Build Upon²
Energy Renovation Framework - Methodology

October 2021

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The BUILD UPON\textsuperscript{2} Project

We are in a state of climate emergency. We must act now to reach net zero carbon by 2050 - and municipalities can lead the way. To get there, local authorities must unlock the huge potential of their buildings - and building renovation in particular.

Deep building renovation has far-reaching benefits for society as increasing indoor comfort and air quality avoids illnesses and premature deaths associated with living in cold and damp homes. This in turn reduces pressure on healthcare and social services.

The EU Horizon 2020 funded BUILD UPON\textsuperscript{2} project will empower municipalities across Europe to join forces with national governments and industry to decarbonise their existing building stock by 2050. BUILD UPON\textsuperscript{2} will strengthen the local effectiveness and implementation of the national building renovation strategies required by the EU Energy Performance of Buildings Directive (EPBD).

[www.worldgbc.org/build-upon](http://www.worldgbc.org/build-upon)

About the Irish Green Building Council

The Irish Green Building Council (IGBC), is the leading authority on sustainable building in Ireland. With a network of over 240 member organisations, the IGBC is working to transform the Irish construction and property sector into a global leader in quality and sustainability.

The mission of the IGBC is to educate and advocate for a more sustainable built environment. To support Ireland’s transition to a low carbon economy, the IGBC has also developed the Home Performance Index (HPI), Ireland’s first national certification for quality and sustainability in new residential developments.

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“The BUILD UPON Framework allows local authorities to measure and record the impacts of their retrofit projects in a holistic manner, looking at CO\textsubscript{2} emissions reductions, but also at the wider impacts, such as the benefits to people’s health and wellbeing and indeed reduction in energy poverty. In future the BUILD UPON Framework will help us in better considering and communicating the multiple benefits of retrofit, which in turn should increase the rate of retrofit.”

- Ali Grehan
  City Architect - Dublin City Council

“The Framework will help to communicate the benefits of energy renovation, including health and comfort in homes, cost savings, climate mitigation and opportunities for local employment.”

- Orla Hegarty
  University College Dublin

“The BUILD UPON Framework will empower municipalities across Europe to join forces with national governments and industry to decarbonise their existing building stock by 2050. BUILD UPON\textsuperscript{2} will strengthen the local effectiveness and implementation of the national building renovation strategies required by the EU Energy Performance of Buildings Directive (EPBD).”

- Brian Cassidy
  Senior Engineer - Cork City Council

"Cork City Council will retrofit 2,700 social houses by 2030. The Build Upon\textsuperscript{2} Framework is a fantastic opportunity to better monitor the impact of this programme on our climate targets and to exchange best practices with fellow European Local Authorities."

- Brian Cassidy
  Senior Engineer - Cork City Council
The objective of this technical manual is to support Irish local authorities in using the core indicators of the Build Upon² Energy Renovation Framework (the Framework).

This document was developed based on the feedback received from the pilot local authorities on V4 of the Framework (D2.8) following the testing phase. Additional feedback was received from the project National Steering Group.

The Irish Green Building Council (IGBC) would like to thank the members of Ireland’s National Steering Group and the five local authorities involved in the pilot phase. These are Dublin City Council, Cork City Council, Kilkenny, Laois and Offaly County Councils.

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**Acronyms**

- **BER** - Building Energy Rating
- **DHW** - Domestic Hot Water
- **EU** - European Union
- **FTE** - Full Time Equivalent
- **HVAC** - Heating, Ventilation and Air Conditioning
- **IAQ** - Indoor Air Quality
- **IAQ** - Sustainable Energy and Climate Action Plan
- **VOCs** - Volatile Organic Compounds
- **WTC** - Winter Thermal Comfort

**Glossary**

Within the Framework, **building professionals** are defined as those involved in the design of energy renovation. In Ireland, these are Registered architects, chartered engineers, chartered and registered building surveyors, architectural technologists, project managers, site managers and supervisors, building and facilities managers, as well as all BER assessors. [Source](#).

**Completion date** is the issue date of the BER post renovation.

Within the Framework, **construction workers** are defined as those involved in the installation of energy renovation. In Ireland, these are electricians, plumbers, bricklayers and stone layers, carpenters and joiners, plasterers, glaziers, PV and solar installers, biomass boiler installers, heat pump installers, and insulation installers. [Source](#).

**Direct local jobs** are jobs supported as a result of the intervention (e.g. designing renovation projects and working on the construction site) – Source: Definition adapted from C40 Cities, *The Multiple benefits of deep retrofits - A toolkit for cities*.

**Energy Renovation** refers to works that improve the energy efficiency of a building. Energy renovation works typically improves building envelope and/or technical building system, such as heating, cooling, ventilation, hot water and lighting. [European Commission, 2019](#). For further information on energy renovation works see appendix 1.
Onsite renewable refers to the energy, electrical and thermal, generated by renewables within the site boundary to cover the building energy demand.

Primary Energy takes account of the energy losses due to energy transformation such as electricity generation and also the losses from transmission and distribution.

According to the EN ISO 7730, thermal comfort is that condition of mind which expresses satisfaction with the thermal environment.

Ventilation is the supply of fresh outside air and the removal of stale indoor air to or from spaces in a building.
About The Framework

The objective of the Framework is to track and monitor holistically the impact of energy renovation at municipal level and to better link local and national initiatives. This in turn should support greater citizen engagement and better policymaking while driving investment.

The Framework is not intended to rank local authorities with regard to their renovation strategies, but to support them in developing better strategies, and in identifying best practices.

Building Types

All indicators (apart from Soc. 1) can be used on all building typologies:

- **PRIVATE RESIDENTIAL**
- **SOCIAL HOUSING**
- **PUBLIC BUILDINGS**
- **TERTIARY BUILDINGS**

Soc. 1 can be used on Private Residential and Social Housing only.

For ease and given the exemplary role that must be played by public bodies, it is suggested to use the indicators initially to gather data on public buildings and/or social housing owned and managed by the municipality.

Baseline

The baseline year is the year included as baseline in the local authority’s SECAP. For local authorities which are not signatories to the Covenant of Mayors, the baseline agreed at national level should be used, i.e., 1990 as per Ireland’s Climate Action Plan (2019). Local authorities must be transparent on the selected baseline year. This should be recorded in the spreadsheet developed to use the Framework.

Reporting Period

The public administrations that signed up to the Covenant of Mayors, are committed to submitting monitoring reports at least every second year after submission of the action plan. The monitoring of the indicators of the Framework should complement the SECAP’s indicators and therefore the two monitoring procedures are supposed to be aligned. Monitoring and communicating progress on indicators related to energy and CO₂ emissions reductions, should hence be aligned to the monitoring activity of SECAPs (where possible).

A standard reporting period should be agreed on when using the Framework. Ideally, reporting should be done on a continuous basis and at the very least on an annual basis.

Further information on reporting will be published shortly in D3.3. “Definition of a methodology for reporting and monitoring the implementation of the Framework”.
Indicators Methodology

The indicators methodology presented below should be read alongside the methodology for reporting and monitoring the implementation of the Framework (D3.3). A spreadsheet has been developed to support the use of the Framework.

Both documents can be used to complete the spreadsheet.

If you have any questions on the methodology presented below, please contact Marion@igbc.ie.

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3% of the total floor area of heated and/or cooled buildings owned and occupied by central government is renovated each year. Under the EU green deal, annual renovation rate must double to 2.4% per year.

The increase rate of energy renovation is a key objective at EU level for the decarbonisation of the building stock. More specifically, the following targets have been set:

- 3% of the total floor area of heated and/or cooled buildings owned and occupied by central government is renovated each year.
- Under the EU green deal, annual renovation rate must double to 2.4% per year.

EUROPEAN UNION

The energy renovation of the building stock is key to reach the 2050 climate neutrality target. The renovated buildings must meet at least the minimum energy performance requirements; therefore, it is important to be aware of the energy consumption reduction achieved. That is why the renovation rate is split up by building type and by depth of the renovation. With that regard, it is also relevant to monitor the percentage of renovated buildings that are compliant with nearly Zero Energy Building’s standard.

IRELAND

Based on the number of energy renovation to be completed by 2030, it can be estimated that Ireland’s unofficial annual energy renovation rate targets are as follows:
- Residential: 2.49%
- Tertiary: 3.33%
- Public: 9%

Source: Ireland’s Long-Term Renovation Strategy (2020)

OBJECTIVE

Add your local authority target here

RELEVANCE

The energy renovation of the building stock is key to reach the 2050 climate neutrality target. The renovated buildings must meet at least the minimum energy performance requirements; therefore, it is important to be aware of the energy consumption reduction achieved. That is why the renovation rate is split up by building type and by depth of the renovation. With that regard, it is also relevant to monitor the percentage of renovated buildings that are compliant with nearly Zero Energy Building’s standard.

DEFINITION

Percentage of the building stock that has completed energy renovations and breakdown of the depth of renovations.

UNIT OF MEASURE

Main Metric: Percentage per year of energy renovations completed
Sub Metric: Percentage breakdown of depth of energy renovations completed

METHODOLOGY

Calculate the buildings renovated during the reporting period (ideally annually) as a percentage rate of the overall building stock.

Three levels of renovation, light, medium and deep are defined in the options below.

Calculation

\[
\text{Main metric - Renovation Rate} = \frac{\text{Residential units renovated during reporting period}}{\text{Total residential units}} \times 100
\]

\[
\text{Sub metric - Percentage breakdown by depth of energy renovations completed} (\text{See Env 01 Table below})
\]

To assess the depth of energy renovation a pre works and post works BER is required. Local authorities must be fully transparent on the source of data and methodology used.

Step 01 - Define depth of renovation

- Light renovation = Post works final energy > nZEB for renovation (final energy)
- Medium renovation = Post works final energy < nZEB for renovation (final energy)
- Deep renovation = Post works final energy < (nZEB for renovation final energy x 0.7)

nZEB renovation target is defined as a medium renovation. A light renovation is below this target and a deep renovation is a 30% improvement above this target in terms of final energy.

Step 02 - Percentage breakdown

Percentage breakdown (light/medium/deep) = \[
\frac{\text{Number of buildings achieving light/medium/deep}}{\text{Total number of buildings being renovated}} \times 100
\]
Source of data
For both the main metric and sub metrics, it is important to have figures for the existing property stock in terms of residential units and non-residential floor area.

These figures should be available as part of SECAP reporting or collated in line with SECAP requirements for non-signatories.

