SRI2MARKET

SRI2MARKET Project – Paving the way to adoption of the SRI into national regulation and market

# Strategies for introducing SRI certification

## Deliverable 2.4

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## List of Abbreviations

| | |
|---|---|
| BACS | Building Automation and Control Systems |
| EC | European Commission |
| EED | Energy Efficiency Directive |
| EPB | Energy Performance of Buildings |
| EPBD | Energy Performance of Buildings Directive |
| EPC | Energy Performance Certification (or certificate – context based) |
| EU | European Union |
| EV | Electric Vehicle |
| HVAC | Heating, Ventilation, and Air Conditioning system |
| ICT | Information and Communications Technology |
| LIFE | Programme for the Environment and Climate Action |
| MS(s) | Member State(s) |
| OIB | Austrian Institute of Construction Engineering |
| SRI | Smart Readiness Indicator |

# 1. Executive summary

This report evaluates potential **certification pathways for the Smart Readiness Indicator (SRI)** within the SRI2MARKET project, focusing on alternative implementation paths, costs, and benefits of **combined Energy Performance Certification (EPC) and SRI assessments**. To establish integration pathways for the SRI framework with existing EPC certification systems, it is crucial to understand the **specific characteristics of EPC systems in each targeted EU Member State** (Austria, Croatia, Cyprus, France, Portugal, Spain, and Greece). Despite following the Energy Performance of Buildings Directive (EPBD) framework, EU Member States exhibit diverse approaches to EPC systems, including calculation methods, energy performance classes, expert qualifications, training, inspection procedures, management structures, and certificate designs. The new EPBD aims for coherence across systems while allowing flexibility for national adaptations, promoting increased EU harmonization. **A high degree of complementarity and synergies is also clearly identified in other EU schemes**, policy instruments and standards such as the **Energy Performance of Buildings (EPB) standards with a focus on Building Automation and Control Systems (BACS)** but also other initiatives such as the **LEVEL(s) framework**, which provides a common language for assessing and reporting on the sustainability performance of buildings.

**The analysis of SRI integration in EPC certification systems across the various countries suggests a mildly integrated solution is more likely, allowing flexibility in SRI certification while keeping the close link to EPC assessments**. Regardless of the possible pathway, some critical features are highlighted such as SRI certification leveraging on EPC data, ensuring database interoperability, and aligning the visual identity of SRI certificates with EPC certificates. Research on the **costs of integrated EPC/SRI assessments** shows that while SRI assessments add time and costs to EPC processes, the overall impact **is manageable, with significant potential savings and benefits, especially in scenarios of full integration with EPC systems**.

Looking briefly at the **main conclusions per country** and degree of possible integration with EPC systems, it is possible to highlight that **Austria**'s flexible integration of SRI with EPC systems will focus on energy savings and GHG reductions, allowing for future mandatory provisions and market-led innovations. **Croatia**'s centralized EPC system and robust quality control suggest a more integrated EPC/SRI approach, emphasizing energy savings and policy impacts. **Cyprus** will likely adopt a mildly integrated scenario, focusing on data exchange and user control. **France**'s test phase experience supports a mildly integrated scenario with advanced features like weighting factors from EPC assessments. **Greece and Portugal**, with high data overlap and centralized systems, favour fully integrated scenarios, leveraging existing infrastructure and strong quality checks. **Spain**'s EPC governance and strong private sector interest also suggest a mildly integrated scenario leaning to a more independent assessment of SRI, emphasizing data exchange and user empowerment.

The SRIMARKET evaluation also suggests potential certification pathways for SRI integration in other countries, considering their national EPC frameworks. Providing a two-step approach - evaluating current systems and deciding on the integration pathway – **defines a blueprint for other countries interested in implementing SRI certification**.

# 2. Introduction

## 2.1 SRI context and main objectives

Building smartness is an increasingly important factor in promoting greater comfort and health for occupants, more effective energy management and better information. The 2018 recast of the European directive on the energy performance of buildings (EPBD) strongly underlined the potential of smart technologies in the building sector to improve both energy efficiency and people's well-being. In this context, the EPBD has thus introduced the concept of the "Smart Readiness Indicator" (SRI): a common EU scheme to classify the readiness of buildings for smart technologies.

In the current recast of the EPBD directive (Directive (EU) 2024/1275) [1], published in May 2024, the SRI is strengthened. More specifically, SRI is planned to become mandatory from June 2027, after a testing phase, for non-residential buildings with an effective rated output for heating systems, air-conditioning systems, systems for combined space heating and ventilation, or systems for combined air-conditioning and ventilation of over 290 kW.

The implementation of the SRI at Member State and European level will provide a glimpse of the building stock in terms of its readiness for smart technologies and its ability to interact with building occupants and the energy grid, as well as its ability to use smart technologies for more effective energy management. It should also provide confidence to occupants about the actual savings provided by these new enhanced functionalities. The results of the evaluations will provide policymakers with the necessary data to implement policies that effectively promote the application of smart technologies in buildings and, overall, increase the monitoring capacity on energy efficiency policies in buildings. The objective is also to prepare the building stock for an energy transition scenario in which a greater contribution of intermittent renewable sources and decentralized production and storage implies the need for flexible building technologies capable of balancing the system.

From a technician point of view, this methodology can be a powerful tool to recommend improvement measures in relation to Building Automation and Control Systems (BACS) that can provide cost-effective solutions to improve energy efficiency, but also to prepare buildings for the future energy transition scenario. At the same time, the SRI will empower end-users (owners, tenants and building occupiers) by providing them with information on their buildings' smart readiness for technologies, including their ability to perform SRI self-assessments.

