climate change

Scotland's centre of expertise connecting climate change research and policy

Operational delivery of Energy Performance Certificates in Europe

Beth Sloan, Isobel Urquhart, Orla Doherty and Fraser Macleod
Technopolis Ltd
July 2024

DOI: http://dx.doi.org/10.7488/era/5342

1 Executive Summary

Heat loss from domestic buildings has been identified as a major source of carbon emissions. Energy Performance Certificates (EPCs) present energy efficiency ratings for buildings. They will become an increasingly important tool in quantifying energy loss for individual properties in Scotland, as outlined in the proposed Heat in Buildings Bill.

This study reviews the approaches taken in European Union (EU) member states on operational governance of EPCs, through a desk-based literature review, expert interviews and in-depth case studies of three countries of interest.

We identify opportunities for Scotland to learn from examples of best practice in other countries. We also present a series of options that could be implemented as part of a potential reform of the operational framework for EPC governance in Scotland.

1.1 Key findings

Governance models
Member states allocate responsibility for EPC implementation and quality assurance of their EPC regimes in different ways. Some member states utilise a central government body, and others use a publicly funded arms-length body. A few member states use an external private organisation or allocate this responsibility at a regional level.

Minimum qualifications, training and accreditation for EPC assessors
Member states must ensure that EPC assessors are suitably qualified and certified. They do this by setting requirements for assessors, such as a higher education degree, and/or professional experience in a related field. Most member states also have approved training courses and/or examinations, which might be voluntary or mandatory. Some countries also require mandatory recertification or retraining after a set period of time or require programmes of continuous professional development.

Auditing and quality assurance in the production of EPCs
Member states must ensure that quality standards are upheld in the production of EPCs. They are required to carry out random sampling of EPCs, although some member states

conduct random sampling of total EPCs issues, and others sample a percentage of EPCs per assessor. Some member states also choose to conduct additional targeted audits, which can be desk-based or on-site and are triggered by specific risk factors. Some member states also use digital screening systems, which automatically screen input data to identify incorrect or inconsistent data.

All member states implement some sort of penalty system for assessor errors to uphold quality standards. These usually depend on the severity of the infraction, but include reissuing the EPC, additional targeted training, or monetary fines. For severe or repeat offences, assessors in some member states can also have their assessor license suspended or withdrawn.

Enforcement mechanisms
Most member states can issue fines for failing to present a valid EPC at the point of sale or rental. However, many do not enforce this requirement or issue fines in practice and there are data gaps in how well the requirement is enforced. Analysis by the European Commission found that only a small number of member states have a robust system for enforcing the requirement to present an EPCs at the point of sale. Those that do require legal professionals to check that an EPC is present as part of the sale. However, rental agreements often do not involve a legal professional in the process, so they cannot be targeted in the same way as sales are more difficult to enforce.

1.2 Options for Scotland

We have established a list of potential options which could improve the operational governance of EPCs in Scotland.

Option 1 - Including standard training requirements for EPC assessors in the Operational framework

This could include introducing standard education and qualification requirements into the operational framework, approving a standardised mandatory training programme for EPC assessors, and/or requirements for assessors to attend mandatory annual re-training.

Option 2 - Develop standardised quality assurance procedures for approved organisations in the operational framework

This could include developing a digital quality assurance system to screen EPC input data, establishing a 'Helpdesk' function to receive complaints about EPCs, implementing targeted audits of EPCs based on specific risk factors and/or outlining a clear penalty system for assessor infractions.

Option 3 - Engage wider stakeholders in the rental/sales process to support enforcement of the requirement to present an EPC

Formalising the requirement for solicitors to check EPC documentation at the point of sale could help enforce this requirement in practice. Engaging stakeholders involved in the rental market, such as estate agents, could help encourage checking of EPC documentation for lettings.

Contents

2 Glossary and abbreviations table

ADENE	The Portuguese Energy Agency
AO	Approved organisations - whose members are approved to deliver EPCs in Scotland
APEL	Approved Prior Experiential Learning
BER	Building Energy Rating – energy efficiency ratings used for buildings in Ireland
CPD	Continuous professional development
CzK	Czech Koruna
EU	European Union
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificate
HRK	Hrvatska Kuna (Croatian Kuna)
ICS	Independent Control System – EPBD requirement that member states must allocate responsibility for upholding the quality of EPCs and their associated QA procedures. This can be allocated to a government department or to an external organisation.
NVQ	National Vocational Qualification
Operational framework	The document which governs approved organisations in Scotland and outlines key processes to ensure that EPCs are prepared by sufficiently qualified persons
QQI	Quality and Qualifications Ireland
QA	Quality assurance
SEAI	Sustainable Energy Authority of Ireland
VEKA	Flemish Energy and Climate Agency

3 Introduction

3.1 Context

3.1.1 Energy Performance Certificates in Scotland

The Energy Performance of Buildings Directive (EPBD) is the primary legislative instrument used to promote energy efficiency in buildings in the European Union (EU). First published in 2002, it was recast in 2010, 2018 and most recently in May 2024 to align with the higher energy efficiency ambition in the European Green Deal (European Union, 2024).

The Energy Performance of Buildings (Scotland) Regulations 2008 transposed the original EU's EPBD into Scottish statute. The Regulations dictate how Energy Performance Certificates (EPC) are implemented in Scotland, and outline that an EPC must be produced when a new building is constructed and when a building is sold or rented. This applies both to homes and to non-domestic buildings. EPCs contain an energy efficiency rating, as well as recommendations on how to improve a building's energy efficiency. Therefore, they are widely considered to be useful tools for helping to drive emission reductions from buildings.

However, using EPCs as a basis upon which to set standards can be problematic, as a result of issues including:

- Poor quality or low robustness of assessments
- Infrequently updated assessments
- Use of modelled data rather than actual energy performance data
- A lack of incentives for decarbonising heat

To ensure that EPCs are fit for purpose in the context of Scotland's leading net zero objectives, the Scottish Government is planning to revise the role of EPCs in line with the proposed Heat in Buildings Bill. There could be a more prominent role for EPCs, particularly as a tool for demonstrating compliance.

3.1.2 Operational governance of EPCs in Scotland and reform

In Scotland, an EPC must be produced by members of six "Approved Organisations" (AOs). Regulation 8(3) of the Energy Performance of Buildings Regulations (Scotland) 2008 requires that AOs "ensure that members are fit and proper persons who are qualified by their education, training and experience to carry out the preparation and issuing of energy performance certificates". AOs therefore hold primary responsibility for training and accrediting EPC assessors in Scotland. An operational framework outlines key processes that ensure EPCs are prepared and issued by sufficiently qualified persons, including (Scottish Government, 2012):

- Ensuring integrity and operational resilience
- Accreditation of energy assessor members
- Administering the operation of energy assessor members
- Maintaining records to facilitate effective operation of the scheme and periodic audit by the Scottish Government

A report by Alembic Research Ltd et al, (2019) and commissioned by the Scottish Government, made recommendations on minimum standard qualifications for EPC assessors, auditors, and AOs. It also suggested an independent redress avenue for EPC consumers. In line with this, the Scottish Government are looking to assess and potentially review the Operating Framework and its role in upholding the quality and robustness of EPCs. This will ensure EPCs are fit for purpose in their potentially enhanced role in the upcoming Heat and Buildings Bill.

3.2 Objectives and scope

In this study, we investigate how the operational governance provisions of the EPBD have been implemented in the EU member states. This will enable us to identify opportunities for Scotland to learn from examples of best practice in other countries. The key objectives of this study are therefore to:

1. Review the approaches taken to operational governance of EPCs in EU member states
2. Identify different methods of implementation and areas of interest for Scotland
3. Develop options for potential reform of the operational framework for EPC governance in Scotland.

We only consider approaches taken in EU member states in this review. In addition, we do not consider aspects related to EPC methodologies. The focus is on the operational aspects of EPC governance. These include:

- **Governance model** – whether central government or arms-length bodies hold responsibility for EPC governance, or if this is delegated to external organisations.
- **Training for EPC assessors** – including coverage of any education prerequisites to apply for certification, training courses or examinations that assessors must complete, and any requirements for re-certification or retraining after a set period.
- **Auditing, verification and quality assurance (QA) procedures** – the systems and processes in place to guarantee the quality of EPC production, how the requirement for an independent control system (ICS) is met, including who holds QA responsibilities and any penalties issued for assessor infractions.
- **Enforcement mechanisms** – how member states enforce the requirement to present an EPC at the point of construction, sale or rental of a property, and any associated penalties
- **Affordability** – any information identified on how member states ensure the affordability of EPCs, in line with Article 16 of the EPBD.

3.3 Methodology

We collected data for this study primarily through a desk-based literature review. This was supplemented with a series of interviews with EPC experts,[1] which we used to triangulate findings from the literature review and to fill any identified gaps in the evidence. We then selected three countries of interest for Scotland (Belgium, Croatia and Ireland) and developed an in-depth case study for each. The collected data was used to derive policy

[1] In most cases, the EPC experts consulted work on EPC regimes within national governments.

options for improving the operational governance of EPCs in Scotland. Full methodological detail, including relevant limitations, is presented in Appendix A.

4 Operational governance of EPCs in the EU member states

4.1 Governance models

This section explores the governance models that member states use to implement Energy Performance Certificate regimes, including how they delegate the responsibility for the **Independent Control System** required in the Energy Performance of Buildings Directive.

4.1.1 EPBD requirements

member states can delegate the responsibility for implementing the ICS for EPCs as they deem fit under Annex VI of the EPBD. This system aims to ensure the quality of EPCs and their associated QA procedures. (European Commission, 2021a). Amongst other requirements, the ICS should:

- **Provide a clear definition of a valid EPC,** which should include requirements to check the validity of input data and calculations used to generate the EPC
- **Clearly outline the quality objectives and level of statistical confidence** that the EPC framework should achieve (these are further explained in Section 4.3.1)
- **Ensure that EPCs are available to prospective buyers and tenants** so that informed decisions can be made on their decision to buy or rent a property
- **Account for different building typologies,** such as single residential, multi-residential, offices or retail
- **Regularly publish information on the ICS,** through the national database of EPCs.

4.1.2 Member state approaches

Scottish approach
Scotland follows the approach agreed in the UK when the EPBD was transposed into domestic regulation in 2008, when the UK was an EU Member State.