For the main metric - Renovation rate, the number of renovated homes completed during the reporting period and the m² of renovated non-residential completed during the reporting period must be recorded. The project figures must be added together to get the local authority-wide data. If this data is not recorded at project level (e.g., for private residential and tertiary buildings), this may be estimated based on the BER databases.

Sub metric will require a pre works and post works BER. Local authorities should require BERs at least for municipal buildings and social housing that they own and manage. This will provide a calculated figure for the proposed reduction in final energy at a project level which can be used to define the depth of renovation as light/medium/deep.

DATA COLLECTION PATHWAY

This is an example of how the Framework works if used on all buildings. For ease, local authorities may only use it initially on their municipal and/or social housing stock.
For private residential and tertiary buildings, encourage owners to have pre and post BER as per above methodology. Grants can include a condition by making pre and post BER a requirement to access public funding.

Private residential & tertiary buildings

- For private residential and tertiary buildings, encourage owners to have pre and post BER as per above methodology.
- Grants can include a condition by making pre and post BER a requirement to access public funding.

Actual data
As a result of considerable variables, it is better to calculate the renovation works based on calculated agreed national methodology for BER. Actual energy use will vary significantly depending on occupation levels, internal temperature requirements, time settings, degree days and other factors which are outside the scope of energy renovation and may skew results for before and after renovation.
METHODOLOGY

Calculate the difference between the emissions before and after the renovation works. The calculation must be done over an agreed reporting period, ideally on a yearly basis.

**Calculation Reduction of CO₂ emissions**

**Main metric**

\[
\text{CO}_2 \text{ emissions reduction (Ton CO}_2\text{/yr}) = \sum (\text{Pre-renovation CO}_2\text{ emissions} - \text{Post-renovation CO}_2\text{ emissions})
\]

**Sub metric - Percentage reduction of CO₂ emissions**

\[
\text{Percentage reduction of CO}_2\text{ emissions} = \frac{\text{CO}_2 \text{ emission reduction}}{\text{Total sector CO}_2\text{ emissions}} \times 100
\]

Local authorities require pre works and post works BERs* for specific projects (or actual monitoring of final energy consumption for a minimum of 12 months pre and post retrofit) multiplied by the CO₂ emission factors (t CO₂ /MWh) for the forms of energy used in the building**.

For ease, it is suggested local authorities initial use it for municipal buildings and social housing that they own and manage. This will provide a calculated – or actual - figure for the proposed reduction in CO₂ emissions at a project level which should be centrally recorded.

*CO₂ emissions are usually displayed on the cover page of the BER as CO₂ /sqm. This will need to be cross referenced against the BER Building Report which will state the floor area (see example on the next page)

**For CO₂ emission factors, please use SEAI’s CO₂ emission factors. The Covenant of Mayors for Climate and Energy Reporting Guidelines also include tables for default emissions factors for fuel combustion (fossil and renewable) and for electricity by country and year.
For private residential and tertiary buildings, encourage owners to have pre and post BER as per above methodology.

- Grants can include a condition by making pre and post BER a requirement to access public funding.

**Actual data**
- Once the Framework has been established the use of actual consumption data from projects should be recorded in the Framework. If using actual data, the CO₂ emissions can be obtained by applying conversion factors to the actual energy consumption measured through monitoring or from energy bills (energy utility could provide this data).
- You may also be able to use Display Energy Certificates (DECs) to capture information on actual energy use of public buildings.
- The gathering of data should be facilitated in the future by the roll out of smart meters.

This is an example of how the Framework works if used on all buildings. For ease, local authorities may only use it initially on their municipal and/or social housing stock.
The final energy consumption (also called delivered energy) reflects the consumed energy by the end-user and depends on the energy needs of the building and the efficiencies of its technical systems. Measuring and assessing the final energy consumption of renovation encourages a building envelope first approach to energy renovation.

At least 32.5% improvement in energy efficiency by 2030 - relative to the 2007 modelling projections for 2030.


To achieve the 55% emission reduction target by 2030, the EU should reduce buildings’ final energy consumption by 14% and energy consumption for heating and cooling by 18% (Compared to 2015 levels)

Source: EU’s Renovation Wave Strategy

**DEFINITION**

**RELEVANCE**

The final energy consumption (also called delivered energy) reflects the consumed energy by the end-user and depends on the energy needs of the building and the efficiencies of its technical systems. Measuring and assessing the final energy consumption of renovation encourages a building envelope first approach to energy renovation.

**EUROPEAN UNION**

At least 32.5% improvement in energy efficiency by 2030 - relative to the 2007 modelling projections for 2030.


To achieve the 55% emission reduction target by 2030, the EU should reduce buildings’ final energy consumption by 14% and energy consumption for heating and cooling by 18% (Compared to 2015 levels)

Source: EU’s Renovation Wave Strategy

**IRELAND**

Targets of 50% energy efficiency improvement by 2030.

Source: Ireland’s Climate Action Plan (2019)

**LOCAL AUTHORITY**

Add your local authority target here.

**UNIT OF MEASURE**

Main metric: kWh/yr - Final (delivered) energy

Sub metric: % reduction in kWh

**METHODOLOGY**

Calculate as the difference between the kWh/yr consumption before renovation works and after the renovation works. All the forms of energy usage must be considered for HVAC, DHW, ventilation and lighting. The calculation must be done over an agreed reporting period, ideally annually.

**Calculation**

**Main Metric - Final energy consumption reduction**

\[ \text{Final (delivered) energy consumption reduction (kWh/yr)} = \sum (\text{Pre-renovation final energy (kWh/yr)} - \text{Post renovation final energy (kWh/yr)}) \]

**Sub metric - Percentage reduction of final energy consumption over the reporting period**

\[ \text{Percentage reduction of final energy consumption} = \left( \frac{\sum \text{Final energy consumption reduction}}{\text{Total sector final energy consumption}} \right) \times 100 \]

**Source of data**

Local authorities must be transparent on the source of data used.

Local authorities require pre works and post works BERs* for specific projects – or actual monitored data for a minimum of 12 months. For ease, it is suggested local authorities initially use it for municipal buildings and social housing that they own and manage. This will provide a calculated – or actual - figure for the proposed reduction in final energy kWh at a project level which should be centrally recorded.

*Final (delivered) energy by source of energy is usually displayed on the results page of the BER as kWh/sqm year (‘total and per usage). This will need to be cross referenced against the BER Building Report which will state the floor area.
This is an example of how the Framework works if used on all buildings. For ease, local authorities may only use it initially on their municipal and/or social housing stock.

**DATA COLLECTION PATHWAY**

**LOCAL AUTHORITY LEVEL**

**Project 1** – Public Building 400 m²
- Pre BER 150 kWh/m²
- Post BER 50 kWh/m²

**Project 3** – Public Building 1200 m²
- Pre BER 120 kWh/m²
- Post BER 50 kWh/m²

**Project 2** – Social Housing 40 units, average 100 m²
- Pre BER 140 kWh/m²
- Post BER 125 kWh/m²

**Project 4** – Private Housing 50 units, average 80 m²
- Pre BER 250 kWh/m²
- Post BER 100 kWh/m²

**COUNTRY LEVEL**

**Local Authority Wide Data**
- Annual Reporting
  - Project 1: Reduction 20,000 kWh/annum
  - Project 3: Reduction 120,000 kWh/annum

**Country Wide Data**
- Annual Reporting
  - Project 1+2+3+4: Reduction 938,000 kWh/annum

**DATA COLLECTION PATHWAY**

**Build Upon² Energy Renovation Framework**

**ADDITIONAL GUIDANCE**

Private residential & tertiary buildings

- For private residential and tertiary buildings, encourage owners to have pre and post BER as per above methodology.
- Grants can include a condition by making pre and post BER a requirement to access public funding.

**Actual data**

- Once the Framework has been established the use of actual consumption data from projects should be recorded in the Framework. If using actual data, the energy consumption prior to the renovation works should be assessed (from actual meter readings on bills) for at least 12 months and compared against the energy consumption post works for another 12 months.
- You may also be able to use Display Energy Certificates (DECs) to capture information on actual energy use of public buildings.
- The gathering of data should be facilitated in the future by the roll out of smart meters.
The objective of the indicator is to capture data on the additional energy produced from renewable resources on site or nearby as a result of energy renovation.

The overall goal is to increase renewable energy sources consumption to 32% by 2030 - Directive (EU) 2018/2001.

**DEFINITION**

Increase in renewable energy generated and used on site as a result of energy renovation

*EPBD 2018/844 Annex I, Point 2*

**UNIT OF MEASURE**

- **Main metric:** kWh/yr from renewables as part of renovation projects
- **Sub-metric:** % increase in kWh from renewables as part of renovation projects

**RELEVANCE**

The provision of additional renewables for both electricity and heating will replace fossil fuels and associated CO₂ emissions with clean renewable energy. It also reduces energy dependence and provides security and diversification of energy supply.

**EUROPEAN UNION**

The objective of the indicator is to capture data on the additional energy produced from renewable resources on site or nearby as a result of energy renovation. The overall goal is to increase renewable energy sources consumption to 32% by 2030 - Directive (EU) 2018/2001.

**IRELAND**

Increase reliance on renewables from 30% to 70% by 2030 for electricity production.

Action 30: Develop an enabling framework for micro-generation which tackles existing barriers and establishes suitable supports within relevant market segments.

Install 600,000 heat pumps.

*Source: Ireland’s Climate Action Plan (2019)*

**LOCAL AUTHORITY**

Add your local authority’s target(s) here.

**METHODOLOGY**

Calculate as the difference between the kWh generation from renewable resources on site or nearby before renovation works and after the renovation works. The calculation must be done over the agreed reporting period, ideally annually.

**Calculation**

**Main metric - Increase in kWh/year from renewables**

\[
\text{Increase in kWh/year from renewables} = \sum (\text{Post Renovation kWh/year from renewables produced onsite or nearby} - \text{Pre renovation kWh/year from renewables produced onsite or nearby})
\]

**Sub metric - Percentage increase in kWh/year from renewables**

\[
\text{Percentage increase in kWh/year from renewables} = \frac{\text{Increase in kWh/year from renewables produced onsite or nearby}}{\text{Total energy production kWh/year from renewables produced onsite or nearby}} \times 100
\]

Local authorities require pre works and post works BERs* for specific projects – or actual monitored data for a minimum of 12 months pre and post renovation. For ease, it is suggested local authorities initially use it for municipal buildings and social housing that they own and manage. This will provide a calculated – or actual - figure for the proposed renewable energy in kWh at a project level which should be centrally recorded.

