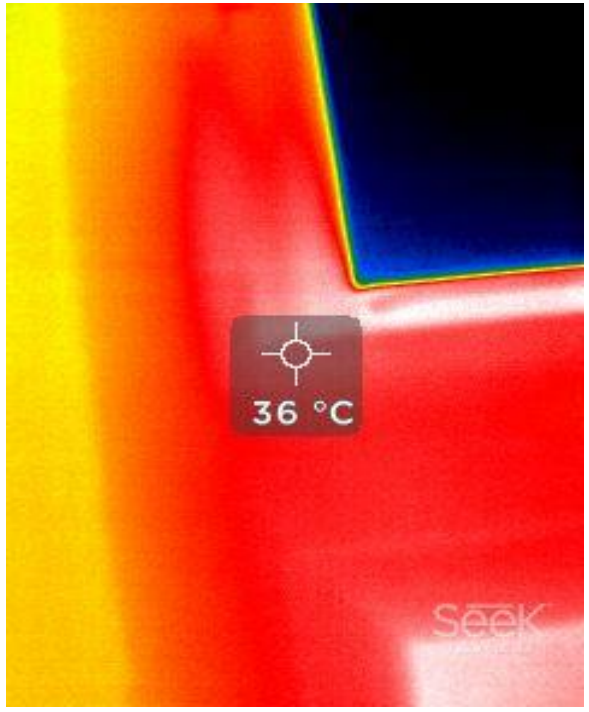
The installation must address several key issues:

- structurally sound,
- watertight,
- airtight,
- vapour smart and
- increase the installed thermal performance of the window.

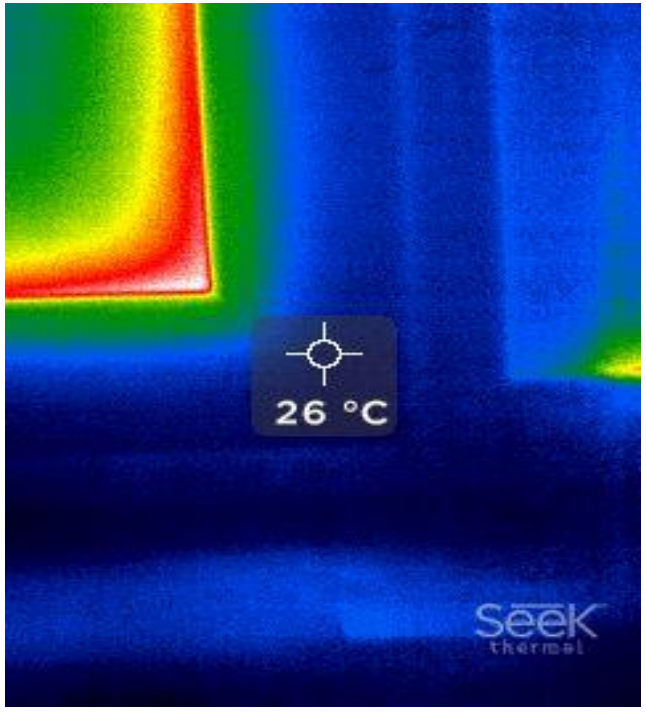
Secondary glazing

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Major Renovations To Existing Buildings- *Openings (Windows & Doors)*

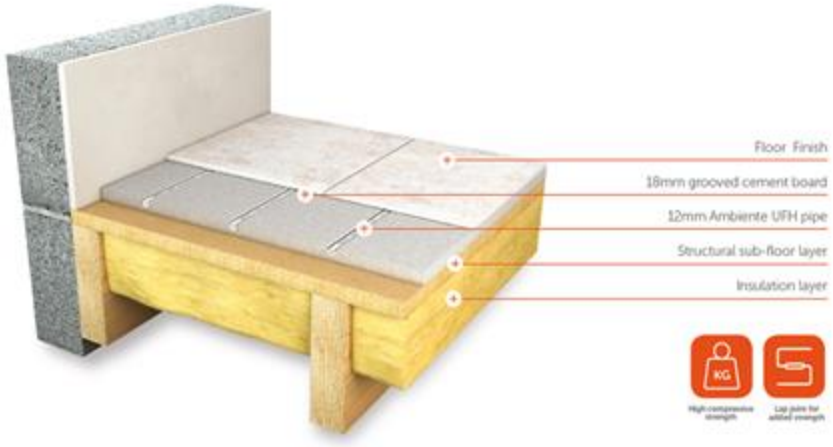


Overheating heat gain & loss

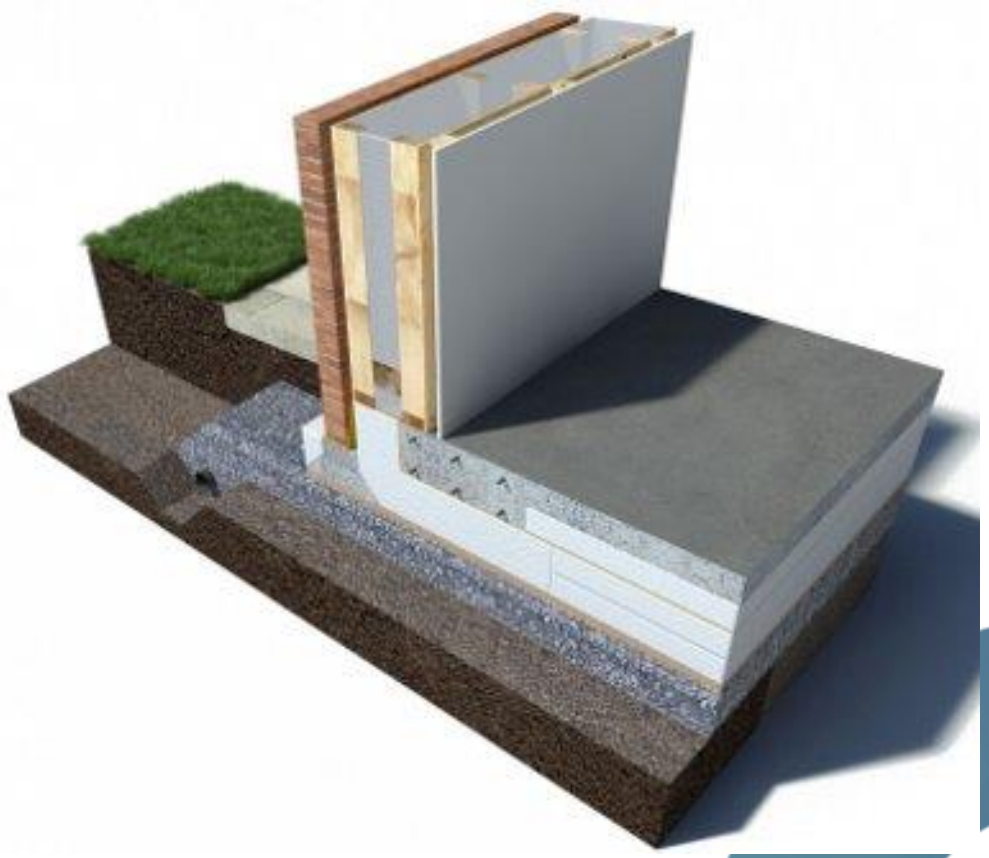


Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Major Renovations To Existing Buildings- *Floors*



Source: https://ambienteufh.co.uk/underfloor-heating-retrofitting-complete-guide/



Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

CE European Conformity Marking

CE Marking on a product is a manufacturer's declaration that the product complies with the essential requirements of the European technical regulations ("Directives"), related to European health, safety and environmental protection legislation, and that the product compliance has been established using the appropriate conformity assessment procedure(s).

