CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

Implementation of the EPBD Ireland

Status in 2020

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NATIONAL WEBSITES
www.seai.ie, www.housing.gov.ie, www.dccae.ie, www.cso.ie/en/statistics/climateandenergy

1. Introduction

In general, Building Regulations in Ireland apply to the construction of new buildings, to major renovations, and to extensions or material alterations to existing buildings.

The 2019 Building Regulations for dwellings (residential buildings)[1] set minimum energy performance requirements for dwellings and their application to new dwellings to achieve NZEB standard. NZEB is equivalent to a 25% improvement in energy performance when compared to the 2011 Building Regulations, including a mandatory Renewable Energy Ratio of 20% for new dwellings.

Major renovation is activated where the work affects a surface area greater than 25% of the existing dwelling and requires the dwelling to reach the cost-optimal level of 125 kWh/m^2.year or lower (B2 energy rating) or alternatively an upgrade of the ceiling insulation and the heating system.

The 2017 Building Regulations for Buildings other than Dwellings (non-residential buildings)[2] are equivalent to a 60% improvement in energy performance when compared to the 2008 Building Regulations. RES must provide 20% of the primary energy use, however there is flexibility where the building is more energy efficient than the minimum required in the Building Regulations. This typically corresponds to an A3 energy rating.

For existing buildings that undergo major renovation, the Regulation requires that the building is brought up to cost-optimal level, which is defined in the building regulations as an upgrade of the heating, cooling and ventilation systems as well as lighting where the systems are more than 15 years old.

2. Current Status of Implementation of the EPBD

2.I. Energy performance requirements: NEW BUILDINGS

The EPBD energy performance requirements for new and existing buildings are transposed into Irish law through the *EC Energy Performance of Buildings Regulations 2006 – 2019*. *Technical Guidance Document Part L* provides detailed guidance for designers, specifiers and other building professionals on compliance with the requirements. The *Dwelling Energy Assessment Procedure (DEAP)* and *Non-dwelling Energy Assessment Procedure (NEAP)* methodologies and software calculate primary energy use and associated CO_2 emissions for space heating and (where applicable) cooling, ventilation, associated motive power and lighting, under standard conditions of use.

2.I.i. Progress and current status of new buildings (regulation overall performance)

Overall maximum permissible energy performance and CO_2 emissions requirements were introduced for residential buildings in 2005, and for non-residential and public buildings in 2008.

The *Energy Performance Coefficient* and *Carbon Performance Coefficient* are defined as the ratios of calculated primary energy consumption and corresponding CO_2 emissions for the proposed building relative to a reference building.

The *Maximum Permitted Energy Performance Coefficient* and *Maximum Permitted Carbon Performance Coefficient* for new residential buildings are given in Table 1.

Year	2005	2008	2011	2019
Maximum Permitted Energy Performance Coefficient	1.0	0.6	0.4	0.3
Maximum Permitted Carbon Performance Coefficient	1.0	0.69	0.46	0.35

Table 1: Maximum Permitted Energy Performance Coefficient and Maximum Permitted Carbon Performance Coefficient for new residential buildings.

Energy from RES is mandatory for new residential buildings since 2008. In 2008 and 2011, the minimum requirement was 10 kWh/m^2.year thermal energy or 4 kWh/m^2.year electrical energy. In 2019, the RES requirement was changed from 10 kWh/m^2.year to a Renewable Energy Ratio (RER) of 0.2 or 20%. A RER of 0.2 represents 20% of the primary energy from RES technologies to total primary energy as defined and calculated in DEAP.

The *Maximum Permitted Energy Performance Coefficient (MPEPC)* and *Maximum Permitted Carbon Performance Coefficient (MPCPC)* for new non-residential buildings are given in Table 2.

Year	2008	2017
Maximum Permitted Energy Performance Coefficient	1.0	1.0
Maximum Permitted Carbon Performance Coefficient	1.0	1.0

Table 2: Maximum Permitted Energy Performance Coefficient and Maximum Permitted Carbon Performance Coefficient for new non-residential buildings.

For all new non-residential buildings, the 2017 NZEB Regulations require 60% reduction in the calculated energy use compared to the 2008 Regulations. This means an improved energy performance for the fabric, services and lighting specifications. The comparison reference and notional buildings were updated in 2017 thus the maximum coefficient values remain at 1.0. In 2017, a mandatory requirement for RES was introduced. RES must in general provide 20% of the primary energy use, however there is flexibility where the building is more energy efficient than the regulations. This typically corresponds to an A3 energy rating.

2.I.ii. Format of national transposition and implementation of existing regulations

For all new non-residential buildings, the 2017 NZEB Regulations require 60% reduction in the calculated energy use compared to the 2008 Regulations. This means an improved energy performance for the fabric, services and lighting specifications. The comparison reference and notional buildings were updated in 2017 thus the maximum coefficient values remain at 1.0. In 2017, a mandatory requirement for RES was introduced. RES must in general provide 20% of the primary energy use, however there is flexibility where the building is more energy efficient than the regulations. This typically corresponds to an A3 energy rating.

The Building Control section in each local authority is responsible for administrating the Building Regulations. SEAI is the issuing authority for the administration of the Building Energy Rating (BER) or EPC scheme. The DEAP and NEAP software, published by SEAI, are compliant with EN 13790 and serve the dual purpose of demonstrating compliance with Part L (Conservation of Fuel and Energy) of the Building Regulations and generating the BER or EPC and advisory report. Building control officers in local authorities are empowered to carry out inspections and, where necessary, undertake enforcement action in order to ensure compliance with the requirement to have an EPC. Penalties include a fine of up to 5,000 €, or up to three months in prison, or both. Enforcement is complemented by a "rights based" approach, focused on creating a compliance culture.

In *DEAP,* the electricity primary energy and CO_2 factors are calculated using forecasts from *SEAI's Energy Modelling unit*.

From	To	Electricity Primary Energy Factor	Electricity CO_2 Factor (kg/kWh)
14th June 2017	Present	2.08	0.409
7th January 2016	13th June 2017	2.19	0.473
17th December 2014	6th January 2016	2.37	0.522
11th December 2013	16th December 2014	2.45	0.555
11th December 2012	10th December 2013	2.42	0.524
1st December 2011	10th December 2012	2.58	0.556
Pre 30th November 2011	30th November 2011	2.7	0.643

Table 3: Electricity primary energy and CO_2 factors used in DEAP.