*Renewables energy is usually displayed on the results page of the BER as kWh/sqm. This will need to be cross referenced against the BER Building Report which will state the floor area.
This is an example of how the Framework works if used on all buildings. For ease, local authorities may only use it initially on their municipal and/or social housing stock.

Private residential & tertiary buildings

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- Grants can include a condition by making pre and post BER a requirement to access public funding.

Actual data

- Once the Framework has been established the use of actual consumption data from projects should be recorded in the Framework.
- You may also be able to use Display Energy Certificates (DECs) to capture information on actual energy use of public buildings.
- The gathering of data should be facilitated in the future by the roll out of smart meters.
Soc 1: Energy Poverty Reduction

**DEFINITION**
Percentage of households living in renovated homes removed from risk of energy poverty post energy renovation

**UNIT OF MEASURE**
Percentage

**RELEVANCE**
As Recital 59 of the recast Electricity Directive recapitulates, energy poverty arises from a combination of low income, high expenditure on energy, and poor energy efficiency of dwellings. Therefore, it is a multidimensional phenomenon that must be approached comprehensively, where improving the building thermal quality through renovation is one of the key elements to tackle. With nearly 34 million Europeans unable to afford to keep their homes adequately warm in 2018, energy poverty is a major challenge for the EU. 


The objective of the indicator is to assess the impact of energy efficiency renovation on reducing the risk of energy poverty.

**EUROPEAN UNION**
The objective of the indicator is to assess the impact of energy efficiency renovation on reducing the risk of energy poverty.

**IRELAND**
The government’s ‘Strategy to combat energy poverty 2016 – 2019’ maintains the objective set out in the first Government strategy on affordable energy (2011), that everyone should be able to afford to adequately heat and power their home.

Action 173 of the Climate Action Plan (2019): Identify ways to improve how current energy poverty schemes target those most in need, to make them as efficient as possible.

**LOCAL AUTHORITY**
Add your local authority’s target(s) here.

**METHODOLOGY**
Calculate the percentage of energy renovation works which lead to a decrease in number of households at risk of energy poverty. Ideally, this data should be compiled at local authority level on an annual basis.

**Calculation**

\[
\text{Percentage of households living in renovated homes removed from risk of energy poverty} = \left( \frac{\text{Number of households at risk of energy poverty pre-renovation work} - \text{Number of households at risk of energy poverty post-renovation work}}{\text{Number of residential units renovated}} \right) \times 100
\]

**Source of data**
EU Guidance on energy poverty accompanying the Commission Recommendation on energy poverty (C/2020/9600) highlights that “to quantify households in energy poverty according to transparent criteria Member States need to develop a working definition of the concept of energy poverty and make it publicly available”. Article 29 of the recast Electricity Directive refers to Member States’ obligation to assess the number of households in energy poverty and provides that Member States must establish and publish the criteria underpinning this assessment.

Energy poverty is quantified in Ireland using what is known as the expenditure method of measuring energy poverty, whereby a household that spends more than 10% of their income on energy is considered to be in energy poverty. 

Source: Department of Communications, Energy and Natural Resources (2015).

The methodology used and any assumptions made must be fully disclosed and recorded. To assess the impact of a renovation project on energy poverty risk, a local authority should collect data on the number of units renovated, as well as on the number of households at risk of energy poverty pre and post energy renovation as per Ireland’s national definition.

More specifically, local authorities should at the very least collect a pre and post renovation BER. These BERs will be used to estimate the cost of energy pre and post renovation. It might also be possible to access actual data on the energy cost pre and post renovation using one of the following methodologies:

- Using a pre and post renovation tenant questionnaire (see appendix 3 for an example) and asking tenants to provide information on their energy bills for 12 months pre and post energy renovation.
- For larger retrofit projects (200+Units), it might be possible to access data on actual energy use pre and post energy renovation using MPRN and GPRN numbers and contacting the CSO. Information should be requested for 12 months pre and post renovation.

The methodology used will depend on data availability and the specificity of the housing stock (e.g., the type of fuel used prior to renovation).

Data on tenants’ income is available through the iHouse system. This should be gathered for one year pre and post renovation. If your department does not have access to this data, please contact the unit responsible for gathering this data in your local authority (anonymised data should be available from them). Alternatively, information may be gathered through a tenant questionnaire (see appendix 3 for an example of same).
DATA COLLECTION PATHWAY

HOUSEHOLD LEVEL

Is the household at risk of energy poverty pre-renovation based on Ireland’s national definition?

- No
- Yes

Is the household at risk of energy poverty post-renovation based on Ireland’s national definition?

- No
- Yes

PROJECT LEVEL

Local Authority wide Energy Poverty data

- Annual Reporting

Country wide Energy Poverty data

- Annual Reporting

LOCAL AUTHORITY LEVEL

PROJECT LEVEL

Local Authority wide Energy Poverty data

- Annual Reporting

COUNTRY LEVEL

Is the household at risk of energy poverty post-renovation based on Ireland’s national definition?

- No
- Yes

ADDITIONAL GUIDANCE

Encourage Approved Housing Bodies to capture data at project level when renovating their own stock.

*Energy consumption data may be available from the CSO in cooperation with the electricity and gas networks for all groups in excess of 200 dwellings to ensure data protection. Consequently, this could be used to capture data on the private residential sector.
Soc 2: Indoor Air Quality

DEFINITION
Renovated building stock with improved Indoor Air Quality (IAQ) in the conditioned spaces.

UNIT OF MEASURE
Main metric: No. of residential units or Non-residential floor area (m²)
Sub-metric: Percentage improvement

RELEVANCE
Europeans spend up to 90% of their time indoor. Indoor air pollution is a major environmental health and wellbeing concern as it can lead to serious health effects. The contaminants that condition IAQ are CO₂, carbon monoxide, particulate matter and volatile organic compounds (VOCs). Most indoor air pollution comes from sources inside the building. It is hence key to control the sources of these contaminants and to ensure its removal through proper ventilation. Good ventilation is critical in well insulated buildings and must be considered as part of any energy renovation works.

EUROPEAN UNION
The objective of the indicator is to provide safe building to people by eliminating the risks that might result in unknowingly reducing the indoor air quality as a result of carrying out energy renovation works.

To achieve the 55% emission reduction target by 2030, the EU should reduce buildings’ final energy consumption by 14% and energy consumption for heating and cooling by 18% (Compared to 2015 levels).

Source: EU’s Renovation Wave Strategy

IRELAND
Technical Guidance Document Part F states “adequate and effective means of ventilation should be provided for people in buildings”

LOCAL AUTHORITY
Add your local authority’s target here.

METHODOLOGY
Calculate improvement in IAQ post energy renovation. This must be reported over an agreed reporting period, ideally annually. This indicator can be used initially at project level. Once it has been adopted and reported across a sufficient number of projects it can be reported at a local authority level.

Calculation
Main metric – Renovated building stock with improved IAQ
No. of residential units with improved IAQ = Σ renovated units with adequate IAQ
Non-residential floor area (m²) with improved IAQ = Σ area of renovated buildings (m²) with adequate IAQ

Sub metric – Percentage of renovated building stock with improved IAQ
Percentage of residential units with improved IAQ = \( \frac{\Sigma \text{renovated units with adequate IAQ}}{\text{Total building renovated}} \times 100 \)
Percentage of non-residential floor area (m²) with improved IAQ = \( \frac{\Sigma \text{area of renovated buildings (m²) with adequate IAQ}}{\text{Floor area (m²)}} \times 100 \)

Source of Data
Ventilation systems designed, installed and commissioned in compliance with TGD Part F 2019
Use the contractor questionnaire (appendix 2) to count the dwellings and spaces in renovated buildings that comply with the airflow rates in Part F 2019 to ensure a good indoor air quality (depending on building occupancy patterns and expectation levels). Post renovation ventilation system to follow guidance in "Installation and Commissioning of ventilation systems for dwellings - Achieving compliance with Part F 2019"
DATA COLLECTION PATHWAY

BUILDING LEVEL

Contractor Questionnaire

Does the ventilation system comply with TGD Part F 2019 and for dwellings is there evidence provided of Commissioning Parts 1-4 in line with Installation and Commissioning of Ventilation Systems for Dwellings – Achieving Compliance with Part F 2019?

Yes - No

Project 1 - Social Housing units with a ventilation system as per TGD Part F 2019

Project 2 - Social Housing units with a ventilation system not commissioned as per TGD Part F 2019

Local Authority Wide Data

Annual Reporting

Ventilation system complies with Part F in 10% of renovated social housing units.

Project 3 – Municipal Building with a ventilation system as per TGD Part F 2019

Example: Ventilation system does comply with TGD Part F 2019

Project 4 – Municipal Building with a ventilation system as per TGD Part F 2019

Example: Ventilation system does comply with TGD Part F 2019

Project 5 - Municipal Building with a ventilation system as per TGD Part F 2019

Example: Ventilation system does comply with TGD Part F 2019

PROJECT LEVEL

LOCAL AUTHORITY LEVEL

COUNTRY LEVEL

Country Wide Data

Annual Reporting

Example: All 5 no. units provided with the Commissioning Parts 1-4 in compliance with “Installation and Commissioning of Ventilation Systems for Dwellings – Achieving Compliance with Part F 2019”

Example: All 45 no. units not provided with the Commissioning Parts 1-4 in compliance with “Installation and Commissioning of Ventilation Systems for Dwellings – Achieving Compliance with Part F 2019

Example: Ventilation system does comply with TGD Part F 2019

Example: Ventilation system does comply with TGD Part F 2019

ADDITIONAL GUIDANCE

Encourage local authorities to carry out design of ventilation systems as per TGD Part F 2019 and commissioned where applicable and include in the scope of works to the design team and installers.

This is an example of how the Framework works. For ease, local authorities may only use it initially on their own municipal and/or social housing stock.

Build Upon² Energy Renovation Framework
Soc.3: Winter Thermal Comfort

**DEFINITION**
Renovated building stock with an improved winter thermal comfort (WTC) in all the conditioned spaces

**UNIT OF MEASURE**
Main-metric: no. of residential units or non-residential floor area (m²)
Sub-metric: Percentage improvement

**RELEVANCE**
Thermal comfort can improve people’s health and wellbeing. Thermal comfort is defined by environmental parameters, like temperature, relative humidity and air velocity, and by personal parameters such as clothing, level of activity, gender and age, which affect a person’s metabolic rate.

**EUROPEAN UNION**
In 2018, nearly 34 million Europeans were unable to afford to keep their homes adequately warm. People in inefficient buildings are more exposed to cold spells, heatwaves and other impacts of climate change. Inadequate comfort in housing and work environments, such as inadequate indoor temperatures and deficient air quality, contribute to lower productivity, health problems and higher mortality and morbidity.