The Scottish Government implements EPCs, including the ICS, through six external private organisations, called Approved Organisations. The Scottish Government has an agreement with these AOs, who are governed by an operational framework, which was published in 2012. Members of AOs are often self-employed energy assessors, whom the AOs contract to produce EPCs in line with government-approved methodologies and tools (Delorme and Hughes, 2016). However, the role of the AOs is to ensure that their members have the skills and expertise necessary to prepare and issue EPCs. They are also responsible for upholding QA protocols and for issuing penalties for incorrect EPCs.

A similar approach is adopted in England and Wales, where six independent accreditation schemes are responsible for managing energy assessors and for ensuring they possess the appropriate skills for the role.

Table 1 gives an overview of the governance models adopted in the member states. The majority place the responsibility of implementing the ICS for EPCs on a Central Government body. This approach is adopted in Greece for example, where the Department of Energy Inspection hold QA responsibilities (CRES, 2020). Some member states have allocated the responsibility of implementing the ICS on government-funded, arms-length bodies. For example, this is the approach adopted in Ireland, where the Sustainable Energy Authority of Ireland (SEAI) is responsible, and in Slovakia, where this falls to the Slovak Trade Inspection. Both bodies are publicly funded, non-profit organisations separate to the central government Ministries and Departments responsible for overall EPC policy (SEAI, 2017b) (Slovak Trade Inspection, n.d.).

Governance model	Description	Examples of Member State adoption
Government body (Central Government Ministry or Department)	Most common model of governance adopted – the Government Ministry or Department made responsible for implementing the ICS	Cyprus, Czechia, Estonia, Finland, France, Greece, Croatia, Lithuania, Luxembourg, Latvia, the Netherlands, Poland, Romania, Slovenia
Government body (arms-length bodies)	Responsibility of implementing the ICS lies with government-funded, arms-length organisations that are separate from the Government	Bulgaria, Denmark, Ireland, Hungary, Malta, Slovakia and Sweden
External body	Responsibility of the ICS lies with an external private organisation	Portugal, Scotland, England and Wales[2]
Regional differentiation	ICS responsibilities are allocated differently at regional level	Austria, Belgium (Flanders, Brussels and Wallonia), Germany, Italy and Spain

Table 1: Overview of different governance models employed by MS.

Portugal has allocated the responsibility of implementing the EPBD and the ICS to an external body. The Portuguese Energy Agency (ADENE) oversees the central register and assessor accreditation. An EU-level EPC expert interviewed for this project perceived that this approach was adopted to separate EPC governance from changing political governments, instilling stability and allowing for a long-term vision for the system to be implemented.

Five member states implement the ICS at regional level. Each of the Belgian regions govern EPCs independently. In Austria, some regions have allocated responsibility of conducting QA on EPC data to the municipalities (OIB, 2020), whereas energy agencies oversee the QA in others (TU Wien, 2021). Italian regions and autonomous provinces had autonomy over energy topics until 2015, resulting in a complex regulatory framework. Guidelines for regulating EPCs were released in 2015 that implemented a new standardised EPC system at national level (Azzolini et al., 2020).

[2] The UK devolved governments follow the approach agreed in the UK when the EPBD was transposed into domestic regulation in 2008, when the UK was an EU Member State.

4.2 Minimum qualifications, training and accreditation for EPC assessors

This section outlines the training and certification schemes member states have adopted to ensure that EPC assessors are suitably qualified **independent experts**.

4.2.1 EPBD requirements

Article 25 of the EPBD sets out a requirement for member states to ensure that EPCs are carried out by 'independent experts'. It outlines that:

- **Experts must be suitably qualified and certified**, but can be self-employed, employed by public bodies or by private enterprises
- **Information on the training and certification process** should be made available to the public
- **A list of certified experts or companies** that offer the services of experts must be regularly updated and made available to the public.

4.2.2 Member state approaches

Scottish approach

The Operating Framework mandates that AOs reference the UK National Occupational Standards for Energy Assessors. These have been developed to ensure energy assessors are competent and possess the right skills to conduct energy assessments. A Level 3 NVQ qualification for assessors exists in Scotland, as well and in England and Wales. However, AOs are ultimately responsible for ensuring EPC assessors are suitably qualified in Scotland. Although some assessors obtain this NVQ, it is not mandatory and AOs use Approved Prior Experiential Learning (APEL), which considers relevant experience, skills, and training of a potential assessor.

EPC experts must complete a 3-5 day training course, designed and delivered by AOs. These can cost between £700 and £1250 (Kanzyl, 2020a). The type of accreditation depends on the building type to be assessed – with separate accreditations for:

- Domestic EPCs (existing buildings).
- Domestic EPCs (new buildings).
- Non-domestic EPCs (existing buildings).
- Non-domestic EPCs (new buildings).

Continuous professional development (CPD) is required, although the minimum level of CPD is specified by each AO (Delorme and Hughes, 2016).

As AOs in Scotland are responsible for ensuring assessors are suitably qualified, and there are no minimum national standards for qualifications, training, or continuous professional development. Therefore, there may be a variation in standards across the country.

The approach taken in England and Wales is similar, where accreditation schemes have discretion over whether assessors hold the necessary skills to become an assessor. However, energy assessors can satisfy requirements through training and examinations, **or** by demonstrating suitable qualifications and experience (Delorme & Higley, 2020).

Pre-Requisites for independent experts

Table 2 outlines the approaches member states have taken to setting pre-requisites for independent experts. Thirteen member states have set subject-specific educational requirements. These are all higher education requirements (either Bachelors or Masters) in subjects such as engineering and architecture. Sweden, Romania and the Netherlands are the only member states only requiring professional experience as a pre-requisite for accreditation. In Sweden for example, applicants must first have 5 years of professional experience to undergo the training for assessor accreditation (Hjorth et al., 2020).

Pre-requisite requirement	Description	Examples of Member State adoption[3]
Education	Higher education (Bachelors or Masters) degree required. These are always in subjects such as engineering or architecture.	Austria, Bulgaria, Cyprus, Czechia, Denmark, Finland, France, Greece, Croatia, Hungary, Italy, Luxembourg, Malta, Poland, Slovenia
Professional	Professional experience in a related field (such as construction)	Sweden, Romania and the Netherlands
Both education and professional	Combination of both educational and professional experience required	Estonia, Germany, Lithuania and Portugal
Flexible approach	Multiple pathways available to assessors (either education, or prior professional experience)	Belgium (Flanders, Brussels, Wallonia), Ireland, Scotland, England and Wales

Table 2: Overview of different pre-requisites for independent experts.

Some member states have more flexible requirements and recognise either professional or educational experience. Others, however, require both specific higher education degrees and professional experience. For example, in Lithuania applicants must have an engineering degree and three years' experience in the construction sector (Kranzl, 2020a).

Training courses for independent experts

Table 3 outlines the approaches to training independent experts adopted by member states for assessor accreditation.

Training requirements	Description	Examples of Member State adoption[4]
Mandatory training programme	Mandatory accreditation training administered either by external certified organisations or government bodies	Germany, Estonia, Croatia, Luxembourg, Slovenia, Sweden and Scotland

[3] The literature review did not identify pre-requisite requirements for Spain, Latvia and Slovakia

[4] The literature review did not identify training requirements for Czechia, Spain, Latvia and Slovakia.

Mandatory training and exam	Mandatory accreditation training and examination administered either by external certified organisations or government bodies	Belgium (Flanders, Brussels and Wallonia), Bulgaria, Cyprus, Denmark, Finland, France, Greece, Ireland, Italy, Lithuania, Malta, The Netherlands, Poland, Portugal, Romania, England and Wales[5]
Voluntary training only	Voluntary training for assessor accreditation, accreditation authority responsible for granting accreditation	Austria and Germany
Voluntary training and exam	Voluntary training for assessor accreditation, accreditation authority responsible for granting accreditation. Mandatory examination also required.	Cyprus and Hungary

Table 3: Overview of the different training requirements for independent experts.

Most member states have implemented a mandatory training programme for EPC assessor accreditation. The majority of member states (including Bulgaria, Denmark, Greece and Ireland) have also implemented a mandatory written examination as a requirement for accreditation. Malta requires both written and oral examinations (BPIE, 2014). Six member states (Austria, Germany, Estonia, Croatia, Luxembourg and Slovenia) do not have a mandatory exam for prospective assessors.

Some member states have only introduced a voluntary training scheme for assessor accreditation. In these member states (Austria and Germany), the authority responsible for assessor accreditation certifies experts based on professional experience or education achievements, without the adoption of mandatory training (Kranzl, 2020a) (BPIE, 2014). In Cyprus and Hungary, despite the adoption of voluntary training, completion of a mandatory exam is required for accreditation (BPIE, 2014). The training requirements for member states do not appear to be linked to the stringency of pre-requisites, for example, the countries who implement a voluntary training programme only do not necessarily have more stringent pre-requisites (and vice versa).

[5] Although Accreditation Schemes can ensure that energy assessors hold the right skills by requiring them to attend a training course and to sit an examination, it appears that assessors can also demonstrate suitable qualifications and experience in place of sitting this exam, so it may not be mandatory in all cases.

Training course administration
In most cases, training is administered by external, private organisations that have been approved by the Government. In Ireland for example, the national agency for qualifications, 'Quality and Qualifications Ireland' oversees the accreditation of training course providers. Only courses administered by these organisations are accepted (SEAI, 2017a). Similarly, in member states such as Denmark and Greece, a singular accreditation body has been appointed (National Energy Agency in Sweden and the Ministry of Environment, Energy and Climate Change in Denmark) (Ruggieri et al., 2023). An interview with an EPC expert in the Belgium (Flanders) highlighted that whilst the Flemish Government had outsourced the delivery of training and examinations to external providers, they are now in the process of re-instating the administration of the accreditation internally. No further clarification on why this was the case was provided.

Recertification or retraining for independent experts
Table 4 outlines the approaches to recertification and retraining adopted in EU member states.

Recertification or retraining requirements	Description	Examples of Member State adoption[6]
Recertification or retraining requirements	Requirement for independent experts to recertify or retrain after a set period of time	Estonia, Finland, France, Ireland, Lithuania, Luxembourg
Continuous professional development requirements	Requirement that independent experts complete programmes of Continuous Professional Development	Austria, Belgium (Flanders, Wallonia and Brussels), Bulgaria, Czechia, Germany, Denmark, Croatia, Slovenia, Scotland, England and Wales
Voluntary refresher training	No requirements for recertification, retraining or continuous professional development	Romania and Portugal

Table 4: Overview of the different recertification or retraining requirements for independent experts.

