IGBC
IRISH GREEN BUILDING COUNCIL

BUILD UPON²

Build Upon² Energy Renovation Framework - Methodology

October 2021

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 840926

BUILD UPON²

GBCe green building council españa · BPIE · Climate Alliance · Hrvatski savjet za zelenu gradnju Croatia Green Building Council · HuGBC Magyar Környezettudatos Építés Egyesülete Hungary Green Building Council · IGBC Irish Green Building Council · Green Building Council Italia · PLGBC Polskie Stowarzyszenie Budownictwa Ekologicznego · Cedbik Çevre Dostu Yeşil Binalar Derneği Turkish Green Building Council · UK GBC · World Green Building Council

The BUILD UPON² 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 UPON² project will empower municipalities across Europe to join forces with national governments and industry to decarbonise their existing building stock by 2050. BUILD UPON² 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

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.

"The BUILD UPON Framework allows local authorities to measure and record the impacts of their retrofit projects in a holistic manner, looking at CO_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

"Cork City Council will retrofit 2,700 social houses by 2030. The Build Upon² 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

About

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**.

Main Author(s)
John Fingleton & Marion Jammet – Irish Green Building Council

Contributors
Irene Rondini – Irish Green Building Council

Disclaimers
Icons by **Flaticon**

Ireland's National Steering Group

DECC
Kevin McCann

Dublin City Council
Patrick Stanley

CIF
Jeannette Mair

ESRI
John Curtis

Codema
Rebecca Cachia

HSE
Ina Kelly

CSO
Gerry Brady

Retrokit
Xavier Dubuisson

DPER
Ken Cleary

SEAI
Conor Hanniffy

Department of Housing
Emmanuel Bourdin

UCD
Orla Hegarty

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
- **SECAP** 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.

Building Energy Rating (BER) is a certificate which notes the standardised calculation of the operational regulated energy. In Ireland, this is the energy used for heating, cooling, hot water, ventilation and lighting. It does not calculate consumption due to plug loads related to computers, TVs, fridges, dishwasher, washing machine etc.

Energy poverty can be defined as "a situation where a household or an individual is unable to afford basic energy services (heating, cooling, lighting, mobility and power) to guarantee a decent standard of living due to a combination of low-income, high-energy expenditure and low energy efficiency of their homes". European Commission, Citizens' Energy Forum 2016 - Definition used by the Covenant of Mayors.

There is no standard definition of energy poverty at EU level. It 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).

Final/Delivered energy is the total energy consumed by end users, such as households, industry and businesses. It is the energy which reaches the final consumer's door and excludes that which is used by the energy sector itself. It is the energy that is metered at the property.

Heating System is the mechanical system that supplies space heating to the building.

Investment in energy renovation refers to all investments to improve the energy efficiency of a building. It includes investments in light, medium and deep renovations. For further information on what may constitute an energy renovation investment, please see appendix 1.

Net floor area is the total useful floor area of the property measured in square meters as per BER report.

Onsite renewable refers to the energy, electrical and thermal, generated by renewables within the site boundary to cover the building energy demand.

Overheating Risk is defined as "the phenomenon of a person experiencing excessive or prolonged high temperatures within a building, resulting from internal and /or external heat gains, and which leads to adverse effects on their comfort health or productivity".

Source: ZeroCarbon HUB, 2015, Defining Overheating – Evidence Review

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

Renewable energy are energy sources that can be used without depleting their reserves. Common sources of renewable energy are bioenergy, geothermal, hydropower, ocean, solar and wind. The national definitions and methods for procurement in relation to renewables take precedence over the principles and methods listed above.

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 CO_2 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.

BUILD UPON²	INDICATOR	METRIC	LEVEL: PROJECT	LEVEL: CITY
ENVIRONMENTAL	Env. 1 Energy Renovation Rate	%		✓
	Env. 2 CO_2 emissions	Ton CO_2 /yr	✓	✓
	Env. 3 Energy Consumption	kWh/yr	✓	✓
	Env. 4 Renewable Energy Production	kWh/yr	✓	✓

BUILD UPON²	INDICATOR	METRIC	LEVEL: PROJECT	LEVEL: CITY
SOCIAL HEALTH & WELLBEING	Soc. 1 Energy Poverty	% of households	✓	✓
	Soc. 2 Indoor Air Quality	# of residentialunits or non-residential floor area	✓	✓
	Soc. 3 Winter Thermal Comfort		✓	✓
	Soc. 4 Summer Thermal Comfort		✓	✓
	Soc. 5 Radon	# post-renovation assessment complying with national guidelines	✓	✓
	Soc. 6 Climate Resilience	# of Renovated buildings	✓	✓

BUILD UPON²	INDICATOR	METRIC	LEVEL: PROJECT	LEVEL: CITY
ECONOMIC	Eco. 1 Investment in energy renovation	€	✓	✓
	Eco. 2 Energy efficiency of investment	kWh/€	✓	✓
	Eco. 3 Jobs in energy renovation	#FTE	✓	✓
	Eco. 4 Upskilling in energy renovation	# Building professionals / construction workers		✓
	Eco. 5 Financial savings from energy renovation	€	✓	

Env.1: Energy Renovation Rate

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

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.

OBJECTIVE

EUROPEAN UNION

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

Source: Article 5 of Directive 2012/27/EU (Under the EU Renovation Wave Strategy (2020), it is anticipated that the revised Energy Efficiency Directive will extend that requirement to all public administration levels and increase that rate).

- Under the EU green deal, annual renovation rate must double to 2.4% per year.

Source: EU Renovation Wave

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 follow:

- Residential: 2.49%
- Tertiary: 3.33%
- Public: 9%

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

LOCAL AUTHORITY

Add your local authority target here

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
Main metric – Renovation Rate

- **Residential:**

$$\text{Renovation rate over reporting period} = \frac{\text{Residential units renovated during reporting period}}{\text{Total residential units}} \times 100$$

- **Non-Residential:**

$$\text{Renovation rate over reporting period} = \frac{\text{Net floor area renovated (m}^2\text{) during reporting period}}{\text{Total non-residential net floor area (m}^2\text{)}} \times 100$$

Sub metric - Percentage breakdown by depth of energy renovations completed (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

$$\text{Percentage breakdown (light/medium/deep)} = \frac{\text{Number of buildings achieving light/medium/deep}}{\text{Total number of buildings being renovated}} \times 100$$

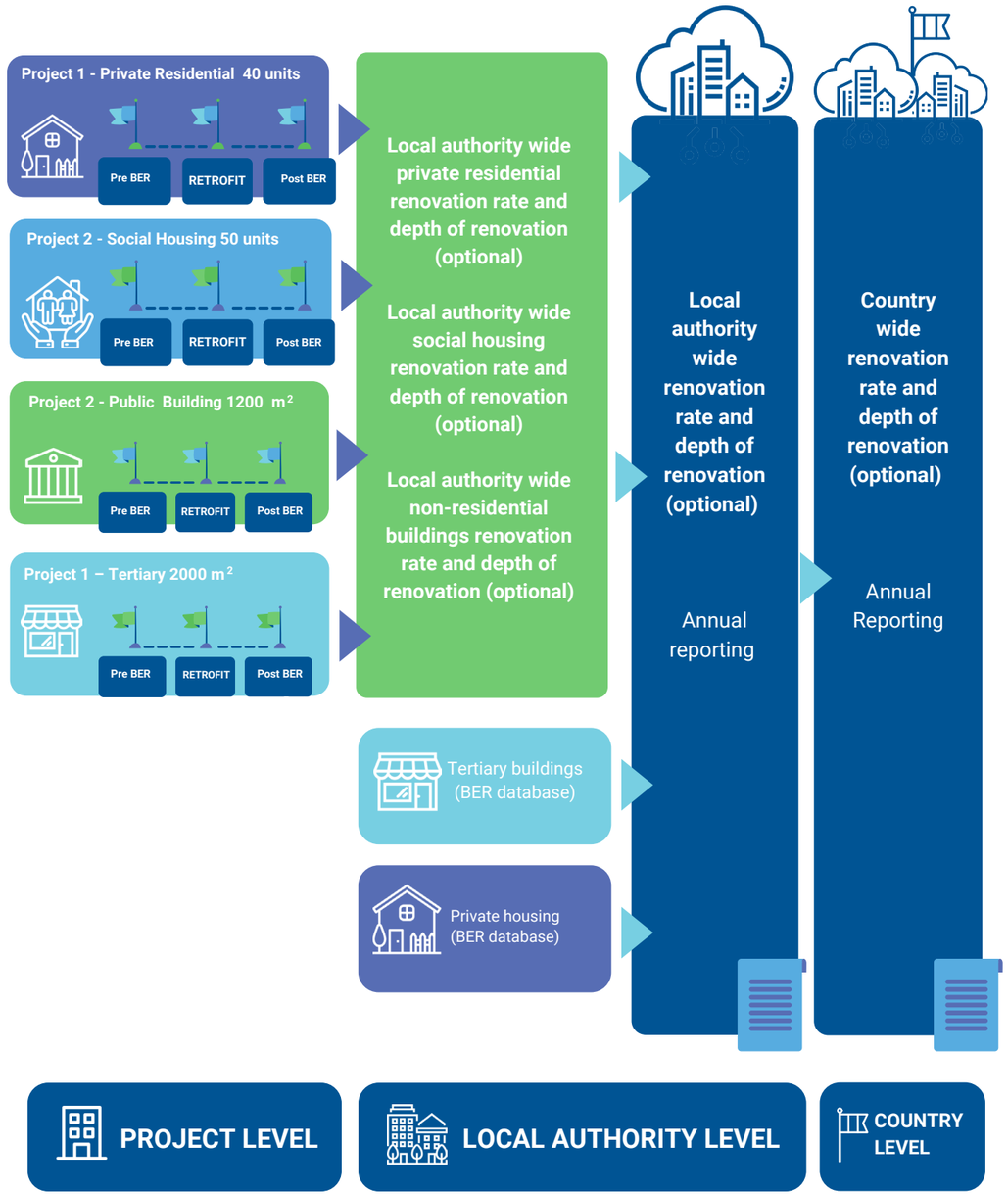
Source of data
For both the main metric and sub metrics, it is important to have figures for the existing property stock in terms of residential units and non-residential floor area.