**IRELAND**
Ireland has some of highest incidences of circulatory and respiratory conditions in the world. ‘This is not due to any genetic factors inherent in the populace but is rather a likely reflection that, in general in Ireland, we live in cold homes in a damp climate. It was calculated that up to 317,000 households were potentially in energy poverty in 2009, equivalent to slightly over 20% of all households in the State. Source: Department of Communications, Energy & Natural Resources (2015)

**LOCAL AUTHORITY**
Add your local authority’s target here.

**OBJECTIVE**

**METHODOLOGY**
Calculate the number of renovated dwellings and areas (m², for non-residential) with adequate winter thermal comfort conditions established post energy renovation works. This must be done over an agreed reporting period, ideally annually. This indicator can be used initially at project level. Once it has been adopted and reported across a sufficient number of projects it can be reported at a local authority level.

**Calculation**

**Main metric – Renovated building stock with improved winter thermal comfort**

Residential

\[
\text{No. of residential units with improved WTC} = \sum \text{renovated units with adequate WTC}
\]

Non Residential

\[
\text{Non-residential floor area (m²) with improved WTC} = \sum \text{Area of renovated buildings (m²) with adequate WTC} / \text{Total building renovated} \times 100
\]

**Sub metric – Percentage of renovated building stock with improved winter thermal comfort**

Percentage of residential units with improved WTC = \[
\frac{\sum \text{renovated units with adequate WTC}}{\text{Total area (m²) of renovated buildings}} \times 100
\]

Percentage of non-residential floor (m²) with improved WTC = \[
\frac{\sum \text{area of renovated buildings (m²) with adequate WTC}}{\text{Total area (m²) of renovated buildings}} \times 100
\]

**Source of data**
Local authorities must be transparent on the methodology used and the assumptions made. In all cases, they must be transparent on the methodology used and the assumptions made.

Heating system for residential units designed, installed and commissioned as per S.R. 50-4:2021 Building services - Part 4: Heat pump systems in dwellings or for non residential buildings heating systems designed, installed and commissioned as per EN 16798-1:2019.

Account the number of renovated dwellings and m² in non-residential buildings that comply with the predefined (theoretical) indoor winter thermal comfort conditions as set in the national building code at design stage as per S.R. 50-4:2021 or EN 16798.
This indicator can be used initially at project level. Once it has been adopted and reported across a sufficient number of projects it can be reported at a city level. This indicator should initially be used for municipal buildings and social housing owned and managed by the municipality.

Local Authority Wide data
Annual Reporting
25% of social housing renovations comply with S.R. 50-4:2021

Country Wide data
Annual Reporting

Project 1 – Social housing energy renovation
Example: Heating systems comply with S.R. 50-4:2021

Project 2 – Social housing energy renovation
Example: Heating systems do not comply with S.R. 50-4:2021 on any of the 150 units.

Project 3 – Municipal building energy renovation
Example: Heating systems comply with EN 16798

Project 4 – Municipal building energy renovation
Example: Heating systems comply with EN 16798

Project 5 – Municipal building energy renovation
Example: Heating systems comply with EN 16798

PROJECT LEVEL

BUILDING LEVEL
Contactor Questionnaire
Does the design demonstrate through compliance with S.R. 50-4:2021 or EN 16798?
Yes-No

Country Level
Local Authority Level
Project Level

DATA COLLECTION PATHWAY

It must be assumed that if there is no data on design of heating systems that no design and commissioning of the system took place and winter thermal comfort may be compromised post renovation.

Encourage local authorities as per S.R. 50-4:2021 or EN 16798 to carry out an assessment of the requirements to ensure the WTC at project stage.
Soc.4: Summer Thermal Comfort

**DEFINITION**
Summer Thermal Comfort refers to the renovated building stock with limited overheating risks.

**UNIT OF MEASURE**
- **Main-metric:** No. of residential units or non-residential floor area (m²)
- **Sub-metric:** Percentage improvement

**RELEVANCE**
The frequency and severity of climate and weather extremes is increasing in Europe. Excess heat affects the health and wellbeing of occupants, especially if sleep is degraded. Factors such as climate change, increased urbanisation, high rise apartments and winter energy efficiency measures increase the overheating risk. To protect people’s health and wellbeing, the objective of this indicator is to ensure energy renovation does not lead to an increase overheating risk. The thermal performance of buildings during summertime is usually measured against a benchmark temperature that should not be exceeded for a certain number of hours during an annual occupied period.

**EUROPEAN UNION**
Extreme weather and long-lasting climatic changes can damage buildings and their mitigation potential, e.g., solar panels after hailstorms. It can also impact people’s comfort and wellbeing. The Commission is exploring options to better predict climate-induced stress on buildings and to integrate climate resilience considerations into the construction and renovation of buildings.

Source: EU Climate Adaptation Strategy (2020).

**OBJECTIVE**

**METHODOLOGY**

**Count the number of renovated dwellings and (m²) in non-residential buildings that achieve adequate summer thermal comfort.**

This should be done over an agreed reporting period, ideally annually.

This indicator can be used initially at project level. Once it has been adopted and reported across a sufficient number of projects, it can be reported at local authority level.

**Calculation**

**Main Metric – Renovated building stock with improved summer thermal comfort**

Residential:
No. of renovated residential units assessed with improved summer thermal comfort = Σ renovated units achieving adequate summer thermal comfort

Non-Residential:
Non-residential floor area (m²) with improved summer thermal comfort = Σ area of renovated buildings (m²) achieving adequate summer thermal comfort

**Sub Metric**

**Percentage of residential units assessed with improved summer thermal comfort**

\[
\text{Percentage of residential units} = \frac{\sum \text{residential units assessed which achieve adequate summer thermal comfort}}{\text{Total building renovated}} \times 100
\]

**Percentage of non-residential floor area (m²) assessed with improved summer thermal comfort**

\[
\text{Percentage of Non-residential floor area} = \frac{\sum \text{area of renovated buildings which achieve adequate summer thermal comfort}}{\text{Total area of renovated buildings}} \times 100
\]

**Source of data**
Local authorities must be transparent on the methodology used and any assumptions made.

CIBSE TM52 / Revised DEAP Methodology (Due to be published to carry out overheating assessment)

This option is based on the assessment of the theoretical overheating risk at design stage. Compliant dwellings and spaces (m²) in renovated buildings are those below the benchmark (theoretical) of overheating criterion. CIBSE TM52 reference (CIBSE TM 59 for homes) can be used until the DEAP methodology is published to carry out an overheating assessment. Summer thermal comfort post energy renovation. These should be completed 12 months after renovation, once the building is occupied.
Contactor Questionnaire

Residential: Does the design demonstrate through compliance with revised DEAP Methodology (Due to be published to carry out overheating assessment) or CIBSE TM59 that the dwelling does not have a risk of high internal temperature? Yes - No

Non-Residential: Does the design demonstrate through compliance with CIBSE TM52 that overheating is avoided? Yes - No

Additional Guidance

It must be assumed that if there is no data on design of heating systems that no design and commissioning of the system took place and summer thermal comfort may be compromised post renovation.

Encourage local authorities to assess limiting heat gains to CIBSE TM 59 /Revised DEAP methodology (due to be published) for residential units and to CIBSE TM52 for non-residential buildings.
In Ireland radon gas is the second biggest cause of lung cancer after smoking and is directly linked to almost 300 lung cancer cases each year. It is a serious public health hazard*. This indicator is included as energy renovation often involves an improvement in air tightness which can inadvertently increase the levels of radon within a building.

*Murphy, P., Dowdall, A., Curtin, B, and Fention, D. In Press, Estimating population lung cancer risk from radon using a resource efficient stratified population weighted sample survey protocol – Lessons and results from Ireland

DEFINITION
Buildings renovated to minimise the exposure to radon.

UNIT OF MEASURE
Residential: no. of units
Non-residential: m²

RELEVANCE
In Ireland radon gas is the second biggest cause of lung cancer after smoking and is directly linked to almost 300 lung cancer cases each year. It is a serious public health hazard*. This indicator is included as energy renovation often involves an improvement in air tightness which can inadvertently increase the levels of radon within a building.

EUROPEAN UNION
COUNCIL DIRECTIVE 2013/59/EURATOM of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation.

IRELAND
The overarching objective of the National Radon Control Strategy (NRCS) is to "minimise the exposure to radon gas for people in Ireland and to reduce to the greatest extent practicable the incidence of radon related lung cancers".

LOCAL AUTHORITY
Add your local authority’s target here.

METHODOLOGY
Ultimately, the objective of the indicator is to measure the radon in the buildings post energy renovation to ensure that works have not created a risk to health through the exposure to radon.

This indicator can be used initially at project level - Only projects completed during the reporting period (ideally annually) should be included. Once it has been adopted and reported across a sufficient number of projects it can be reported at local authority level.

For ease, it is suggested local authorities initially use it for municipal buildings and social housing that they owned and managed. Local authorities must be fully transparent on the methodology and data set used. Any assumptions made must be fully disclosed and recorded.

Calculation

Residential
Dwellings (housing or ground floor apartments) with post renovation on site measurements of safe radon levels (> 200Bq/m³) = \( \sum \) Dwellings (housing or ground floor apartments) with post renovation on site measurements of safe radon levels (>200Bq/m³)

Non-Residential
Buildings (ground floor spaces in m²) with post renovation on site measurements of safe radon levels (>200Bq/m³) = \( \sum \) Buildings (ground floor spaces in m²) with post renovation on site measurements of safe radon levels (>200Bq/m³)

Source of data
Generally, radon measurement devices will need to be in situ for 3 months. There is specific guidance that needs to be followed on the location of the measurement devices. The devices are then sent to be analysed to measure the levels of radon in the device.

Certificates from the testing centre should be requested and retained by the local authority.
CONTRACTOR QUESTIONNAIRE

Will a post renovation radon measurement be carried out?

NO

YES

Have guidance / strategies been developed when radon levels are above 200Bq/m³?