For non-residential buildings, the *NEAP* electricity primary energy and CO_2 factors are given in Table 4.

From	To	Electricity Primary Energy Factor	Electricity CO_2 Factor (kg/kWh)
November 2018	Present	2.08	0.409
2008	October 2018	2.7	0.643

Table 4: Electricity primary energy and CO_2 factors used in NEAP.

2.I.iii. Action plan for progression to NZEB for new buildings

The *Building Regulations* for new residential buildings were last updated in 2019. Approximately 6% of all new and existing residential buildings achieve the NZEB standard, as shown in Table 5. Ninety-seven percent (97%) of the 50,706 new homes built in the 2015-2020 period may be considered NZEB.

% of row

Period of Construction	Energy Rating													
	A	B1	B2	B3	C1	C2	C3	D1	D2	E1	E2	F	G	Total
1700-1899	0	0	1	2	2	3	4	7	10	9	10	14	37	22,937
1900-1929	0	0	1	2	3	3	4	7	10	9	10	14	37	49,838
1930-1949	0	0	1	3	4	6	7	9	12	9	10	13	25	43,145
1950-1966	1	1	1	3	5	6	8	11	14	11	11	12	16	66,897
1967-1977	0	0	1	3	6	9	11	15	17	11	9	9	8	85,815
1978-1982	0	0	1	4	9	13	15	18	18	9	6	4	3	55,904
1983-1993	0	0	1	4	9	13	16	19	17	8	5	4	2	93,444
1994-1999	0	0	1	5	11	16	19	20	14	6	4	3	1	101,835
2000-2004	0	0	2	8	18	22	20	13	8	4	2	1	0	160,206
2005-2009	1	3	10	22	24	18	9	6	4	2	1	1	0	149,411
2010-2014	35	28	17	10	4	2	1	1	1	0	0	0	0	11,266
2015-2020	97	2	1	0	0	0	0	0	0	0	0	0	0	50,706
Total	6	1	3	7	12	13	12	12	11	6	5	5	7	891,404

Table 5: Number of residential buildings at NZEB standard.

The *Building Regulations* for new buildings other than dwellings (non-residential) were updated in 2017. Approximately 1% of all new and existing non-residential buildings achieve the NZEB standard, as shown in Table 6. Twenty-one percent (21%) of the 1,623 new non-residential buildings built in the 2015-2020 period may be considered NZEB. The Building Regulations for residential buildings were updated in 2005, 2008, 2011 and 2019. RES is mandatory for residential buildings from 2008 onwards. The Building Regulations for non-residential buildings were only updated in 2008 and 2017. This accounts for the large difference in NZEB buildings between residential and non-residential buildings.

% of row

Period of Construction	Energy Rating													Total
	A	B1	B2	B3	C1	C2	C3	D1	D2	E1	E2	F	G	
1900-1929	0	0	1	3	8	9	10	16	13	9	7	10	12	6,720
1930-1949	0	0	2	4	10	12	9	15	11	8	7	8	13	1,607
1950-1966	0	1	2	5	10	10	10	13	12	9	7	8	14	3,064
1967-1977	0	1	3	5	10	12	10	13	11	8	6	8	13	3,323
1978-1982	0	2	2	5	10	11	11	13	10	9	6	9	13	2,788
1983-1993	0	1	3	7	13	12	9	13	10	7	6	7	12	5,134
1994-1999	0	1	4	9	16	15	11	14	9	6	4	5	6	5,146
2000-2004	0	1	5	10	16	15	12	11	8	5	3	4	8	7,916
2005-2009	1	2	7	11	14	13	9	9	7	4	3	5	16	14,537
2010-2014	8	9	10	11	11	9	8	10	5	3	4	4	8	2,114
2015-2020	21	15	11	9	7	6	5	5	4	2	2	2	11	1,623
Total	1	2	5	8	13	12	10	12	9	6	5	6	12	53,972

Table 6: Number of non-residential buildings at NZEB standard.

The *Building Regulations* for new buildings other than dwellings (non-residential) were updated in 2005, 2008 and 2017. From 2008, the Non-domestic Energy Assessment Procedure (NEAP) for energy and CO_2 calculations is required. The first significant change, including mandatory RES, in Building Regulations for non-residential buildings since 2005 came in 2017 (12 years later) while there were 3 incremental changes of regulations for residential buildings (in 2008, 2011 and 2019) in the same period.

2.I.iv. Requirements for building components for new buildings

The requirements for building components in new buildings are described in the Technical Guidance Document Part L accompanying the Building Regulations. There is a separate Technical Guidance Document for dwellings (residential) and buildings other than dwellings (non-residential). Where a building contains dwellings, e.g. apartments, Technical Guidance Document Part L should be used for the individual dwellings. The Technical Guidance Document Part L for Buildings other than Dwellings should be used for those parts of the building which are not a dwelling such as common areas and, in the case of mixed-use developments, the commercial or retail space.

The overall energy, carbon and RES energy performance levels specified in the *Building Regulations* and *Technical Guidance Documents Part L* are in the nature of backstop minimum performance levels so as to ensure reasonable levels of performance for all factors affecting energy use, irrespective of the measures incorporated to achieve compliance.

Meeting the specified individual minimum performance levels will not necessarily mean that the overall level specified for primary energy consumption and related CO_2 emissions will be met. One or more of the following performance levels specified, will need to be exceeded to achieve this: use of RES, fabric insulation, airtightness, boiler efficiency, building services controls, insulation of pipes, ducts and vessels, and mechanical ventilation systems.

Maximum elemental U-value (W/m²K)[1, 2]		
Column 1	**Column 2**	**Column 3**
Fabric Elements	**Area-weighted Average Elemental U-value (Um)**	**Individual element or section of elementAverage Elemental U-value**
Roofs Pitched roof - Insulation at ceiling - Insulation on slope Flat roof	 0.16 0.16 0.20	 0.3
Walls	0.18	0.6
Ground floors[3]	0.18	0.6
Other exposed floors	0.18	0.6
External doors, windows and rooflights	1.4[4,5]	3.0

Notes:

1. *The U-value includes the effect of unheated voids or other spaces.*
2. *For alternative method of showing compliance see paragraph 1.3.2.3.*
3. *For insulation of ground floors and exposed floors incorporating underfloor heating, see paragraph 1.3.2.2.*
4. *Windows, doors and rooflights should have a maximum U-value of 1.4 W/m²K.*
5. *The NSAI Window Energy Performance Scheme (WEPS) provides a rating for windows combining heat loss and solar transmittance. The solar transmittance value g_{perp} measures the solar energy through the window.*

Table 7: Maximum Element U-Values (W/m²K) for residential buildings 2019.