Some member states require independent experts to recertify or retrain after a set period of time. This is achieved either by re-sitting the accreditation examination, taking refresher training or through proof of experience. Eight member states have a requirement that independent experts complete programmes of CPD. In Belgium (Flanders), for example, all independent experts must undergo training and sit an examination annually. This training is used to either introduce new concepts or developments (ensuring continuous improvement) or to provide targeted refresher training for specific areas where errors have been identified by a significant number of assessors. The annual training is administered by

[6] The literature review did not identify re-certification requirements for Cyprus, Spain, Greece, Hungary, Italy, Latvia, Malta, The Netherlands, Poland, Sweden, Slovakia and Scotland

the Flemish Energy and Climate agency (VEKA) and is tailored each year.[7] In Germany however, no official continuous development or recertification procedures have been adopted but experts are required to take personal responsibility for the quality of certification and ensure they are up to date with developments in the field (BPIE, 2014). ADENE in Portugal administers regular refresher training for experts in Portugal who wish to improve their skills (Kranzl, 2020a).

4.3 Auditing and quality assurance in the production of EPCs

This section discusses the various approaches that member states take to ensure that the **quality of EPCs** and their associated quality assurance procedures are upheld.

4.3.1 EPBD requirements

Annex VI of the recast EPBD (European Commission, 2024) outlines provisions related to QA of EPCs that the ICS should implement. These include requiring member states to:

- **Provide a clear definition of quality objectives**, including the level of statistical confidence that the EPC framework should achieve - at a minimum the ICS should ensure that at least 90% of all valid EPCs issued are evaluated with 95% statistical confidence over a period that cannot exceed one year.
- **Carry out random sampling of EPCs** to assess the level of quality and confidence in the ICS for EPCs.
- **Use a third party to verify** at least 25% of the random sample when the ICS has been delegated to non-governmental bodies.
- **Ensure the validity of the input data through an on-site visit** for at least 10% of EPCs that are part of the random sampling (this is a new requirement of the 2024 recast of the EPBD).
- **Employ pre-emptive and reactive measures** to ensure the quality of the overall EPC regime, including but not limited to:
    - Additional training for independent experts.
    - Targeted sampling (in addition to random sampling) to specifically detect and target poor-quality EPCs.
    - Obligations to resubmit EPCs.
    - Monetary fines.
    - Temporary or permanent bans for independent experts.

Article 24 of the EPBD states that member states should implement penalties with regards to infringements of aspects of EPBD implementation, including EPCs. These penalties are not prescribed, however must be “effective, proportionate and dissuasive”.

Scottish approach
AOs hold responsibility for QA in Scotland. They must check a representative sample of EPCs, with a minimum of 2% of all EPCs produced being checked. In 2016, 260,206 EPCs were produced, and 6,604 (2.53%) were checked (Delorme and Hughes, 2016). The checks repeat the EPC calculations using data on the register, most checks are desk-based. Assessors' outputs are checked every six months. Poor performance can lead to targeted

[7] Information obtained in an interview with an EPC expert in Belgium (Flanders).

auditing, retraining, suspension, or being struck off (Delorme and Hughes, 2016).

The Scottish Government audits AOs on a 3-yearly basis to ensure compliance with the Operating Framework. In addition, AOs are obliged to complete and return annual reports to the Scottish Government, which were recently reviewed to include more detailed QA information in an effort to better understand the nature of audit failures, complaints, and other important information. Organisations failing to meet the terms of the Framework are subject to corrective action and may have their agreement terminated (Delorme and Hughes, 2016).

A similar approach is taken in England and Wales, where Accreditation Schemes hold responsibility for assuring the outputs produced by their accredited energy assessors. The government then audits the Accreditation Schemes to ensure quality standards are upheld (Delorme & Higley, 2020).

4.3.2 Member state approaches

Digital quality assurance audits

Approach to digital quality assurance	Description	Examples of Member State adoption[8]
Random sampling of a percentage of total EPCs issued	Conducting digital audits on a statistically significant number of the total EPCs issued within a given timeframe (maximum one year)	Austria, Belgium (Brussels), Bulgaria, Czechia, Estonia, Malta, Romania, Scotland, England and Wales
Random sampling of a percentage of EPCs per assessor	Conducting digital audits on a statistically significant number EPCs issued per assessors issued within a given timeframe (maximum the last year)	The Netherlands
Random sampling – per assessor and per total of EPCs issued	Conducting both audits on a random sample of a percentage of total EPCs issued and a random sample of a percentage of EPCs per assessor	France
Two-tiered approach to digital QA	Additional targeted audits conducted. These are identified either by errors flagged during the random sampling or by specific citizen complaints of non-compliance	Belgium (Flanders and Wallonia), Germany, Denmark, Spain, Finland, Greece, Croatia, Cyprus, Hungary, Luxembourg, Lithuania, Latvia, Ireland, Poland, Portugal and Sweden

Table 5: Overview of the approaches to QA audits in EU MS.

[8] We did not identify approaches to QA of EPCs for Slovenia. Italy has adopted a region approach to QA and Slovakia has adopted random sampling, but we did not identify a sampling approach.

Digital screening systems
Some member states have adopted a digital system that automatically screens EPC input data before an EPC is issued. The Portuguese EPC database does this, and flags inconsistencies detected to prevent the input of incorrect or inconsistent data. An EU-level interviewee stated that implementing a mechanism like this limits the amount of QA that is required at later stages of the process.

This study found that all member states are conducting a statistically significant number of random sampling audits as per the requirements of the EPBD. Some member states collate a random sample by sampling a percentage of the total number of EPCs, which is the approach taken in Scotland. Others collate a sample of EPCs by sampling a percentage of EPCs per assessor. France reported conducting a two-tiered random sampling QA approach, conducting audits on both a random sample of total EPCs issues and on a percentage of EPCs per assessor.

Several member states reported that a second phase of targeted audits forms part of their QA procedures. These audits are carried out on EPCs whereby inconsistencies are identified during the random sampling auditing phase. Moreover, targeted audits are conducted in some member states where instances of non-compliance are reported. An interview with an EPC expert in Belgium (Flanders) highlighted that a system has been implemented, whereby citizens can notify complaints of non-compliance which can also lead to targeted audits.

It is understood that Slovakia is also conducting random sampling audits, although the nature of these audits is unknown. Moreover, Italy has reported that the approach to QA is implemented at regional level, resulting in variation. The literature review did not identify QA approaches for Slovenia.

A compliance study published by the European Commission in 2015 conducted analysis on the strength of the compliance checking systems implemented in EU member states. The analysis found that Belgium (Wallonia), Cyprus, Denmark, France, Italy and Lithuania had very robust compliance checking systems. Estonia, Latvia, Malta, Poland, Slovakia and Spain were found to have the lowest strength of EPC compliance checking systems (European Commission, 2015).

Public awareness and compliance
A Danish EPC expert we interviewed reported that the high strength and quality of EPCs in Denmark could be linked to high levels of public awareness and acceptance of EPCs and their benefits. It is believed that Danish homeowners have a strong understanding of EPCs and the benefits they can bring in raising property sale prices. This has resulted in higher levels of compliance and a desire to have high-rating EPC certificates.

On-site quality assurance audits
Mandatory on-site inspections were introduced in the 2024 recast version of the EPBD. Therefore, the data collected as part of this literature review may not reflect these most recent requirements and any subsequent changes to Member State QA regimes.

Approved organisations are responsible for carrying out QA checks in Scotland, and the majority of checks are desk-based. This is similar to the approach taken in England and

Wales, where Accreditation Schemes are responsible for QA checks. However, Some member states (such as Belgium, Bulgaria, Cyprus, Denmark, Hungary and Ireland) conduct on-site audits alongside digital audits. In the majority of member states, these are carried out where inconsistencies are identified during the digital random sampling audits (as in Denmark[9]) or where specific citizen complaints or reports of non-compliance are received (as in Belgium (Flanders)[9]). Moreover, as in Ireland[9], specific risk factors such as multiple infractions per assessor or an assessor publishing an abnormally high level of EPCs result in on-site audits being conducted. This is because on-site audits can provide a more detailed understanding of the accuracy of the data reported. Auditors can see the properties of the building in person, allowing for an extra level of QA[10]. In a few cases however (as in Cyprus), experts do on-site sample checks to verify data (MECI, 2020).

Approach to assessor infractions

In Scotland, poor performance by assessors can lead to targeted auditing, retraining, suspension, or being struck off. However, this is at the discretion of Approved Organisations. Accreditation Schemes hold similar responsibilities in England and Wales. All member states implement some kind of penalty system for assessors to minimise the risk of producing incorrect or invalid EPCs. member states have different levels of penalties for assessors, which are dependent on the severity of their infraction. For some, including Ireland and Latvia, this is quantified using a penalty points system (BPIE, 2014). In both member states, the penalties range from requiring the assessor to undertake corrective training to a temporarily or permanently suspended licence (BPIE, 2014). In Ireland, points on an assessor's portfolio last for 2 years before they are removed from the record (SEAI, 2016). In other member states, the level of penalty appears to be linked to the severity or number of errors. Common approaches to assessor infractions are detailed below.

- **Reissue of an EPC** - Assessors may be required to reissue a correct EPC at their own cost, usually within a certain timeframe. This is one of the most common practices amongst member states. This occurs in member states including Austria, Belgium (Wallonia), Bulgaria, Cyprus, Czechia, Denmark, Spain, Finland, Croatia, Lithuania, Malta, Portugal and Slovenia. In Finland, the penalty sometimes requires the original assessor to pay for a different assessor to carry out the re-certification (TU Wien, 2021).
- **Training** - Assessors may be required to undergo corrective training. For example, this approach is used in Belgium (Wallonia), Ireland, and Latvia. In the case of Belgium (Wallonia), the assessor must also pass an exam in order to continue carrying out EPC assessments (Fourez et al., 2020).
- **Monetary fines** - The majority of member states have monetary fines in place, the value of which is usually dependent on the perceived severity of the error. The value of monetary fines can vary greatly within and between member states. Examples of values are shown in Table 6.