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

NSAI's 'Construction Products Regulation' (CPR)

Before a product can be certified, it must first undergo a process of inspection and testing to ensure it meets **Minimum quality assurance standards & Any relevant legal requirements.**

The product certification services can be divided into two broad categories:

- **CE marking:** legal requirement for many products sold in the European Union
- **Irish Standards Mark (ISM):** A system of quality control supervised by NSAI.

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Standards related to Construction

- NSAI's 'Construction Products Regulation' (CPR)
- "CE European Conformity Marking"
- SR 325 – design of masonry structures
- 'Woodspec – A Guide to Designing, Detailing and Specifying Timber in Ireland'
- I.S. 127 and I.S. EN 14081 relating to timber strength grading
- I.S. 193 and I.S. EN 14250 relating to roof truss manufacturing standards

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Self-Assesment Quiz

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Post Recording Survey

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Source: St. David's Castle- Naas

Thank-You for listening!

Any Questions?

Please Contact: Benny.McDonagh@tus.ie

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Shaping a Circular Sustainable Future

Module 4

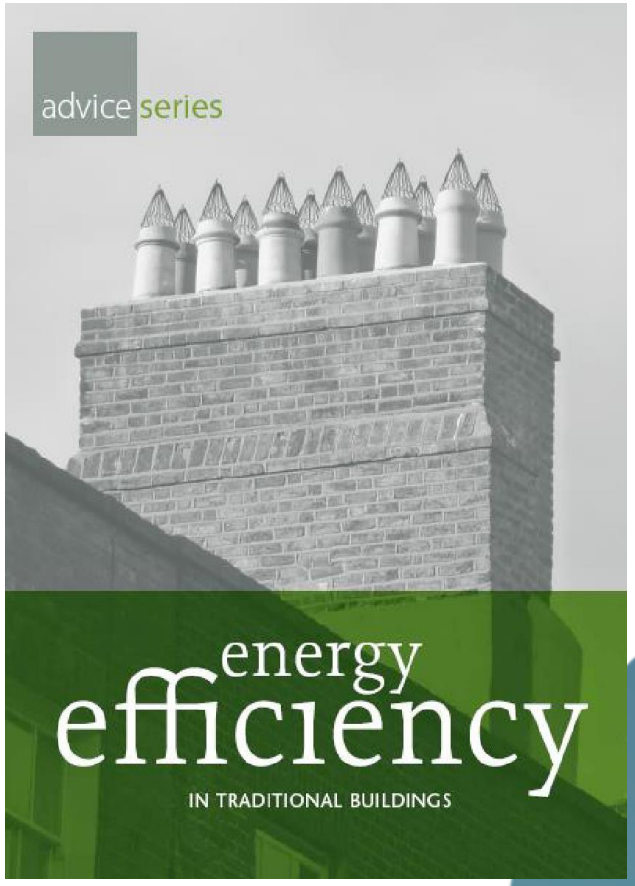
Traditional Buildings
Defining Traditional Buildings & Improving Energy Efficiency

Traditional Buildings
Defining Traditional Buildings & Improving Energy Efficiency

The aim of this module is to explain the concept of:

- What Traditional Buildings are
- Renovation to energy efficiency standards
- Wellbeing

Duration
2.5 hours



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Introduction to Traditional Buildings

- **What are Traditional buildings**
- **How to renovate correctly**
- **Defects and solutions**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Projected cumulative number of home upgrades 2019-25

- Since 2000, over 465,000 homeowners have upgraded their homes with support from SEAI schemes, representing 25% of homes nationwide.
- 15,457 home energy upgrades were completed in 2021, just 4,600 were to a B2 standard and 2,010 installed a heat pump
- The depth and volume of retrofits needs a huge increase in addition to the number of heat pumps installed, to deliver the required emissions reductions
- It is estimated that between 2019 and 2025 almost 185,000 home energy upgrades will be delivered with over 83,000 to a B2/'cost optimal' level.
- When the carbon savings from the non-B2 upgrades are included, this is the equivalent of 120,000 B2 upgrades over the period.
- Need to deliver, on average, approximately 75,000 B2-equivalent home upgrades per year from 2026 to 2030 to achieve the overall target of 500,000 by 2030
- By 2025, it is expected that 80% of B2 upgrades will involve installation of a heat pump.

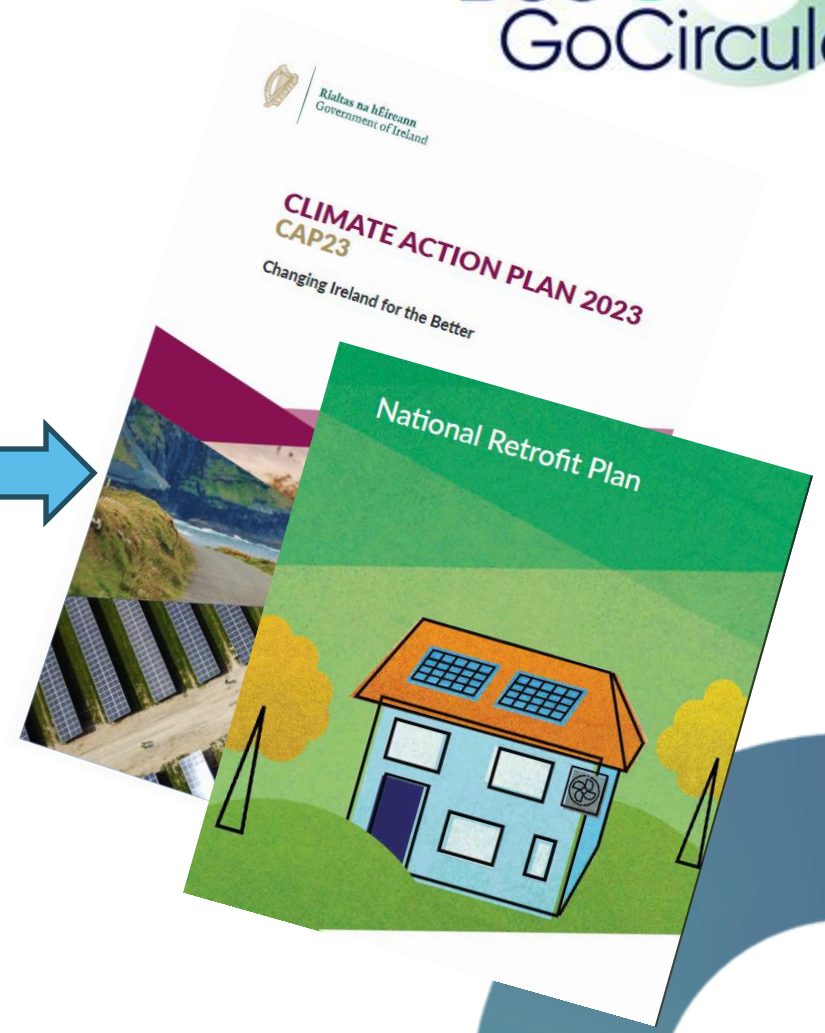
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