Minimum energy efficiency standards for boiler systems[1]		
	Gas, oil and biomass-fired boilers	**Seasonal efficiency (gross)[2]**
Natural Gas	Single or Multiple boiler system > 70kW and <=400kW output	93%
Natural Gas	Single or Multiple boiler system <= 70kW and >400kW output	86%
LPG	Single or Multiple boiler system > 70kW and <=400kW output	93%
LPG	Single or Multiple boiler system <= 70kW and >400kW output	86%
Oil	Single or Multiple boiler system > 70kW and <=400kW output	93%
Oil	Single or Multiple boiler system <= 70kW and >400kW output	86%
Biomass independent, automatic, pellet/woodchip	Single or Multiple boiler system <= 20kW output	75%
Biomass independent, automatic, pellet/woodchip	Single or Multiple boiler system > 20kW output	77%

Notes:

1. *EU Regulations implementing the Eco-design Directive set minimum standards for the efficiency of energy using products that can be placed on the market. Products should also comply with these standards as they come into effect. Current regulations are listed at https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficient-products*
2. *Efficiency is the heat output divided by the calorific output of the fuel. The net calorific value of a fuel excludes the latent heat of water vapour in the exhaust, and so is lower than the gross calorific value. Efficiency test results and the European standards normally use net calorific values. The calculation methodology for the seasonal efficiency (gross) can be found in the NEAP guidance.*

Table 8: Minimum energy efficiency standards for boiler systems in non-residential buildings, 2017.

2.I.v. Enforcement systems new buildings

Table 8: Permitted Variation in combined areas and average U-Values of external doors, windows and rooflights in residential buildings.

The Building Regulations apply equally to all Local Authorities. There are 31 Local Authorities in Ireland designated as Building Control Authorities who monitor compliance with Building Regulations in their area having regard to:

- the minimum requirements for the design and construction of buildings as set out in the Building Regulations;
- detailed Technical Guidance Documents showing how these requirements can be achieved in practice;
- procedures set out in the Building Control Regulations for demonstrating compliance in respect of an individual building or works.

Building Control Authorities have strong powers of inspection and enforcement under the Acts. Responsibility for compliance rests with the owner of the proposed building or works, and with any builder or designer engaged by the owner.

The Sustainable Energy Authority of Ireland (SEAI) is responsible for the administration of the building energy rating scheme including the quality checks for published EPCs. Enforcement to ensure that a valid EPC is in place on construction, sale or rental lies with the Local Authorities.

2.II. Energy performance requirements: EXISTING BUILDINGS

2.II.i. Progress and current status of existing buildings (regulation overall performance)

In general, *Building Regulations* apply to the construction of new buildings and to extensions and material alterations to existing buildings. In addition, certain parts of the *Regulations*, including *Part L*, apply to existing buildings where a material change of use takes place. Guidance is given on insulation levels to be achieved by the plane fabric elements, thermal bridging and limitation of air permeability. The major renovation requirement was added to the *Building Regulations* for residential buildings in 2019. The cost-optimal works activated by major renovation for dwellings (residential) is shown in Table 9.

Cost Optimal Works activated by Major Renovation		
Major renovation > 25% surface area[1,2,3,5]	Cost-optimal level as calculated in DEAP (Paragraph 2.3.3 a.)	Works to bring the dwelling to a cost-optimal level in so far as they are technically, economically and functionally feasible (Paragraph 2.3.3 b.)
External walls renovation External walls and windows renovation External walls and roof renovation External walls and floor renovation	The cost-optimal performance level to be achieved is 125 kWh/m^2.year.	Upgrade insulation at ceiling level where: U-values are greater than in Table 11: Maximum elemental U-value for material alterations or material change of use for residential buildings, 2019 & Oil or gas boiler replacement[6] & controls upgrade where the oil or gas boiler is more than 15 years old and efficiency is less than 86% & Replacement of electric storage heating[7] systems where more than 15 years old and with heat retention not less than 45% measured according to IS EN 60531.
New Extension affecting more than 25% of the surface area of the existing dwelling's envelope (see 2.3.6)	The cost-optimal performance level to be achieved is 125 kWh/m^2.year	Upgrade insulation at ceiling level where: U-values are greater than in Table 11: Maximum elemental U-value for material alterations or material change of use for residential buildings, 2019 & Oil or gas boiler replacement[6] & controls upgrade where the oil or gas boiler is more than 15 years old and efficiency is less than 86% & Replacement of electric storage heating[7] systems where more than 15 years old and with heat retention not less than 45% measured according to IS EN 60531 & Upgrade insulation at wall level where U-values are greater than in Table 11: Maximum elemental U-value for material alterations or material change of use for residential buildings, 2019
Windows renovation Roof renovation Floor renovation Roof and windows renovation Windows and floor renovation	Not applicable[4]	Not applicable[4]

Table 9: Cost-optimal works activated by a major renovation for residential buildings, 2019.

For buildings undergoing major renovation, the *2017 Building Regulations for non-residential buildings* require that the building is upgraded to the cost-optimal level of energy performance in so far as this is technically, functionally and economically feasible. Upgrading the heating, cooling, ventilation and lighting systems are normally considered to be cost-optimal and will typically be economically feasible when more than 25% of the surface area of a building is being upgraded. As an alternative, the whole building performance achieves the performance levels specified in Table 10 where technically, functionally and economically feasible this can be considered the cost-optimal level of performance.

Whole-building cost-optimal level	
Building type	**Major renovation – cost-optimal performance kWh/m^2.year primary energy**
Air-conditioned retail buildings	338
Naturally ventilated offices and other buildings	124
Air-conditioned offices	180
Air-conditioned hotels	342
Schools	60
Other air-conditioned buildings	338
Other naturally ventilated buildings	124

Table 10: Whole building cost-optimal level of performance for major renovations for non-residential buildings, 2017.