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.

TERTIARY AND PUBLIC (based on m²)

				TOTAL
MAIN METRIC: ENERGY RENOVATION RATE		2.2 %	1.8 %	2.0 %
SUB METRIC of which	light	29.8 %	54.5 %	43.1%
	medium	2.1 %	27.3 %	15.7 %
	deep	68.1 %	18.2 %	41.2 %

RESIDENTIAL (based on # dwellings)

				TOTAL
MAIN METRIC: ENERGY RENOVATION RATE		2.3 %	1.3 %	1.4 %
SUB METRIC of which	light	32.6 %	20.0 %	22.4 %
	medium	2.2 %	30.0 %	24.0 %
	deep	65.2 %	50.0 %	52.8 %

ENV 01 - Table

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

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 dependenting 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.

Env. 2: CO_2 emissions reduction

DEFINITION

Reduction in the direct annual CO_2 emissions equivalent achieved through renovation - operational energy only

UNIT OF MEASURE

Main metric: Ton CO_2eq/year (total building stock)
Sub metric: % Reduction in CO_2

RELEVANCE

CO_2 is a major contributor to global warming. CO_2 is emitted into the atmosphere by burning fossils to heat and cool, as well as to produce Domestic Hot Water (DHW) and produce electricity for use in the building. Buildings are responsible for 36% of CO_2 emissions in the European Union (EU).

OBJECTIVE

EUROPEAN UNION

The objective of the indicator is to identify the CO_2 emissions reductions from renovations at a project level and to track overall progress at a municipal level towards EU's objective of reducing CO_2 emissions by at least 55% by 2030 and to reach carbon neutrality by 2050. Read more.

IRELAND

Reduce CO_2 emissions from the Built Environment Sector by 40-45% relative to 2030 pre-National Development Plan projections.

Source: All Government Climate Action Plan (2019)

Reaching Climate Neutrality by 2050

Source: Climate Action and Low Carbon Development (Amendment) Act 2021

LOCAL AUTHORITY

Add your local authority's target here

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 CO_2 emissions

Main metric

CO_2 emissions reduction (Ton CO_2 eq. / year) = ∑ (Pre-renovation CO_2 Emissions - Post renovation CO_2 emissions)

Sub metric - Percentage reduction of CO_2 emissions

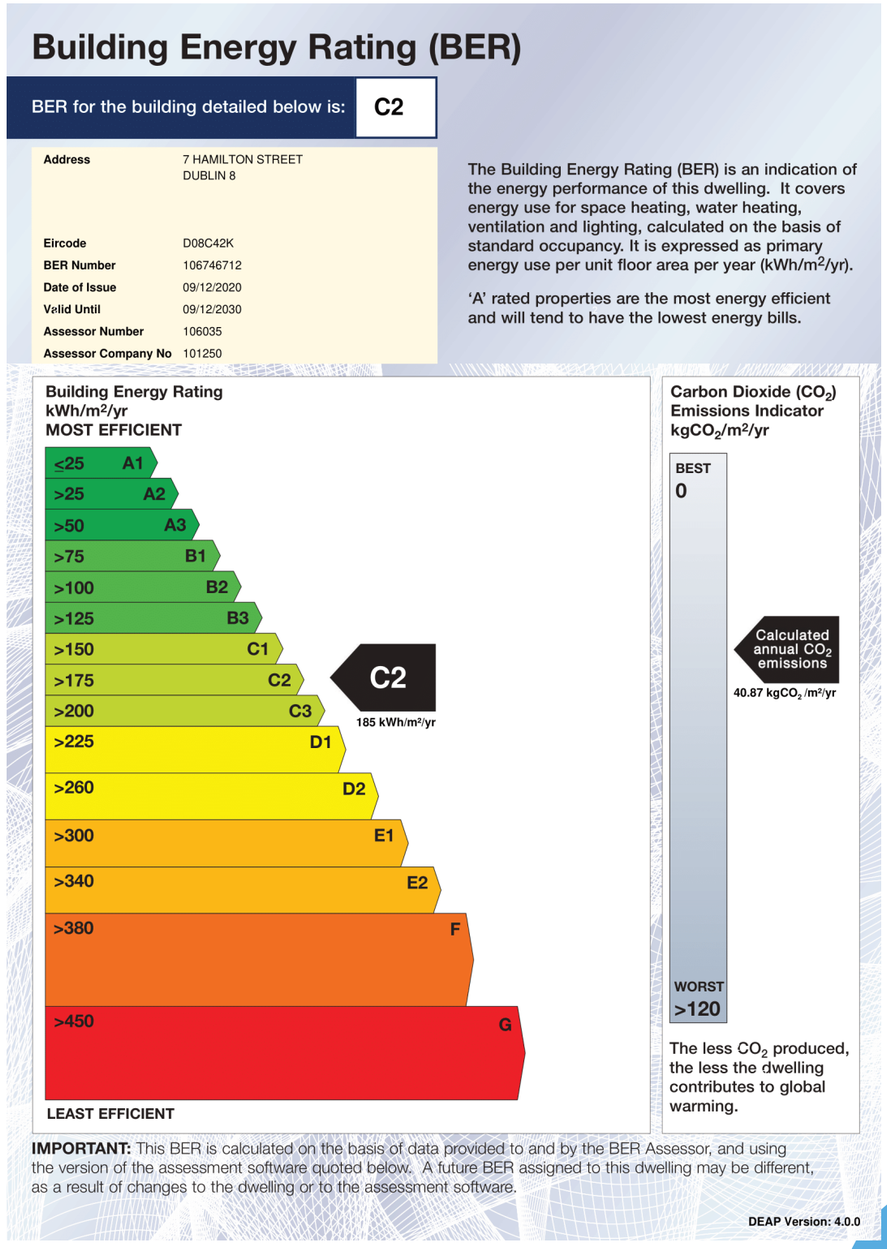
$$\text{Percentage reduction of } CO_2 \text{ emissions} = \frac{CO_2 \text{ emission reduction}}{\text{Total sector } CO_2 \text{ emissions}} \times 100$$

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 CO_2 emission factors (t CO_2 /MWh) for the forms of energy used in the building**.

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 CO_2 emissions at a project level which should be centrally recorded.

**CO_2 emissions are usually displayed on the cover page of the BER as CO_2 /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 CO_2 emission factors, please use SEAI's CO_2 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.*



Building Energy Rating (BER)

BER for the building detailed below is: **C2**

Address	7 HAMILTON STREET DUBLIN 8
Eircode	D08C42K
BER Number	106746712
Date of Issue	09/12/2020
Valid Until	09/12/2030
Assessor Number	106035
Assessor Company No	101250

The Building Energy Rating (BER) is an indication of the energy performance of this dwelling. It covers energy use for space heating, water heating, ventilation and lighting, calculated on the basis of standard occupancy. It is expressed as primary energy use per unit floor area per year (kWh/m²/yr).

'A' rated properties are the most energy efficient and will tend to have the lowest energy bills.

Building Energy Rating
kWh/m²/yr
MOST EFFICIENT

LEAST EFFICIENT

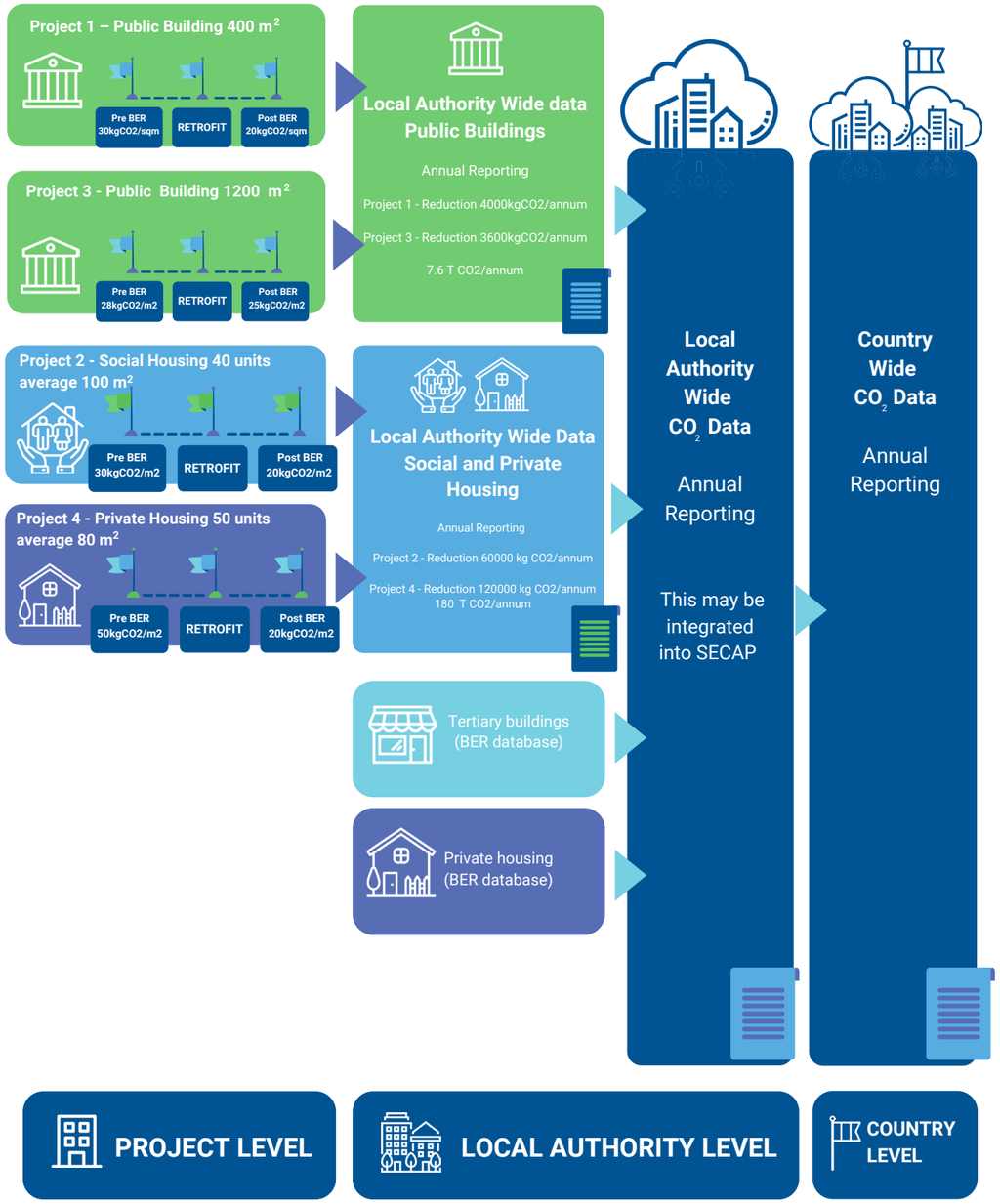
Carbon Dioxide (CO_2) Emissions Indicator
$kgCO_2/m^2/yr$

The less CO_2 produced, the less the dwelling contributes to global warming.