[9] Information obtained during an interview with an EPC expert
[10] Information obtained during an interview with an EPC expert

Member state	Value of fines for assessors
Belgium (Flanders)	€250 - €5000 (TU Wien, 2021)
Germany	Up to €15,000 (TU Wien, 2021)
Estonia	Up to €6,400 for an individual or €64,000 for an organisation (Ministry of Economic Affairs and Communications et al., 2020)
France	Up to €1500 (Deslot et al., 2020)
Greece	€200 - €10,000 (CRES, 2020)
Italy	€300 - €10,000 (Azzolini et al., 2020)
Portugal	€500 - €700 (Kranzl, 2020a)
Romania	€250 - €2000 (Kranzl, 2020a)

Table 6: Table showing the value of fines imposed on EPC assessors when errors are found in certain EU MS.

In some member states, monetary fines are technically possible but not imposed in practice. This includes Bulgaria (SEDA, 2020), Czechia (BPIE, 2014), and Estonia (Ministry of Economic Affairs and Communications et al., 2020). Monetary fines are very rarely used in Germany (BfEE, 2020). In Cyprus and Portugal, monetary fines are only possible if the EPC assessor does not reissue the EPC in the required period (MECI, 2020; Fragoso and Baptista, 2016). In other member states, monetary fines are only imposed if the errors surpass a certain threshold. For example, in Croatia an assessor must have produced more than three incorrect EPCs to face a monetary fine (MCPP, 2020), and in Hungary the energy class must be wrong by at least two classes for the assessor to face a monetary fine (Jenei et al., 2020). In Poland, assessors only face monetary fines if the error is quantified at more than 10%, or if they use incorrect technical assumptions in their methodology (Kranzl, 2020a; Bekierski et al., 2016).

No evidence was found that Austria, Denmark (Energistyrelsen et al., 2020), Ireland (BPIE, 2014), Lithuania (Encius, 2016), Luxembourg (Worré et al., 2020), Latvia (BPIE, 2014), Malta (Degiorgio and Barbara 2016), Sweden, and Slovakia impose monetary fines on assessors.

- **Suspension or withdrawal of accreditation** - In Scotland, poor performance by assessors can lead to penalties including suspension or withdrawal of accreditation at the discretion of Approved Organisations. Accreditation Schemes in England and Wales also have discretion over applying such penalties to assessors. In many member states, assessors can face temporary or permanent loss of accreditation to carry out EPC assessments as a result of infractions. This is the case in Belgium (Flanders) (TU, Wien, 2020; Kranzl, 2020a), Belgium (Wallonia) (Fourez et al., 2020), Cyprus (BPIE, 2014), Czechia (BPIE, 2014), Finland (TU Wien, 2021), France (BPIE, 2014), Greece (TU Wien, 2021), Croatia (Mardetko-Škoro, 2015), Hungary (Jenei et al., 2020), Ireland (BPIE, 2014), Lithuania (Encius, 2016), Luxembourg (Worré et al., 2020), Latvia (BPIE, 2014), and Poland (BPIE, 2014).

  In a number of member states, the length of the suspension is dependent on the severity of the infraction. For example, in Greece assessors can face suspensions of between one and three years, depending on the severity of the mistake (TU Wien, 2021). In Croatia, assessors can lose their accreditation if they submit more than

three invalid EPCs (Mardetko-Škoro, 2015). In Hungary, assessors can lose their license for three years if errors result in EPCs changing by more than 2 energy classes (Jenei et al., 2020).

In other member states, suspension or withdrawal of a license is only imposed if a threshold is passed. For example, in Ireland, if an assessor submits more than 10 incorrect EPCs in two years, they can be suspended for between 3-12 months (BPIE, 2014). In Latvia, if an assessor has more than seven points on their portfolio they face suspension of six months, and if they have more than 10 points on their portfolio, they face suspension of 12 months (BPIE, 2014). In Denmark, EPC assessors are employed by certified organisations, and the organisations can lose their accreditation in the case of repeated errors from their assessors (Energistyrelsen et al., 2020).

4.4 Use of administrative fees and levies

This section explores **fees and levies implemented by Member States charged to assessors for the registration or lodgement of EPCs.** It does not include fines implemented for assessor registration or fines associated with assessor infractions.

4.4.1 EPBD requirements

There is no requirement in the EPBD for what administrative fees or levies Member States can charge to assessors for EPC lodgement or registration. Therefore, Member States have taken different approaches in whether they choose to implement such a fee or its value.

4.4.2 Member state approaches

Scottish approach
Scotland has implemented a fee for the lodgement of EPCs of Existing Domestic Buildings and Non-Domestic Buildings in Scotland. The value of the fees varies based on the nature of the building. The Energy Performance of Buildings (Scotland) Regulations 2008 outline that the fee associated with a domestic EPC is £2.60, whereas the fee associated with a non-domestic EPC is £12.60. The revenue generated from these fees is ring-fenced to support the effective operation and maintenance of register systems. (Scottish Government, 2017).

Country	Description	Examples of Member State adoption
No administrative fee	Member State does not charge an administrative fee to assessors	Austria, Belgium, Bulgaria, Croatia, Czechia, Cyprus, Estonia, France, Finland, Greece, Hungary, Italy, Luxembourg, Latvia, The Netherlands, Poland, Romania, Slovenia, Slovakia, Spain, Sweden
Administrative fee in place with no ringfencing	Member State does not ring fence revenue for specific purpose	Malta
Administrative fee in place with	Member State ring fences revenue for EPC-related	Ireland, Portugal, England and Wales, Germany, Lithuania, Denmark

ringfencing of revenue	purposes, which can include maintaining the EPC registry or QA procedures, for example	

Table 7: Table showing the approaches taken to charging administrative fees and levies to assessors

Member state EPC regimes can be partly or fully financed through their lodgement or registration fees, in combination with other fees such as annual assessor registration fees. For example, the EPC system in Ireland was intentionally designed to be cost-neutral (BPIE, 2014). In countries that don't charge specific administration costs, Borragán and Legon, (2021) report that this fee can also be indirectly covered by the overall EPC assessment price. However, in most cases, Member States rely partly or fully on public funds to support their EPC systems. The amount of public funds used to finance EPC systems can amount to as much as several million euros every year in some Member States (Loncour and Heijmans, 2018).

Lodgement fee value

Whilst the majority of Member States have not implemented fees or levies for issuing or publishing individual EPCs, Ireland, Malta, Lithuania, Portugal, Germany and Denmark have, as have England and Wales (BPIE, 2014). The value of these fees varies between the Member States. Although Malta has the highest fee for domestic EPCs at €75, it doesn't appear for the other Member States that the size of the Member State or the number of EPCs they issue directly correlates with the value of the fee.

Germany, Lithuania and Malta charge one fee for all EPCs, whereas Denmark, England and Wales, Ireland and Portugal outline different fees for domestic and non-domestic EPCs. In all cases where a different fee is charged, the fee associated with a non-domestic EPC is higher than the fee for a domestic EPC. In England and Wales, the difference is very small, but in Denmark, Ireland and Portugal, the fee associated with a non-domestic EPC is at least double the value of the fee for a domestic EPC.

Country	Fee for domestic EPCs	Fee for non-domestic EPCs
Denmark [11]	€17.30	€35.30
England and Wales	£1.50	£1.70
Ireland (SEAI, 2019).	€30	€60
Germany [12]	€6.90	€6.90
Lithuania (Encius and Baranauskas, 2016)	€6	€6
Malta [13]	€75	€75
Portugal [14]	€28 to €65 (pus VAT)	€135 to €950 (plus VAT)

Table 8: Table showing the fees associated with lodgement of domestic and non-domestic EPCs in the Member States and England and Wales

[11] Information obtained during stakeholder consultation with a Danish EPC expert
[12] Information obtained during stakeholder consultation with a German EPC expert
[13] Information obtained during stakeholder consultation with a Maltese EPC expert
[14] Information obtained during stakeholder consultation with a Portuguese EPC expert

Use of revenue generated

In the following Member States that have adopted a fee for registering and publishing EPCs, the revenue generated is ring-fenced and used for EPC-related purposes.

- **Ireland -** the SEAI uses the revenue to make investments back into the EPC programme, such as by developing, upgrading or replacing the systems and increasing the resources to support assessors, industry, and the wider public through the EPC Helpdesk and quality assurance system[15].
- **Portugal** - the revenue generated from the fees is used to support daily technical support to the experts, IT infrastructure and developments, quality assessment and enforcement, awareness and communication.[16]
- **Germany** - the registry budget is supported through the fees for lodging EPCs (BPIE, 2014)
- **Lithuania** - part of the revenue raised from the EPC lodgement fee is used to finance quality assurance of EPCs (Encius and Baranauskas, 2016).
- **Denmark** - the fee charged by DEA in covers work carried out by DEA concerning the necessary supervision of the scheme. It involves taking EPCs out for quality control, handling complaints, but also answering general questions about the EPC scheme, developing and maintaining the IT systems (the EPC database, etc.), and the contact with the educational institutions for the training of EPC assessors[17].
- **England and Wales** - the revenue generated from these fees is ring-fenced to pay for the technical team that run the register for the fees, as well as policy and operations salaries. Moreover, the revenue generated funds any technical running costs associated with the lodgement of EPCs as well as any opportunities identified for "register improvement"[18].

In Malta however, the money generated from the lodgement fee is not ring-fenced for any specific purpose. It joins other sources of revenue and then funding is allocated where and as necessary[19].

4.5 Enforcement mechanisms

This section investigates how member states ensure that the requirement to **present an EPC for a building at the point of sale/rental** is enforced.

4.5.1 EPBD requirements

Article 20 of the recast EPBD (European Commission, 2024) mandates that digital EPCs must be issued for buildings or building units when they are:

- **Newly constructed** or have undergone major renovation.
- **Sold** to a new owner.

[15] Information obtained during stakeholder engagement with an Irish EPC expert
[16] Information obtained during stakeholder consultation with a Portuguese EPC expert
[17] Information obtained during stakeholder consultation with a Danish EPC expert
[18] Information obtained during stakeholder consultation with an EPC expert in England and Wales
[19] Information obtained during stakeholder consultation with a Maltese EPC expert

- **Rented** to a tenant (or a rental contract is renewed).
- **An existing building** owned or occupied by public bodies.

It also requires that the EPC must be shown and handed over to prospective tenants or buyers at point of sale or rental. There are some exceptions to this, for example, when the building is only intended to be used for less than four months of the year or has an actual energy consumption of less than 25% of the expected annual energy consumption.