2.II.ii. Regulation on individual parts, distinct from whole building performance

For existing dwellings (residential) acceptable levels of thermal insulation for each of the plane elements of the building are specified in terms of average area-weighted U-value (Um) for material alterations and material changes of use, as specified in column 2, Table 11. These values can be relaxed for individual elements or parts of elements where considered necessary for design or construction reasons. Maximum acceptable values for such elements or parts of elements are specified in column 3, Table 11. Where this relaxation is availed of, the average area-weighted values given in Table 11 continue to apply and compensatory insulation measures may be necessary for other elements or parts of elements of that type to ensure that these are met. Where there is underfloor heating, the maximum floor U-value should be 0.15 W/m^2.K.

Maximum elemental U-value (W/m²K)[1, 2] for material alterations or material change of use		
Column 1 **Fabric elements**	**Column 2** **Area-weighted** **Average elemental U-value (Um)**	**Column 3** **Individual element or section of element** **Average elemental U-value**
Roofs Pitched roof - Insulation at ceiling - Insulation on slope Flat roof	 0.16 0.25 0.25	 0.35
Walls Cavity walls[4] Other walls	 0.55 0.35	 0.6
Ground floors[3]	0.45[5]	-
Other exposed floors[3]	0.25	0.6
External doors, windows and rooflights and curtain walling	1.40[4]	3.0

Notes:

1. *The U-value includes the effect of unheated voids or other spaces.*
2. *For material alterations, the U-values relate to the new works.*
3. *For insulation of ground floors and exposed floors incorporating underfloor heating, see paragraph 2.1.2.2.*
4. *This only applies in the case of a wall suitable for the installation of cavity insulation. Where this is not the case it should be treated as for "other walls".*
5. *This U-value only applies where floors are being replaced.*

Table 11: Maximum elemental U-value for material alterations or material change of use for residential buildings, 2019.

2.II.iii. Initiatives/plans to improve the existing building stock

The National Energy & Climate Plan 2021-2030[3] defines a roadmap to a net zero carbon energy systems objective by 2050. In terms of energy efficiency, a number of actions across various sectors will contribute to achievement of Ireland's national energy efficiency contribution. Further improving energy efficiency is central to our transition to a low carbon economy. Using less energy in a more flexible way is the most cost-effective and accessible way we can tackle climate disruption. Ireland is committed to applying the energy efficiency first principle to all proposals, decisions and investments flowing from this Plan. This Plan commits to a wide range of ambitious and far-reaching policies and measures aimed at improving our energy efficiency.

- All new dwellings are built to NZEB standard from 1 November 2019.
- Setting stricter requirements for new buildings and substantial refurbishments. Building a supply chain and a model for aggregation where home retrofits are grouped together.
- 500,000 homes retrofitted to a BER of B2 or cost-optimal equivalent by 2030.
- Public sector buildings to have a BER of B by 2030.
- One third of commercial (including mixed use) buildings to have a BER of B (or carbon equivalent gains) by 2030.
- 600,000 heat pumps installed over the period 2021-2030.
- Effectively ban the installation of oil boilers from 2022 and the installation of gas boilers from 2025 in all new dwellings through the introduction of new regulatory standards for home heating

systems. Progressively phase out oil and gas boilers in existing dwellings through a combination of incentives, information and regulatory measures.

- Ensure that a suitable policy framework is in place to support district heating.
- A 50% energy efficiency target for the Public Sector by 2030.
- Scale-up and improve the Sustainable Energy Communities and Better Energy Communities (BEC) programme and enlist a wider range of organisations to anchor its collective approach.
- Develop the necessary supply chain, including working with Regional Skills Fora to train skilled workers.

2.II.iv. Long Term Renovation Strategies, status

Ireland's next Long Term Renovation Strategy (LTRS) will outline the indicative milestones for 2030, 2040 and 2050, the domestically established measurable progress indicators, an evidence-based estimate of expected energy savings and wider benefits, and their contributions to the energy efficiency targets. The current LTRS is available on the Department's website[4]. The next LTRS will further reflect the commitments in the National Development Plan (NDP) and the actions set out in the Irish Government's Climate Action Plan.

For 2030 these include:

- 500,000 homes retrofitted to a BER of B2 (100 – 125 kWh/m^2.year primary energy) or cost-optimal by 2030;
- public sector buildings to have a BER of B (or carbon equivalent) by 2030;
- one third of all commercial buildings to have a BER of B (or carbon equivalent gains) by 2030.

For 2050 these include:

- In 2014, Ireland adopted a National Policy Position for an 80% reduction in CO_2eq emissions by 2050 compared to 1990 levels for the electricity generation, built environment, and transport sectors.
- The Climate Action plan states the Government's ambition to support the adoption of a net zero target by 2050 at EU level.

2.II.v. Financial instruments and incentives for existing buildings

Ireland has introduced multiple financial incentives including:

- Better Energy Programme – grants are available for energy efficiency upgrades and RES in homes and community buildings.
- ACA - The Accelerated Capital Allowance (ACA) is a tax incentive operated by Revenue which encourages businesses to upgrade to the most energy efficiency equipment.
- Local Authorities will upgrade their housing stock under Phase 2 of the social housing retrofit programme to bring dwellings that are more than 40 years old (30% of the social housing stock) to a B2 equivalent BER.

- The Public Sector Energy Efficiency Strategy and its associated support programme are designed to assist public bodies in achieving the national energy efficiency targets of 33% by 2020, and 50% by 2030.

- Scale-up and improve the Sustainable Energy Communities and Better Energy Communities programme and enlist a wider range of organisations to anchor its collective approach. This will be done through establishing new partnerships, creating more visibility within communities, and attracting matching finance.

- Develop the necessary supply chain, including working with Regional Skills Fora to train skilled workers.

- Develop a smart finance initiative to provide a competitive funding offer with State support. A guarantee-based product will offer both a degree of risk-sharing to lenders, and an additional leverage effect, which means that the funding is used in a more efficient way.

- Expand salary incentive schemes within existing SEAI programmes, including setting up public and private sector pioneer programmes for these models and consider other 'easy pay' methods.

2.II.vi. Information campaigns / complementary policies

Through the support of SEAI, communities are improving the energy efficiency of shared community buildings, and businesses are becoming more competitive through reduced energy costs. In addition, homes are being upgraded making them more comfortable and helping alleviate the effects of energy poverty. SEAI delivers free energy efficiency upgrades to homeowners who receive certain welfare payments. In 2019, SEAI offered grant support to 57 community energy projects to a value of over €60 million. This helped support the upgrade of over 650 homes and 450 community buildings and businesses right across Ireland.