IMPORTANT: This BER is calculated on the basis of data provided to and by the BER Assessor, and using the version of the assessment software quoted below. A future BER assigned to this dwelling may be different, as a result of changes to the dwelling or to the assessment software.

DEAP Version: 4.0.0

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.

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 CO_2 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.

Env. 3: Final Energy Consumption Reduction

DEFINITION

Reduction in final (delivered) energy consumption through renovation

UNIT OF MEASURE

Main metric: kWh/yr - Final (delivered) energy
Sub metric: % reduction in kWh

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.

OBJECTIVE

EUROPEAN UNION

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

Source: Energy Efficiency Directive (2018/2002)

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.

METHODOLOGY

Calculate as the difference between the kWhr/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

Final (delivered) energy consumption reduction (kWh/yr) = ∑ (Pre-renovation final energy (kWh/yr) - Post renovation final energy (kWh/yr))

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

$$\text{Percentage reduction of final energy consumption} = \frac{\Sigma\ \text{Final energy consumption reduction}}{\text{Total sector final energy consumption}} \times 100$$

Source of data

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

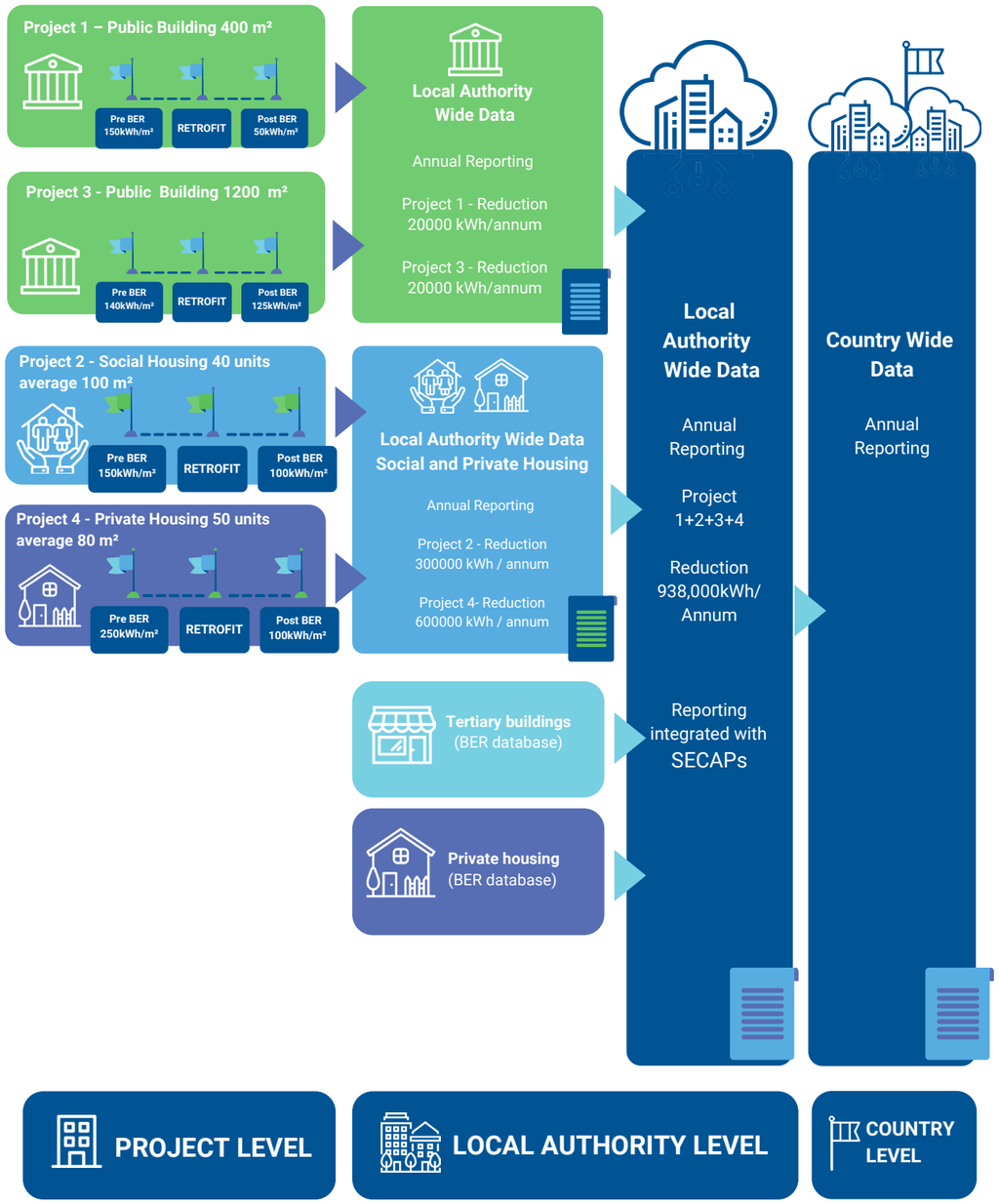
Local authorities require pre works and post works BERs* for specific projects – or actual monitored data for a minimum of 12 months. For ease, it is suggested local authorities initially use it for municipal buildings and social housing that they own and manage. This will provide a calculated – or actual - 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.

Results

	Delivered energy [kWh/y]	Primary energy [kWh/y]	CO_2 emissions [kgCO_2/y]
Main space heating system	15199	16719	3085
Secondary space heating system	0	0	0
Main water heating system	3924	4317	797
Supplementary water heating system	0	0	0
Pumps and fans	0	0	0
Energy for lighting	262	544	107
CHP input (individual heating systems only)	0	0	0
CHP electric output (individual heating systems only)	0	0	0
Renewable and energy saving technologies			
Energy produced and saved	2450	5096	1002
Energy consumed by the technology	0	0	0
Total	16935	16483	2987
Per m^2 floor area	148.55	144.59	26.20
Energy Rating	B3		

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.

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.

Env. 4: Additional Renewable Energy Production

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 CO_2 emissions with clean renewable energy. It also reduces energy dependence and provides security and diversification of energy supply.

OBJECTIVE

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

Increase in kWh/year from renewables = ∑ (Post Renovation kWh/year from renewables produced onsite or nearby - Pre renovation kWh/year from renewables produced onsite or nearby)

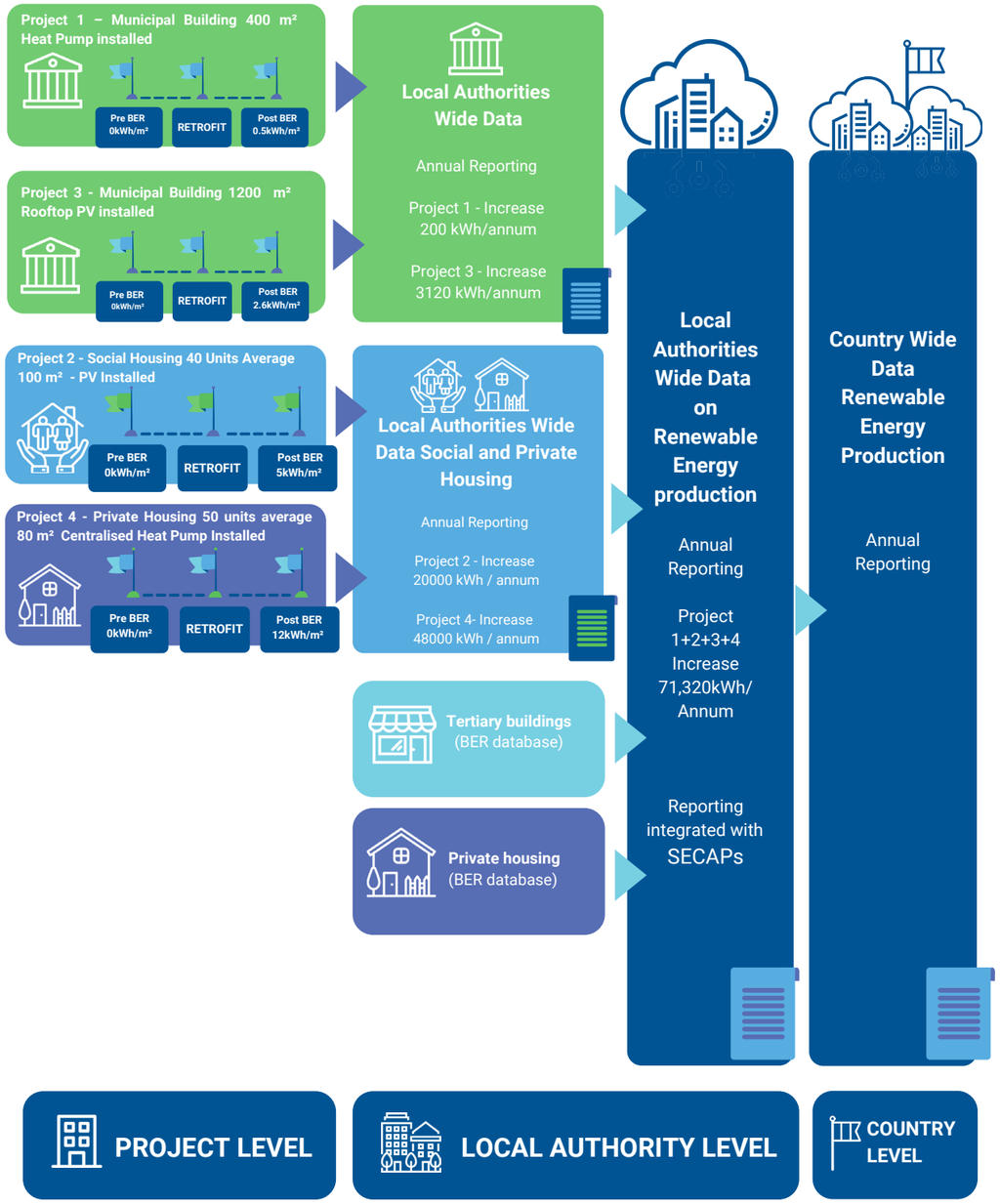
Sub metric - Percentage increase in kWh/year from renewables