National Retrofit Plan Development

Approach

- Engagement, consultations and workshops with homeowners, the supply chain and financiers NZEB Fundamentals training a feasible option
- Work collaboratively across all relevant Government Departments and Agencies – take the 'Holistic' approach
- Reviewing national and international experience of retrofitting programmes
- Commit to ongoing collaborative approach in the implementation phase

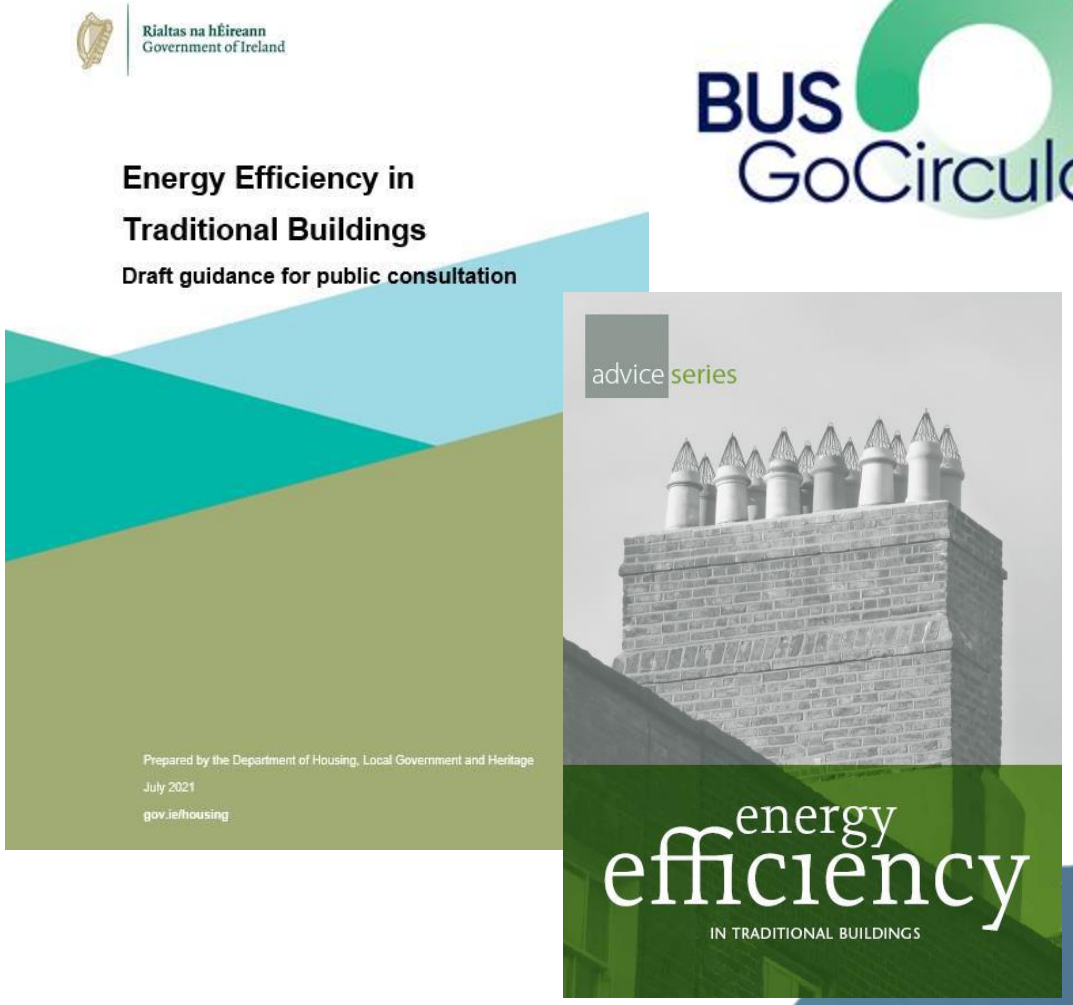
Design Principals	
Fair	**Ensure fairness to all citizens**
Universal	**Cover all housing typologies and areas of feasibility**
Customer - Centricity	**Design solutions** for occupants owners to reduce retrofitting risks
Cost-Optimal	**Encourage cost optimal retrofitting** including grant aid to reduce emissions, costs and fuel poverty
Sector-Led	**Help to stimulate the sector** and ensure skills are promoted



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

New guidance

- Aims to provide clear and robust advice to specifiers and installers, while being accessible to a wide audience
- Guidance will be strategic more than prescriptive given the nature of the historic building stock
- Illustrate good practice and establish principles and processes to be followed
- Public consultation was held in 2021. Publication planned for later this year entitled *Improving Energy Efficiency in Traditional Buildings*



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Traditionally built buildings account for a sizeable fraction---17% of our building stock and need to contribute as much as possible to energy and emissions reductions

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

What is a Traditional Building?

This type of construction was used for the majority of buildings constructed in Ireland before 1940 and represent an estimated 15-18% of the building stock
These buildings perform differently to modern construction regardless of any statutory protection they may have

Traditional buildings include those with:

- Solid masonry walls (brick or stone, often with a render finish) –i.e. no cavity
- Single-glazed timber or metal windows
- Timber-framed roofs with slate or tiles
- Traditional buildings are of flexible construction, usually with shallow foundations
- Generally, they were built with no damp-proof course

This type of construction was used for the majority of buildings constructed in Ireland before 1940 and represent an estimated 15-18% of the building stock
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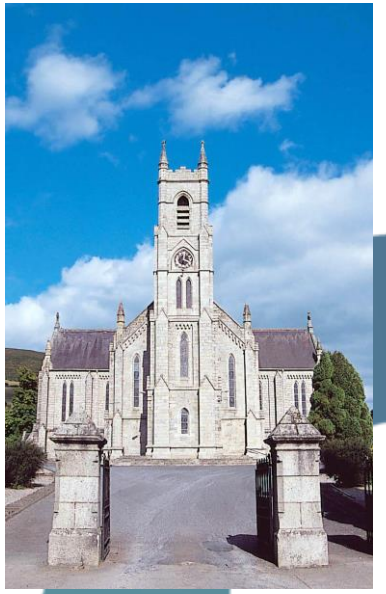
Traditional buildings

- Traditional building methods evolved over centuries, making best use of available materials and craft skills, to deal with local weather conditions
- Traditional building materials are usually soft, flexible and vapour-permeable
- Primary difference between traditional construction and modern construction is in how moisture is managed. Traditional building materials need to be ‘breathable’ in order to function properly, that is they need to absorb and release moisture to the atmosphere depending on the environmental conditions
- These buildings relied on natural ventilation which was originally provided through open fireplaces, gaps between slates and around windows and doors



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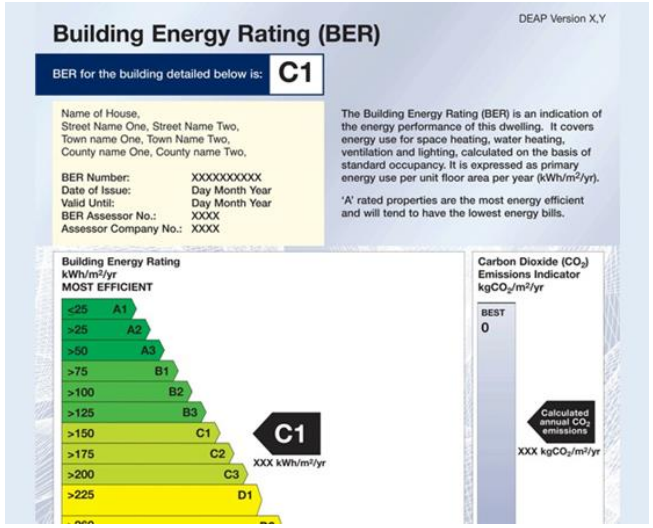
Statutory requirements