Figure 1 Sustainable Energy Communities.

A diverse selection of organisations working together, such as clubs and other sports facilities, local authorities, retail outlets, factories, community centres, charities, hotels, public sector facilities and schools participate in the projects. By bringing together groups of buildings under the same retrofit project, community-wide energy improvements can be achieved more efficiently and cost effectively than might otherwise be possible. Innovative and pioneering partnerships between sectors are encouraged. This might include collaborations between public and private sectors, residential and non-residential sectors, commercial and not-for-profit organisations, or financing entities and energy suppliers. Projects that are part of a larger energy efficiency project or that engage with other SEAI programmes are welcome. Participant buildings are required to achieve a B2 BER or better after energy upgrade.

2.III. Energy performance certificate requirements

SEAI as the issuing authority is responsible for the administration of the EPC scheme. The EPC is on the list of documents checked by the legal representatives when a building sale or rental is completed. A legal representative is not mandatory, particularly for residential buildings, when a building or building unit is offered for rent.

The total number of *EPCs* for residential buildings is given in Figure 2. In a multi-unit residential building each unit has a unique EPC. In 2019, over 91,500 residential buildings or building units received an EPC.

DOMESTIC BERs BY GRADE (On Public Register and Not Expired - Current)

Energy Rating	Quantity
A1	344
A2	23,765
A3	44,234
B1	9,824
B2	21,384
B3	57,565
C1	93,596
C2	104,613
C3	99,146
D1	96,608
D2	82,751
E1	47,940
E2	37,717
F	38,834
G	55,246
Total	**813,567**

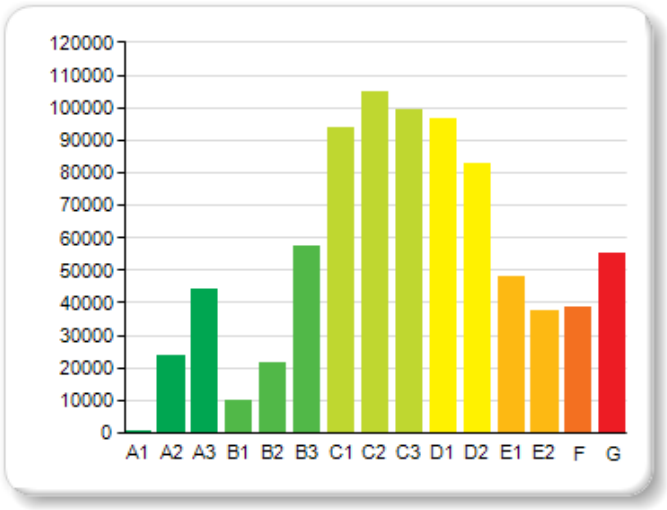

Figure 2. EPCs for residential buildings.

The total number of *EPCs* for non-residential buildings is given in Figure 3. In 2019, 4,175 non-residential buildings or building units received an EPC.

NON-DOMESTIC BERs BY GRADE (On Public Register and Not Expired - Current)

Energy Rating	Quantity
A1	16
A2	111
A3	745
B1	1,163
B2	2,625
B3	4,523
C1	7,280
C2	7,099
C3	5,797
D1	7,253
D2	5,531
E1	3,785
E2	2,925
F	3,934
G	7,470
Total	**60,257**

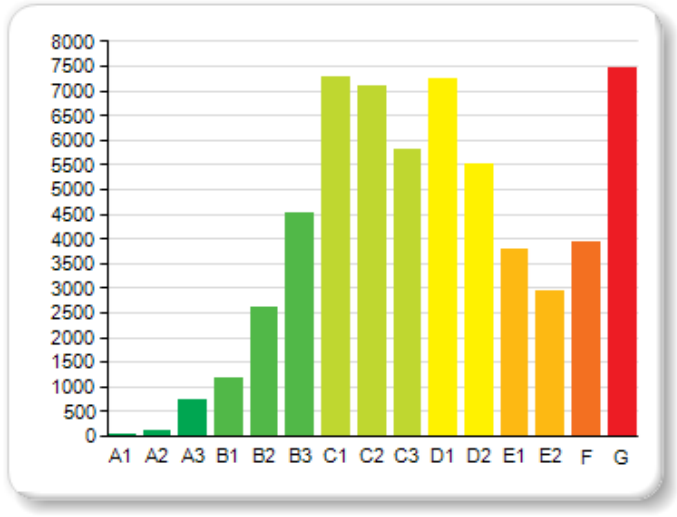

Figure 3. EPCs for non-residential buildings.

2.III.i Progress and current status on EPCs at sale or rental of buildings

Residential buildings constructed in the period 2015-2020 were considerably more energy efficient than those built in earlier periods, with 97% given an "A" rating compared with 35% in 2010-2014 and 1% in 2005-2009. There are 1,623 EPCs for non-residential buildings constructed between 2015 and 2020. Over one fifth (21%) of these buildings received an "A" rating compared with 8% of non-residential buildings constructed during 2010 to 2014[5].

2.III.ii. Quality Assessment of EPCs

The selection of EPCs for audit is carried out on both a targeted and a random basis with due consideration for risks associated with the EPC assessment processes. *SEAI* randomly selects a statistically significant percentage of all the EPCs issued annually and subjects those certificates to verification. Routine follow up audits identify if findings from previous audits have been adequately resolved. In addition, *SEA*I may, under its *Quality Assurance System and Disciplinary Procedures*, require EPC Assessors to participate in mentoring visits arranged by its auditors to facilitate further training.

SEAI publishes a detailed *Code of Practice and Quality Assurance and Disciplinary Procedure*. The impact of errors is sized to determine the audit outcome: compliance, severity 3, severity 2 and severity 1. Findings of non-compliance may lead to the accumulation of penalty points and/or revocation of the EPC data file(s) as follows:

Severity of non-compliance	Penalty points	Revocation of EPC
Compliance	0	No
Severity 3	1	No
Severity 3 (Advisory)	0	No
Severity 2	2	Yes
Severity 2 (Advisory)	0	Yes
Severity 1	3	Yes
Severity 1 (Advisory)	0	Yes

Table 12: Classification system for audit findings of non-compliance.