The current SRI methodology (as depicted in the delegated and implementing acts, respectively, (EU) 2020/2156 [2] and (EU) 2020/2155 [3] both from 14 October 2020) ranks the readiness of buildings to adopt smart technologies by their ability to perform three key functionalities:

1. energy performance and operation,
2. response to the needs of the occupants, and
3. energy flexibility, including the ability of the building or building unit to enable participation in demand response.

The current EPBD recast adds an additional functionality related to the ability to improve energy efficiency and overall performance through the use of energy-saving technologies and suggests it can also include the interoperability between systems (smart meters, building automation and control systems, built-in home appliances, self-regulating devices for the regulation of indoor air temperature within the building and indoor air quality sensors and ventilations), and the positive influence of existing communication networks. The updated EU SRI regulations, including the new provisions and the results of the test phases currently ongoing or already completed in 15 EU member-states (Austria, Belgium (Flanders), Bulgaria, Croatia, Cyprus, Czech

Republic, Denmark, Finland, France, Germany, Greece, Poland, Portugal, Slovenia and Spain), are planned to be published on the 30th of June 2027.

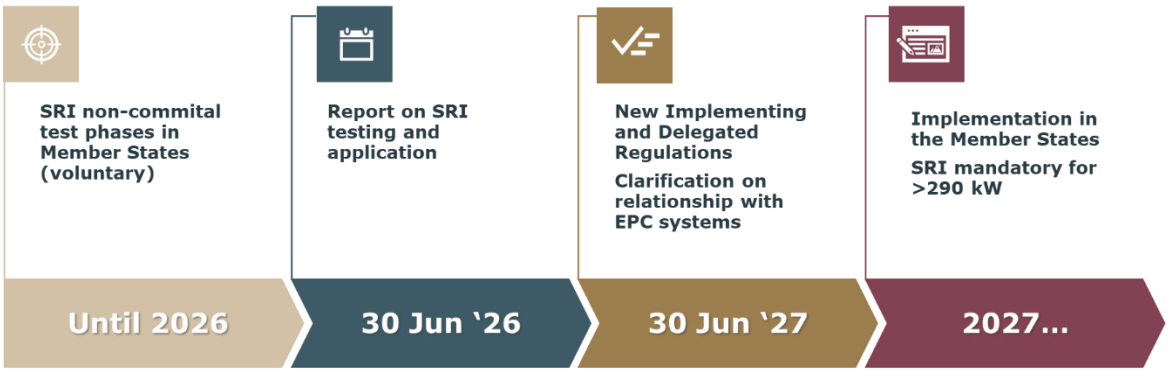


*Figure 1 – SRI implementation timeline in the EU.*

The legal framework in force at moment, defines SRI as an optional tool for Member States, details the test phase conditions, and the generic framework for the calculation of the value of SRI for the buildings (which is based on the three key functionalities mentioned above, seven impact criteria and nine technical domains), the rules for weighting criteria between these parameters and a framework for a service catalogue. The technical framework is to be defined by each Member State and must be provided by national authorities implementing the SRI, adapted to their circumstances and policy priorities, since there is a wide range of adaptations and configurations possible on all the components mentioned above. Still, a generic technical framework, which was designed after extensive Europe-wide stakeholder consultations, is available under request at the European Commission dedicated website [4]. It includes a smart ready service catalogue (54 services in total) and respective functionality levels (ranging from 0 to 4 where a higher functionality level reflects a smarter performance). The service catalogue is an available tool that describes specific services in each technical domain (examples: storage and shifting of thermal energy, control of distribution pumps in networks, window control, EV charging capacity) and respective functionality levels (example: level 0: no automatic control; level 4 optimized control based on grid signals and predictive modelling). More detailed information on the current calculation methodology is presented in chapter 3, the full list of services is also available in Table 4 and the full description can be found in the SRI2MARKET learning course.

Additionally, two methods have been developed based on these service catalogues: a more simplified calculation methodology with only 27 services, as a simplified version to be used mainly in smaller residential buildings called "Method A"; and "Method B" which includes all 54 services and is more suitable to more experienced assessors and more useful to larger non-residential buildings. Still, both methods can be applied to all types of buildings.

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In this context, there are several ongoing and past EU funded projects working on the development of the methodology, its implementation at the policy level, and the creation of new features and tools related to the Smart Readiness. Four of these projects have started in 2022 as part of the LIFE programme call "Creating the conditions for a global improvement of smart readiness of European buildings" and three have started in 2023 as part of the call "Energy performance and Smart Readiness of buildings – making the instruments work" (details, links, contacts and outputs for each project can be reached at the EU's dedicated webpage on the SRI [4]. The SRI2MARKET is one of these projects and aims to:

1. Support the targeted EU Member States (Austria, Croatia, Cyprus, France, Portugal, Spain) on introducing the SRI into their national regulation – although not a directly targeted country, several outputs and support are also being developed to Greece;
2. Propose public funding schemes to finance SRI upgrades in buildings;
3. Develop tools to guide SRI assessors and streamline building assessments;
4. Provide training to EPC (Energy Performance Certification) assessors on the SRI and the methodology of its calculation;
5. Set up SRI pilots at national level so as to identify best practices for SRI assessments;
6. Provide recommendations to building owners and facility managers on cost-effective SRI upgrades.