- National Monuments Acts
- Planning & Development Acts
- Building Control Acts and Regulations
- Building Energy Rating



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National Monuments Acts

A structure or place may be protected under these Acts in one or more ways:

By reason of being a national monument in the ownership or guardianship of the Minister for Housing, Local Government & Heritage or a local authority, or subject to a preservation order – **National Monument**

As a monument or area entered in the Register of Historic Monument –**Registered Monument**

As a monument entered in the Record of Monuments and Places -**Recorded Monument**

- The Record of Monuments & Places (RMP) is the most widely applying provision. The list and maps can be consulted online at www.archaeology.ie

Structures protected under the National Monuments Acts are exempt from the requirements of the

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Planning & Development Acts

- Architectural heritage is protected under the Planning and Development Acts and administered by the local authorities
- **Part IV of the Planning and Development Act 2000 is concerned with architectural heritage**.
- Planning permission is required for all works that would materially affect the character of a protected structure, a proposed protected structure, or an architectural conservation area. In the case of protected structures and proposed protected structures, this includes the interiors of the buildings and any buildings within their curtilage
- Further guidance is available in 'Architectural Heritage Protection: guidelines for planning authorities' Available to download from: www.buildingsofireland.ie/resources

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Professional skills & competence

- There are risks associated with altering a traditional building which has performed well in the past
- Specification of retrofitting works for traditional buildings should generally only be undertaken by competent professionals with the necessary skills and experience
- Where a project is complex or the building is of architectural heritage significance, particular skill sets will be required
- Certain low-risk interventions may be undertaken by skilled and experienced

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Understanding traditional buildings

- The physics of traditional buildings, how heat and moisture move through a building and how this can be dealt with, taking into consideration the importance of ventilation and indoor air quality
- Methods available for assessing a building to determine any thermal bridges, air leakage and existing damage
- The calculation method for U-values relevant to traditional buildings
- Potential health risks associated with the build-up of harmful substances/gasses in a building and how to avoid them

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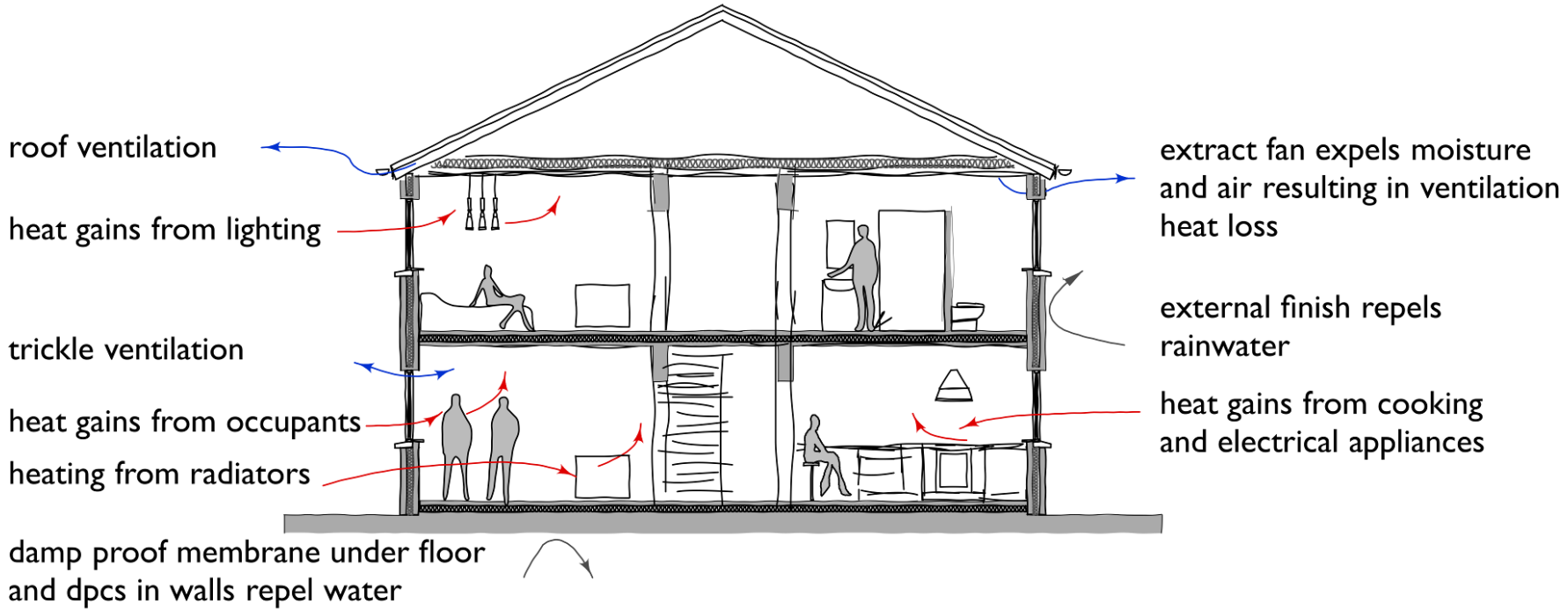
How modern construction behaves



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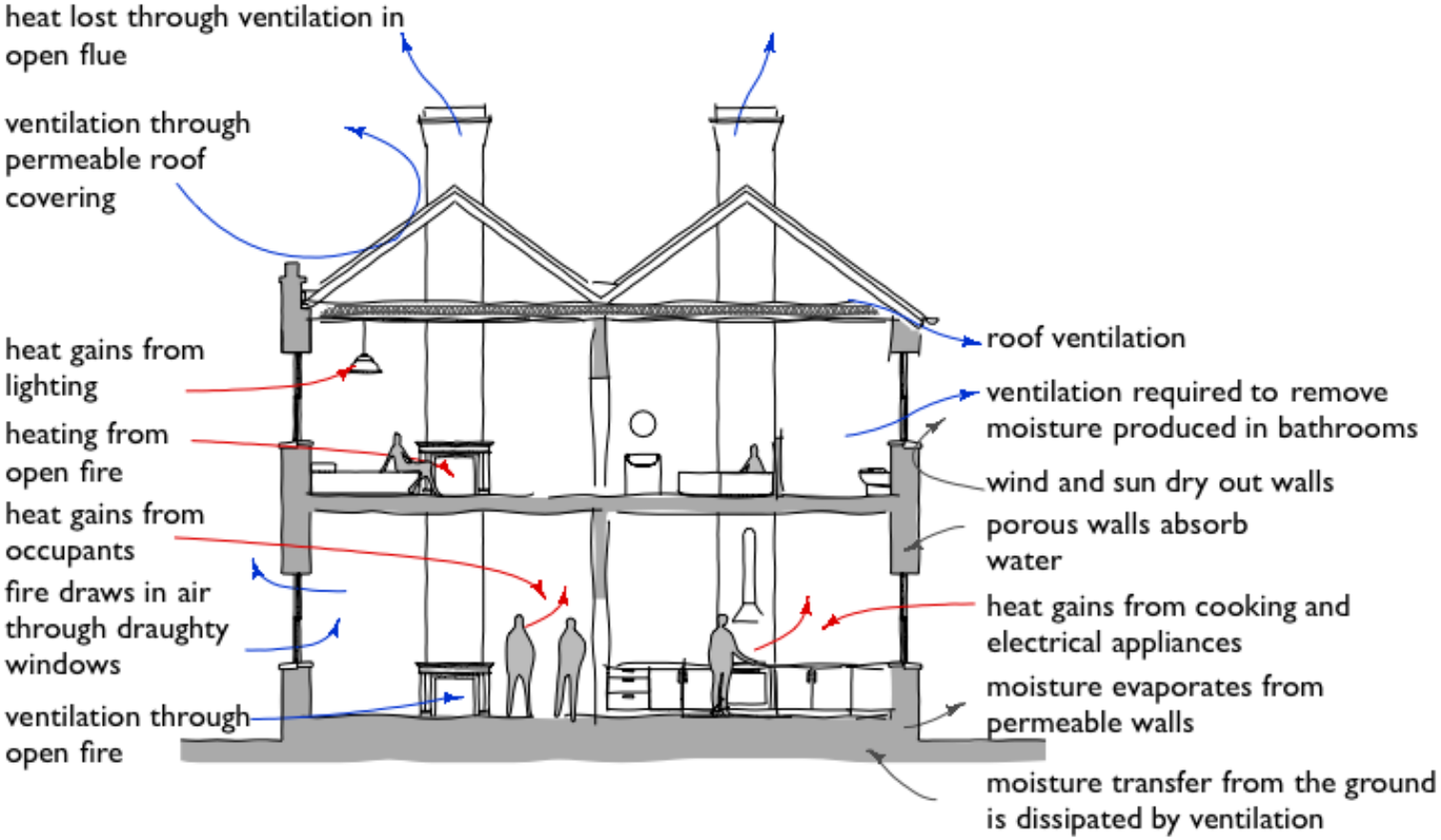
How traditional construction behaves