Suspension or termination of registration of an EPC assessor may result where 10 penalty points or more are accumulated within the previous 2-year period.

2.III.iii. Progress and current status of EPCs on public and large buildings visited by the public

In Ireland, all large buildings (those with a total useful floor area over 500 m^2 and, since July 2015, over 250 m^2) that are frequently visited by the public should have an EPC on display. This requirement applies irrespective of whether the building is occupied by a public authority.

The *Building Control section* in each authority is responsible for monitoring and enforcing the requirement to display EPCs in public buildings and large buildings often visited by the public. The number of EPCs published for display in 2019 was 495.

2.III.iv. Implementation of mandatory advertising requirement – status

SEAI published advertisement guidelines[6] which can be summarised as follows:

- A person offering a property for sale or rent on or after 9th January 2013, or their agent, shall ensure that the energy performance indicator of the current EPC for the building is stated in any advertisements, where such advertisements are taken relating to the sale or letting of that building.
- Prospective buyers and renters will be shown the EPC rating (Alphanumeric value) along with other prescribed content (dependent on the particular medium) in a prominent location in each specific advertisement.
- Where images of the property are used, then the presentation of the alphanumeric value will be by way of *the prescribed EPC Alphanumeric Rating Motif for the particular property rating.*
- The *EPC Alphanumeric Rating Motif* artwork files will be made available in electronic format from the *SEAI* website or on request to info@ber.seai.ie.

These requirements apply to advertisements, meaning a public announcement in newspaper, magazine, brochure, leaflet, advertising notice, vehicle, radio, television, internet (including apps and social media) and direct mail.

2.IV. Smart buildings and building systems

2.IV.i. Status and plans on smart buildings

The Smart Readiness Indicator (SRI) for buildings will allow for rating the smart readiness of buildings, i.e. the capability of buildings (or building units) to adapt their operation to the needs of the occupant, also optimising energy efficiency and overall performance, and to adapt their operation in reaction to signals from the grid (energy flexibility). The SRI should raise awareness amongst building owners and occupants of the value behind building automation and electronic monitoring of technical building systems and should give confidence to occupants about the actual savings of those new enhanced functionalities. The roll out of intelligent metering through the National Smart Metering Programme described in 2.IV.iv. is an important step in enabling smart buildings and the adoption of the SRI. Potential testing of the SRI in Ireland will be considered in 2021.

2.IV. ii. Regulation of system performance

For new residential buildings or dwellings, the nearly zero energy performance requirements are met by providing and commissioning energy efficient space and water heating systems with efficient heat sources and effective controls, providing that all oil and gas fired boilers shall meet a minimum seasonal efficiency of 90%, and providing to the dwelling owner sufficient information about the building, the fixed building services, controls and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable. Guidance is given on heat generator efficiency, space heating and hot water supply system controls, and insulation of hot water storage vessels, pipes and ducts. The seasonal efficiency is described in the following document: https://www.seai.ie/resources/publications/HARP_Gas_and_Oil_Boiler_Database_Submission_Notes.doc. Non-residential buildings also require limiting the heat gains by chilled water and refrigerant vessels, and by pipes and ducts that serve air-conditioning systems and providing energy efficient artificial lighting systems and adequate control of these systems.

2.IV.iii. Building Automation and Controls (BACs)

For buildings with a heat generator with an effective rated output for space heating purposes of over 70 kW a building automation and control system should be installed for the building with the following functions:

1. continuously monitoring, analysing and allowing for adjusting energy usage including that provided by RES technologies;
2. benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement;
3. allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers, and
4. monitoring the energy provided by RES technologies.

A building automation and control system and a building management system may be integrated into a single system. Controls and building management systems should be commissioned by competent persons and commissioning records kept for handover information.

2.IV.iv. Status and encouragement of intelligent metering

The National Smart Metering Programme was established by the Commission for the Regulation of Utilities (CRU) and is the delivery plan for the roll out of smart meters across Ireland. The Electricity Supply Board (ESB) Networks[7] have been tasked with the delivery of the roll out programme, which involves upgrading all of Ireland's electricity meters to smart meters.

Ireland's smart meter upgrade programme is part of the national Climate Action plan. Smart meters will support Ireland's transition to a low carbon future by enabling the development of smart grids, and supporting the electrification of heat and transport, local RES generation and microgeneration. From 2021, electricity supply companies will begin to offer new smart products and services, which will enable a shift of part of the consumption to times of the day when electricity is cheaper.

Smart meters will significantly reduce the need for estimated bills, make the supplier switching process easier and empower customers to make more informed choices for their energy needs. Smart metering will also allow ESB Networks to find faults quicker and manage the electricity network more efficiently.

The roll out began in 2019 and is being delivered on a phased basis until 2024. By the end of 2020, it is envisaged that 250,000 meters will have been replaced and approximately 500,000 meters will be installed in each of the four years thereafter.

2.IV.v. Progress and current status on heating systems (Inspection / Equivalence)

The EPBD Article 14 Heating Systems Inspections National Equivalence Report (Ireland) 2018 presents the analysis of the annual energy saving potential arising from a hypothetical regular inspection scheme complying with Article 14(1)–(3) of the EPBD and from the multi-pronged alternative approach adopted in Ireland, comprising the promotion of heating related energy efficiency measures and of a scheme of capital grants for heating system upgrades. The results of this analysis show that this alternative approach would yield considerably more energy and CO_2 savings that would be achieved by a hypothetical inspection

scheme over the 3-year reporting period 2015 to 2017. SEAI intends to run a similar suite of measures over the next 3-year period.

This report sets out the revised analysis of the annual energy saving potential arising from both approaches for the 3-year reporting period, from 2015 to 2017 inclusive. The key results of the revised analysis are shown in Table 13.

Hypothetical Regular Inspection Scheme - Article 14(1)–(3)			Alternative Measures - Article 14(4)		
Annual Energy Saving	GWh	77	Annual Energy Saving	GWh	333
Annual CO_2 Savings	tonnes	18,284	Annual CO_2 Savings	tonnes	70,610

Table 13: Energy & CO_2 Savings Comparison (2015-2017), heating.

The updated equivalence analysis indicates that the energy savings achieved, which can be attributed to the implementation of alternative measures, will exceed the estimated energy savings of 76.6 GWh that could arise from a hypothetical regular inspection scheme (by a factor of 3).