Two tools have already been developed by SRI2MARKET, which are **freely available by signing up at** SRI2MARKET learning course. These include (i) an e-learning course on the SRI (which has textual contents and explanatory videos) and is intended to be thorough and easy to use, suitable for both beginners and advanced learners and, (ii) an SRI assessment tool designed for conducting and securely storing assessments related to SRI. Both tools are available in English, German, Spanish, French, Croatian, Portuguese, and Greek.

## 2.2 Objectives and structure of this report

Within the SRI2MARKET project, an assessment is being made on the possible certification pathways in the targeted countries which is the core of this report. The purpose of this assessment is to evaluate alternative implementation paths for SRI certification and the costs and benefits from introducing combined EPC-SRI assessments and alternative options regarding the way SRI certificates could be issued. To evaluate the integration potential, several tools were used such as a questionnaire to experts on current EPC systems certification processes, a simplified multicriteria evaluation and an overlap analysis of inputs used in SRI evaluations and EPC systems.

This report begins with an **Introduction section**, which sets the stage by detailing the context for SRI implementation and the main objectives of the SRI2MARKET project. This section is divided into two parts: the first part explains the background and primary goals of the SRI2MARKET initiative, while the second part outlines the specific aims of the report, and the task related to SRI certification pathways.

Following the introduction, the report delves into the **SRI Implementation Process**. This section describes the steps involved in implementing the SRI. It includes details on the calculation methodology, the types of buildings and geographical areas covered, and discusses optional elements within the SRI framework. Additionally, it explains the quality control system, the qualifications required for experts, the issuance and terms of use for SRI certificates, and how the SRI is monitored and promoted. The design of the SRI certificates and the non-committal test phases are also covered.

Next, the report provides **country profiles on Current EPC Certification Systems**, offering an overview of the current EPC systems in various countries. This section discusses the EPC within the context of the current and new EPBD and focuses on the EPC systems in specific partner countries, including Austria, Croatia, Cyprus, France, Greece, Portugal, and Spain. It also includes an aggregated analysis of the EPC certification processes across these targeted countries.

The report then explores **Bridging SRI and EPC Certification**, examining how the SRI can be integrated with EPC certification. This section discusses the coordination of SRI with other EU schemes, policy instruments, and standards, including SRI and Energy Performance of Buildings (EPB) standards and certification schemes, as well as the LEVEL(s) European framework for sustainable buildings. It also examines the overlap in data requirements between SRI and EPC and details available tools and projects that are addressing SRI and EPC integration.

Following this, the report describes different SRI Certification Pathways. It outlines a simplified methodology for multicriteria analysis and presents three scenarios: "Fully Integrated," "Mildly Integrated," and "Solo." The results of the assessment for each partner country are presented, followed by a cross-analysis of these results to identify preferred certification pathways. This section also includes an evaluation of the costs and benefits of different certification pathways.

Finally, the report concludes with a wrap-up of the analysis, summarizing the findings and providing recommendations. It offers specific recommendations for each country and provides general recommendations for other countries based on a cross-analysis of the main issues

# 3. The SRI implementation process

The provisions for SRI implementation at national level are manyfold, as indicated in the EPBD [1], the Commission Delegated Regulation 2020/2155 [3] and the Commission Implementing Regulation (EU) 2020/2156 [2]. They are outlined in Figure 2.