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

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.

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.

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.
- 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. Source: 2018. Eurostat, Statistics on Income and Living Conditions (SILC).

OBJECTIVE

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.

METHOLOGY

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

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

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.

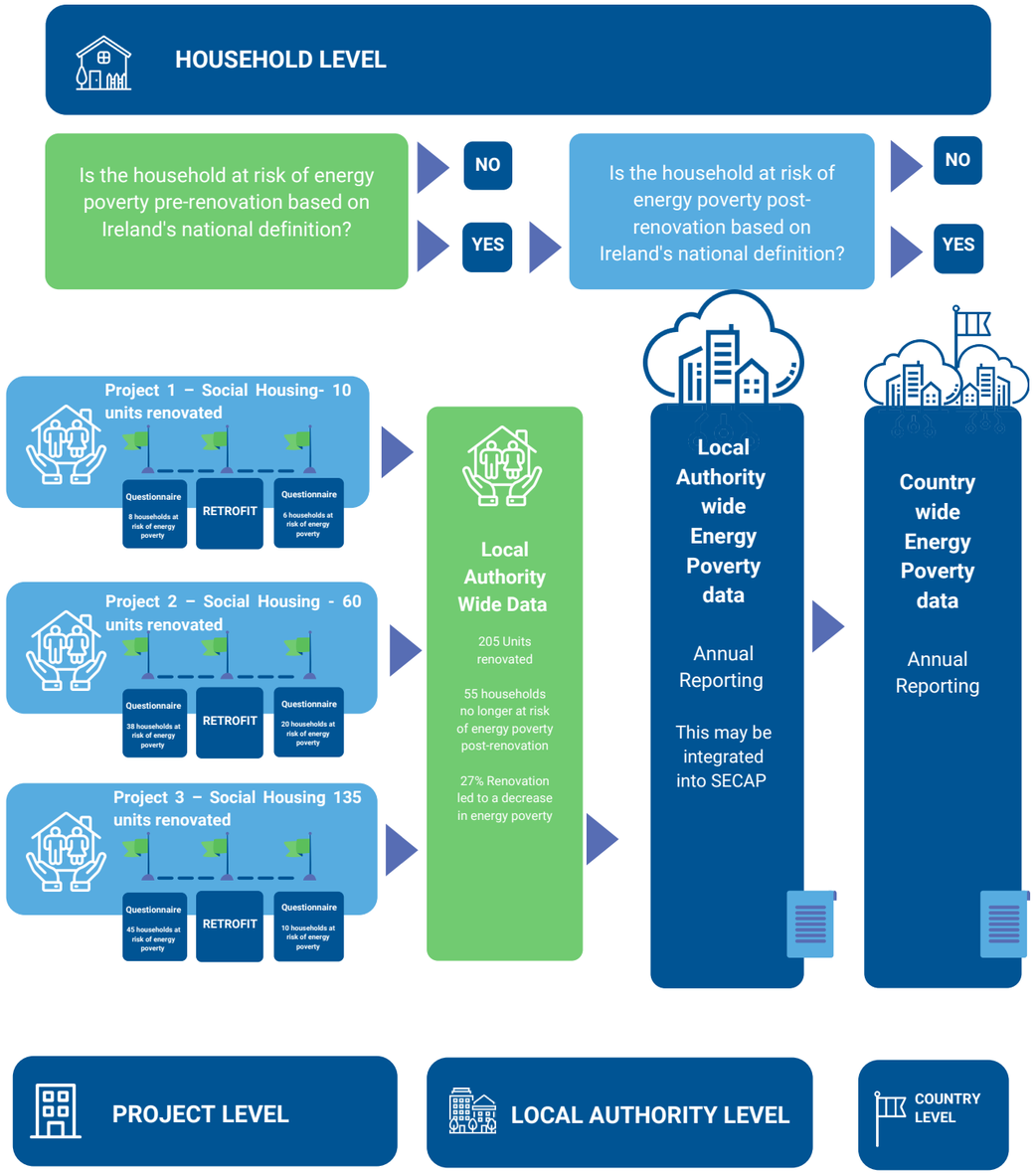
More specifically, local authorities should at the very least collect a pre and post renovation BER. These BERs will be used to estimate the cost of energy pre and post renovation. It might also be possible to access actual data on the energy cost pre and post renovation using one of the following methodologies:

- 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



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 CO_2, 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.

OBJECTIVE

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 = ∑ renovated units with adequate IAQ
Non-residential floor area (m²) with improved IAQ = ∑ area of renovated buildings (m²) with adequate IAQ

Sub metric – Percentage of renovated building stock with improved IAQ

$$\text{Percentage of residential units with improved IAQ} = \frac{\sum \text{renovated units with adequate IAQ}}{\text{Total building renovated}} \times 100$$

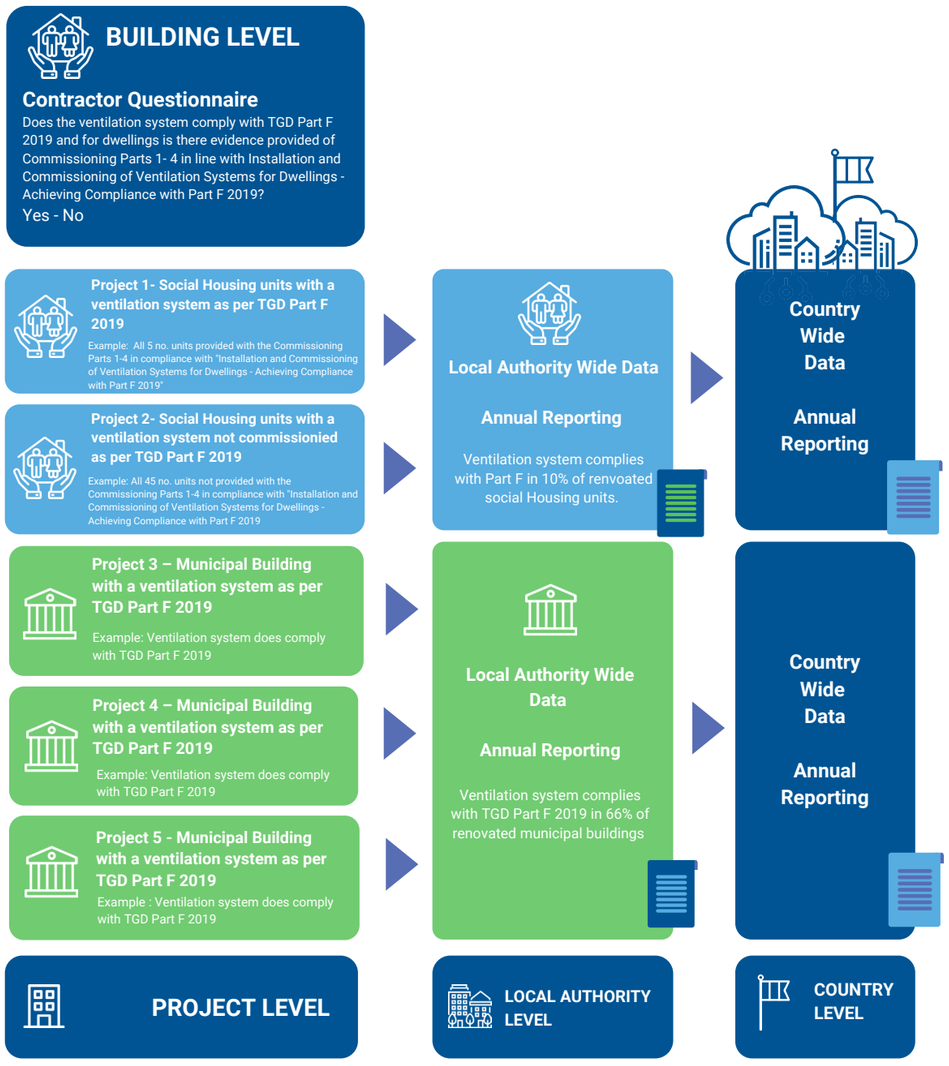
$$\text{Percentage of non-residential floor area (m}^2\text{) with improved IAQ} = \frac{\sum \text{area of renovated buildings (m}^2\text{) with adequate IAQ}}{\text{Floor area (m2)}} \times 100$$

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



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.

ADDITIONAL GUIDANCE

Encourage local authorities to carry out desing 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.

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.