The alternative measures analysed in this report are the key initiatives that will continue to deliver energy savings in the next reporting period.

2.IV.vi. Progress and current status on AC systems (Inspection / Equivalence)

The EPBD Article 15 Air Conditioning Systems Inspections National Equivalence Report (Ireland) 2018 comparison of the annual energy saving potential arising from a hypothetical regular inspection scheme complying with Article 15(1)–(3) and the alternative approach adopted in Ireland, complying with Article 15(4), is shown in Table 14.

Hypothetical Regular Inspection Scheme - Article 15(1)–(3)			Alternative Measures - Article 15(4)		
Annual Energy Saving	GWh	2.8	Annual Energy Saving	GWh	6.1
Annual CO_2 Savings	tonnes	1,150	Annual CO_2 Savings	tonnes	2,497

Table 14. Energy & CO_2 Savings Comparison (2015-2017), cooling

The use in air-conditioning in domestic dwellings in Ireland is insignificant. The analysis, conducted in April 2018, shows that the alternative approach in Ireland, consisting of a promotional and financial support, would yield over 110% more energy and CO_2 savings that would be achieved by a hypothetical inspection scheme over the reporting period July 2014 to June 2017. The costs of inspecting each air-conditioning system and the administration of the hypothetical regular inspection scheme have not been quantified as part of this study. These potential costs are likely to significantly reduce the potential annual energy and CO_2 savings arising from the introduction of a hypothetical regular inspection scheme.

2.IV.vii. Enforcement and impact assessment of inspections

In opting for the alternative approach set out in Article 15(4) of Directive 2010/31/EU, the proposed approach is to deliver an effective communications campaign coupled with other support actions that will encourage regular inspection of AC systems with associated maintenance, modification and replacement of inefficient installations. The focus is on establishing a well-structured set of initiatives, led by Governmental bodies, aligning with business interests of energy efficiency products and service providers, especially key influencers, in the AC systems sector. This approach is likely to achieve greater energy efficiency improvements when compared to an inspection regime. Ireland has opted for alternative measures for Directive 2010/31/EU Articles 14 and 15. Consequently, enforcement, penalties and quality control of inspection reports do not arise. The impact assessment of the alternative measures is quantified in the reports submitted to the European Commission.

3. A success story in EPBD implementation

The EPBD has provided the framework for understanding and improving building energy performance and raised awareness on energy consumption in buildings resulting in a more prominent role in energy policy. When the EPBD was transposed into national legislation in 2006, *SEAI* established a national database for all EPC related information. The national database of EPC is essential for collecting statistical insights in the energy performance of the existing building stock. The database is used to inform renovation strategies and to enable stakeholders in the supply chain to better understand the market for their products.

The *Central Statistics Office (CSO)* is Ireland's official statistics office. The *CSO* combines EPC data with other data sources including the national census. The *CSO* publishes comprehensive EPC data. Residential buildings' EPC ratings for the 3rd quarter of 2020 can be accessed at https://www.cso.ie/en/releasesandpublications/er/dber/domesticbuildingenergyratingsquarter32020/.

Dwellings built in the period 2015-2020 were considerably more energy efficient than those built in earlier periods, with 97% given an "A" rating compared with 35% in 2010-2014 and 1% in 2005-2009.

Mains gas was the main space heating fuel used in 49% of the dwellings completed during 2015-2020. This was an increase from the period 2000-2004 when 41% of dwellings used mains gas. There were contrasting trends for heating oil and electricity, with 35% of the in the period 2000-2004 built dwellings using heating oil compared with 4% for dwellings built in the period 2015-2020. In contrast, usage of electricity increased from 19% in the period 2000-2004 to 47% in the period 2015-2020.

The average floor area of all dwellings was 112 m^2. This average size varied from 158 m^2 for detached houses to 61 m^2 for basement dwellings.

4. Conclusions, future plans

The EPBD implementation in Ireland has provided detailed information and requirements to document the current energy efficiency of buildings. The minimum energy performance of residential buildings has undergone revisions in 2005, 2008, 2011 and 2019. RES is mandatory in new homes. The *Building Standards* are aligned with NZEB requirements. The *Building Standards* for non-residential buildings were improved by 40-60% in 2017, with a mandatory 20% of the energy demand being supplied through RES. The major renovation requirement was added for all buildings.

The existing housing stock in Ireland continues to pose one of the greatest energy efficiency challenges. A considerable portion of the current building stock performs poorly when compared against a building built to the current standards.

The next LTRS will further reflect the commitments in the National Development Plan (NDP) and the actions set out in the Irish Government's Climate Action Plan.

For 2030 these include:

- 500,000 homes retrofitted to a BER of B2 or cost optimal by 2030
- Public sector buildings to have a BER of B (or carbon equivalent) by 2030
- One third of all commercial buildings to have a BER of B (or carbon equivalent gains) by 2030

Endnotes

1. https://www.housing.gov.ie/sites/default/files/publications/files/tgd_l_dwellings_2019.pdf
2. https://www.housing.gov.ie/sites/default/files/publications/files/tgd_l_2017_for_buildings_other_than_dwellings.pdf
3. https://www.dccae.gov.ie/en-ie/energy/publications/Documents/26/National_Energy_and_Climate_Plan2021-2030.pdf
4. https://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/energy-efficiency-directive/ireland's-national-renovation-strategy/Pages/Ireland's-Renovation-Strategy.aspx
5. https://www.cso.ie/en/releasesandpublications/er/ndber/non-domesticbuildingenergyratingsq42020/
6. http://seai.ie/Your_Building/BER/Advertising_of_BER/BER-Advertising-Guidelines-Issue-2-.pdf
7. https://www.esbnetworks.ie/