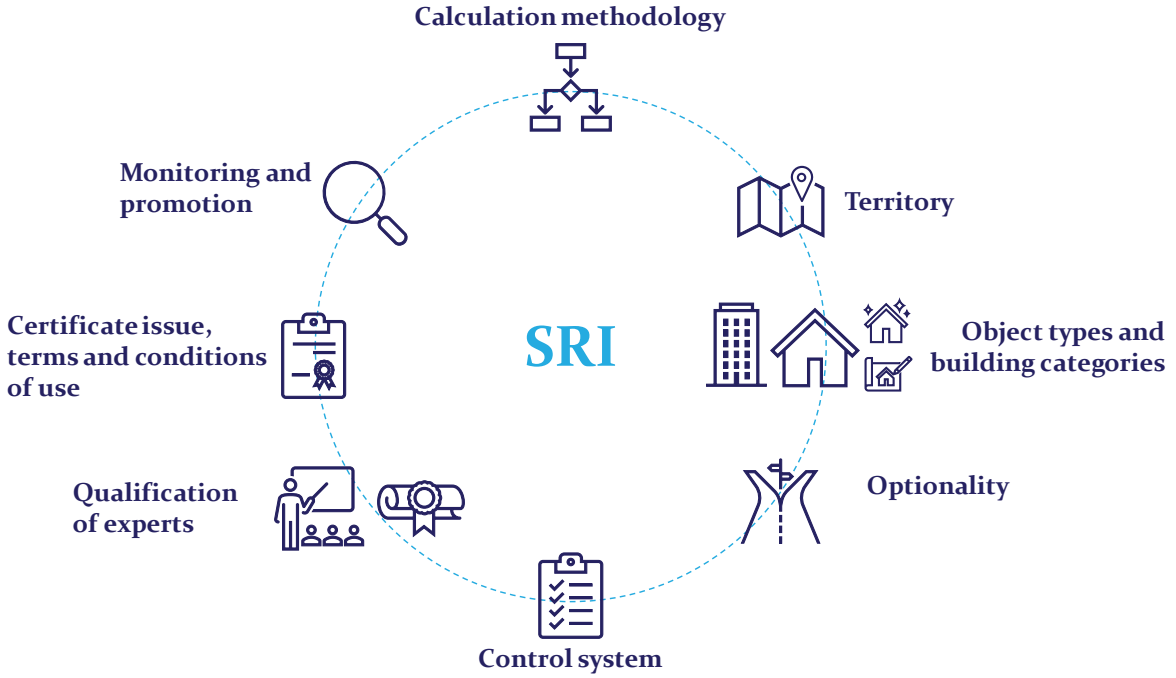



*Figure 2 - Provisions for SRI implementation at national level. SRI scheme.*

## 3.1 Calculation methodology

The Commission Delegated Regulation 2020/2155 [3] established the calculation methodology of the common Union scheme for rating the smart readiness of buildings. The methodology for calculating the SRI is based on the assessment of smart-ready services present or planned at design stage in a building or building unit, and of smart-ready services that are considered relevant for that building or building unit. The SRI support team has produced a default calculation methodology based on the Commission Delegated Regulation 2020/2155 [3], which is practically implemented in the SRI assessment package calculation tool (v4.5 being the latest) and available on request EU's dedicated webpage on the SRI [4].

The standard calculation methodology and smart readiness rating is described in annexes I to VII of the Commission Delegated Regulation 2020/2155 [3]. In an effort for consistency and comparability of building ratings across the EU, flexibility to adapt the calculation to specific conditions is allowed as per annex VII. For the national implementation of the SRI calculation methodology, the core elements, such as the calculation process for smart readiness scores, the list of impact criteria, and the technical domains, must remain unchanged by Member States. Alternatively, Member States shall decide the technical domains which should be mandatory or optional; they shall also define the respective weighting factors of relevant impact criteria and of technical domains for each functionality. The latter may differ between building types and categories. In addition, Member States ought to make available at least one smart-ready service catalogue, including the functionality levels and related scores corresponding to each service. Additional service catalogues may be devised, for instance for different building types. The framework for national implementation of the SRI calculation methodology is depicted in Figure 3.

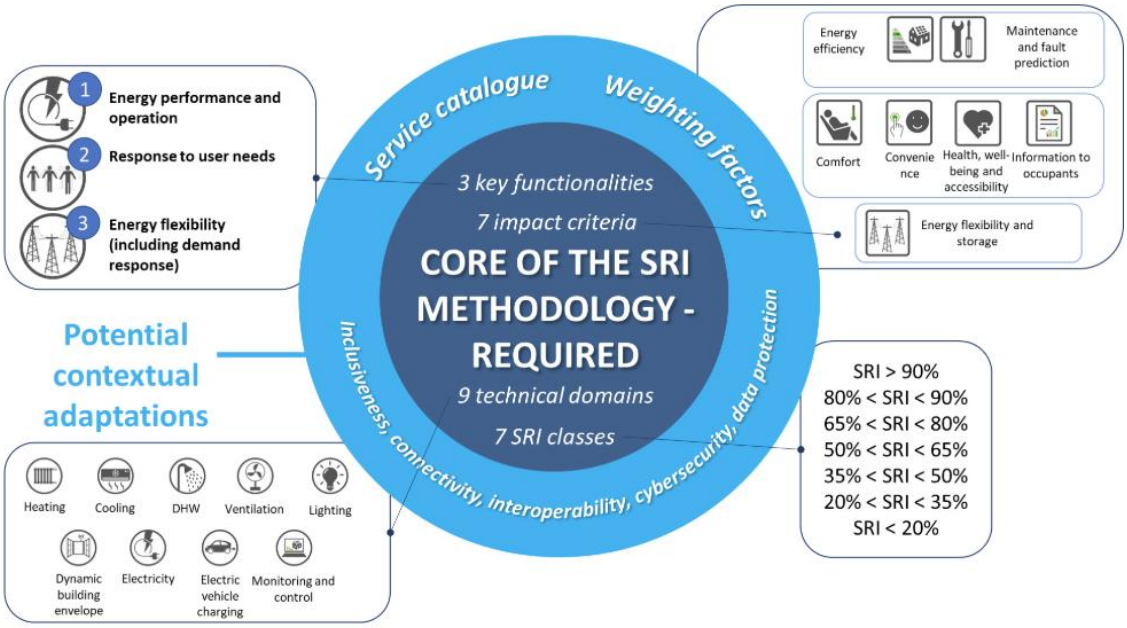



*Figure 3 - Framework for SRI implementation at national level. SRI calculation methodology.*

Member States shall define the respective weighting factors of relevant impact criteria, which shall add up to 100%. By default, the SRI Support Team proposed those outlined in Table 1, which assume equal weight of each key functionality in the overall rating, and of each relevant impact criteria.

*Table 1 - Impact criteria and default weighting factors.*

| Key functionality | | Impact criterion | | Default weighting factor |
|---|---|---|---|---|
| 1 | Energy performance and operation | | Energy efficiency | 1/6 |
| | | | Maintenance and fault prediction | 1/6 |
| 2 | Response to user needs | | Comfort | 1/12 |
| | | | Convenience | 1/12 |
| | | | Health, well-being, and accessibility | 1/12 |
| | | | Information to occupants | 1/12 |
| 3 | Energy flexibility | | Energy flexibility and storage | 1/3 |

Member States may modify the weightings for and within each key functionality. In addition, they shall define weightings of each technical domain on each impact criterion. The sum of the weighting factors of the technical domains shall equal 100%. The standard approach is dependent on the technical domain. For those related to technical building systems, except for building automation and control, the weighting factor is determined according to the energy balance of the applicable climatic zone for the impact criteria of energy efficiency, maintenance and fault prediction, and energy flexibility and storage. Member States shall define the climatic zones that are used. For every other case, equal and fixed weightings are proposed. The standard approach is depicted in Figure 4, adapted from the EU commissioned report on the technical support to the development of a smart readiness indicator for buildings [3] and proposed on the SRI technical framework, including the default equal and fixed weightings when possible.