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It is important to understand the building before considering any upgrading works, including:

- Approximate construction date of the building
- Construction materials used
- Construction methods used
- Any later interventions or alterations and their appropriateness or otherwise

- Thermal mass
- Moisture movement
- Thermal bridging
- Airtightness, ventilation & indoor air quality
- Potential health risks from mould growth, radon, hazardous materials (asbestos, lead, etc.)

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Upgrading traditional buildings

- Regardless of any statutory protection on the building, works to upgrade the energy efficiency of a traditionally built building will differ from those appropriate for modern construction
- Essential to understand how traditionally built buildings work before carrying out works to avoid causing irreversible damage
- In traditional buildings, elements are not isolated or separated by barriers or cavities so it is essential to consider the buildings as a whole
- There must be a balance between the requirements of energy conservation and of building conservation

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Developing a retrofit strategy

(Based on I.S. EN 16883: 2017: Conservation of cultural heritage -Guidelines for improving the energy performance of historic buildings)

- ✓ Carry out a building condition assessment
- ✓ Determine the complexity of the project
- ✓ Set retrofit objectives and targets with the client
- ✓ Develop long list of measures and assess risk
- ✓ Undertake risk mitigation measures (are specialist surveys, condensation risk analysis, etc. needed?)
- ✓ Review the list of retrofit measures and create a short list
- ✓ Develop detailed specifications
- ✓ Apply for statutory consents (planning permission, etc.)
- ✓ Tender for competent contractor

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Assessing the building

The first step in upgrading thermal performance is to identify the special features of the building and see where change can occur
This should include an assessment of the building as a whole and of individual elements such as:

- Walls and structure
- Roofs
- Openings: doors and windows
- Interiors: walls, floors, ceilings
- Building services

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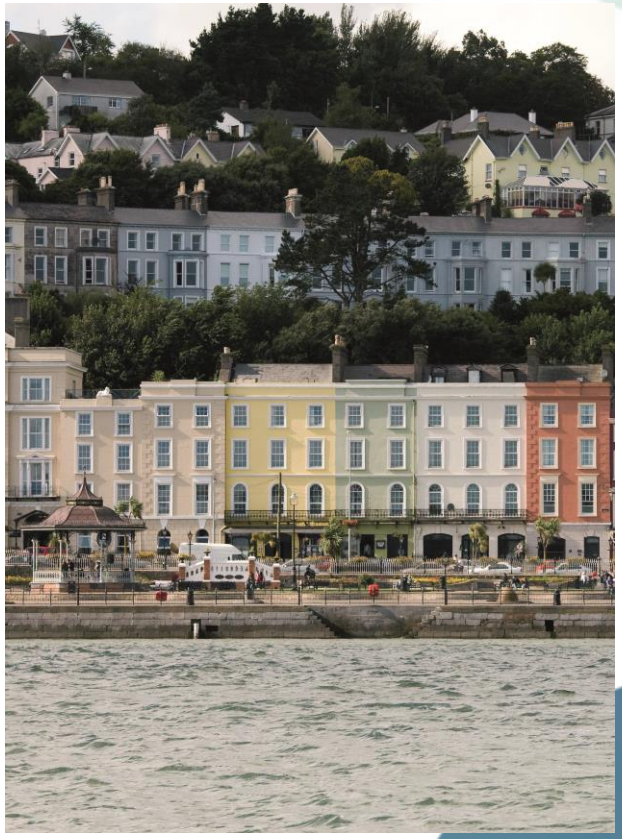
Sustainability & historic buildings

- '*The Greenest Building is the One Already Built*' (Carl Elefante, 2007)
- The continued use and/or reuse of older buildings is an essential component of sustainable development and avoiding greenhouse-gas emissions
- Carbon reduction strategies have to date largely concentrated on operational emissions and fabric performance
- It's becoming clear that to meet climate goals, future focus must be on **carbon reduction**



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Conservation principles

1. Keeping the building in use
2. Researching and analysing
3. Using expert conservation advice
4. Protecting the special interest
5. Promoting minimal intervention
6. Repairing rather than replacing
7. Using appropriate materials and methods
8. Ensuring reversibility of alterations
9. Avoiding incremental damage

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Future steps

- We hope shortly to commission a study into **embodied carbon and life cycle assessment** for the retrofit of traditional buildings and develop a practical step-by-step guide to undertaking these assessments for the retrofit of case study building types
- Sustainable Energy Authority Of Ireland (SEAI) has commissioned a RD&D project ('FabTrads') to identify the **hygrothermal properties** for a range of Irish traditional construction materials/assemblies. The project includes laboratory and in-situ testing and the findings are intended to inform the National Calculation Methodology(BER ratings) and be of use in developing further retrofit guidance for traditional buildings
- Intend to undertake a number of **exemplar projects** to establish, demonstrate, monitor and publish best practice case studies of the appropriate and sensitive energy retrofitting of traditional buildings across the country in accordance with the forthcoming guidance on *Improving Energy Efficiency in Traditional Buildings*

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Self-Assesment Quiz-

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Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Post Recording Survey-

scan QR Code

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Thank-You for listening!

If you have any Questions? Please Contact: Benny.McDonagh@tus.ie

Shaping a Circular Sustainable Future

Module 5

Traditional Buildings
Building Renovation Passports

Introduction to Building Renovation Passports

- **This module will present the opportunity of introducing Building Renovation Passports (BRPs) in Ireland. It a Roadmap and a Logbook.**
- **The Roadmap is a masterplan for the deep energy retrofit of a Building which sets out the measures step by step.**

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Energy Performance of Buildings Directive was Recast –22/10/22

Article 10: **Renovation passport**

- By 31 December 2023, the Commission will be establishing a common EU framework for renovation passports.
- By 31 December 2025, Member States shall introduce a scheme of Renovation Passports for use by building owners.
- Member States are considering allowance for the integration of the renovation passport into the EPC (Energy Performance Certificate), BER in Ireland in relation to major renovation plans and to receiving ongoing financial support.