OBJECTIVE

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.

Source: EU's Renovation Wave Strategy

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.

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

No. of residential units with improved WTC = Σ renovated units with adequate WTC

Non Residential

Non-residential floor area (m²) with improved WTC =

$$\frac{\Sigma \text{ area of renovated buildings (m}^2\text{) with adequate WTC}}{\text{Total building renovated}} \times 100$$

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

Percentage of residential units with improved WTC =

$$\frac{\Sigma \text{ renovated units with adequate WTC}}{\text{Total area (m}^2\text{) of renovated buildings}} \times 100$$

Percentage of non-residential floor (m²) with improved WTC =

$$\frac{\Sigma \text{ area of renovated buildings (m}^2\text{) with adequate WTC}}{\text{Total area (m}^2\text{) of renovated buildings} \times 100} \times 100$$

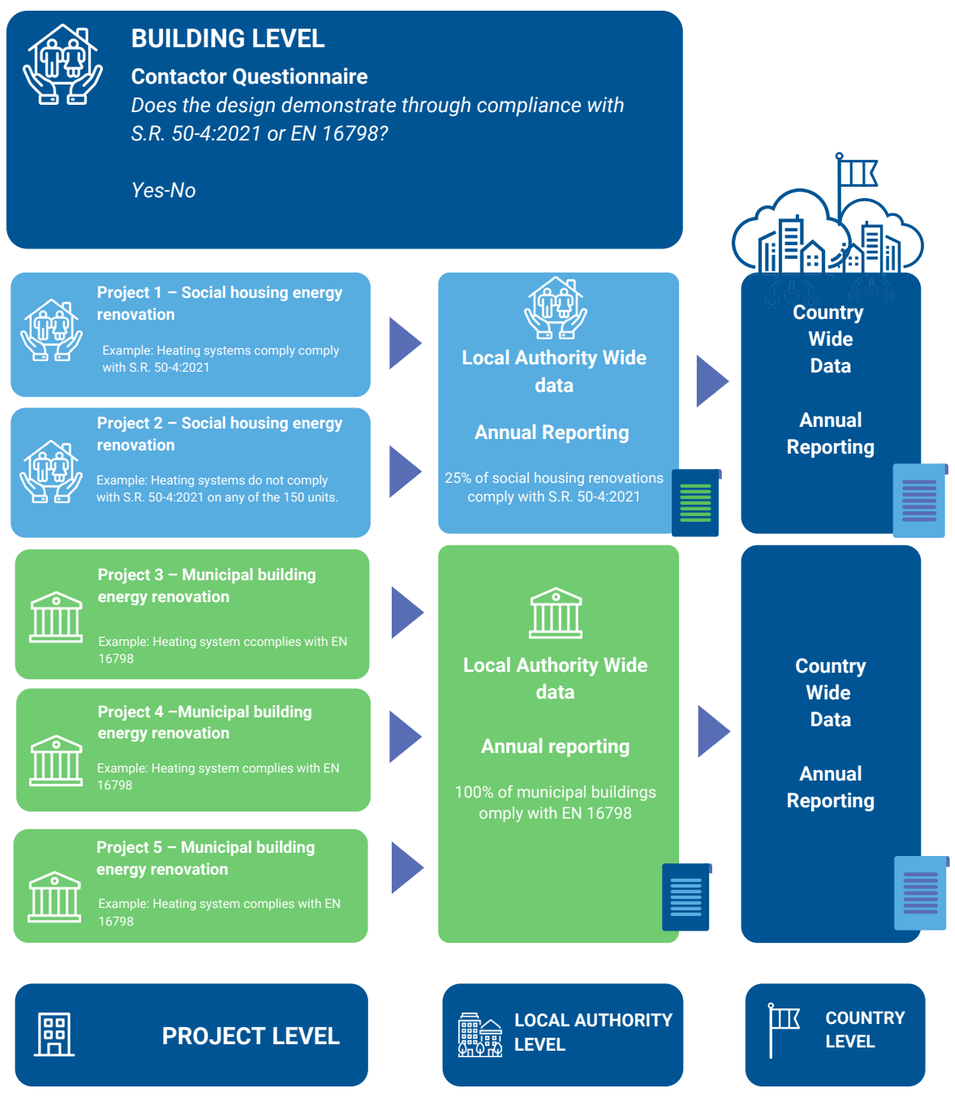
Source of data

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.

DATA COLLECTION PATHWAY



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 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.

OBJECTIVE

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)

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 = ∑ renovated units achieving adequate summer thermal comfort

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

Sub Metric
Percentage of residential units assessed with improved summer thermal comfort =

$$\frac{\sum \text{residential units assessed which achieve adequate summer thermal comfort}}{\text{Total building renovated}} \times 100$$

Percentage of Non-residential floor (m²) assessed with improved summer thermal comfort =

$$\frac{\sum \text{area of renovated buildings which achieve adequate summer thermal comfort}}{\text{Total area of renovated buildings} \times 100} \times 100$$

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

CIBSE TM 52 / 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.ummer thermal comfort post energy renovation. These should be completed 12 months after renovation, once the building is occupied.

DATA COLLECTION PATHWAY

BUILDING LEVEL

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

Project 1 – Social housing energy renovation

Overheating risk assessed and all 25 units comply.

Project 2 – Social housing energy renovation

Overheating risk not assessed and none of the 50 units comply.

Local Authority Wide data

Annual Reporting

33% of social housing assessed to have no risk of high internal temperature

Country Wide Data

Annual Reporting

Project 3 – Municipal building energy renovation

Overheating risk assessed and complies with CIBSE TM52

Project 4 – Municipal building energy renovation

Overheating risk assessed and complies with CIBSE TM52

Local Authority Wide data
Annual reporting

100% of renovated buildings comply with CIBSE TM52

Country Wide Data

Annual Reporting

PROJECT LEVEL | **LOCAL AUTHORITY LEVEL** | **COUNTRY LEVEL**

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.

Soc.5: Radon

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.

*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

OBJECTIVE

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

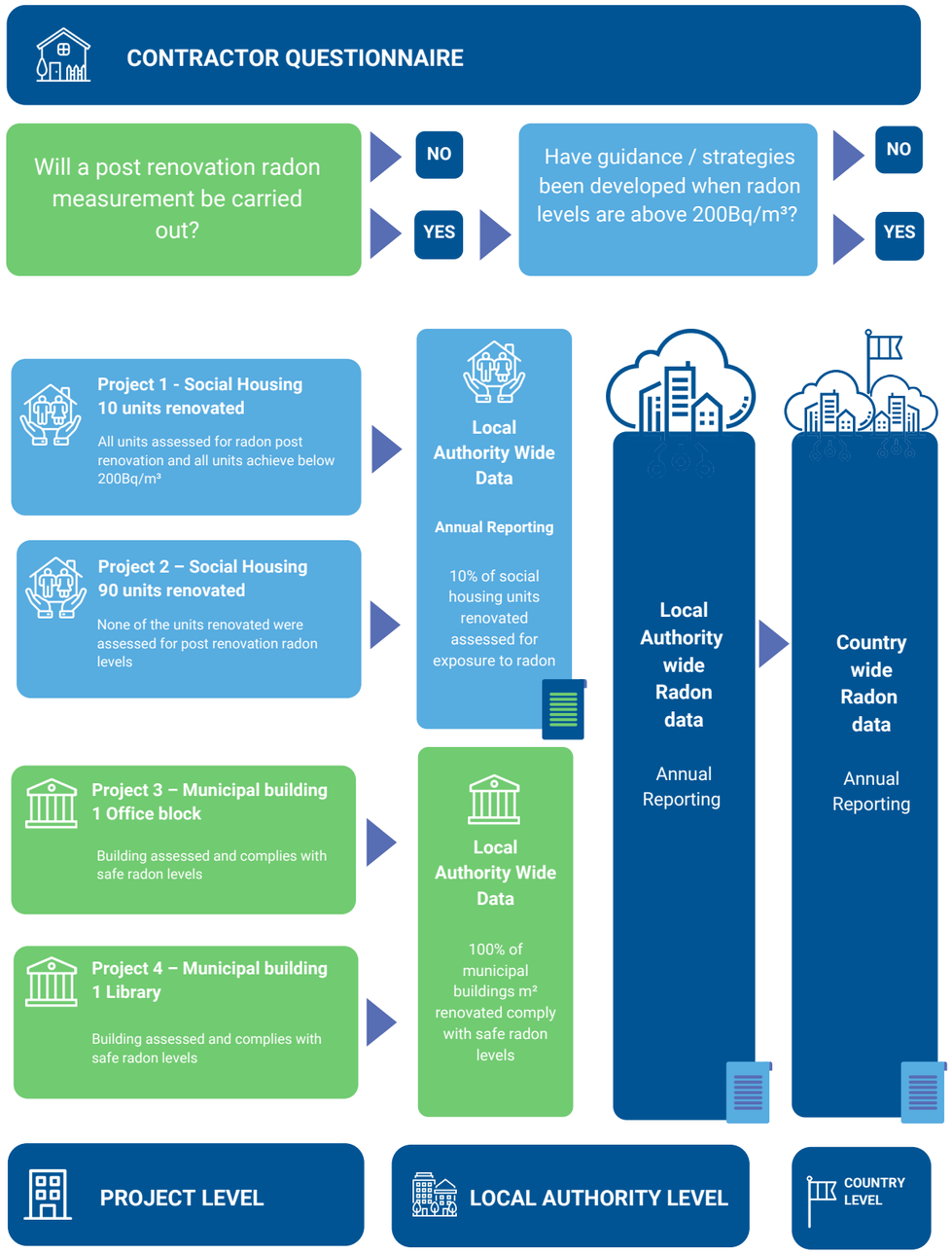
Residential
Dwellings (housing or ground floor apartments) with post renovation on site measurements of safe radon levels (> 200Bq/m³) = ∑ Dwellings (housing or ground floor apartments) with post renovation on site measurements of safe radon levels (> 200Bq/m³)

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

DATA COLLECTION PATHWAY



ADDITIONAL GUIDANCE

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.