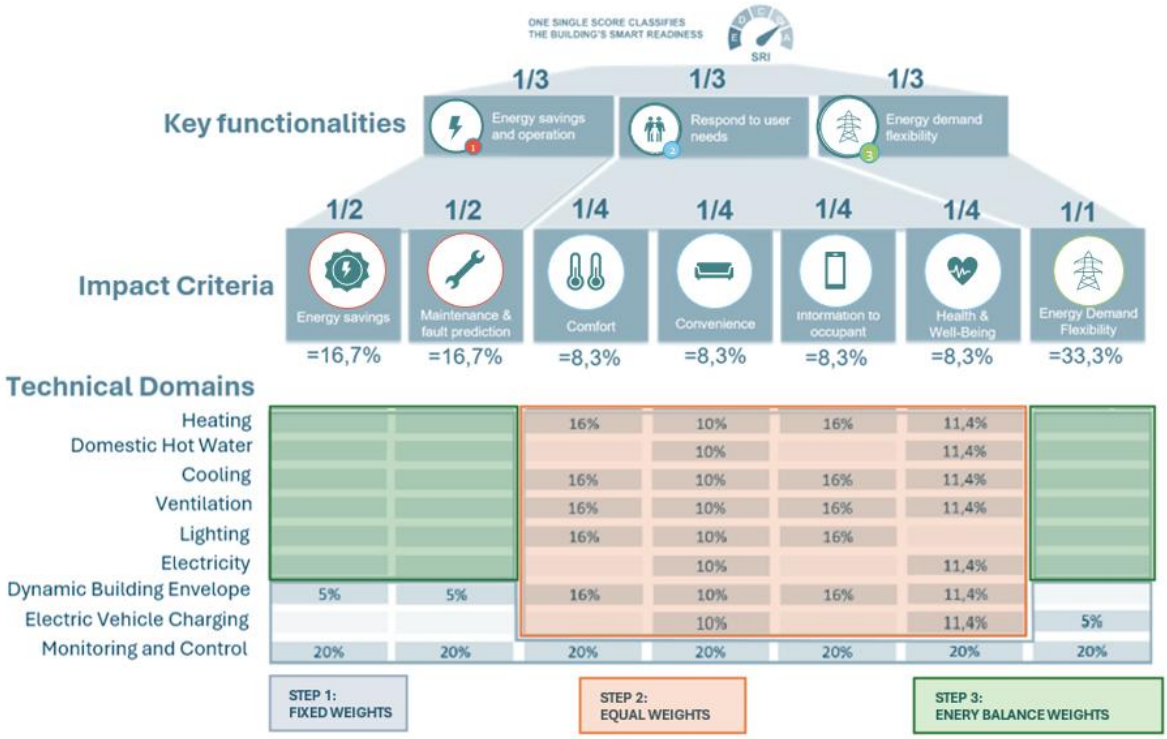



*Figure 4 - The 3 key functionalities, 7 impact criteria and related 9 technical domains with their respective weightings defining the overall SRI value (adapted from Verbeke et al. 2020 [5]).*

The general procedure to obtain the energy balance weighting factors can be conceptualised as follows.

For each climatic zone $(c)$, and building type and category $(b)$ the energy performance $(Ewe)$ of each *technical domain* $(d)$ can be defined as in Expression 1.

$$Ewe_d\ (c, b) \qquad \text{Expression 1.}$$

The overall energy performance can be defined as the sum of each *technical domain*'s as in Equation 1.

$$Ewe\ (c, b) = \sum_{d=1}^{Nd} Ewe_d\ (c, b) \qquad \text{Equation 1.}$$

As a result, the contribution of each *technical domain* $(REwe_d)$ to the overall energy performance can be obtained through Equation 2. This contribution can be used to define the energy balance weighting factor.

$$REwe_d = \frac{Ewe_d\ (c,b)}{Ewe\ (c,b)} \qquad \text{Equation 2.}$$

Note how the procedure enables to differentiate among building type and category.

For the assessment of the energy performance, both overall and per technical domain, the SRI Support Team describes an approach relying on data from the Building Stock Observatory [6]. Thus, the default weighting factors per technical domain proposed are different for residential and non-residential buildings. Alternatively, other sources of data may be used; namely, those from energy performance in buildings and certification schemes.

Member States shall make available at least one smart-ready service catalogue. Additional catalogues may be devised, for instance for different building types. A default smart-ready service catalogue is included in EU commissioned final technical report on the development of the SRI [5] without making differences between building types and categories. Member States may make modifications to such service catalogue by removing certain smart-ready services from each technical domain, or by adding others.

Member States have the prerogative to enable the omission of certain smart-ready services from the calculation of the smart readiness scores to avoid unfairly penalising a building or a building unit in which those services are not relevant. For example, the smart-ready services related to the cooling technical domain may be omitted for buildings or building units located in climatic zones where such service is not relevant. However, it may be included in some other regions in which the smart readiness of the service shall be assessed and rated accordingly.

## 3.2 Building categories and geographical scope

The Commission Delegated Regulation 2020/2155 [3] established that Member States may decide to implement the SRI scheme only to certain categories of buildings.