4.5.2 Member state approaches

Scottish approach
Failing to issue EPCs when marketing a property for sale or for rent can result in enforcement actions. Penalties, outlined in the Energy Performance of Buildings Regulations (Scotland) 2008, are £500 for residential dwellings and £1000 for other cases. Local Authorities are the nominated Enforcement Authorities and hold the duty to uphold EPC regulations within their jurisdictions, so are therefore responsible for issuing fines. Local Authorities can also consider criminal action (Delorme and Hughes, 2016).

The Scottish Government does not have a clear picture of the scale of enforcement activity undertaken by the Local Authorities and are currently engaging with all 32 local authorities to gain more detailed information on enforcement in practice.
In England and Wales, local authorities are responsible for enforcement and hold powers to request that copies of an EPC are produced for inspection. They also hold powers to decide the appropriate course of action to enforce compliance, which can include a range of actions from providing compliance advice to issuing a penalty (Delorme & Higley, 2020).

Only a small number of member states have a vigorous mechanism for ensuring EPCs are available at the point of rental or sale (European Commission, 2015) and availability of enforcement rate data is often low. In most of these member states, checks are made by notaries during the sale transaction, which is thought to be an effective system (European Commission, 2015). However, as rental agreements are often less formal, ensuring EPCs are made available here is more challenging. It is thought that ensuring the EPC is signed off by a lawyer in the rental agreement is a good way to address this problem (European Commission, 2015). However, rental agreements are often less formal and do not always involve a legal professional, meaning that the systems in place for enforcement can be less developed in the rental sector than they are for sales. This often results in lower compliance rates or poor data availability in the rental sector. However, in Hungary for example, it is a requirement that a legal professional signs off on rental agreements. They are then responsible for checking the presence of EPC documentation.

The member states found to have the highest level of compliance rates with requirements for new, sold and rented buildings, as well as the highest strength of EPC compliance checking systems, are Belgium (Wallonia), Cyprus, France, Italy, Lithuania and the UK (this study was conducted when the UK was an EU Member State). Latvia and Poland were found to have the lowest compliance rates, coupled with the lowest strength of EPC compliance checking system (European Commission, 2015).

Monetary fines

The majority of member states impose monetary fines on building owners if they fail to present a valid EPC at the point of sale or rental. The cost of fines vary within and between member states, as shown in Table 9.

Member state	Value of fines for building owners
Austria	Up to €1450 (OIB, 2020; Arbeiterkammer Oberösterreich, 2024)
Belgium (Flanders)	€500 - €5000 (Kranzl, 2020a)
Belgium (Wallonia)	€500 - €1000, which can double if the same individual or organisation reoffends within three years (TU Wien, 2021; Fourez et al., 2020)
Czechia	100,000 Czech Koruna (CZK) (€3979), up to 200,000 CZK (€7958) for apartment buildings (Mečíccrová, 2021)
Germany	Up to €10,000 (Olschner, 2024)
Spain	€300 - €6000 (TU Wien)
Greece	€200 - €2000 (TU Wien, 2020)
Croatia	5000 Hrvatska Kuna (Croatian Kuna) (HRK) - 30,000 HRK (€662 – €3976) (StanGRAD, n.d.),
Italy	€3000 - €18,000 (Azzolini et al., 2020)
Lithuania	Up to €289 (Encius, 2016)
Portugal	€750 - €7500 (Kranzl, 2020a)

Table 9: Table showing the value of fines imposed on building owners when EPCs are not presented at required times in certain EU member states.

In most member states, it is unclear what type of infraction results in a higher level of fine for building owners. However, in Spain there are clear guidelines: simple faults result in fines of €300 - €1000, while serious faults can result in fines of up to €6000 (TU Wien, 2021). Serious faults include knowingly falsifying data or having an EPC assessment performed by a non-accredited assessor (TU Wien, 2021). In Finland, the level of fine is dependent on the type of building for which an EPC was not presented, or for the size of the municipality in the case of public buildings (Ministry of the Environment of Finland & Motiva Oy, 2020).

Use of notaries in enforcement

In some member states, notaries or lawyers involved in the sale or rental process are liable for ensuring EPCs are presented when necessary and are also liable for monetary fines if EPCs are not presented. This is the case for lawyers in Hungary, who are required to sign-off the EPC included in a rental agreement (European Commission, 2015). Similarly, notaries in Portugal are required to notify the relevant authorities if an EPC is not presented at the point of sale and can be fined between €250 - €3500 for failing to do so (Kranzl, 2020a). Notaries may also be fined in Belgium (Wallonia), for failing to notify the authorities of an absent EPC at point of sale or rental (TU Wien, 2021).

4.6 Affordability of EPCs

This section discusses any action that member states take to ensure that EPCs are **affordable.**

4.6.1 EPBD requirements

Article 19 of the EPBD requires that member states "take measures to ensure that EPCs are affordable and shall consider whether to provide financial support for vulnerable households." The EPBD does not require member states to provide any price caps or subsidies, although some member states have chosen to do so.

Little information was found on interventions taken by member states to provide financial support for households requiring EPCs, nor the ability of citizens in member states to pay for EPCs assessments. Therefore, the following discussion focuses on EPC pricing and price controls in member states.

4.6.2 Member state approaches

Scottish approach
The price of EPCs in Scotland is controlled by the market. Research in 2016 showed that indicative starting costs were £35 to £60 (€40 - €70) for residential EPCs and £129 to £150 (€150-€175) for non-residential EPCs. This includes the registration fee payable each time an EPC is recorded on the register (Delorme and Hughes, 2016). There is no cap on EPC prices, and affordability is not actively managed by the Scottish Government.

Price-caps
The majority of member states have not imposed any price limitations on the cost of EPCs and rely on the market to control the affordability of EPCs. However, three member states have imposed price regulations, as detailed in Table 10:

Member state	Details of price cap on EPC cost
Slovenia	€1.5 / m^2 for residential buildings up to 220m^2, €2 / m^2 for residential buildings over 220 m^2, and €1 – €4 /m^2 for apartment buildings (between 5 and 51 dwellings) (BPIE, 2014). The total cost is also capped at €170 for one and two-dwelling buildings (Kranzl, 2020a).
Hungary	An EPC for apartments and single-family homes is capped at €40 (+VAT) (Kranzl, 2020a; Jenei et al., 2020). There is no legally defined price for an EPC in non-residential or public buildings (Jenei et al., 2020).
Denmark	EPCs in 2024 are capped at €1,067 for a single family house. For larger buildings, the price for EPCs is subject to the market[20].

Table 10: Table showing the price caps on the cost of an EPC assessment in various MS.

[20] Information obtained during an interview with an EPC expert in Denmark

Greece and Croatia used to have price caps which have since been abolished (TU Wien, 2021). In Croatia, the price cap was introduced when there were few EPC assessors in the market which caused prices to increase. When more EPC assessors were accredited, the price cap was removed, and EPC prices are now effectively controlled by the market[21].

While the price caps imposed generally have a positive impact on building owners who face the costs of EPCs, the price caps are commonly criticised for being too low and having resulting impacts on the quality of the certificate produced. For example, in Hungary, there are concerns that the price cap is set unrealistically low which results in lower quality EPCs (Jenei et al., 2020). Similarly, in Croatia, it is thought that the low price cap resulted in the recommendations of energy efficiency measures included in the certificate being of poor quality (Sayfikar & Jenkins, 2024). In Demark, it is thought that competition within the market keeps EPC prices much lower than the price cap, as average prices for single family houses is reported to be around €667[20],suggesting the price cap is not necessary here.

Member states which have not imposed price caps have been criticised for average EPC costs being too high. For example, in Bulgaria the average price of an EPC is estimated at €0.2–€1/m^2, which is thought to be relatively high for the average EPC consumer in Bulgaria (Sayfikar & Jenkins, 2024). This, alongside low public awareness of EPCs, is thought to be a reason why only around 1% of residential buildings in Bulgaria have an EPC (BPIE, 2018). Appendix F shows a summary of estimated EPC costs across member states, however it is important to note that this data comes from a variety of sources with different publication dates. Some figures have also been subject to exchange rates from local currencies. As a result, price data between member states is not necessarily comparable.

Other measures to ensure affordability

Member states who have not imposed price caps have often not done so to reflect the true cost of an EPC calculation. The cost can vary greatly according to various factors, including the type and complexity of a building and the quality of existing data (TU Wien, 2021). For example, in Czechia the average cost of a standard EPC is thought to be between 3000 – 7000 CZK (€119 – €278). This is because many buildings in the country are old and do not have much existing documentation or data (Mečíccrová, 2021). These buildings require an on-site visit from a specialist assessor, which can increase the cost of an EPC to tens of thousands of CZK (Mečíccrová, 2021).

While no other member states actively control the price of their EPCs, some have introduced other methods of promoting affordability. For example, in Belgium (Wallonia) the EPC methodology is kept as efficient as possible to keep costs down (Fourez et al., 2020). In the Netherlands, the government imposed a system to minimise costs in which building owners first receive a temporary EPC, which is calculated using existing data on a property (e.g. building type, data of construction, insulation, and heating and energy systems). The building owner can then change or add information (alongside proof such as photographs), which is then approved by an assessor. The assessor then recalculates the EPC and uploads it to the national database (Kranzl, 2020a). This process is thought to minimise on-site visits and time spent by assessors, and minimise the final cost of an EPC.

[21] Information obtained during an interview with EPC experts from Croatia

5 Case studies

After we conducted our review of the approaches taken to operational governance of EPCs in the EU member states, we selected three countries of interest to the Scottish Government. These were countries with approaches which could have the potential to improve the current operational governance procedures in Scotland. The countries we selected were Belgium, Croatia and Ireland.

Full case studies are presented in Annexes B-D, however, an overview of the main findings from each case study is presented in Table 11 - Table 15.

Country	Overview of governance model
Belgium	EPCs are governed by authorities at the regional level. This is the Flemish Energy and Climate Energy Agency (VEKA) in Flanders, the Department of Energy and Sustainable Buildings in Wallonia and The Brussels Environment Office in Brussels.
Croatia	The Ministry of Physical Planning, Construction and State Assets (MPGI) is responsible for the implementation of the EPBD including EPCs, the ICS and accrediting independent experts. The Ministry of Economy, Market Inspectorate is responsible for ensuring EPCs are correctly advertised during the sale or lease of a building.
Ireland	The EPBD Implementation in Ireland is coordinated by senior officials of the following bodies with sufficient authority to make decisions and allocate resources: Department of Environment, Climate and Communications, Department of Housing, Local Government and Heritage, and the Sustainable Energy Authority of Ireland (SEAI). The SEAI is responsible for administering the EPC scheme, which is called a Building Energy Rating (BER) scheme in Ireland. SEAI also govern the registration and performance of BER assessors.