OBJECTIVE

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 (DCCAE, 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 = ∑ Dwellings renovated to minimise the impacts of climate hazards

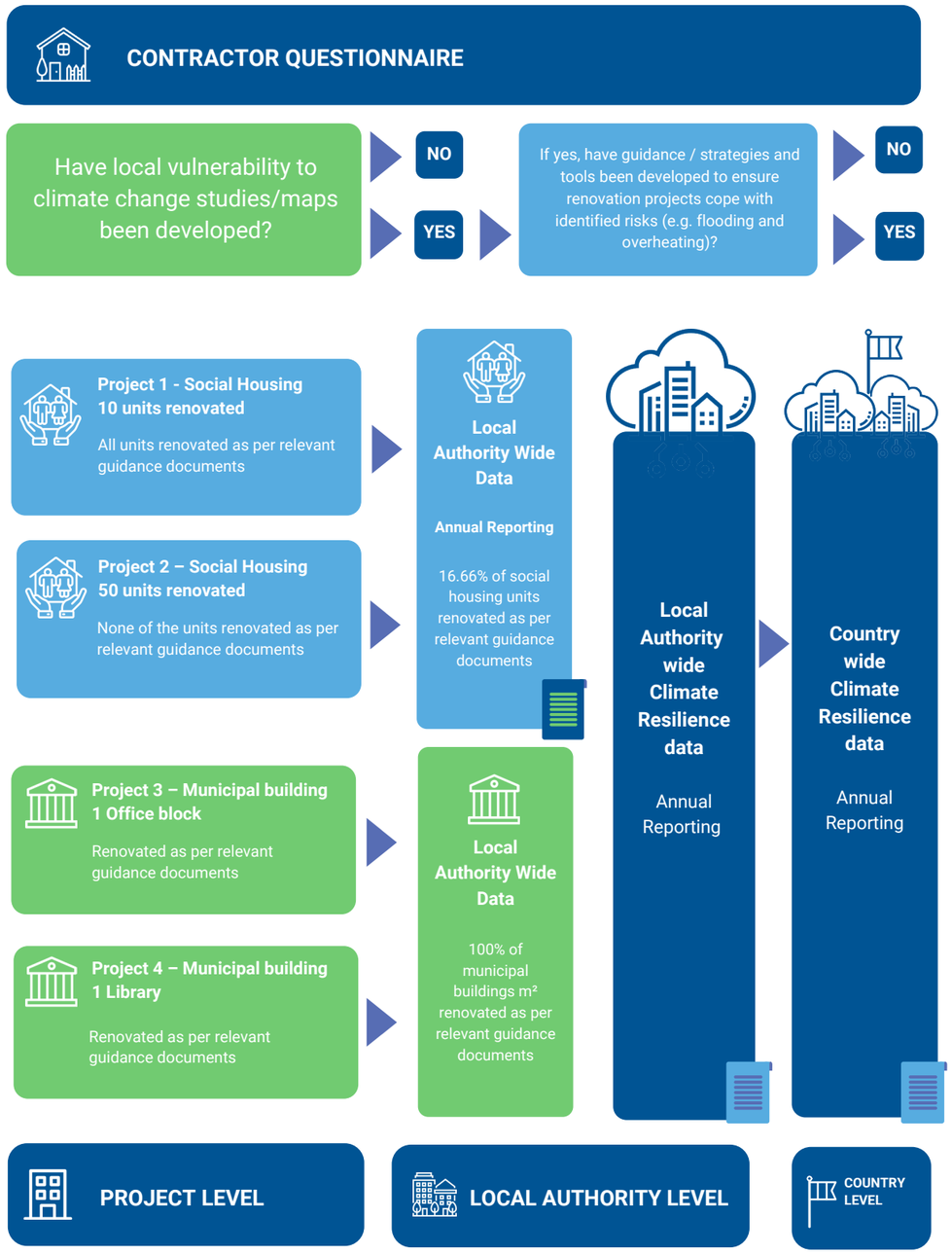
Non-Residential
Buildings renovated to minimise the impacts of climate hazards (m²) = ∑ Buildings (m²) renovated to minimise the impacts of climate hazards

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



ADDITIONAL GUIDANCE

Private residential & tertiary buildings

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

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).

OBJECTIVE

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.

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 (€) = ∑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 =

$$\frac{\text{∑Investments on energy renovation of residential buildings (€)}}{\text{∑Units and/or m² renovated}} \times 100$$

With breakdown for social and private housing.

Non-Residential:

Investment costs of energy renovation per m² renovated =

$$\frac{\text{∑Investments on energy renovation of non-residential buildings (€)}}{\text{∑renovated area (m²)}} \times 100$$

With breakdown for public and tertiary buildings.

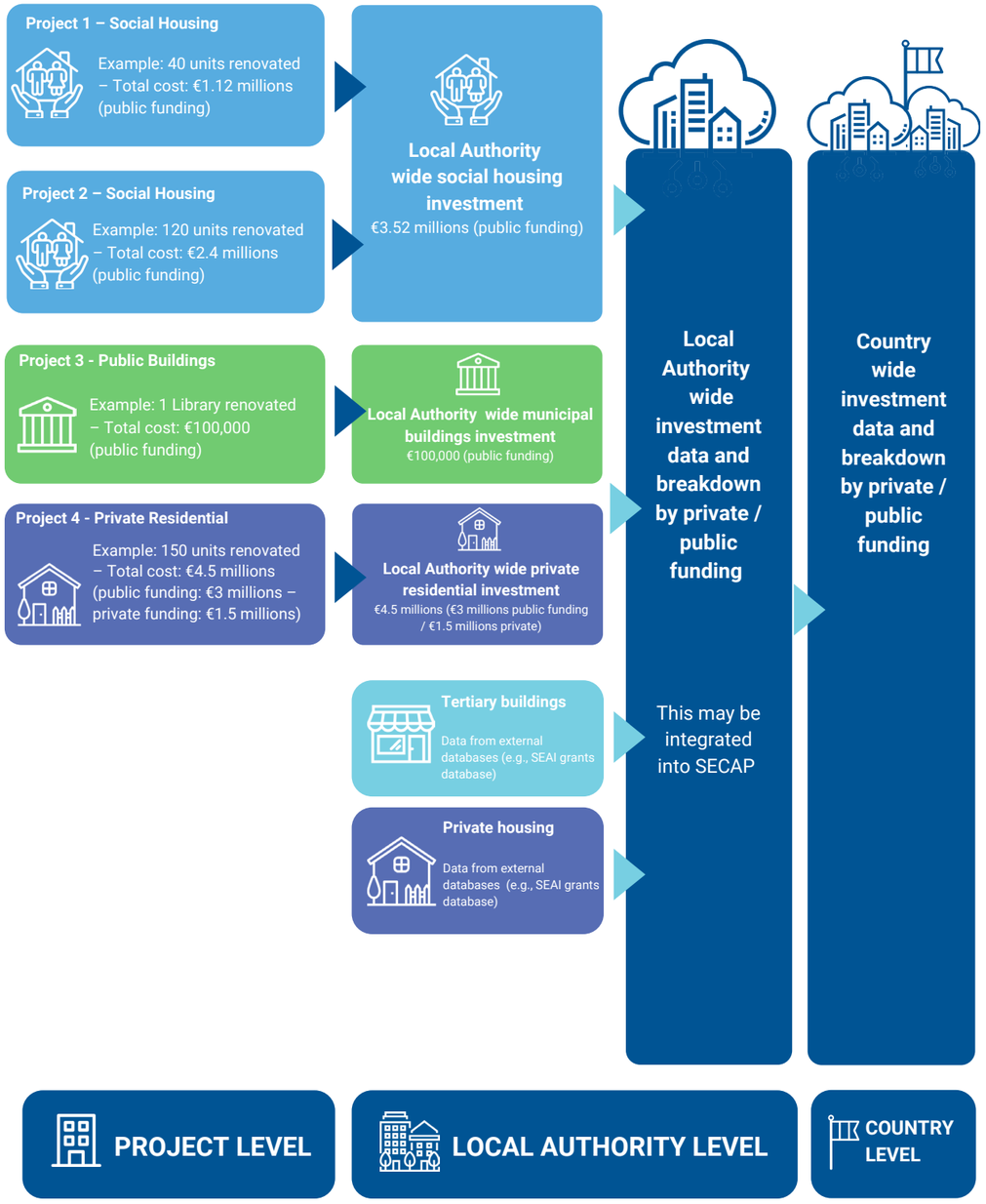
Source of data

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.

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.

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) =

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

With breakdown per type of building.

Sub-metric (Optional)

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

$$\frac{\sum \text{Final energy consumption reduction (Env.3) in kWh/year} / \sum \text{Renovated floor area (m}^2\text{)}}{\sum \text{Investments in energy renovation (Eco.1 in €)} / 1000}$$

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).

Eco.3: Jobs in energy renovation

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.

Sources:
* Burr, A. Majersik, C. Stelburg, S. and Garrett-Peltier, H. (2012). Analysis of job creation and energy cost savings: from building energy rational and disclosure policy.
** Renovate Europe - Building Renovation: a kick-starter for the EU economy – Renovate Europe (renovate-europe.eu).

OBJECTIVE

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

METHODOLOGY

Calculate the direct jobs (FTE) in energy renovation in a given reporting period. Ideally, this should be a **year.**

Calculation
Depending on the local authority's objective and resources available, local authorities may use option A or B. In all cases, local authorities must be transparent on the methodology and data set used. Any assumptions made should be fully disclosed and recorded.

Option A – Starting from data collected at project level
Direct jobs in energy renovation (FTE) in a reporting period = ∑ Labour days (FTE) for energy renovation projects in reporting period.