Furthermore, as indicated by the Commission Implementing Regulation 2020/2156 [2], Member States shall report annually to the Commission on the distribution of smart readiness classes for each of the following categories of buildings: single-family dwellings; multifamily apartment buildings; non-residential buildings with a total useful floor area equal to or less than 1000 $m^2$; and non-residential buildings with a total useful floor area of more than 1000 $m^2$.

The Commission Delegated Regulation 2020/2155 established that Member States shall decide if the SRI scheme is implemented on their national territory, or parts thereof.

## 3.3 Optionality

The Commission Delegated Regulation 2020/2155 states, in its article 6, that the SRI scheme is an optional common Union scheme. Moreover, Member States that implement the SRI scheme may choose to apply it on a voluntary or mandatory basis for buildings or building units located on their territory. Member States that decide to implement, modify, adapt, or terminate the implementation of the scheme needn't provide any justification, but shall notify the Commission.

However, the EPBD recast indicated that by 30 June 2027, the EC shall adopt a delegated act requiring the SRI certificate for all non-residential buildings with an effective rated output for heating systems, air-conditioning systems, systems for combined space heating and ventilation, or systems for combined air-conditioning and ventilation of over 290 kW.

## 3.4 Quality control system

The Commission Delegated Regulation 2020/2155 states that Member States that decide to implement the SRI scheme shall establish an independent control system for SRI certificates, which shall ensure the validity of the SRI certificates issued on the territory.

Where relevant, those Member States may rely on the independent control systems that are already in place, such as those for energy performance certification schemes.

## 3.5 Qualification of experts

The Commission Delegated Regulation 2020/2155 states that Member States that decide to implement the SRI scheme shall ensure that the assessment of the smart readiness of buildings or building units with a view to issuing a smart readiness certificate is carried out by experts that are qualified or accredited. Consequently, Member States shall lay down requirements on the qualification or accreditation of smart readiness indicator experts and ensure that those requirements include competence criteria, including in the ICT field. Member States shall make available to the public information on the qualifications of experts in charge of the smart readiness assessment, as per the Commission Implementing Regulation 2020/2156.

In addition, the Commission Implementing Regulation 2020/2156 indicates that where Member States decide to implement the smart readiness indicator scheme, they may decide that experts accredited or qualified for issuing energy performance certificates, or for carrying out inspection of heating, air-conditioning, combined heating or air-conditioning and ventilation systems under Directive 2010/31/EU [7], or for performing energy audits under Directive 2012/27/EU [8], are also competent for issuing smart readiness indicator certificates. In that case, Member States may decide to set additional requirements for those experts in order to qualify for issuing smart readiness indicator certificates, in particular in relation to their training. Where relevant, Member States may make available to the public either regularly updated lists of qualified or accredited experts or regularly updated lists of accredited companies that offer the services of such experts. Member States may use for this purpose the same means as for experts for energy performance certification and inspections under Article 17 of Directive 2010/31/EU.

## 3.6 Certificate issue, content, terms, and conditions of use

The Commission Implementing Regulation 2020/2156 states that any economic operator may request from a qualified experts an SRI assessment and certificate for the building or building unit in question. The expert shall verify the reliability of the information collected for the assessment of the smart readiness of the building or building unit and for the issue of the SRI certificate. An SRI certificate shall only be issued based on an assessment performed by a qualified or accredited expert. It can be coupled with EPC certification, the inspection of heating, air-conditioning and combined heating or air-conditioning and ventilation systems or the energy audits scheme.

The SRI certificate shall include the elements listed in Annex IX of the Delegated Regulation (EU) 2020/2155. The certificate itself must include information such as a unique ID, date of issuing and expiry, relation to the EPC and energy performance class, general information on the building, smart readiness class and scores (in each of the three key functionalities and per impact criterion). Optionally, it can include the total smart readiness score and for each technical domain and impact criterion, recommendations for SRI upgrades and additional information on assumptions for calculation, available information on interoperability, cybersecurity of systems and data protection and connectivity.

The validity of the SRI certificate shall not exceed 10 years. However, where there is a significant change in a building or building unit that would have had an impact on the initial assessment of smart readiness, a new certificate shall be recommended.

The EU Delegated Regulation (EU) 2020/2155 foresees 7 labelling classes for the SRI values to be used. Each smart readiness class corresponds to a range of total smart readiness scores as follows: 90 – 100 %; 80 – 90 %; 65 – 80 %; 50 - 65 %; 35 – 50 %; 20 – 35 %; < 20 %. It is up to the Member States to define if they want to assign theses seven classes to specific naming conventions. For instance, France has decided to label these classes as follows: A+++, A++, A+, A, B, C, D.

The new EPBD also defines a template for energy performance certificates which has related information to the SRI, such as the mandatory information on whether the building has a capacity to react to external signals and adjust the energy consumption and, optionally, a yes/no indication if an SRI assessment has been performed for the building and the SRI value.

### 3.7 Monitoring, promotion, databases and publicly accessible information

The Commission Implementing Regulation 2020/2156 states that where Member States decide to implement the SRI scheme, experts that operate in the respective Member State's or Member States' territory shall report data on the SRI certificates they issue to the national or, where applicable, the regional authorities of the respective Member States, in accordance with the Annex to this Regulation. They may rely on their energy performance certificate database, where available.

Member States that decide to implement the SRI scheme shall report annually to the Commission the number of smart readiness indicator certificates issued on their territory and related statistics, as set out in the Annex to this Regulation.