NO

YES

PROJECT LEVEL

LOCAL AUTHORITY LEVEL

DATA COLLECTION PATHWAY

Project 1 - Social Housing
10 units renovated
All units assessed for radon post renovation and all units achieve below 200Bq/m³

Local Authority Wide Data
Annual Reporting

Country Wide Radon data
Annual Reporting

Project 2 – Social Housing
90 units renovated
None of the units renovated were assessed for post renovation radon levels

Local Authority Wide Data
Annual Reporting

Country Wide Radon data
Annual Reporting

Project 3 – Municipal building
1 Office block
Building assessed and complies with safe radon levels

Local Authority Wide Data
Annual Reporting

Country Wide Radon data
Annual Reporting

Project 4 – Municipal building
1 Library
Building assessed and complies with safe radon levels

Local Authority Wide Data
Annual Reporting

Country Wide Radon data
Annual Reporting

PRIVATE RESIDENTIAL & TERTIARY BUILDINGS

For private residential and tertiary buildings, encourage building owners to carry out the test in particular in high radon areas: https://www.epa.ie/environment-and-you/radon/radon-map/
Soc.6: Climate resilience

DEFINITION
Buildings renovated to minimise the impacts of climate hazards

UNIT OF MEASURE
Residential: no. of units
Non-residential: m²

RELEVANCE
Climate across Europe will be different in 30 years’ time. Priority climate hazards identified in Ireland relate to sea level rise, coastal storms and pluvial and fluvial flooding, and extreme events (extreme heat, extreme wind, wildfires, drought and frost) – EPA, 2021. Consequently, the objective of this indicator is to encourage local authorities and central government to start considering climate resilience when designing renovation programmes, and to raise awareness about this issue.

EUROPEAN UNION
The new EU Strategy on Adaptation to Climate Change (2021) highlights the need to do more to prepare Europe’s building stock to withstand the impacts of climate change. More specifically, it states that the Commission will explore options to better predict climate-induced stress on buildings and to integrate climate resilience considerations into the construction and renovation of buildings through Green Public Procurement criteria for public buildings, the Digital Building Logbook, and as part of the process to revise the Energy Performance of Buildings Directive and the Construction Products Regulation.

The Renovation Wave (2020) also identifies climate resilience as a key principle.

IRELAND
The National Adaptation Framework (NAF), published in 2018, provides a strategic policy focus to ensure that adaptation measures are taken across all sectors and levels of governance to increase Ireland’s preparedness for, and reduce its vulnerability to, impacts of climate change (DOCAE, 2018). From 2021 onwards the European Commission’s Energy Union and Climate Action Regulation requires detailed reporting on adaptation actions to be submitted every 2 years by Member States. This includes detailed reporting on climate hazards, impacts and actions taken at sectoral level. Currently, the DECC holds responsibility for reporting on behalf of the Irish government.

LOCAL AUTHORITY
Add your local authority’s target here.

Note: Under the National Adaptation Framework (NAF) 2018, local resilience to the impact of climate change must be built through delivery of local authority adaptation strategies. This is also mentioned in the All-Government Climate Action Plan (2019) – Action 182.

METHODOLOGY
Ultimately, the objective of the indicator is to calculate the number of buildings renovated to minimise the impacts of risks associated to climate change.

This indicator can be used initially at project level - Only projects completed during the reporting period (ideally annually) should be included. Once it has been adopted and reported across a sufficient number of projects it can be reported at local authority level.

For ease, it is suggested local authorities initially use it for municipal buildings and social housing that they owned and managed.

Local authorities must be fully transparent on the methodology and data set used. Any assumptions made must be fully disclosed and recorded.

Calculation

Residential
Dwellings renovated to minimise the impacts of climate hazards = \[ \sum \text{Dwellings renovated to minimise the impacts of climate hazards} \]

Non-Residential
Buildings renovated to minimise the impacts of climate hazards (m²) = \[ \sum \text{Buildings (m²) renovated to minimise the impacts of climate hazards} \]

Source of data
To report on this indicator, the following questions should be answered for each renovation project:

1. Have local vulnerability to climate change studies/maps been developed?*
2. If yes, have guidance / strategies and tools been developed to ensure renovation projects cope with identified risks (e.g. flooding and overheating)?*
3. If yes, have the buildings in this specific project been retrofitted in line with the above guidance documents?*

*If developed, this is likely to be included in your local authority’s adaptation strategy.
DATA COLLECTION PATHWAY

CONTRACTOR QUESTIONNAIRE

Have local vulnerability to climate change studies/maps been developed?

- NO
- YES

If yes, have guidance / strategies and tools been developed to ensure renovation projects cope with identified risks (e.g. flooding and overheating)?

- NO
- YES

PROJECT LEVEL

Local Authority Wide Data
Annual Reporting

Country wide Climate Resilience data
Annual Reporting

PRIVATE RESIDENTIAL & TERTIARY BUILDINGS

For private residential and tertiary buildings, encourage contractors to collect this data through the contractor questionnaire – Appendix 2

PROJECT LEVEL

Local Authority Wide Data
Annual Reporting

Local Authority Wide Climate Resilience data
Annual Reporting

LOCAL AUTHORITY LEVEL

Country wide Climate Resilience data
Annual Reporting

COUNTRY LEVEL

Private residential & tertiary buildings

None of the units renovated as per relevant guidance documents

10 units renovated
All units renovated as per relevant guidance documents

50 units renovated
None of the units renovated as per relevant guidance documents

PROJECT 1 - Social Housing
1 Office block
Renovated as per relevant guidance documents

PROJECT 2 - Social Housing
10 units renovated
All units renovated as per relevant guidance documents

PROJECT 3 - Municipal building
1 Library
Renovated as per relevant guidance documents

PROJECT 4 - Municipal building
1 Office block
Renovated as per relevant guidance documents

16.66% of social housing units renovated as per relevant guidance documents

100% of municipal buildings m² renovated as per relevant guidance documents

ADDITIONAL GUIDANCE

Build Upon² Energy Renovation Framework
In economic terms it is very relevant to capture accurate information on how much money is invested annually in energy renovation at local and national level, and where this money comes from (public or private investment).

**Eco.1: Investment costs in energy renovation**

**DEFINITION**
Total amount of money invested in energy renovation projects within the boundary of the local authority each year (or in a specific project/initiative).

**UNIT OF MEASURE**
- **Main-metric:** € with breakdown of private/public investment
- **Sub-metric:**
  - € / residential unit (and/or m²) renovated
  - € / m² of non-residential renovation

**RELEVANCE**
In economic terms it is very relevant to capture accurate information on how much money is invested annually in energy renovation at local and national level, and where this money comes from (public or private investment).

**EUROPEAN UNION**
To meet the 2050 climate targets, the European Commission estimates that €185 bn must be invested annually in energy renovation in the EU.

**OBJECTIVE**

**METHODOLOGY**
Calculate investment/money spent on renovation projects that have been completed within a given reporting period, ideally a year. All costs associated with that project are to be included.

Investment/money spent on projects not completed during that reporting period/year should not be included. For further information on items that should or should not be included as energy renovation costs, please check Appendix 1. VAT may be included or excluded and this needs to be clearly stated.

Large projects with phased completion stages can include the different stages if that section of the project is fully complete and the costs can be itemised.

Local authorities must be fully transparent on the methodology used and assumptions made.

**Calculation**
**Main metric**
Total investment costs on energy renovations (€) = \( \sum \text{investments on energy renovation projects completed} \)
With breakdown of private and public (including subsidies) investments

**Sub-metric**
- **Residential:**
  Investment costs of energy renovation per residential unit and/or m² = \( \frac{\sum \text{investments on energy renovation of residential buildings (€)}}{\sum \text{Units and/or m² renovated}} \) x 100
  With breakdown for social and private housing.

- **Non-Residential:**
  Investment costs of energy renovation per m² renovated = \( \frac{\sum \text{Investments on energy renovation of non-residential buildings (€)}}{\sum \text{renovated area (m²)}} \) x 100
  With breakdown for public and tertiary buildings.

**Source of data**
Starting from data at project level
Local authorities will pay for completed works (municipal buildings and social housing) and should use these figures to calculate the investment in renovation projects.
Private homes and tertiary buildings that are renovated with grant funding (e.g., SEAi grants) are likely to have total costs available too.
This is an example of how the Framework works if used on all buildings. For ease, local authorities may only use it initially on their municipal and/or social housing stock.

**DATA COLLECTION PATHWAY**

**Project 1 – Social Housing**
Example: 40 units renovated - Total cost: €1.12 millions (public funding)

**Project 2 – Social Housing**
Example: 120 units renovated - Total cost: €4.4 millions (public funding)

**Project 3 – Public Buildings**
Example: 1 Library renovated - Total cost: €100,000 (public funding)

**Project 4 – Private Residential**
Example: 150 units renovated - Total cost: €4.5 millions (public funding: €3 millions – private funding: €1.5 millions)

**Local Authority wide social housing investment**
€3.52 millions (public funding)

**Local Authority wide municipal buildings investment**
€100,000 (public funding)

**Local Authority wide private residential investment**
€4.5 millions (€3 millions public funding / €1.5 millions private)

**Country wide investment data and breakdown by private / public funding**

This may be integrated into SECAP.

**COUNTRY LEVEL**

**Tertiary buildings**
Data from external databases (e.g., SEAI grants database)

**Private housing**
Data from external databases (e.g., SEAI grants database)

**ADDITIONAL GUIDANCE**

**Social Housing**
All renovation works, and associated costs should be centrally recorded within the local authority.

**Public Buildings**
All renovation works, and associated costs should be centrally recorded within the local authority.

**Private housing and tertiary buildings**
- Where possible, local authorities and central government are encouraged to capture accurate data on private energy renovation investment, including on the financial mechanisms used. E.g., low interest loans, green mortgages, and bonds.
- The following methodology may be used to capture this data:
  - Capture data on SEAI grants allocated to the renovation of these buildings.
  - Estimate what percentage of contractors’ renovation works relate to energy renovation projects which have received state subsidies and extrapolate from there. Please refer to Appendix 1 for a list of items that should be considered within energy renovation.
Eco.2: Cost efficiency of the energy consumption reduction

**DEFINITION**

Energy consumption saved for each thousand € invested in energy renovation

**UNIT OF MEASURE**

Main Metric: kWh saved for each thousand € invested
Sub-metric: kWh/m²/year saved for each thousand € invested

**RELEVANCE**

Bringing into relation two key parameters of an energy renovation, energy savings (Env.3) and monetary investment (Eco.1) allows to analyse the energy efficiency of an investment and its cost-effectiveness. This indicator is critical to ensure value for money is delivered. It should also support local authorities in making a better business case for energy renovation. Furthermore, it will capture any reduction in energy renovation cost.

**OBJECTIVE**

Although no specific targets have been set at European, national or local authority level, the overall objective is to ensure a highly competitive and innovative energy renovation sector is developed and maintained.

A 2020’s report by the European Court of Auditors highlighted that greater focus on cost-effectiveness is needed in relation to energy efficiency in buildings. Read more.