Option B – Starting from data at municipal level
Direct jobs in energy renovation (FTE) in a reporting period = (Eco. 1 - Investment in energy renovation in the reporting period)/1000000) x Direct jobs proportion* x Direct jobs in energy efficiency renovation multiplier*
Note: This is aligned with the C40 indicator (and methodology) on energy renovation and job creation.

*See Source of data section for further details.

Source of data

Option 1 – Starting from data at project level
Local authorities collect data on number of FTE working on specific projects through a contractor questionnaire – See Appendix 2 / Appendix 1 may also be used to track what relates to energy 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 figure at a project level which should be centrally recorded.

Option 2 – Starting from data at local authorities level
The effect on jobs can be calculated by applying multipliers to investment in energy renovation (Eco. 1). 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:
- Where local studies detailing the impact of energy renovation on jobs creation are available, data from these studies should be used and inputted as multiplier numbers.
- Based on literature review and where a municipality does not have local studies detailing the impact of energy renovation on jobs creation, the following default values should be used:
  - 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

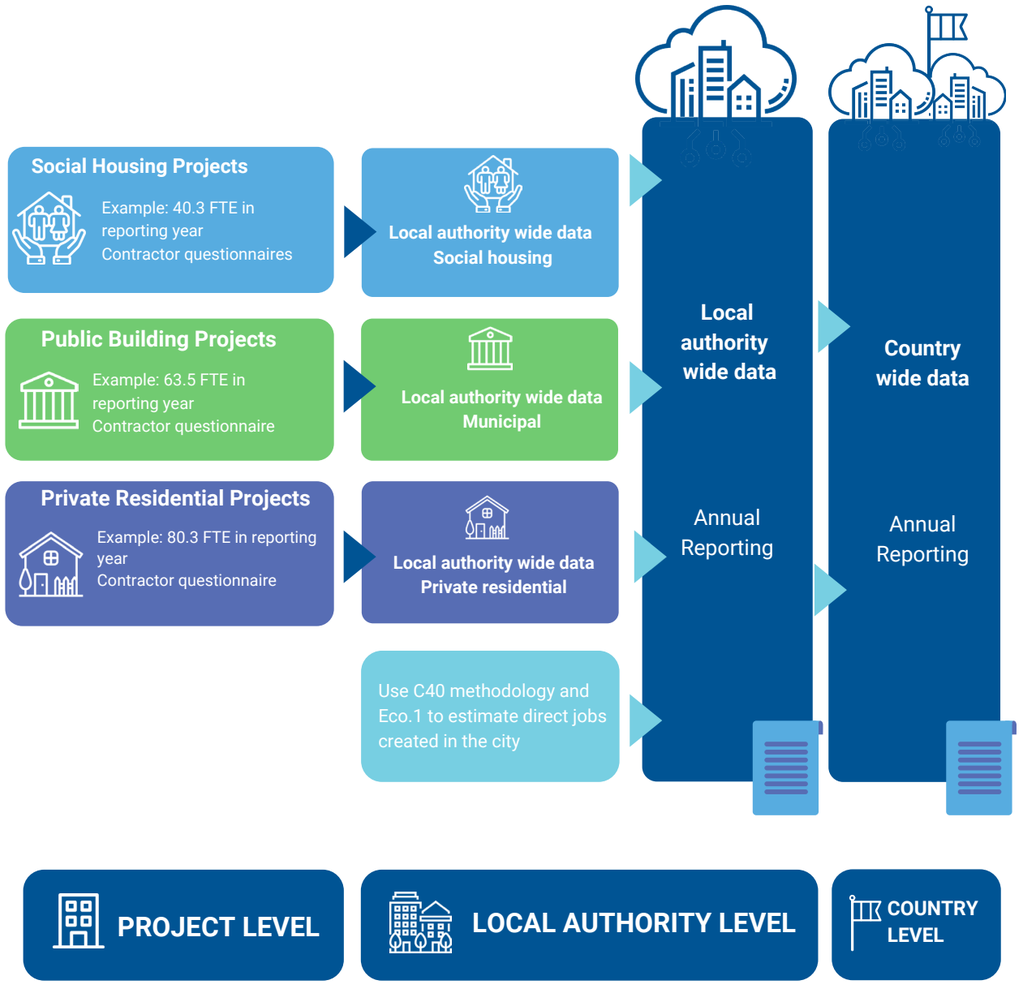
C40 have estimated that direct jobs proportion is approximately 33% (0.33 in above calculation)
This will allow a ocal authority to obtain an estimate range of the direct jobs created (between the lower and the upper band).

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.

DATA COLLECTION PATHWAY



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.

Eco.4: Upskilling in Energy Renovation

Main metric to be used at national or regional level
Sub-metric to be used at municipal level.

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 = ∑ building professionals and construction workers who have upskilled in energy renovation in a reporting period

Sub metric
Upskilling in energy renovation (local authority employees) = ∑ 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*.

Main metric
To assess the number of building professionals and construction workers taking part in energy renovation upskilling in a reporting period, the national authorities should liaise with professional bodies and training providers who provide the training courses previously identified, and then report on the number of participants receiving CPD certificates from these courses.

Sub metric
Local authorityy should record the number of construction workers and building professionals employed by local authority completing any of the energy renovation related courses previously identified.

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 = ∑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 = $\frac{\text{∑Savings from energy renovated residential buildings}}{\text{∑Units renovated}}$

With breakdown for social and private housing.

Non-Residential:
Average financial savings from energy renovations per m² = $\frac{\text{∑Savings from energy renovatednon-residential buildings}}{\text{∑Units renovated (m}^2\text{)}}$

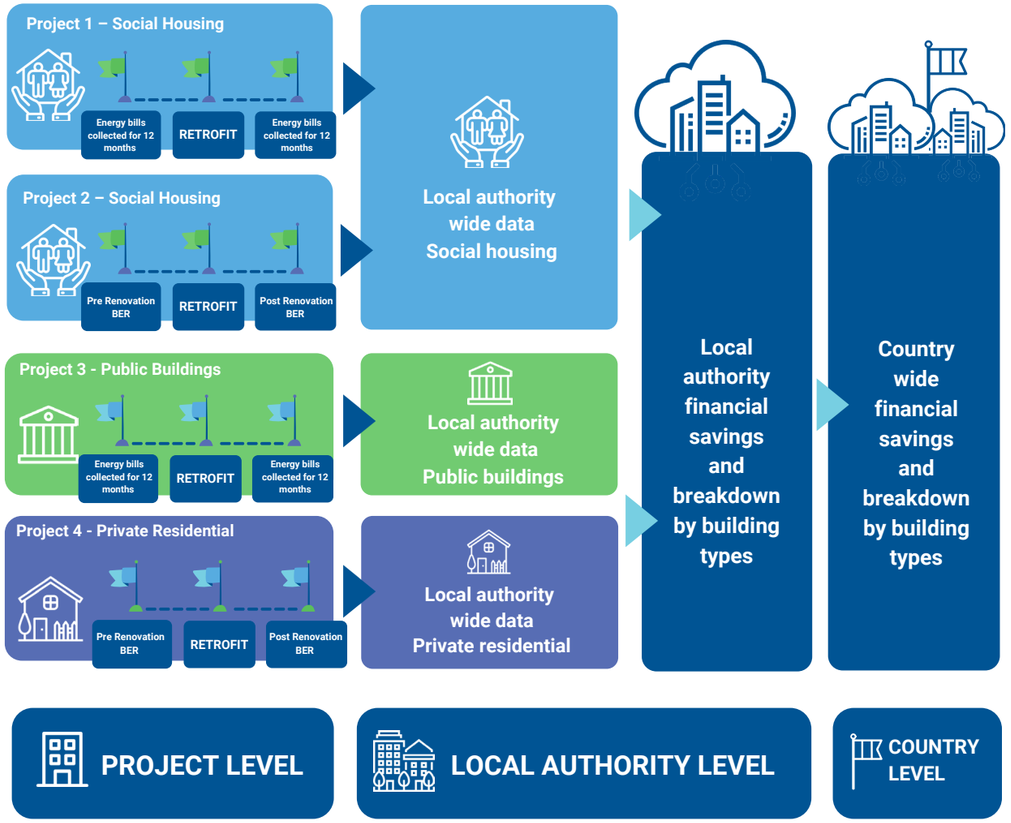
With breakdown for public and private buildings.

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.

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.

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:

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

This information can be used to verify that the actual savings are not skewed by extreme weather events which are more likely going forward.

Appendices

Appendix 1: Energy Efficiency Investment

TAX	VAT	Please state clearly if VAT is included or excluded from all stated costs	COMMENT

		To be included in energy renovation works	Likely to be included in energy renovation works	Unlikely to be included in energy renovation works	Not to be included in energy renovation works	COMMENT
ENERGY RENOVATION WORKS	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	Likely to be included in energy renovation works	Unlikely to be included in energy renovation works	Not to be included in energy renovation works	COMMENT
	Associated 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 accomadate heat pumps, repairs to flooring and skirting if required, making good of decoration			
	Maintenance Works			Planned Decoration		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.
				Roof Repair		
				Upgrade of Rainwater Goods		
				Repairs to Walls/Masonary		
				Groundworks for Damp Issues		
				Repairs to windows and Doors		
				Appliance Upgrade		
Construction Works	**Construction Works**				Kitchen Install	
					Bathroom Install	
					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		
4 Terrace properties	**Itemised Project Costs**	**Energy Renovation Works**
External insulation	72,000	72,000
New windows and doors	60,000	60,000
New heat pumps	60,000	60,000
Demand control ventilation	16,000	16,000
2 ground floor accessible bathrooms	36,000	
2 Ground floor accessible ramps	8,000	
1 new kitchen fit out	12,000	
Total Construction Costs	**264,000**	**208,000**
Renovation Percentage = Renovation Costs/Total Construction Costs		**79%**
Total Design Team Fees	60,000	
"Energy renovation Design Team Fees 60,000*.79"		47,273
Total Admin Costs (Source: Internal Timesheets and Accounting)	35,000	
"Energy renovation Admin Costs 35000*.79"		27,576
Total Project Costs	**359,000**	**282,848**