Annexes -Key Indicators & Decisions

Key Indicators & Decisions – General Background

no	Key Implementation Decisions – General Background	Description / value / response	Comments
01.01	Definition of public buildings (according to article 9 b)	Any building in excess of 500 m^2 which is frequently visited by the public is required to display either a BER certificate or a Display Energy Certificate (DEC) in a prominent place clearly visible to members of the public. This requirement is extended to all buildings in excess of 250 m^2 which are frequently visited by the public when occupied by public bodies. “Public body” means a Department of State, the Office of the President, the Office of the Attorney General, the Office of the Comptroller and Auditor General, the Office of the Houses of the Oireachtas, a local authority, the Health Service Executive, or a person, body or organisation (other than the Defence Forces) established (i) by or under any enactment (other than the Companies Acts), or (ii) under the Companies Acts, in pursuance of powers conferred by or under another enactment, and financed wholly or partly, whether directly or indirectly, by means of moneys provided, or loans made or guaranteed, by a Minister of the Government or shares held by or on behalf of a Minister of the Government.	
01.02	Definition of public buildings used by the public (according to article 13)	A public building is considered used by the public in case it is occupied by a public body and has a total floor area exceeding 250 m^2 and is frequently visited by the public or when it has a total useful floor area exceeding 500 m^2 and is frequently visited by the public.	
01.03	Number of residential buildings	2,003,645 houses and apartments	Year: 2016 Source: Census https://www.cso.ie/en/census/census2016reports/
01.04	Number of non-residential buildings	109,000 commercial buildings 10,000 buildings in public sector 4,300 industrial sites	https://www.seai.ie/publications/ Extensive-Survey-of-Commercial-Buildings-Stock-in-the-Republic-of-Ireland.pdf
01.05	If possible, share of public buildings included in the number given in 01.04	10,000 buildings in public sector	
01.06	If possible, share of commercial buildings included in the number given in 01.04	109,000 commercial buildings	
01.07	Number of buildings constructed per year (estimate)	New house and apartment completions in 2019 were 21,241	

no	Key Implementation Decisions – General Background	Description / value / response	Comments
01.08	If possible, share of residential buildings constructed per year (estimate, included in the number given in 01.07)	New house and apartment completions in 2019 were 21,241	
01.09	If possible, share of non-residential buildings constructed per year (estimate, included in the number given in 01.07)	Construction activity indicators available from www.cso.ie	
01.10	Useful floor area of buildings constructed per year in million square meters (estimate)	Construction activity indicators available from www.cso.ie	

Key Indicators & Decisions – New Buildings

no	Key Implementation Decision – New Buildings	Description / value / response	Comments
02.01	Are building codes set as overall value, primary energy, environment (CO_2), reference building or other	Yes	
02.02	Requirements for energy performance of residential buildings in current building code	Yes	
02.03	Requirements for energy performance of non-residential commercial buildings in current building code	Yes	
02.04	Requirements for energy performance of non-residential public buildings in current building code	Yes	
02.05	Is the performance level of nearly zero energy (NZEB) for new buildings defined in national legislation?	Yes	
02.06	Nearly zero energy (NZEB) level for residential buildings (level for building code)	Yes	
02.07	Year / date for nearly zero energy (NZEB) as level for residential buildings (as indicated in 02.04)	Building Regulations 2019 apply from 1 November 2019	
02.08	Nearly zero energy (NZEB) level for all non-residential buildings (level for building code)	Yes	
02.09	Year / date for nearly zero energy (NZEB) as level for non-residential buildings (as indicated in 02.06)	Building Regulations 2017 apply from 1 January 2019	
02.10	Are nearly zero energy buildings (NZEB) defined using a carbon or environment indicator?	Primary Energy, CO_2 and RES	
02.11	Is renewable energy a part of the overall or an additional requirement?	Yes	
02.12	If renewable energy is an additional requirement to NZEB, please indicate level	20%	
02.13	Specific comfort criteria for new buildings, provide specific parameters for instance for airtightness, minimum ventilation rates	Refer to Technical Guidance Documents Part L for residential and non-residential	

Key Implementation Decision – Existing Buildings

no	Key Implementation Decision – Existing Buildings	Description / value / response	Comment
03.01	Is the level of nearly zero energy (NZEB) for existing buildings set in national legislation?	Yes	
03.02	Is the level of nearly zero energy (NZEB) for existing buildings similar to the level for new buildings?	Yes	
03.03	Definition of nearly zero energy (NZEB) for existing residential buildings (if different from new buildings)	Yes	
03.04	Definition of nearly zero energy (NZEB) for existing non-residential buildings (if different from new buildings)	Yes	
03.05	Overall minimum requirements in case of major-renovation	Yes	
03.06	Minimum requirements for individual building parts in case of renovation	Yes	
03.07	National targets for renovation in connection to Long Term Renovation Strategy (number or percentage of buildings)	Yes	
03.08	National targets for renovation in connection to Long Term Renovation Strategy (expected reductions and relevant years)	Yes	

Key Implementation Decision - Energy Performance Certificates

no	Key Implementation Decision – Energy Performance Certificates	Description / value / response	Comment
04.01	Number of energy performance certificates per year (for instance average or values for of 3-5 years)		
04.02	Number of EPCs since start of scheme	1,035,741 residential 61,843 non-residential	
04.03	Number of EPCs for different building types	1,035,741 residential 61,843 non-residential	
04.04	Number of assessors	517 residential 148 non-residential	
04.05	Basic education requirements for assessors	Level 6 in construction related discipline – residential Level 7 in construction related discipline – non-residential	
04.06	Additional training demands for assessors	Yes – residential No – non-residential	
04.07	Quality assurance system	Yes	
04.08	National database for EPCs	Yes	
04.09	Link to national information on EPCs / Database	Ber.seai.ie, ndber.seai.ie	

Key Indicators & Decisions – Smart Buildings and Building Systems

no	Key Implementation Decision – Smart Buildings and Building Systems	Description / value / response	Comment
05.01	Is there a national definition of smart buildings?	No	
05.02	Are there current support systems for smart buildings?	No	
05.03	Are there currently specific requirements for technical building systems (for instance in building codes)?	Yes	
05.04	Are there current requirements for automatics (for instance in building codes)?	Yes	
05.05	Chosen option A or B for heating systems (inspection or other measures)	B	
05.06	Number of heating inspections; reports per year (if option A)	N/A	
05.07	Chosen option A or B for cooling systems (inspection or other measures)	B	
05.08	Number of air-conditioning / cooling system inspections; reports per year (if option A)	N/A	
05.09	Is there a national database for heating inspections?	N/A	
05.10	Is there a national database for cooling / air-conditioning inspections?	N/A	
05.11	Are inspection databases combined with EPC databases for registration of EPCs and inspection reports?	N/A	
05.12	Link to national information on Inspection / Database	N/A	

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