**METHODOLOGY**

Calculate the final energy saved (Env. 3) in a given reporting period (ideally annually) through energy renovation per thousands of € invested (Eco. 1).

Calculation

**Main metric**

Energy efficiency of investment (kWh saved for each thousand € invested) =

\[ \frac{\Delta \text{Final energy consumption reduction (Env. 3) in kWh/year}}{\Delta \text{Investment in energy renovation (Eco. 1 in €)/1000}} \]

With breakdown per type of building.

**Sub-metric (Optional)**

Energy efficiency of the investment per m² (kWh/m²/year saved for each thousand € invested) =

\[ \frac{\Delta \text{Final energy consumption reduction (Env. 3) in kWh/year}}{\Delta \text{Renovated floor area (m²)}} \]

With breakdown per type of building.

**Source of data**

When using the Framework, this figure will be automatically calculated based on the data inputted in Env. 3 (Energy Consumption) and Eco. 1 (Investment in Energy Renovation).

**ADDITIONAL GUIDANCE**

See additional guidance for Env. 3 (Energy Consumption) and Eco. 1 (Investment in Energy Renovation).
Supporting jobs is a key benefit of investing in energy renovation. Increased demand for energy efficiency services and technologies have proven to create a large number of local jobs*. For every €1 million invested in energy renovation of buildings, an average of 18 jobs are created in the EU**.

The objective of the indicator is to support local authorities and central government in making a better business case for renovation, by showing the positive impact of energy renovation programmes on the jobs market. This is highly relevant in the context of the Covid-19 pandemic.

Sources:

There are no specific targets set at European, national or local level for this indicator.

DEFINITION
Direct jobs in energy renovation

UNIT OF MEASURE
Full time equivalent (FTE)

RELEVANCE
Supporting jobs is a key benefit of investing in energy renovation. Increased demand for energy efficiency services and technologies have proven to create a large number of local jobs*. For every €1 million invested in energy renovation of buildings, an average of 18 jobs are created in the EU**.

The objective of the indicator is to support local authorities and central government in making a better business case for renovation, by showing the positive impact of energy renovation programmes on the jobs market. This is highly relevant in the context of the Covid-19 pandemic.

The methodology is based on the C40, 2020 - The multiple benefits of deep retrofits - A toolkit for cities.

The indicator used to calculate job creation is based on full-time equivalent (FTE) jobs per million Euro spent. Employment creation is calculated across all building typologies. Expenditure is based on the capital cost of the energy renovation programme (Eco. 1) and employment opportunities have been proportioned between direct, indirect and induced job creation. The focus in the Build Upon Framework is on direct local jobs, i.e., jobs supported as a result of the intervention (e.g., working on the construction site).

Multiplier:
- Total jobs created - lower bound (FTE per million €): 12.8
- Total jobs created - median (FTE per million €): 17.12
- Total jobs created - upper bound (FTE per million €): 26.3

C40 have estimated that direct jobs proportion is approximately 33% (0.33 in above calculation) which will allow a local authority to obtain an estimate range of the direct jobs created (between the lower and the upper band).

Example:
A local authority invest €30 million in energy renovation. Using the default values, direct jobs in energy renovation in the reporting period can be estimated to be between 127 and 260 FTE.

Calculation:
- Lower bound: (30,000,000/1,000,000) x 0.33 x 12.18 = 127
- Upper bound: (30,000,000/1,000,000) x 0.33 x 26.3 = 260

Please see the Framework spreadsheet for further details.

Source: The methodology is based on the C40, 2020 - The multiple benefits of deep retrofits - A toolkit for cities.
This is an example of how the Framework works if used on all buildings. For ease, local authority may only use it initially on their municipal and/or social housing stock.

**DATA COLLECTION PATHWAY**

**PROJECT LEVEL**
- Social Housing Projects
  - Example: 40.3 FTE in reporting year
    - Contractor questionnaire
- Public Building Projects
  - Example: 63.5 FTE in reporting year
    - Contractor questionnaire
- Private Residential Projects
  - Example: 80.3 FTE in reporting year
    - Contractor questionnaire

**LOCAL AUTHORITY LEVEL**
- Local authority wide data
  - Social housing
  - Municipal
  - Private residential

**COUNTRY LEVEL**
- Local authority wide data
- Annual Reporting
- Annual Reporting
- Country wide data
- Local authority wide data
- Social housing
- Municipal
- Private residential

**Eco.4: Upskilling in Energy Renovation**

**DEFINITION**
Number of building professionals and construction workers who upskill in energy renovation annually, including local authority staff.

**UNIT OF MEASURE**
Main metric: Number of building professionals and construction workers upskilled in energy renovation
Sub-metric: Number of local authority employees upskilled in energy renovation

**RELEVANCE**
The building sector offers a large untapped potential for cost-effective energy savings. The most challenging aspect of reducing energy use in the building sector lies in increasing the rate, quality and effectiveness of building renovation, since the current rate of renovation is only 1.2% per year. One significant barrier that hampers the development of effective renovations is the lack of adequate construction skills. Improving the skills of middle- and senior-level building professionals as well as the various trade professionals in the area of sustainable energy-efficient construction is therefore of key importance.

Source: Construction skills: Equipping building professionals with new skills to achieve European energy targets | H2020 | Results Pack | CORDIS | European Commission (europa.eu)

**OBJECTIVE**
There are no specific targets set at European, national or local level for this indicator.
METHODOLOGY

Main metric: Calculate the number of building professionals and construction workers who have upskilled in energy renovation in a reporting period, ideally annually. This information is to be captured at national level.

Sub-metric: Calculate the number of building professionals and construction workers employed by the local authority who have upskilled in energy renovation in a reporting period, ideally annually.

Calculation

Main metric
Upskilling in energy renovation = \sum \text{building professionals and construction workers who have upskilled in energy renovation in a reporting period}

Sub metric
Upskilling in energy renovation (local authority employees) = \sum \text{building professionals and construction workers employed by the local authority who have upskilled in energy renovation in a reporting period.

Source of data
As an example, the process followed in Ireland is described below. Please see appendices 9.a, 9.b and 9.c of this document for further information. Local authorities must be fully transparent on methodology and data source, if any assumptions are made these must be fully disclosed and recorded.

A first step is to identify training courses that allow building professionals and construction workers (as per glossary definition) to gain energy renovation skills and competences. A list of key energy renovation skills and competences was developed by IGBC and Limerick Institute of Technology (LIT) and is available in Appendix 5.

Based on this list, the IGBC and LIT have developed a list of training courses that allow building professionals and construction workers to upskill in energy renovation. The list is available in appendices 9.b and 9.c of this document and is regularly updated via the Build Up Skills Advisor App.
Eco.5: Financial savings from energy renovation

**DEFINITION**
Total financial cost savings for end-users per year based on savings on heating, cooling and DHW, carbon tax (when applicable), and the usable contribution from renewable energy systems.

**UNIT OF MEASURE**
- **Main metric:** €
  - Sub metric:
    - €/number of residential unit renovated
    - €/m² of non-residential buildings renovated

**RELEVANCE**
One dimension of value creation by renovation is the extent to which the project generates cost savings for end-users. Energy renovation should not be only presented and perceived as a cost but as a financial benefit, which can be an important trigger for the user acceptance and the market uptake.

**OBJECTIVE**
No specific targets set at European, national or municipal level. A 2020’s report by the European Court of Auditors highlighted that greater focus on cost-effectiveness is needed in relation to energy efficiency in buildings. Read more.

**METHODOLOGY**
Calculate the total financial savings as a result of the energy renovation. This methodology can be cross-referenced to the Env 03 – Final Energy Consumption Indicator.

Only projects completed during the reporting period (ideally annually) should be included. Large projects with phased completion stages can include the different stages if that section of the project is fully complete and the costs can be itemised.

This indicator can be used initially at project level. Once it has been adopted and reported across a sufficient number of projects it can be reported at a local authority level.

Savings in energy bills and carbon taxes, as well as any incomes made from newly installed renewables should be included where applicable. Local authority must be fully transparent on the methodology and data set used. Any assumptions made must be fully disclosed and recorded.

**Main metric**
Total financial savings from energy renovations = \( \sum \) financial savings from energy renovations completed projects

With breakdown for residential, social housing, public and tertiary buildings.

**Sub metric**
- Residential (private and social):
  - Average financial savings from energy renovations per residential unit = \( \frac{\sum \text{savings from energy renovated residential buildings}}{\text{units renovated}} \)
  - With breakdown for social and private housing:
- Non-Residential:
  - Average financial savings from energy renovations per m² = \( \frac{\sum \text{savings from energy renovated non-residential buildings}}{\text{units renovated (m²)}} \)
  - With breakdown for public and private buildings.

**Source of Data**
Ideally, actual energy bills over a 12-month period pre and post renovation (once the building is occupied) should be used. This will give a good indication of savings on heating, DHW and carbon tax and with the introduction of smart metering any contribution from exporting renewable electricity.

Alternatively, data on delivered energy (disaggregated per type, e.g., electricity, natural gas and biomass) should be available from the pre and post renovation BERs. Data on any energy exported to the grid should also be calculated based on the BERs. The average energy tariffs for each type of energy applied to the corresponding energy import/export, and carbon tax rates - where applicable, should then be used to calculate the financial savings.
This is an example of how the Framework works if used on all buildings. For ease, local authorities may only use it initially on their municipal and/or social housing stock.

### Data Collection Pathway

**Project 1 – Social Housing**
- Pre Renovation BER
- Post Renovation BER

**Project 2 – Social Housing**
- Pre Renovation Energy bills collected for 12 months
- Post Renovation BER

**Project 3 – Public Buildings**
- Pre Renovation BER
- Post Renovation BER

**Project 4 – Private Residential**
- Pre Renovation Energy bills collected for 12 months
- Post Renovation BER

### Local Authority Level

- Local authority wide data

### Project Level

- Social housing
- Public buildings
- Private residential

### Country Level

- Financial savings and breakdown by building types

### Additional Guidance

#### Social Housing
A sample of house types should be assessed for 12 months pre and post renovation (once the homes are occupied) to ensure that actual energy bills reduction is in line with calculated figures from BERs.

#### Public Buildings
Actual energy bills should be monitored for 12 months pre and post renovation (once the buildings are occupied) to ensure that financial savings are realised.

#### Private Housing and Tertiary Buildings
Actual energy bills pre and post renovation should be assessed (once the buildings are occupied) on a sample of buildings to verify the calculated savings.