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 CO_2 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 TM52 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 Buidings 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 preared 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 form Electricity Bill- 11 digit Number):

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

Questionnaire Version 5, 14.09.21, developed by UKGBC (Adapated by Irish GBC)

CONTRACTOR/COUNCIL TO COMPLETE THIS SIDE

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.*

	WC	Bathroom 1	Bathroom 2	Bedroom 1	Bedroom 2	Bedroom 3	Bedroom 4	Living/Dining	Kitchen	Stair	Hall/Corridor	Other
I. Rooms												
II. Damp												
III. Ventilation												
IV. Door Undercuts												
V. Windows												

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 preared by UKGBC and Leeds City Council)

POST-RETROFIT OCCUPANT QUESTIONNAIRE

OCCUPANT TO COMPLETE THIS SIDE

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

What is your name? *first name, surename*

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 1year | more than 1year |

How many other people live with you? | under 18 yrs old: | over 18 years 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.*

							Is having control important to you?
Heating System: No Control	1	2	3	4	5	Full Control	heating: Y/N
Ventilation System: No Control	1	2	3	4	5	Full Control	ventilation: Y/N

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

Have you received a heating & ventilation guide since completion of the retofit / when you moved in. | yes | no |

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

							If uncomfortable, is it generally...?
Uncomfortably hot/cold	1	2	3	4	5	Comfortable	too hot / too cold
Variable	1	2	3	4	5	Stable	

Air in Winter

							If uncomfortable, is it generally...?
Uncomfortably dry/humid	1	2	3	4	5	Comfortable	too dry / too humid
Stuffy/smelly	1	2	3	4	5	Fresh/odourless	
Uncomfortably Draughty	1	2	3	4	5	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

							If uncomfortable, is it generally...?
Uncomfortably hot/cold	1	2	3	4	5	Comfortable	too hot / too cold
Variable	1	2	3	4	5	Stable	

Air in Summer

							If uncomfortable, is it generally...?
Uncomfortably dry/humid	1	2	3	4	5	Comfortable	too dry / too humid
Stuffy/smelly	1	2	3	4	5	Fresh/odourless	
Uncomfortably Draughty	1	2	3	4	5	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 (Adapated by Irish GBC)

Appendix 4:
Sample summary report from a reporting period

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

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

ENVIRONMENTAL

CO2 Emissions
1,260 ton yr **saved**
60% reduction

Energy Consumption
reduced from **150 kWh/m2.yr** to **80 kWh/m2.yr**

Renewable Energy
150,000 kWh/yr produced by PVs
on the 300 homes supplying 60% of the homes' energy needs

BER
Energy Efficiency Rating improved from average of **BER D2** **to average of** **BER B2**

SOCIAL

Indoor Air Quality
improved in **65%** of homes

Winter Thermal Comfort
improved in 100%
of homes with fewer draughts and warmer rooms

Summer Thermal Comfort
improved in **50%** of homes

ECONOMIC

Investment in Energy Renovationy
€7.5 m total project cost
€25,000 spent per home on average

Financial Savings
Energy Bills reduced by €400/yr to €900/yr per home on average
Income from PVs **€ 85/yr** per home on average

Jobs
60 FTE jobs
directly supported throughout the 18 month project

BUILD UPON² IGBC IRISH GREEN BUILDING COUNCIL

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

REGISTERED BUILDING PROFESSIONALS - BC(A)R CERTIFIERS	CONSTRUCTION PROFESSIONALS	CRAFT WORKERS	SPECIALISED WORKERS	GENERAL OPERATIVES	PROPERTY & BUILDING PROFESSIONALS
Registered architect - Chartered engineer - Chartered and registered building surveyor	Architectural technologist - Project manager - Site manager/supervisor - Building and Facilities manager- BER Assessor	impacting energy renovation: Electrician - Plumber - Bricklayer & Stone Layer - Carpenter & Joiner - Plasterer	Glazier, PV and Solar Installer, Biomass boiler Installer, Heat Pump Installer, External Insulation Installer etc.	General operatives & Craft workers with little impact on renovation projects: Groundworker, Stone Cutter and Stone Mason, Slater, Tiler, Painter and Decorator.	Valuers - Estate agents - Quantity surveyors - Contract manager
• Practice the principles of sustainability and of sustainable building design and detailing • Assess and manage risks associated with energy renovation (including hazardous materials and condensation issues) • Interpret building standards and regulations in relation to energy efficiency and quality (especially Part L, F and J) • Use energy modelling tools • Assess buildings for energy efficiency and quality retrofit • Diagnose and differentiate sources of damp and moisture • Cost retrofit and retrofit options • Connect the individual performance to a team performance • Communicate and transfer all this information clearly to members of the supply chain, building users and clients. • Collaborate with cross-trades	• Practice the principles of sustainability and of sustainable design, detailing and construction • Interpret building standards and regulations in relation to energy efficiency and quality (especially Part L, F and J) • Collaborate with cross-trades • Assess buildings for energy efficiency and quality retrofit (BER assessor only) • Communicate effectively on energy renovation with clients and other members of the construction chain. • Connect the individual performance to a team performance • Use energy modelling tools (Essential for all except contract manager)	• Interpret building standards and regulations in relation to energy efficiency and quality (especially Part L, F and J) • Collaborate with cross-trades • Communicate effectively on energy renovation with other members of the construction chain. • Connect the individual performance to a team performance	• Interpret building standards and regulations in relation to energy efficiency and quality (especially Part L, F and J) • Collaborate with cross-trades • Communicate effectively on energy renovation with other members of the construction chain.	• Communicate effectively on energy renovation with other members of the construction chain. • Collaborate with cross-trades	• Integrate energy efficiency considerations in valuations. • Communicate effectively on energy renovation with clients and other members of the construction chain.
• Basics of building physics and construction types, including traditional buildings • Building pathology (including wet and dry rot) • Energy use in existing buildings, energy reduction and energy production (including renewables) solutions, as well as of their interdependencies and effectiveness. • The value of energy renovation (including co-benefits) and the users' needs and motivations • Building regulations compliance software • Energy management solutions and post-retrofit building operation and maintenance. • Financing options • Sustainable materials and resource	• Basics of building physics and construction types, including traditional buildings • Basics of building pathology (including wet and dry rot) • Energy use in existing buildings and of the most common energy reduction and energy production (e.g. renewables) solutions, as well as their interdependencies and effectiveness. • The value of energy renovation (including co-benefits) and building users' needs. • Risks assessment and management in relation to energy renovation (including hazardous materials and condensation issues). • Sustainable materials and resources.	• The concept of sustainability and sustainable design • Basics of building physics and construction types, including traditional buildings • Basics of building pathology (including wet and dry rot) • 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. • The value of energy renovation (including co-benefits) and building users' needs. • Risks assessment and management in relation to energy renovation within their trade expertise (including hazardous materials and condensation issues).	• The concept of sustainability and sustainable design • Basics of building physics and construction types, including traditional buildings • Basics of building pathology (including wet and dry rot) • 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. • The value of energy renovation (including co-benefits) and building users' needs. • Risks assessment and management in relation to energy renovation within their trade expertise (including hazardous materials and condensation issues).	• The concept of sustainability and sustainable design • Basics of building physics and construction types, including traditional buildings • Building standards and regulations in relation to energy efficiency (NZEB) and quality (especially Part L, F and J).	• The cost of retrofit and retrofit options • The value of energy renovation (including co-benefits) and building users' needs.
	• Energy management solutions, and post-retrofit building operation and maintenance (Understand for facilities managers) • The cost of retrofit and retrofit options.	• Sustainable materials and resources. • The cost of retrofit and retrofit options • Energy management solutions, and post-retrofit building operation and maintenance	• Sustainable materials and resources. • The cost of retrofit and retrofit options • Energy management solutions, and post-retrofit building operation and maintenance •	• Basics of building pathology (including wet and dry rot) • Risks assessment and management in relation to energy renovation within their trade expertise (including hazardous materials and condensation issues). • 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. • Sustainable materials and resources • Most common retrofit and renewable solutions • The value of energy renovation (including co-benefits) and building users' needs. •	• The concept of sustainability • Building regulations in relation to energy efficiency and quality (especially Part L, F and J) • Energy use in existing buildings, energy management solutions and post-retrofit building operation and maitenance • Sustainable materials and resources • Most common retrofit and renewable solutions • Building physics, building pathologies and construction types, including traditional buildings. • The risks associated with energy renovation and how to manage them (including hazardous materials and condensation issues) • Climate change targets and their impacts on the real estate market.

- Must be able to
- Must understand
- Must know
- Must be aware of

This document was developed by the Irish Green Building Council and Limerick Institute of Technology as part of the SEAI funded BUNRS project. Read more at www.igbc.ie.

BUILD UPON²

IGBC

IRISH GREEN BUILDING COUNCIL

Platinum Members

AIB · bam · Bord Gáis Energy – Imagine a better way · Google · Lioncor · seai – Sustainable Energy Authority of Ireland

Gold Members

AERECO · ballymore. · bre · CAIRN · Chadwicks Group · etex – inspiring ways of living · Hammerson · I-RES · Paul – John Paul Construction · KSN · Lidl · Saint-Gobain · Sisk – Builders Contractors · VELUX

Silver Members

CBRE · Dulux · electric Ireland – Smarter Living · Fine Grain Property · GlenDimplex Ireland · hibernia REIT · HWBC · IPUT Real Estate Dublin · Kingscourt Brick · Kingspan · Mannok · Marlet · Gníomhaireacht Bainistíochta an Chisteáin Náisiúnta – National Treasury Management Agency · Reynaers Aluminium · Xtratherm – More than insulation

---

Email marion@igbc.ie

Web www.igbc.ie

Twitter @IrishGBC #BUILDUPON

WORLD GREEN BUILDING COUNCIL