### 3.8 SRI certificates design

Besides the regulatory framework, the EU commissioned final technical report on the development of the SRI [5], also evaluated the SRI certificate format and design. Using consumer focus groups, it was concluded that

a) a blend of a physical and virtual certificate/platform would add most value (a one-page certificate with a QR code for additional detail could serve the purpose),
b) the scores disaggregation should be presented by domain and impact criterion,
c) a common EU graphic layout could be used as a basis, and
d) there were no obstacles to EPC integration or other building rating, labelling or certification schemes.

Some countries have also conducted test phases and produced their own SRI certificates based on this premises as is the case of France. Some of these graphic proposals are presented in Figure 5.

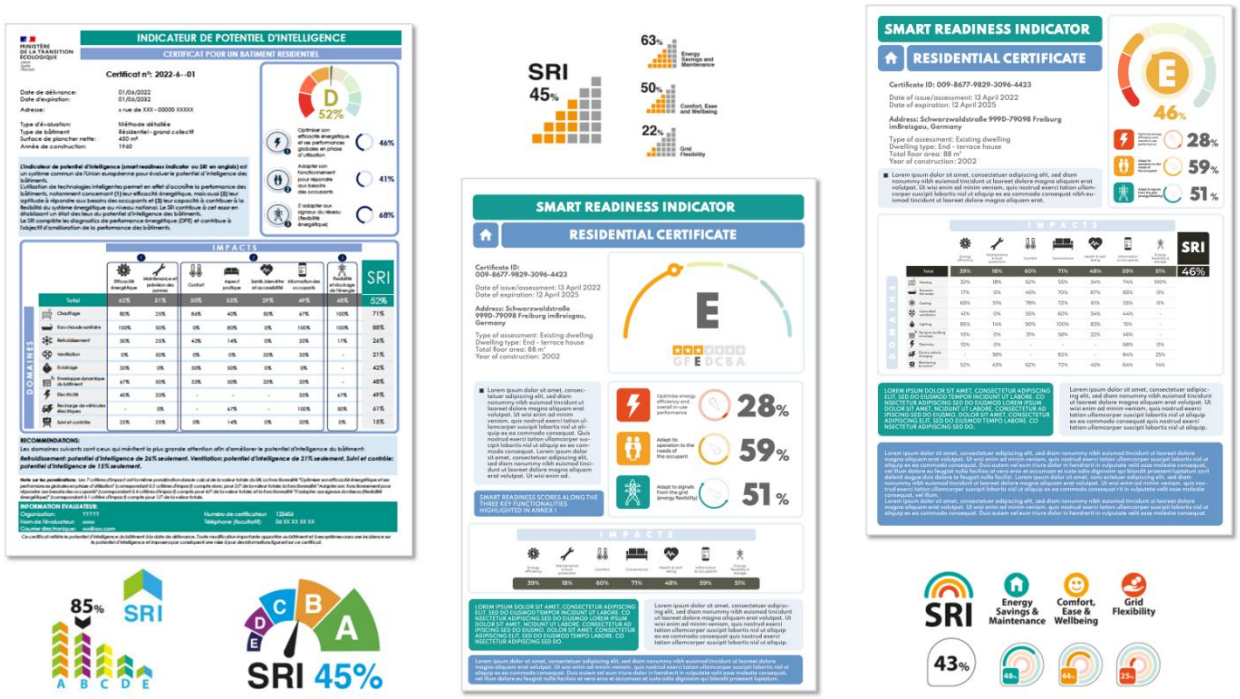



*Figure 5 - Several graphical layout and design proposals for SRI logos and certificates [9][10].*

There are several tools available for SRI calculation which provide graphic outputs even if not in a certificate format. Several examples and links can be found on chapter 5.3. Below, some screenshots of the graphical output generated by the SRI2MARKET web-based SRI assessment platform are presented:

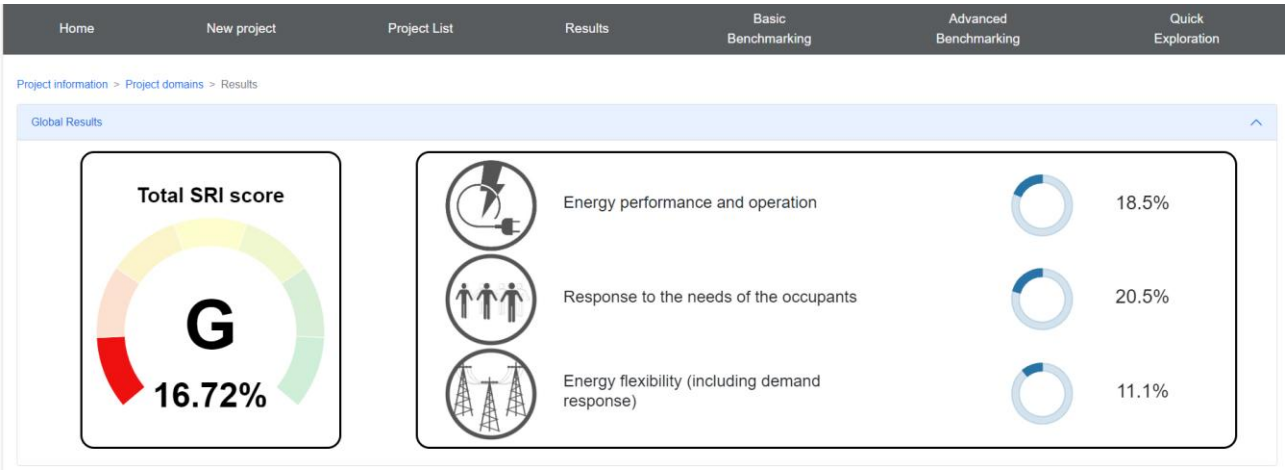



*Figure 6 - Graphical results output generated by the SRI2MARKET web-based SRI assessment platform (extract).*

## 3.9 SRI non-committal test phases

At the present time, all SRI2MARKET countries have developed or are developing an official SRI test phase with the support of the project, and the objectives include:

- Refinement of Methodology: The test phase helps refine the SRI calculation methodology, ensuring it is adapted to the countries' specific context and the needs of its building sector.