#### Degree Days
Once established a financial saving sub metric should be introduced which will include reference to degree days. Weather data will be required for 12 months pre retrofit and post retrofit using the same base temperature. Corresponding meter readings over the same period will be used to calculate € saved per year. The following data can then be extrapolated:

\[
\text{Savings in €/degree day} = \frac{(\text{pre-retrofit €/degree day}) - (\text{post-retrofit €})}{\text{degree day}}
\]

This information can be used to verify that the actual savings are not skewed by extreme weather events which are more likely going forward.
## Appendix 1: Energy Efficiency Investment

<table>
<thead>
<tr>
<th>TAX</th>
<th>VAT</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Please state clearly if VAT is included or excluded from all stated costs</td>
</tr>
</tbody>
</table>

### Fabric
- Wall Insulation - Internal, External and Cavity
- Roof Insulation
- Floor Insulation
- Window Upgrade
- External Door Upgrade
- Airtightness Upgrades
- External Solar Shading

### Heating System
- Heating System Upgrade
- Heating Control Upgrade
- Fitting Pipe Insulation

### Ventilation
- Ventilation System Upgrade

### DHW
- Low Flow Restrictors
- Fitting Pipe Insulation

### Lighting
- Lighting Upgrade
### To be included in energy renovation works

- Associated Works
- Maintenance Works
- Construction Works

### Likely to be included in energy renovation works

- All additional works required as a result of the energy efficiency measure. For example: redecoration and moving services and windows when installing internal/external wall insulation, upgrading of electrics to accommodate heat pumps, repairs to flooring and skirting if required, making good of decoration.

### Unlikely to be included in energy renovation works

- Associated Works
- Maintenance Works
- Construction Works

### Not to be included in energy renovation works

<table>
<thead>
<tr>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is suggested that if any of the maintenance works listed are greater than 10% of the overall projects costs they can be considered as maintenance works and not part of the energy renovation works.</td>
</tr>
</tbody>
</table>

### Associated Works

- Planned Decoration
- Roof Repair
- Upgrade of Rainwater Goods
- Repairs to Walls/Masonry
- Groundworks for Damp Issues
- Repairs to windows and Doors
- Appliance Upgrade

### Maintenance Works

- Kitchen Install
- Bathroom Install
- Fitted Furniture
- New Builds
- Flood Resilience Works
- Extensions

### Construction Works

- Fitted Furniture
- New Builds
- Flood Resilience Works
- Extensions

### Design Team Costs

Include any applicable design team costs paid to staff/external consultants to design and oversee the energy renovation projects. If the renovation project involves non energy renovation works, the proportion of design team costs can be estimated or can be based on the percentage of the construction costs applicable to energy renovation. The method for calculating design team costs should be clearly stated and recorded.

### Admin Costs

Internal staff hours should be recorded according to the hours spent on the renovation projects. If the renovation project involves non energy renovation works, the proportion of admin costs can be estimated or can be based on the percentage of the construction costs applicable to energy renovation. The method for calculating admin costs should be clearly stated.
## Working Example

### Project 1

<table>
<thead>
<tr>
<th>Item</th>
<th>Itemised Project Costs</th>
<th>Energy Renovation Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Terrace properties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External insulation</td>
<td>72,000</td>
<td>72,000</td>
</tr>
<tr>
<td>New windows and doors</td>
<td>60,000</td>
<td>60,000</td>
</tr>
<tr>
<td>New heat pumps</td>
<td>60,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Demand control ventilation</td>
<td>16,000</td>
<td>16,000</td>
</tr>
<tr>
<td>2 ground floor accessible bathrooms</td>
<td>36,000</td>
<td></td>
</tr>
<tr>
<td>2 Ground floor accessible ramps</td>
<td>8,000</td>
<td></td>
</tr>
<tr>
<td>1 new kitchen fit out</td>
<td>12,000</td>
<td></td>
</tr>
<tr>
<td><strong>Total Construction Costs</strong></td>
<td><strong>264,000</strong></td>
<td><strong>208,000</strong></td>
</tr>
</tbody>
</table>

Renovation Percentage = Renovation Costs/Total Construction Costs

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>79%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Design Team Fees</td>
<td>60,000</td>
<td></td>
</tr>
<tr>
<td>&quot;Energy renovation Design Team Fees 60,000x.79&quot;</td>
<td>47,273</td>
<td></td>
</tr>
<tr>
<td>Total Admin Costs (Source: Internal Timesheets and Accounting)</td>
<td>35,000</td>
<td></td>
</tr>
<tr>
<td>&quot;Energy renovation Admin Costs 35000x.79&quot;</td>
<td>27,576</td>
<td></td>
</tr>
<tr>
<td><strong>Total Project Costs</strong></td>
<td><strong>359,000</strong></td>
<td><strong>282,848</strong></td>
</tr>
</tbody>
</table>
Appendix 2: Contractor Questionnaire

This contractor questionnaire was developed by the UK Green Building Council, in partnership with Leeds City Council (pilot city) as part of the Build Upon² project, and adapted for Ireland by the IGBC.

BUILD UPON² - INFORMATION REQUIRED FROM CONTRACTOR when collating data at a project level

Env.1 Energy Renovation Rate
Not applicable at a project level (but pre and post BER should be recorded for all projects)

Env.2 CO₂ emissions
Pre & post BER - if available fuel bills & meter readings for 12 months pre and post renovation

Env.3 Energy consumption
As Env.2

Env.4 Renewable Energy Production
As Env.2

Soc.1 Energy Poverty
Pre & post BER, if available (for larger projects) anonymised actual consumption data from the CSO

Soc.2 Indoor Air Quality
Part F commissioning documentation

Soc.3 Winter Thermal Comfort
For Domestic Properties Heat Pump Installed in Compliance with S.R. 50-4:2021 - Non Residential heating systems as per 16798-1:2019

Soc.4 Summer Thermal Comfort
CIBSE TMS2 Calculations / CIBSE TM 59 Calculations (or DEAP Methodology when available)

Soc.5 Radon
Post renovation on site measurements of safe radon levels (if part of Contract Documentation)

Soc.6 Climate Resilience
Buildings retrofitted in line with relevant guidance document

Eco.1 Investment in Energy Renovation
Contract Sum (and where available breakdown of public - private funding)

Eco.2 Energy Efficiency of Investment
Calculated automatically

Eco.3 Jobs in Energy Renovation
Contractors information

Eco.4 Upskilling in Energy Renovation
N/A at a project level

Eco.5 Financial Savings from Energy Renovation
Pre & post BER, Fuel Bills or anonymised data from MRPN/GRPN gathered from the CSO (for projects with 200 units or more)

Natural touch points with occupants, useful for carrying out occupant questionnaires – Appendix 3, obtaining historic fuel bills and taking meter readings:
- Pre-retrofit BER assessment
- Survey (typically min 3 months before retrofit)
- Practical completion & handover (at end of retrofit)
CONTRACTOR QUESTIONNAIRE for SOCIAL INDICATORS
required for each individual building/home
Desktop analysis, input into excel spreadsheet

Soc. 2 Indoor Air Quality
Have measures been taken to ensure adequate ventilation? (Yes/No)
This can be assessed on completion of the retrofit by answering the questions below:
• If the ventilation was not upgraded, has the property’s existing ventilation system been commissioned post renovation in accordance with Part F 2019?
• If the ventilation system was upgraded, has it been commissioned in accordance with Part F 2019?

Soc. 3 Winter Thermal Comfort
Have measures been taken to ensure adequate winter comfort? (Yes/No)
This can be assessed on completion of the retrofit by answering the questions below:
• Has the property’s existing heating system been assessed in relation to calculated post-retrofit heat losses & deemed either adequate or where deemed inadequate, upgraded? YES/NO
• Residential: Has a new heat pump been installed in compliance with S.R. 50-4:2021?
• Non-Residential: Have the heating systems been installed as per 16798-1:2019?

Soc. 4 Summer Thermal Comfort
Have measures been taken to minimise summer overheating risk? (Yes/No)
This can be assessed on completion of the retrofit by answering the questions below:
• Has the property been modelled using dynamic simulation software to assess overheating risk? YES/NO
• According to the thermal model, does the property meet the criteria of CIBSE’s TM59 Design methodology for the assessment of overheating risk in homes or CIBSE’s TM52 The Limits of Thermal comfort: Avoiding Overheating in European Buildings for non-residential buildings? YES/NO
• Where the thermal model relies on opening windows for cooling, can they be securely left sufficiently open at night? YES/NO/Not Applicable

Must answer YES (or not applicable) to all three questions to meet Criteria 1

Soc. 5 Radon
Post renovation on site measurements of safe radon levels (if part of Contract Documentation)
• Has a radon measurement device been left on site to measure radon levels post renovation works?
• Has the contractor committed to remedy unsafe levels of radon (>200Bq/m3)?

Soc. 6 Climate Resilience
• Have local vulnerability to climate change studies/maps been developed?
• If yes, have guidance / strategies and tools been developed to ensure renovation projects cope with identified risks (e.g., flooding and overheating)?
• If yes, have the buildings in this specific project been retrofitted in line with the above guidance documents?

CONTRACTORS INFORMATION for ECONOMIC INDICATORS
required for project as a whole
Desktop analysis, input into excel spreadsheet

Eco. 1 Investment in Energy Renovation
This can be assessed on completion of the retrofit through the following data:
• Amount of money spent (not anticipated budget)
• Breakdown by funding type (public, private)

Eco. 3 Jobs in Energy Renovation
This can be assessed on completion of the retrofit through the following data. It will need updating 12 months post completion to allow for work carried out post-practical completion:
• No. of FTE labour days supported during the project (consultants, main contractor, sub-contractors)
**Appendix 3: Tenant Questionnaire**

Irish GBC – Build Upon 2 (Adapted from the questionnaire prepared by UKGBC and Leeds City Council)

**POST-RETROFIT OCCUPANT QUESTIONNAIRE**

**HOUSING EVALUATION**
This survey is being conducted to help understand the impact of retrofit on this home. The information collected will be treated as completely confidential by the survey team. Survey reports will summarise information and not reveal identities of individuals. **Who should fill this in?** Anyone over the age of 18 currently living in the residence. This will normally be one person from single-family households.