Table 11: Overview of the main findings from each case study: Overview of Governance Model

Country	Affordability
Belgium	In Wallonia, EPC prices have been actively controlled by designing a short certification process to reduce costs. This reduced costs from €480 to €240 for single-family houses from the early stages of the scheme to 2020. In Flanders, the price of EPCs is regulated by the market. Prices range from €195 for a small apartment to €345 for a 5-bedroom house. No evidence was identified for Brussels.
Croatia	The price of EPCs was capped at €1.5 / m^2, but this requirement was removed in 2014 and the price is now controlled by the market. The average price for an EPC is reported at around 200.00 EUR for an apartment and 380.00 EUR for a house.
Ireland	The price of a BER assessment is controlled by the market, meaning it can vary based on the supplier and size of a building. Prices are approximately €150 in apartments, while the cost for a standard house is between €200 and €300. Moreover, a levy of €30 is in place for the publication of a Domestic BER Certificate.

Table 12: Overview of the main findings from each case study: Affordability

Country	Minimum qualifications, training and accreditation for EPC assessors
Belgium	• In Flanders, education pre-requisites are needed to assess certain building types. All assessors undergo training which varies based on the type of buildings they will assess. Assessors sit a central exam, and annual re-training is mandatory. • Wallonia has a flexible pathway to eligibility and accept either education or professional experience. Assessors attend a five and a half day training course and complete both an oral and written exam. There are no requirements for continuous professional development. • Brussels has subject-specific education requirements for all assessors, who must also sit a 5-day training course and complete an exam. There are no requirements for continuous professional development.
Croatia	Assessors must have both specific higher education qualifications and at least five years of work experience in the profession or two years of work experience in design and/or expert construction supervision. They must then complete a two-week course, followed by a written and practical examination. Every year, assessors must attend eight-hours of training to upgrade their skills.
Ireland	Assessors are required to either hold an NFQ level 6 certificate in a construction-related disciplines or equivalent (demonstrated by a combination of appropriate construction-related qualifications or relevant experience). Assessors must also complete an accredited Domestic BER Training Course and achieve a minimum of 70%. Continuous professional development is obligatory for all BER assessors.

Table 13: Overview of the main findings from each case study: Qualifications, training and accreditation

Country	Auditing, verification and QA
Belgium	• Flanders use a combination of random sampling and targeted audits, which include on-site audits on a less frequent basis. A citizen complaints system can trigger a targeted review. • Wallonia has a digital 'control web' which automatically screens all EPCs submitted and flags inconsistent data or values. Audits are conducted on a randomly selected statistically significant sample of the total number of EPCs submitted. • Brussels conducts audits on a yearly basis and reviews 1.5% of total EPCs issued. Refresher training is mandatory for accredited experts who make frequent mistakes.
Croatia	As of October 1, 2017, EPCs can only be issued using the Information System of Energy Certificates (IEC). All EPCs go through administrative checks when uploaded to the EPC database. A random sample undergo more detailed checks, as well as EPCs which have received a complaint. Detailed checks are performed on the contents and accuracy of the EPC report, the input data, and the recommended energy efficiency measures.

	Assessors are penalised when EPCs are found to be invalid. Penalties include warnings, re-issue of the EPC at their own cost, and having accreditation revoked. Monetary fines are possible but are rarely used in practice.
Ireland	Ireland conducts audits on both a targeted and random basis. Targeted audits are mostly desk-based reviews, but on-site audits are also conducted when certain risk factors are met. Training audits are also carried out for newly qualified assessors. The SEAI have implemented a penalty point system, whereby the level of penalty imposed on assessors depends on the severity of the assessor infraction. The nature of these penalties ranges from corrective training to the permanent suspension of the license.

Table 14: Overview of the main findings from each case study: Auditing, verification and QA

Country	Enforcement
Belgium	• In Flanders, the responsibility for enforcing the requirement to display an EPC at the point of sale lies with VEKA, although notaries are required to check the existence of an EPC. An administrative fine exists for notaries is possible in the case that a sale or rental is made without the existence of an EPC, but these have not been administered to date. A fine of minimum €500 can be administered to building owners for not displaying an EPC at the point of sale. • In Wallonia, minimum fines of €500 can be issued to building owners who do not present an EPC at the point of rent or sale. • In Brussels, the BEO are responsible for enforcement. Estate agencies repeatedly reported as non-compliant face fines or potential imprisonment.
Croatia	If building owners fail to produce an EPC at the point of sale or rental, they can receive fines between 662 – 3,976 EUR.
Ireland	The solicitor managing the sale of the property is responsible for checking the presence of an EPC at the point of sale. Failure to present a BER certificate at the time of rental or sale can result in financial or judicial penalties, with fines ranging from €500 to €5,000. Criminal records and prison sentences are also a possibility. Compliance with the requirement is higher with property sales than with property rentals.

Table 15: Overview of the main findings from each case study: Enforcement

6 Conclusions and options for Scotland

Our research has shown that a range of different approaches are applied in the EU member states to enable effective EPC governance. There is limited data available to evidence the effectiveness of the various approaches taken, making it difficult to determine the impact that each approach has on the overall quality of EPCs in each Member State.

To address this gap, we conducted interviews with EPC professionals in member states of interest to understand their opinions on the perceived effectiveness of the approaches they have adopted. We have established a list of potential options which could improve the operational governance of EPCs in Scotland based on evidence collected in the review of approaches taken in the EU member states, targeted interviews and case studies. The options are presented in Table 16.

Option		Rationale
1	Include standardised training requirements for independent experts in the operational framework	Many member states have standard requirements at a national level to ensure that independent experts have the necessary skills and training. As the Scottish Government currently delegates responsibility for training and certifying assessors to the AOs, there may be variations in the standards across the country.
2	Develop standardised QA procedures for AOs in the operational framework	QA procedures in Scotland are the responsibility of AOs, who are responsible for checking a representative sample of EPCs. However, many member states go beyond the random sampling approach to guarantee the quality of EPCs. A more stringent QA approach could be standardised in the Operating Framework to ensure higher quality EPCs across Scotland. For example, a digital system that screens EPC data or targeted audits based on certain risk factors.
3	Establish requirements for stakeholders involved in the rental and sales processes to support enforcement of the requirement to present an EPC	Enforcing the requirement to present an EPC at the point of sale/rental is difficult for the majority of member states. Those that are enforcing this successfully rely on notaries to check the presence of an EPC as part of the sales process. Although notaries are not generally involved in house sales in Scotland, considering different options for encouraging stakeholders to check the presence of an EPC at the point of sale could result in higher compliance rates in Scotland: for example, formalising the requirement for solicitors involved in sales processes to check whether EPC documents have been presented. For rentals,

		various options could be explored further to encourage stakeholders to check for compliance.

Table 16: Options for Scotland to improve their operational governance of EPCs

Options have not been assessed for feasibility of implementation in Scotland, or for potential long-term impacts. There is an opportunity for additional research, if the Scottish Government wish to explore any of these options in further detail.

Each of these options are outlined below, with a series of sub-options which outline how each overarching option could be operationalised in practice. These options are not mutually exclusive and could be implemented in conjunction with each other.

6.1 Including standardised training requirements for independent experts in the operational framework

Sub-option 1a – Introduce standard education and qualification requirements into the operational framework

This could include requirements for higher education and/or relevant professional experience. However, the flexible approach adopted in Bulgaria, Denmark, Estonia and Ireland ensures that independent experts can access via multiple routes. In Scotland, this could mean that experts must either:

1. Hold a National Vocational Qualification (NVQ) Level 3 or other similar (as required in England and Wales) or,
2. Demonstrate they hold an equivalent level of experience, which could be in the form of another qualification alongside proof of significant industry experience.

Requirements could also be tailored by assessor type. For example, higher education is only required for EPC assessors who conduct EPCs for new buildings in Belgium (Flanders).

Although AOs in Scotland may be using similar pre-requisites for independent experts, these are not standardised and may vary by AO. Ensuring that requirements are clearly defined in the operational framework will reduce ambiguity in requirements and ensure standardisation across the country.

Sub-option 1b – Approve a standardised mandatory training programme for independent experts

This can be delivered by AOs, but the content should be regularly updated and approved by the Scottish Government to ensure independent experts have skills which are aligned with the most recent developments in the sector.

This could be combined with an examination and, on passing, certification proving the independent expert has attended and taken on board the content of the training modules.

Sub-option 1c – Introduce requirements to attend mandatory annual re-training

In addition to a Scottish Government-approved training module for assessors, the Scottish Government could approve an annual retraining course for assessors. Mandatory retraining for assessors to keep their license would ensure assessors are up to date with the latest

developments in the field and present an opportunity to learn from and correct mistakes. The approach taken in Belgium (Flanders) could be adopted, where retraining includes both mandatory modules (which cover common errors or new developments in the field) and optional modules, tailored to the assessor type and/or any infractions identified for that assessor in the previous year.

6.2 Develop standardised QA procedures for AOs in the operational framework

Sub-option 2a - Develop a digital QA system and screening of EPC input data

To streamline current QA procedures, a central digital system could be developed that screens and sense-checks EPC input data for errors. For example, when an independent expert conducts an assessment, they can input data into a digital system which will flag when they have input data which falls outside an expected range. An example of this approach is the digital 'control web' in Belgium (Wallonia), which screens all submitted EPCs to flag inconsistent values or data.

Sub-option 2b – Establish a 'Helpdesk' function to receive complaints about EPCs
Some member states, including Croatia and Belgium (Flanders) operate a helpdesk function, which customers can use to submit complaints or report suspected non-compliance. This could be introduced in Scotland and co-ordinated by central government at a national level, with complaints being redirected to the relevant AO for further investigation.

Sub-option 2c - Targeted audits of EPCs based on specific risk factors
In addition to the minimum random sampling required by the EPBD, best practice among member states is to combine this sampling with more targeted audits in a two-tiered QA approach. The approach taken in Ireland and Belgium (Flanders) is that certain risk factors, such as assessors issuing a large number of EPCs, or a complaint from a customer, trigger a targeted audit. These can be desk-based or on-site, but the Operating Framework could clearly outline what risk factors trigger a particular follow-up audit.