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

EPBD –Energy Performance of Buildings Directive Recast

3. The renovation passport shall comply with the following requirements:
(a)it shall be issued by a qualified and certified expert, based on an on-site visit of the building, which may be carried out by virtual means, where appropriate ;

(b) it shall comprise a renovation roadmap indicating a sequence of renovation steps building upon each other, with the objective to transform the building into a zero-emission building by 2050 at the latest;
(c) it shall indicate the expected benefits in terms of energy savings, savings on energy bills and operational greenhouse emission reductions as well as wider benefits related to health and comfort and theimproved adaptive capacity of the building to climate change; and
(d) it shall contain information about potential financial and technical support.

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Legislative Framework

EN 16883:2016 (E)

Energy efficiency in Historic Buildings

10.3 Compile a long list of measures

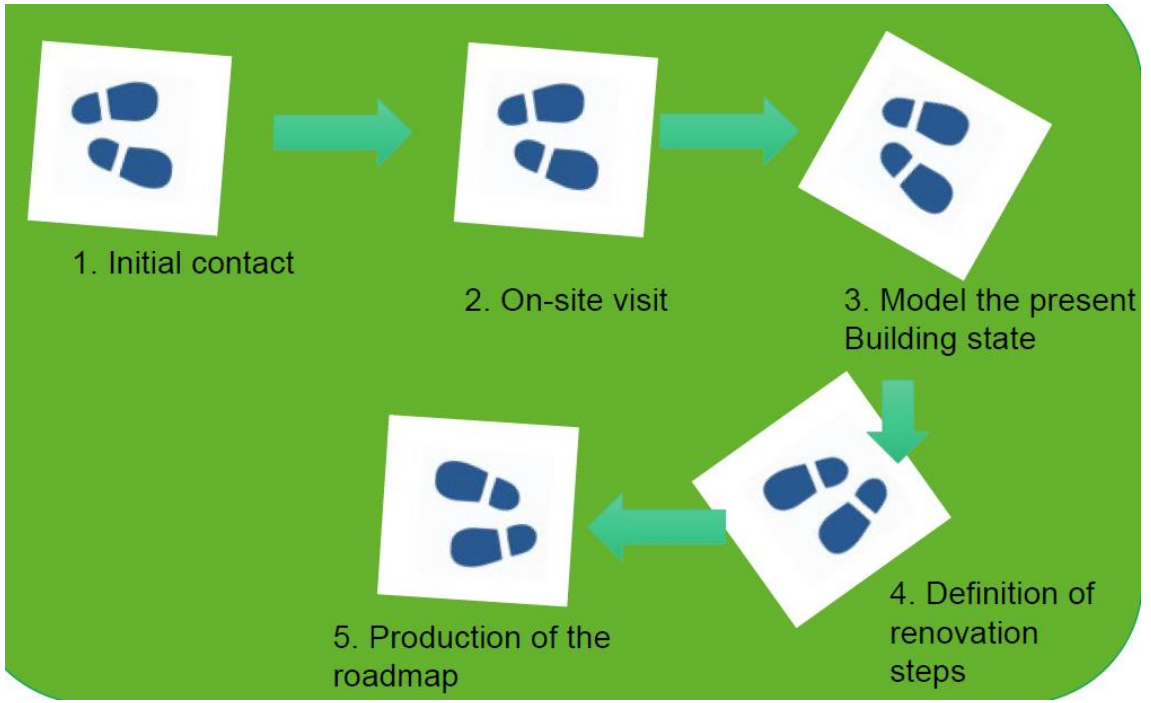
A complete list of possible measures is the starting point. It is a general list without regard to the specific technical properties or heritage significance of the building in question. Such a list depends on the climate, building practices, cultural context etc. The list covers measures to the building envelope and technical building system and to change user behaviour. The list can be based on EN 16247-2.

10.4 Exclude inappropriate measures

The first step of the selection process is to eliminate any measures from the long list that are clearly inappropriate. On the basis of the long list, a quick assessment is undertaken by the expert team. This will be based on the above criteria using experience rather than thorough analysis. If the team agrees, a measure will be removed. Brief justifications for each decision should be given. The outcome of this step will be a short list of measures that are considered potentially suitable.

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Renovation Roadmap
A document outlining a long-term step-by-step renovation roadmap for a specific building, resulting from an on-site energy audit fulfilling specific quality criteria established in dialogue with building owners.



Logbook
A repository of all building-related information (e.g. energy consumption and production, executed maintenance and building plans).