**BACKGROUND**
Name of person filling out this side of the survey:

Retrofit Programme Name:

Date of questionnaire:

Date retrofit works commenced on this site:

Date retrofit works finished on this site:

Property Address:

MPRN (Taken from Electricity Bill- 11 digit Number):

**ELECTRICITY & GAS METER TYPE & READING**

Elec Meter Type & Reading: Standard Pre-payment Reading

Gas Meter Type & Reading: Standard Pre-payment Reading

Have photos been taken of utility bills for the last 12 months? Yes No

Have occupants signed the utility bill disclaimer? Yes No

**Is this home ...?**
- detached
- semi-detached
- terrace
- flat/apartment
- other

**Is this home ...?**
- owner occupied
- social tenancy
- private tenancy

**VENTILATION & DAMP**

I. What rooms does this home have? In the table below, tick all that apply.

II. Do any rooms have signs of damp? Note one of the following options for each room: N for none, C for condensation, L for leaks, D for damp, M for mould.

III. What ventilation equipment is installed in each room? Note one of the following options for each room: N for no equipment; F for intermittent extract fan; E for air extract linked to MEV, MVHR or PSV; T for air inlet or trickle vent; P for PIV fan; S for single room ventilator with heat recovery. MEV = continuous mechanical extract ventilation, MVHR = mechanical ventilation with heat recovery, PSV = passive stack ventilation (not common), PIV = positive input ventilation

IV. Which rooms have min 10mm undercuts on doors? In the table below, tick all rooms that apply.

V. Which rooms have windows that can be opened? In the table below, tick all rooms that apply.

Please note any other comments here or on an additional sheet, if necessary: eg. blocked air inlets, disfunctional fans, blocked or open chimneys, more detail about moisture problems.
Irish GBC - Build Upon 2  (Adapted from the questionnaire prepared by UKGBC and Leeds City Council)

POST-RETROFIT OCCUPANT QUESTIONNAIRE

BACKGROUND
This information helps us understand your energy usage and comfort needs.

What is your name?  first name, surname

What is your age?  under 30  30-60  over 60  prefer not say

What is your sex?  male  female  prefer not say

How long have you lived here?  less than 1 year  more than 1 year

How many other people live with you?  under 18 yrs old  over 18 yrs old

Is someone normally at home...?  most of the time  evenings & weekends only  other

What is your household’s gross (income before tax deducted) annual income?

ENERGY USE & CONTROLS
Since the retrofit...how much control do you personally have over the following? Please tick your rating on each scale. Tick the side boxes if having control is important to you.

Heating System: No Control  Full Control  Is having control important to you?

Ventilation System: No Control  Full Control  heating: Y/N  ventilation: Y/N

If you have anything else to add about your energy or comfort needs please write it here: eg. unusual appliances like hot tubs/aquariums, activities like cooking often for others, vulnerable occupants.

Have you received a heating & ventilation guide since completion of the retrofit / when you moved in.

What is your household’s average monthly energy bill?

WINTER COMFORT
Since the retrofit...how would you describe typical conditions in WINTER. If you have not lived here in winter leave these questions blank. Please tick your rating on each scale.

Temperature in Winter
Uncomfortably hot/cold 1  2  3  4  5 Comfortable
Variable 1  2  3  4  5

Air in Winter
Uncomfortably dry/humid 1  2  3  4  5 Comfortable
Stuffy/smelly 1  2  3  4  5

Uncomfortably Draughty 1  2  3  4  5 Comfortable
Still/welcome breeze

Conditions in Winter generally
Unsatisfactory overall 1  2  3  4  5 Satisfactory overall

Summer Comfort
Since the retrofit...how would you describe typical conditions in SUMMER. If you have not lived here in summer leave these questions blank. Please tick your rating on each scale.

Temperature in Summer
Uncomfortably hot/cold 1  2  3  4  5 Comfortable
Variable 1  2  3  4  5

Air in Summer
Uncomfortably dry/humid 1  2  3  4  5 Comfortable
Stuffy/smelly 1  2  3  4  5

Uncomfortably Draughty 1  2  3  4  5 Comfortable
Still/welcome breeze

Conditions in Summer generally
Unsatisfactory overall 1  2  3  4  5 Satisfactory overall

Questionnaire Version 5, 14.09.21, developed by UKGBC (Adapted by Irish GBC)
Appendix 4:
Sample summary report from a reporting period

In 2021, Dublin City Council retrofitted 300 homes. What was the impact?

<table>
<thead>
<tr>
<th>ENVIRONMENTAL</th>
<th>SOCIAL</th>
<th>ECONOMIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2 Emissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,260 ton yr</td>
<td>Energy Consumption</td>
<td></td>
</tr>
<tr>
<td>saved</td>
<td>improved in 65%</td>
<td>Investment in Energy Renovation</td>
</tr>
<tr>
<td>60% reduction</td>
<td>of homes</td>
<td>€7.5 m total project cost</td>
</tr>
<tr>
<td>CO2</td>
<td>Energy Consumption</td>
<td></td>
</tr>
<tr>
<td></td>
<td>reduced from</td>
<td>€25,000 spent per home on average</td>
</tr>
<tr>
<td></td>
<td>150 kWh/m2.yr to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>80 kWh/m2.yr</td>
<td></td>
</tr>
<tr>
<td>Renewable</td>
<td>BER</td>
<td>Financial Savings</td>
</tr>
<tr>
<td>Energy</td>
<td>Energy Efficiency Rating</td>
<td>Energy Bills reduced</td>
</tr>
<tr>
<td>150,000 kWh/yr</td>
<td>improved from</td>
<td>by €400/yr to €900/yr</td>
</tr>
<tr>
<td>produced by</td>
<td>average of</td>
<td>per home on average</td>
</tr>
<tr>
<td>PVs</td>
<td>BER D2</td>
<td></td>
</tr>
<tr>
<td>on the 300</td>
<td>to average of</td>
<td></td>
</tr>
<tr>
<td>homes</td>
<td>BER B2</td>
<td></td>
</tr>
<tr>
<td>supplying 60%</td>
<td>of homes with</td>
<td></td>
</tr>
<tr>
<td>of the homes'</td>
<td>fewer draughts</td>
<td></td>
</tr>
<tr>
<td>energy needs</td>
<td>and warmer rooms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indoor Air Quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>improved in 100%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>of homes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Winter Thermal Comfort</td>
<td>improved in 100% of homes</td>
</tr>
<tr>
<td></td>
<td>with fewer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>draughts and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>warmer rooms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Summer Thermal Comfort</td>
<td>improved in 50% of homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jobs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60 FTE jobs directly supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td>throughout the 18 month project</td>
</tr>
</tbody>
</table>

Effective and impactful communication of key messages in a digestible format is of significant importance in achieving stakeholder interest, uptake and buy-in. This is an example of how annual impact of energy renovation could be presented to the general public if the Framework was used at scale.
Appendix 5: Key energy renovation skills for building professionals and construction workers

<table>
<thead>
<tr>
<th>REGISTERED BUILDING PROFESSIONALS - BC(A)R CERTIFIERS</th>
<th>CONSTRUCTION PROFESSIONALS</th>
<th>CRAFT WORKERS</th>
<th>SPECIALISED WORKERS</th>
<th>GENERAL OPERATIVES</th>
<th>PROPERTY &amp; BUILDING PROFESSIONALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Practice the principles of sustainability and of sustainable building design and detailing</td>
<td>• Practice the principles of sustainability and of sustainable design, detailing and construction</td>
<td>• Interpret building standards and regulations in relation to energy efficiency and quality (especially Part L, F and J)</td>
<td>• Interpret building standards and regulations in relation to energy efficiency and quality (especially Part L, F and J)</td>
<td>• Communicate effectively on energy renovation with clients and other members of the construction chain</td>
<td>• Integrate energy efficiency considerations in valuations.</td>
</tr>
<tr>
<td>• Assess and manage risks associated with energy renovation (including hazardous materials and condensation issues)</td>
<td>• Interpret building standards and regulations in relation to energy efficiency and quality (especially Part L, F and J)</td>
<td>• Collaborate with cross-trades</td>
<td>• Collaborate with cross-trades</td>
<td>• The concept of sustainability and sustainable design</td>
<td>• The cost of retrofit and retrofit options.</td>
</tr>
<tr>
<td>• Interpret building standards and regulations in relation to energy efficiency and quality (especially Part L, F and J)</td>
<td>• Collaborate with cross-trades</td>
<td>• Communicate effectively on energy renovation with other members of the construction chain</td>
<td>• Communicate effectively on energy renovation with other members of the construction chain</td>
<td>• Basics of building physics and construction types, including traditional buildings</td>
<td>• The value of energy renovation (including co-benefits) and building users’ needs.</td>
</tr>
<tr>
<td>• Collaborate with cross-trades</td>
<td>• Assess buildings for energy efficiency and quality retrofit (BER assessor only)</td>
<td>• Connect the individual performance to a team performance</td>
<td>• Connect the individual performance to a team performance</td>
<td>• Risks assessment and management in relation to energy renovation within their trade expertise (including hazardous materials and condensation issues).</td>
<td>• The concept of sustainability.</td>
</tr>
<tr>
<td>• Communicate and transfer all this information clearly to members of the supply chain, building users and clients.</td>
<td>• Use energy modelling tools</td>
<td>• Use energy modelling tools (Essential for all except contract manager)</td>
<td>• Risks assessment and management in relation to energy renovation within their trade expertise (including hazardous materials and condensation issues).</td>
<td>• Energy use in existing buildings and of the most common energy reduction and energy production solutions relevant to trade, as well as their interdependencies and effectiveness.</td>
<td>• Building regulations in relation to energy efficiency and quality (especially Part L, F and J).</td>
</tr>
<tr>
<td>• Collaborate with cross-trades</td>
<td>• Connect the individual performance to a team performance</td>
<td>• Energy use in existing buildings</td>
<td>• Energy use in existing buildings and of the most common energy reduction and energy production solutions relevant to trade, as well as their interdependencies and effectiveness.</td>
<td>• The value of energy renovation (including co-benefits) and building users’ needs.</td>
<td>• Energy use in existing buildings, energy management solutions and post-retrofit building operation and maintenance.</td>
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<tr>
<td>• Collaborate with cross-trades</td>
<td>• Use energy modelling tools</td>
<td>• Energy use in existing buildings</td>
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<td>• Must understand.</td>
<td>• Must know.</td>
<td>• Must be aware of</td>
<td>• Climate change targets and their impacts on the real estate market.</td>
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</tbody>
</table>
Platinum Members

AIB, Bam, Bord Gáis Energy, Google, Lioncor, SEAI

Gold Members

Aereco, Ballymore, BRE, Cairn, CHL Group, Etex, Hibernia REIT

Silver Members

CBRE, Dulux, Electric Ireland, Fine Grain, Glen Dimplex Ireland, HWBC, Kingspan, Mannok, Marlet, Kingscourt, Kingspan, MANNOK, MARLET, Xtratherm

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