Sub-option 2d – Outline a clear penalty system for assessor infractions
A penalty points system, which clearly outlines what infractions result in what penalties, could be outlined in the operational framework to ensure that all assessors and AOs are clear about the penalties which will be issued in identified cases of non-compliance. Linking infractions to points and setting a maximum number of points would result in the suspension of their accreditation.

Penalties for assessors should be developed alongside a standardised and regular training schedule. Working with assessors, by providing regular and up-to-date training opportunities, gives them the opportunity to refresh their training. It also allows repeat issues to be targeted in dedicated training sessions and would ensure assessors remain engaged and interested in the process.

6.3 Engage wider stakeholders in the rental/sales process to support enforcement of the requirement to present an EPC

Sub-option 3a – Formalising the requirement for solicitors to check EPC documentation at the point of sale

The European Commission's 2015 compliance study reported that member states generally struggle to enforce the requirement to make EPCs available at the point of sale or rent and data availability on compliance rates is often low. member states that are enforcing this in a robust manner rely on notaries to conduct checks during the sale transaction (European Commission, 2015).

Solicitors are responsible for checking documentation during a property sale in Scotland. Formalising the requirement to check the presence of an EPC at the point of sale as part of a legal checklist could result in greater enforcement of this requirement in Scotland.

Sub-option 3b – Requirements for stakeholders in the rental market to check EPC documentation

Rental agreements often do not involve a legal professional in the process, so they cannot be targeted in the same way as sales (European Commission, 2015). Hungary was the only country we identified that required a legal professional to sign-off on all rental agreements. Generally, this means that the systems in place to enforce these requirements are less developed in the rental sector, resulting in lower compliance or limited data availability on compliance rates.

Various options could be explored as to how this requirement could be enforced in the rental market. These could include:

- Requiring that a legal professional signs off on all rental agreements in Scotland
- Formalising the requirement to present an EPC when registering on the Scottish Landlord Register
- Introducing compliance measures for estate agents, such as legal obligations or linking compliance to incentives such as green financing
- Encouraging estate agents to use the Helpdesk function to report instances of non-compliance

7 References

Alembic Research, Energy Action Scotland and Dr Patrick Waterfield (2019) A review of domestic and non-domestic energy performance certificates in Scotland. Available at: A Review of Domestic and Non-Domestic Energy Performance Certificates in Scotland: Research report for the Scottish Government, Heat, Energy Efficiency and Consumers Unit - Final Report (www.gov.scot)

Arbeiterkammer Oberösterreich (2024). Energy certificate. Available at: https://ooe.arbeiterkammer.at/beratung/wohnen/mieten/Energieausweis.html#:~:text=Fehlt%20ein%20g%C3%BCltiger%20Energieausweis%2C%20muss,Geb%C3%A4udes%20entsprechende%20Gesamtenergieeffizienz%20als%20vereinbart.

Arroyo, C. (2024). How much does an energy efficiency certificate cost? cronoShare. Available at: https://www.cronoshare.com/cuanto-cuesta/certificado-eficiencia-energetica

Azzolini et al. (2020). Implementation of the EPBD Italy status in 2020. Energy and Sustainable Economic Development (ENEA) and Italian Thermo-technical Committee (CTI). Available at: https://epbd-ca.eu/wp-content/uploads/2022/03/Implementation-of-the-EPBD-in-Italy-2020.pdf

Bekierski et al. (2020). Implementation of the EPBD Poland status in 2016. Available at: https://epbd-ca.eu/ca-outcomes/outcomes-2015-2018/book-2018/countries/poland

Berard (2023). So, what is it and how does it affect you? Available at: https://blog.se.com/homes/2023/09/21/navigating-the-changing-property-scene-in-france-a-quick-guide-for-renters-and-property-owners/#:~:text=The%20DPE%2FEPC%20is%20payable,is%20valid%20for%20ten%20years.

Borragán, G. and Legon, C. (2021). Guidelines on how national Energy Performance Certificates (EPCs) schemes and the Smart Readiness Indicator (SRI) could be linked. ePANACEA. Available at: https://www.construction21.org/articles/h/epanacea-how-can-national-epc-schemes-be-linked-with-the-smart-readiness-indicator.html

BPIE (2014). Energy performance certificates across the EU. Available at: https://www.bpie.eu/publication/energy-performance-certificates-across-the-eu/#:~:text=This%20report%20explores%20the%20national,of%20the%20European%20building%20stock.

BPIE (2018). Factsheet: Bulgaria current use of EPCs and potential links to iBRoad. Available at: http://bpie.eu/wp-content/uploads/2018/01/iBROAD_CountryFactsheet_BULGARIA-2018.pdf

BRE (n.d.). Fee Factsheet. Available at: https://www.bre.co.uk/filelibrary/Scotland/Fees_Sheet_7_April__update_(2).pdf

Centre for Renewable Energy Sources and Saving [CRES] (2020). Implementation of the EPBD Greece status in 2020. Available at: https://www.ca-epbd.eu/Media/638373599786588364/Implementation-of-the-EPBD-in-Greece-2020.pdf

Certienergie (n.d.b). Prices of Energy Performance Certificates. Available at: https://www.certinergie.be/en/energy-performance-certificate/epc-prices/

Citizens Information (2024). Getting a building energy rating for your home. Available at: https://www.citizensinformation.ie/en/housing/owning-a-home/home-owners/getting-a-building-energy-rating-for-your-home/#:~:text=The%20price%20of%20a%20BER,on%20which%20one%20to%20choose

Degiorgio and Barbara (2016). Implementation of the EPBD Malta. Building Regulation Office. Available at: https://epbd-ca.eu/ca-outcomes/outcomes-2015-2018/book-2018/countries/malta

Delorme and Higley (2020) Implemetation of the EPBD in the United Kingdom – England. Status in 2020. AECOM and Ministry of Housing, Communities and Local Government. Available at: https://www.ca-epbd.eu/Media/638373595508144645/Implementation-of-the-EPBD-in-the-United-Kingdom--England-2020.pdf

Delorme and Hughes (2016). EPBD implementation in the United Kingdom - Scotland. Status in December 2016. AECOM and Local Government and Communities Directorate. Available at: https://epbd-ca.eu/wp-content/uploads/2019/05/CA-EPBD-IV-UK-Scotland-2018.pdf

Deslot et al. (2020). Implementation of the EPBD France status in 2020. General Directorate for Urban Development, Housing and Nature, General Directorate for Energy and Climate (DGEC). Available at: https://epbd-ca.eu/wp-content/uploads/2022/10/Implementation-of-the-EPBD-in-France-%E2%80%93-Status-in-2020.pdf

Encius (2016). EPBD implementation in Lithuania. Status in December 2016. Certification Centre of Building Products (SPSC). Available at: https://epbd-ca.eu/wp-content/uploads/2019/04/CA-EPBD-IV-Lithuania-2018.pdf

Energistyrelsen, Aalborg University & Danish Housing and Planning Authority (2020). Implementation of the EPBD Denmark Status in 2020. Available at: https://epbd-ca.eu/wp-content/uploads/2021/07/Implementation-of-the-EPBD-in-Denmark-%E2%80%93-2020.pdf

European Commission (2021a). Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02010L0031-20210101

European Commission (2015). Energy Performance of Buildings Directive (EPBD) compliance study. Available at: https://op.europa.eu/en/publication-detail/-/publication/00e943a2-aa0a-11e5-b528-01aa75ed71a1/language-en/format-PDF/source-317980685

European Union (2024). Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast). Official Journal of

the European Union. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401275&pk_keyword=Energy&pk_content=Directive

Federal Agency for Energy Efficiency [BfEE] (2020). Implementation of the EPBD Germany status in 2020. Available at: https://epbd-ca.eu/wp-content/uploads/2022/10/Implementation-of-the-EPBD-in-Germany-2020.pdf

Fourez et al. (2020). Implementation of the EPBD Belgium - Walloon Region Status in 2022. Available at: https://epbd-ca.eu/wp-content/uploads/2022/10/Implementation-of-the-EPBD-in-Belgium-2020-%E2%80%93-Walloon-Region.pdf

Fragoso and Baptista (2016). EPBD Implementation in Portugal. Status in December 2016. Available at: https://epbd-ca.eu/wp-content/uploads/2018/08/CA-EPBD-IV-Portugal-2018.pdf

Hang.ee (2022). Energy label and energy efficient house. Available at: https://www.hange.ee/blogi/energiamargis-ja-energiatohus-maja/

Hjorth et al. (2021). Implementation of the EPBD Sweden status in 2021. Available at: https://epbd-ca.eu/wp-content/uploads/2022/10/Implementation-of-the-EPBD-in-Sweden.pdf

Jenei et al. (2020). Implementation of the EPBD Hungary status in 2020. Available at: https://epbd-ca.eu/wp-content/uploads/2022/10/Implementation-of-the-EPBD-in-Hungary-2020.pdf

Kranzl, L. (2020a). Energy Performance Certificates, assessing their status and potential. Available at: https://x-tendo.eu/wp-content/uploads/2020/05/X-TENDO-REPORT_FINAL_pages.pdf

Loncour, X. and Heijmans, N. (2018). Certification, Control system and Quality – 2018. Concerted Action Energy Performance of Buildings. Available at: https://www.ca-epbd.eu/Media/638373594206410585/CA-EPBD-CT3-Certification_Control-system_Quality-2018.pdf

Marđetko-Škoro, N. (2015). Implementation of the EPBD in Croatia - Status December 2014. In 2016 Implementing the Energy Performance of Buildings Directive (EPBD) – Featuring country reports. ADENE. https://www.epbd-ca.eu/outcomes/2011-2015/CA3-2016-National-CROATIA-web.pdf

Mečíccrová, L. (2021). How much does a certificate of energy performance of buildings cost and when do you need it? Finance.cz. Available at: https://www.finance.cz/538646-energeticke-stitky-budov-platnost-cena-pokuta/#:~:text=Vydat%20platn%C3%BD%20pr%C5%AFkaz%20energetick%C3%A9%20n%C3%A1ro%C4%8Dnosti,3%20a%C5%BE%207%20tis%C3%ADc%20korun.