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

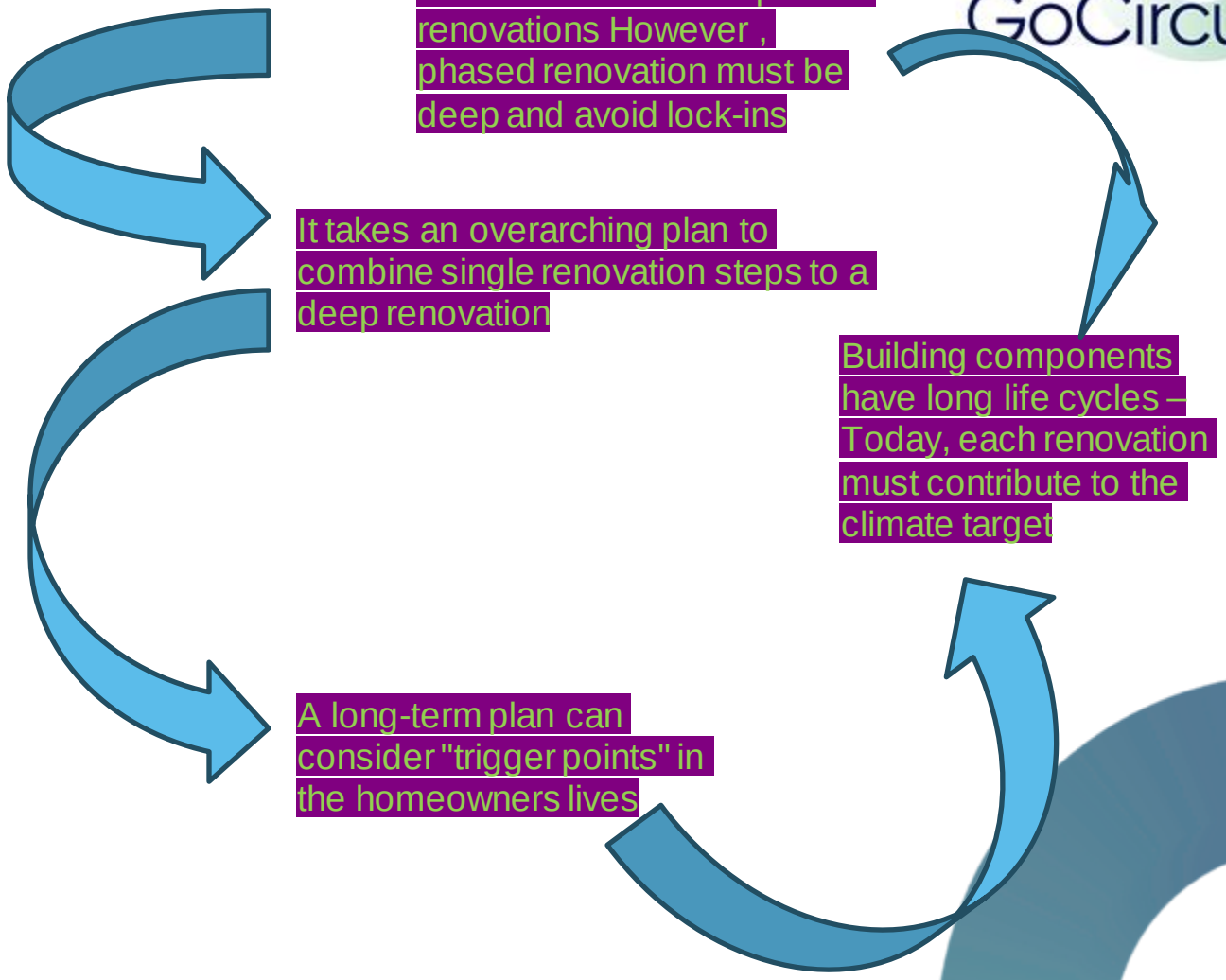
Renovation Roadmap

Step by Step Plan

ENERGY CLASS C3	ENERGY CLASS B3	ENERGY CLASS B2	ENERGY CLASS B1
YOUR BUILDING TODAY	RENOVATION STEP 1 2025 - 2030 PENDING MAINTENANCE MEASURES	RENOVATION STEP 2 2025 - 2030 HIGHER COMFORT DEMANDS	RENOVATION STEP 3 2025 - 2030
	WHAT TO DO? • Optimization control system	WHAT TO DO? • Substitution of the old windows • Improve the air permeability of the envelope • Optimization of the ventilation control system	WHAT TO DO? • External Wall insulation • Roof insulation
ENERGY BILL 3200 €/a	INVESTMENT COSTS 2000 € COSTS FOR MAINTENANCE 300 € ENERGY BILL 1474 €/a	INVESTMENT COSTS 37697 € COSTS FOR MAINTENANCE 20000 € ENERGY BILL 1376 €/a	INVESTMENT COSTS 7435 € COSTS FOR MAINTENANCE 700 € ENERGY BILL 1220 €/a

Costs should be a range or approximate.

Costs for Maintenance needs to be defined clearer and may be removed for single-family dwellings. People do not routinely plan for maintenance in Ireland. It would create an additional level of ambiguity over the cost analysis of the system.



Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

All the homeowners involved in the pilot affirmed that the Logbook provided them with a long-term possibility to track their building-related information

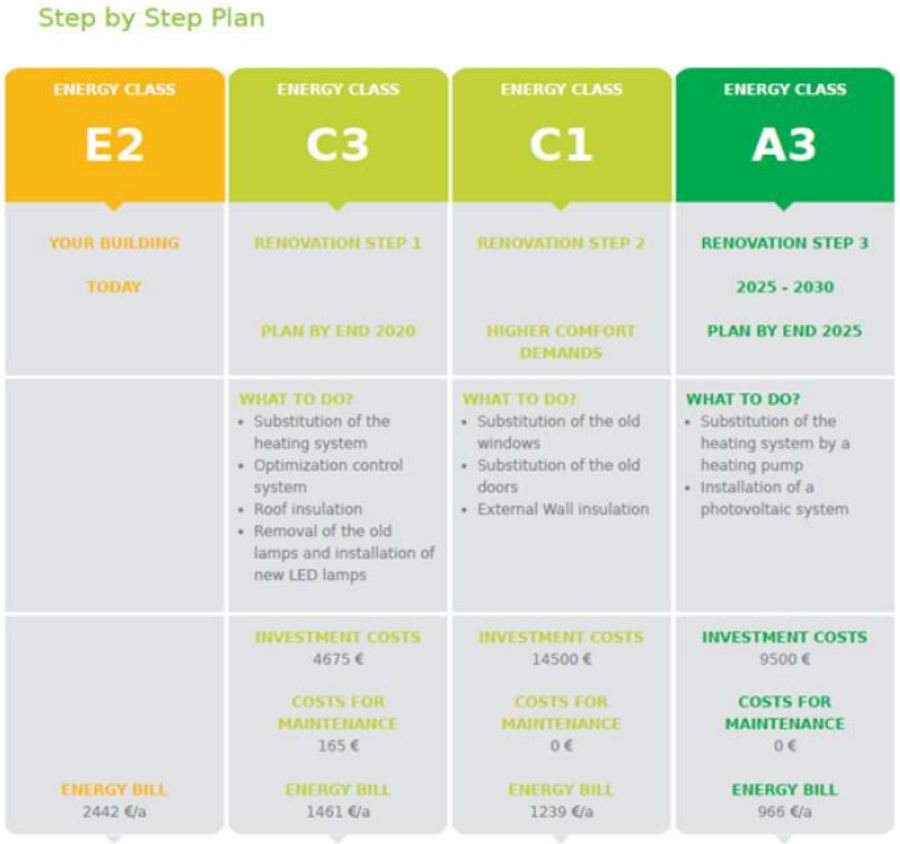
Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Building Renovation Passport

A **Building Renovation Passport** is document in paper format outlining a long-term phased deep renovation roadmap to achieve deep renovation for a specific building. It will be designed to reflect the variable situation of the owner or occupier which can change a buildings requirement due to use, mobility and cognisance and updated regularly.