Ministry of Construction and Physical Planning [MCPP] (2020). Implementation of the EPBD Croatia, Status in 2020. Available at: http://bpes.ypeka.gr/?page_id=21

Ministry of Economic Affairs and Communications, Tallinn University of Technology & Estonian Consumer Protection and Technical Regulatory Authority (2020). Implementation of the EPBD Estonia Status in 2020. Available at: https://epbd-ca.eu/wp-content/uploads/2022/10/Implementation-of-the-EPBD-in-Estonia.pdf

Ministry of Energy, Commerce and Industry [MECI] (2020). Implementation of the EPBD Cyprus status in 2020. Available at: https://epbd-ca.eu/wp-content/uploads/2022/03/Implementation-of-the-EPBD-in-Cyprus.pdf

Ministry of the Environment of Finland & Motiva Oy (2020). Implementation of the EPBD Finland status in 2020. Available at: https://epbd-ca.eu/wp-content/uploads/2021/07/Implementation-of-the-EPBD-in-Finland-%E2%80%93-2020.pdf

Motiva (2024). What does the energy certificate cost? Available at: https://www.motiva.fi/ratkaisut/energiatodistusneuvonta/mika_on_energiatodistus/mita_energiatodistus_maksaa

Netherlands Enterprise Agency (2021). Price survey and international comparison of the NTA 8800 Energy Performance Certificate. Available at: https://www.rvo.nl/sites/default/files/2022/02/price-survey-and-international-comparison-of-the-nta-8800-energy-perfermance-certificate-summary.pdf

Österreichisches Institut für Bautechnik [OIB] (2020). Implementation of EPBD in Austria, status in 2020. Available at: https://www.ca-epbd.eu/Media/638373591769297881/Implementation-of-the-EPBD-in-Austria--2020.pdf

Olschner, S (2024). Energy certificate for the house: when it is mandatory and what it costs. Available at: https://www.adac.de/rund-ums-haus/energie/spartipps/energieausweis/

RTL Today (2014). Understanding the energy passport. Available at: https://today.rtl.lu/life/real-estate/a/1240940.html

Sayfikar, M. & Jenkins, D. (2024). Cross-country comparison of format and nature of recommended improvements in different EPCs. Available at: https://www.crosscert.eu/fileadmin/user_upload/crossCert_D3.4_Cross-country_comparison_recommended_improvements_EPCs.pdf

Schoenherr (n.d.). Slovenia: Energy Performance Certificate (EPC) - Additional Burden on Real Properties' Owners or Welcomed Measure? Available at: https://www.schoenherr.rs/uploads/tx_news/schoenherr_Slovenia_Energy_Performance_Certificate__EPC_.pdf

Scottish Government (2012). Energy Performance Certificate approved organisations: operational framework. Available at: https://www.gov.scot/publications/energy-performance-certificate-approved-organisations-operational-framework/

Scottish Government (2017). Consultation on funding of the Scottish Energy Performance Certificate Register. Available at:

https://www.gov.scot/binaries/content/documents/govscot/publications/consultation-paper/2017/05/consultation-funding-scottish-energy-performance-certificate-register-consultation-funding-scottish/documents/00517537-pdf/00517537-pdf/govscot%3Adocument/?inline=true

SEAI (2016). Quality Assurance System and Disciplinary Procedures (QADP) for Building Energy Rating (BER) and Display Energy Certificates (DEC). Available at: https://www.seai.ie/publications/Quality-Assurance-System-and-Disciplinary-Procedure-New.pdf

SEAI (2017a). Training courses - Step 2: Complete the BER training course. Available at: https://www.seai.ie/register-with-seai/ber-assessor/training-courses/

SEAI (2017b). About us. Available at: https://www.seai.ie/about/

Slovak Trade Inspection (n.d.). Slovak Trade Inspection. Available at: https://www.soi.sk/en/SOI.soi

StanGRAD (n.d.). Energy certification of real estate in Croatia. Available at https://nekretnine-stangrad.hr/about-us/topics/constructing-real-estates-for-sale/energy-certification-of-real-estate-in-croatia

Sustainable Energy Development Agency [SEDA] (2020). Implementation of the EPBD Bulgaria status in 2020. Available at: https://epbd-ca.eu/wp-content/uploads/2022/10/Implementation-of-the-EPBD-in-Bulgaria-2020.pdf

TU Wien (2021). Description of current Energy Performance Certificates (EPCs) related policy framework in implementing countries. Available at: https://epanacea.eu/?smd_process_download=1&download_id=2670

Worré et al. (2020). Implementation of EPBD in Luxembourg, status in 2020. Ministry of Energy and Spatial Planning. Available at: https://epbd-ca.eu/wp-content/uploads/2022/10/Implementation-of-the-EPBD-in-Luxembourg-%E2%80%93-Status-in-2020.pdf

Appendix A Methodology

Literature review

Identifying and logging sources
We conducted a literature review using key search terms and Boolean operators where relevant, to maximise the search outputs and refine results. We used key search terms including: 'Energy efficiency in buildings', 'EPC', 'Implementation', '[Name of Member State], in combination with each of the following terms 'Legislation', 'Governance', 'Independent Control System', 'Assessors', 'Accreditation', 'Audit', 'Verification', 'Assurance', 'Enforcement body', 'Enforcement mechanism', 'Affordability'.

We conducted searches in English and in the official language of the MS in question, using machine translation software DeepL. We used Google and Google Scholar to conduct searches.

Data extraction into summary database
When we identified relevant data sources, we reviewed them in full and extracted relevant information into a summary database (Annex A). The summary database was structured with a row for each MS and Scotland (28 total) and columns representing an area of interest for the research. These included:

- Key data sources used for the country in question.
- Governance model.
- Qualifications and training for EPC assessors.
- Auditing, verification and QA of EPCs.
- Enforcement of EPC requirements.
- How affordability of EPCs is ensured.

Case studies

Based on the outputs of the literature review, we selected three case studies of interest, which adopted different approaches to that currently taken in Scotland for the operational governance of EPCs. These were jointly selected with the Scottish Government. The three final case studies selected were:

- Belgium
- Croatia
- Ireland

We first drafted each case study from the outputs of the literature review, and the enhanced them with targeted consultation with experts from the MS in question.

Targeted interviews

We held eight interviews with key stakeholders to supplement this research, as well as an additional interview with a Scottish Government representative to better understand the operational governance. These consisted of:

- Two interviews with overarching EU-level EPC experts.

- One email-based interview with a Danish EPC expert.
- Two interviews with Irish EPC experts.
- One interview with a Belgian EPC expert from Belgium (Flanders), and one email-based interview with an expert from the Walloon region (representatives from Brussels were contacted, but either did not respond or were unavailable to participate in this research).
- One interview with a Croatian EPC expert (additional interviewees from Croatia were contacted, but either did not respond or were unavailable to participate in this research).
- One interview with a Scottish EPC expert.

In most cases, the country-level EPC experts worked on EPC regimes within national governments.

Case study limitations

We conducted this research on a relatively short timescale (between April and July 2024). The collected data was used to derive policy options for improving the operational governance of EPCs in Scotland. A detailed assessment of the long-term impacts of these policy options, including analysis of uncertainties associated with future scenarios and feasibility constraints, was not within scope of this project.

Appendix B Summary database

Submitted as a separate Excel document

Appendix C Case study - Belgium

Submitted as a separate standalone document

Appendix D Case study – Croatia

Submitted as a separate standalone document

Appendix E Case study – Ireland

Submitted as a separate standalone document

Appendix F Table of estimated EPC costs in member states

Member state	Estimate EPC cost
Austria	Average of €400 (Netherlands Enterprise Agency, 2021)
Belgium (Brussels)	Gap
Belgium (Flanders)	Prices range from €195 for a small apartment to €345 for a 5-bedroom house (Certinergie, n.d.b).
Belgium (Wallonia)	Single family house average of €480 Apartment average €165 (Fourez et al, 2020)
Bulgaria	€0.2 - €1 per m^2 (BPIE, 2014)
Cyprus	Gap
Czechia	3000-7000 crowns, tens of thousands of crowns if an energy specialist is required to visit (Mečíccrová, 2021)
Germany	Single family home average of less than €100 If an on-site inspection is required, this is €300 – €500 (Olschner, 2024)
Denmark	EPCs in 2024 are capped at €1,067 for a single family house. However, competition makes the price lower – currently around €667. For larger buildings the price for EPCs is subject to a free market. For larger buildings the price for EPCs is subject to a free market[22].
Estonia	Average for existing house of €100 – €300 (Hang.ee, 2022)
Spain	Average price of €60 – €130 for a 50-100m^2 building (Arroyo, 2024)
Finland	Small houses average of €300 – 400 (existing) and €200 – €300 (new) Terraced houses and apartments average of €510 (existing) and €450 (new) (Motiva, 2024)
France	Average of €100 – €250 (Berard, 2023)
Greece	Gap
Croatia	Capped at €1.5 / m^2 (BPIE, 2014)
Hungary	Price is regulated for apartments and single family homes at €40 + VAT (Jenei et al, 2020; Kranzl, 2020a)
Ireland	Apartments average of €150 Standard house average of €200 – €300 (Citizens Information, 2024)
Italy	Average of €150
Lithuania	Between €100 – €500 (Encius, 2016)
Luxembourg	Between €500 – €1000 (RTL Today, 2014)
Latvia	Gap
Malta	Gap
The Netherlands	Average of €255 (Netherlands Enterprise Agency, 2021)
Poland	Between €40 – €1300 (Bekierski et al., 2016)
Portugal	Average of €200 (Netherlands Enterprise Agency, 2021)

[22] Information obtained during interview with Danish EPC Expert

Romania	Gap
Sweden	Average for a single family house of €500 (BPIE, 2014)
Slovenia	Price is regulated at €1.5 / m^2 for residential buildings up to 220m^2 and €2 / m^2 for over 220 m^2, and €1 – €4 / m^2 for apartment buildings (depending on number of dwellings) (BPIE, 2014) There's also a cap of €170 for one-dwelling and two-dwelling buildings (Kranzl, 2020a)
Slovakia	Average of an apartment (60m^2) of €200 Average of a single family house (220m^2) of €250 Average of small apartment building of €1000 (Schoenherr, n.d.)

ClimateXChange
Edinburgh Climate Change Institute
High School Yards
Edinburgh EH1 1LZ
+44 (0) 131 651 4783

info@climatexchange.org.uk
www.climatexchange.org.uk

If you require the report in an alternative format such as a Word document, please contact info@climatexchange.org.uk or 0131 651 4783.