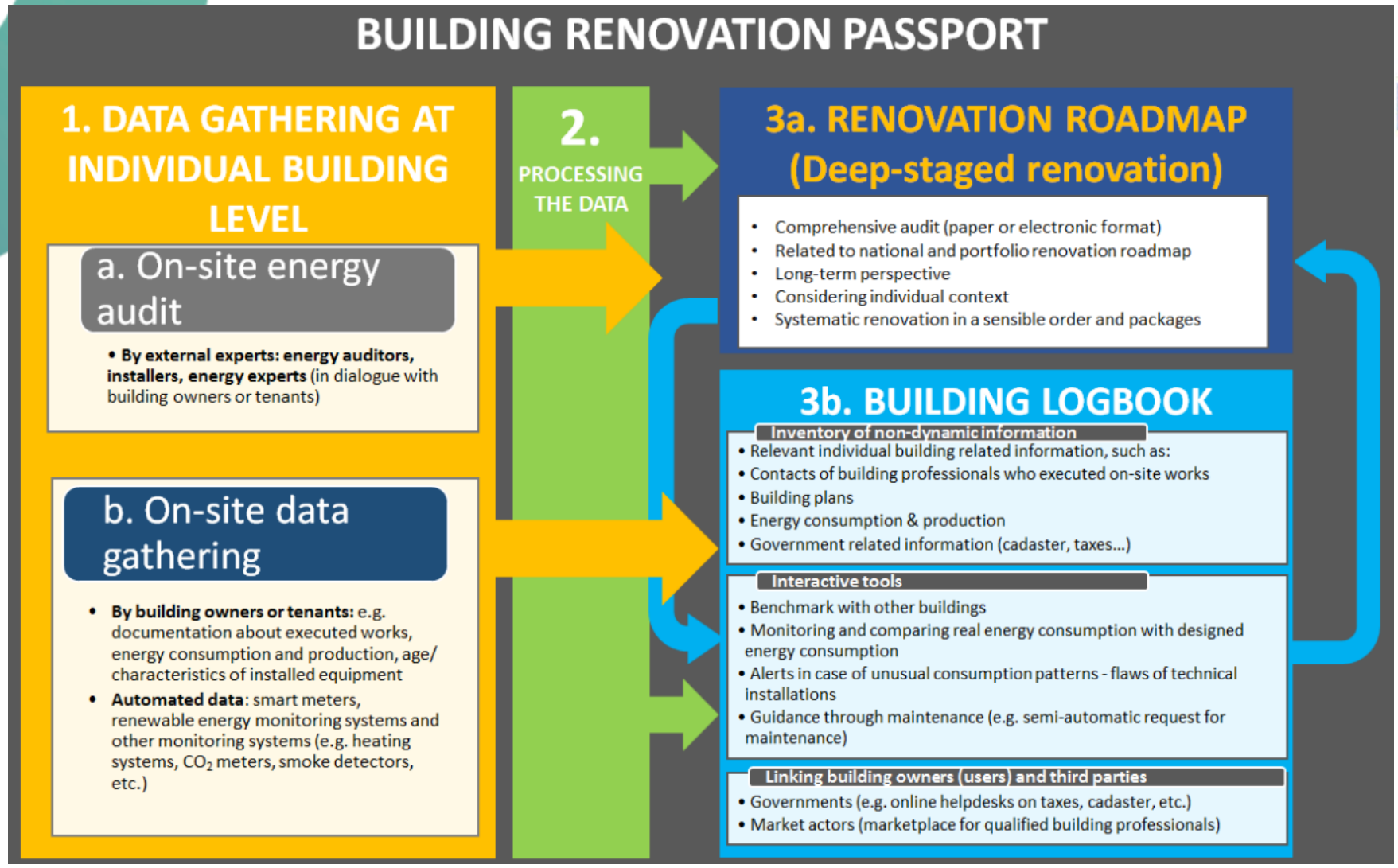
The BRP also simplifies and explains the complexity of renovation works and present a futureproofed plan interlinking the different stages so as to ensure the best measures are implemented.

The BRP can be linked to Energy Assessment Procedures, such as DEAP in Ireland, and additionally, as recommended by an EU study, a digital editable version created called Digital Building Logbooks (DBLs).



Introducing Building Renovation Passports In Ireland Feasibility Study 2019 (Source: IGBC)

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final



Building Renovation Passport – Overview of its component (Source: BPIE)

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

The **iBRoad Renovation Roadmap**:

- provides a ready-to-use solution for the BRP as announced in the Energy Performance of Buildings Directive (EPBD)
- It can adapt to specific national requirements and offer a unified design, making the BRP a recognisable concept throughout all EU States.

Source: ibroad-project-Renovation Passport

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Project outcome Recommendations for action:

1. Implement a EU-harmonised system for issuing Building Renovation Passports (BRPs)
2. Anchor the BRP in national legislation
3. Implement funding to support the BRP
4. Build up a stock of qualified auditors through targeted training offers and Quality Assurance
5. Monitor the energy status of the building stock over long periods of time with a building database
6. Motivate building owners through transparent objectives and provide supporting tools

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

John Fingleton
john@igbc.ie

United in one common goal

Accelerate the transformation to a sustainable built environment, industry and supply chain through leadership, research, education, and policy into national and local government

TUS
Technological University of the Shannon: Midlands Midwest
Oliscoil Teicneolaíochta na Sionainne: Lár Tíre Iarthar Láir

An Chomhairle Oidhreachta
The Heritage Council

HCI Human Capital Initiative

DASBE
Digital Academy for the Sustainable Built Environment

Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Self-Assesment Quiz-

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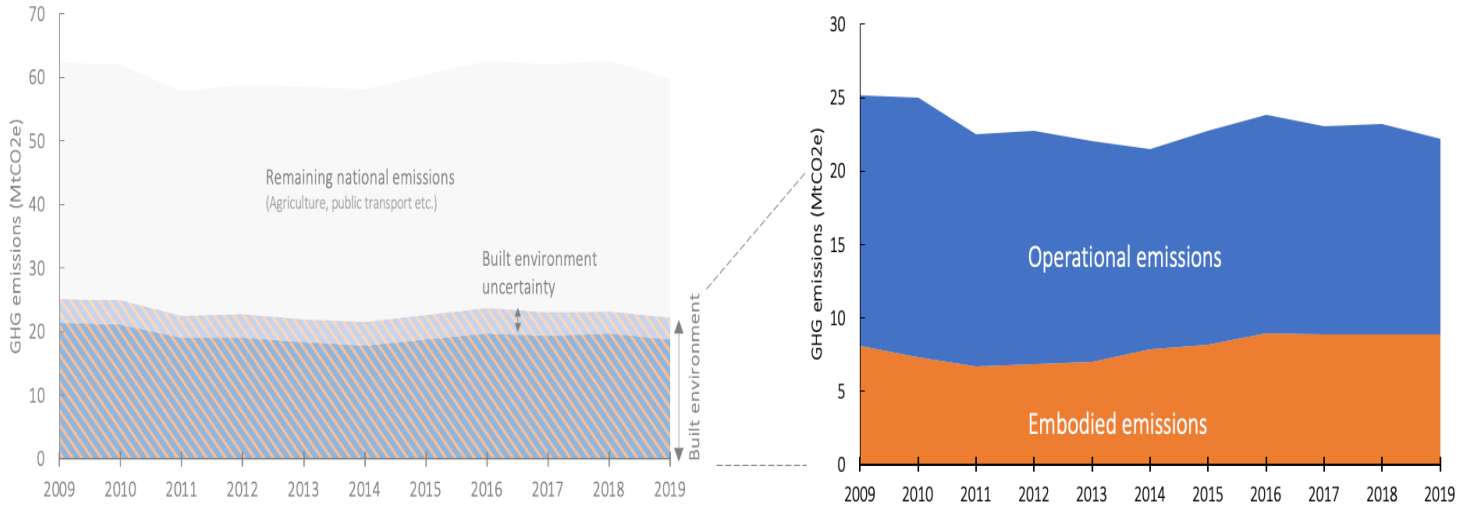

Whole Life Carbon in Construction & the Built Environment in Ireland (Source Oliver Kinnane, Richard O 'Hegarty & Stephen Wal)

Thank-You for listening!

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Circular economy scheme. Source: Adapted from European Commission. COM (2014) 398 final

Traditional Buildings
Building Renovation Passports

The aim of this module is to introduce:

- The Energy Performance of Buildings Directive recast- Article 10
- Explain the Renovation Passport
- Digital Logbook for buildings

Duration
2.5 hours

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Possible post its for each type of case study

[Building name]

[Architects]
[Year construction]
[City]
[more info in web]

[Product name]

[Producer]
[Type of product]
[circular strategy]
[Country]
[web]

[Another case study name]

[Organisation]
[Circular Strategy]
[Relevant info]
[Country]
[web]

EXTRA MATERIAL

[Provide some bibliography, if possible, to increase the explanation of the contents involved in all the modules of the pack]

- Name, Author, Year, etc
- https://knowledge-hub.circle-lab.com/ [link]
- Drive 0 - Circular Homes, IVE, 2021
- https://www.circularhomes.eu/

REFERENCES

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Colophon

BUS GoCircular

Partners

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