- Policy Development: Insights from the test phase can guide policymakers in developing regulations and standards for smart buildings, potentially leading to the integration of SRI in national building codes.
- Market Readiness: The test phase prepares the market for the adoption of SRI by raising awareness among stakeholders, including building owners, tenants, and technology providers.
- Training and Accreditation: The experience gained from the test phase can inform the development of training programs for professionals who will conduct SRI assessments and the accreditation process for SRI certificates.

As depicted in the SRI implementing regulation [2] , the non-committal test phase should include a definition on its "duration, phasing, types of building and geographical zones targeted, aspects of the smart readiness indicator framework that are tested, arrangements for collecting feedback, the criteria for the choice of experts carrying out the smart readiness indicator assessments, the decision on whether an independent control system is established as part of the test phase, the decision on whether certificates are issued and made available to economic operators during the test phase, and designation of a third party to manage the test phase, where relevant.". The SRI2MARKET methodology addresses many of these requirements and is used to support countries in implementing the test phases. Further details on the status for each country and how they can support SRI certification definition are available on chapter 4.

# 4. Country profiles on current EPC certification systems

To define pathways for integration and linking to the EPC certifications systems of the SRI framework described in the previous chapter, it is fundamental to understand the specific characteristics of the EPC system in each country. This chapter provides a glimpse of each EPC system characteristics in the targeted EU Member States (Austria, Croatia, Cyprus, France, Portugal, Spain but also Greece). With this framework and pinpointing opportunities and existing building smartness initiatives, it will be possible to better define each country's likely certification pathway but also derive conclusions for other countries under similar conditions.

## 4.1 EPC certification: zoom in on partner countries

This chapter details SRI2MARKET partner countries EPC systems with a special focus on the last part of the system (the certificate itself and issuance). Whenever relevant the current and potential smart buildings features/obligations are addressed. The main source of information was a semi-structured questionnaire filled in by SRI2MARKET experts, also taking into account feedback from national stakeholders. The detailed questionnaire and instructions can be found ANNEX A – Questionnaire for partners. Information from the Concerted Action on EPBD report "(CT5) Certification and Training - Status in 2022" [11] and the SRI2MARKET report "Paving the way to adoption of the SRI into national regulation and market" [12] was used to fill in any identified gaps.

### 4.1.1 Austria

*EPC certification legislative framework*

Basis of the EPC certification process in Austria is the OIB Guideline No.6 [13], which turns the respective European law (EPBD) into national law. The obligatory content of the certificate itself is also defined there. EPC is conducted and calculated by numerous professionals (see point d. below). They are organized mostly but not necessarily in regional energy consultant networks like NET-EB [14] in Styria. The calculations are based on the latest Austrian Institute of Construction Engineering (OIB) guideline No.6 and performed with different market-oriented calculation tools like GEQ [15]. Fees around EUR 160 - 500 per building's EPC are normal.

*Quality control / quality check*

In Austria, the quality of EPCs is audited through a structured process defined by each of the 9 Austrian regional governments, as an example the energy agency of Styria [16] controls the quality of the EPCs in the Styrian region. The quality of EPCs is assessed by verifying the accuracy of the provided data, by ensuring the correctness of energy performance calculations, and by checking adherence to national standards and regulations. For this, around 5% of all EPCs are randomly selected for inspection every year. 6 of the 9 Austrian regional governments run ZEUS [17], an online database for all the EPCs.

*Building typologies*

In Austria, building typologies covered by EPCs include single-family houses, multi-apartment buildings, office buildings, educational facilities (i.e. primary and secondary schools, and universities), hospitals, hotels, restaurants, sport facilities, retail buildings and non-residential buildings that are conditioned and maintained at a temperature of more than +5°C, including buildings for transportation, communication, cultural activities, museums, libraries, and other similar uses.

*Qualification, accreditation, and training of experts*

There is a specific training program [18] for energy assessors from the private association 'Arge EBA' in Austria, but it is not obligatory for the experts calculating EPCs. Furthermore, the Austrian Economic Chambers [19]

define together with the Ministry of Labour and Economy [20] who is allowed to conduct EPCs – the actual list of authorized professionals [21] is published on the chambers' website. There are different training programs for assessors of buildings with more complex technical systems on the market, as well as for those performing energy audits of companies. Authorization for conducting energy audits following the federal energy efficiency law [22] and issuing EPCs is only mandatory for energy audits of companies – authorized persons are listed at E-control website [23].

*Management structure*

The Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) is responsible for the EPC system, assisted by the Austrian Institute of Construction Engineering (OIB) [24] together with the 9 regional governments which have to legally implement, collect and control the EPCs in their respective region - most likely will also be for the SRI system.

*Other building certification systems*

There are also other building certification systems used in Austria, but not legally binding – in nearly all Austrian regions one can get more subsidies using the most important voluntary used standard "klimaaktiv" [25], but there are also ÖGNI [26] and ÖGNB [27]. 'klimaaktiv' building standard was designed by a government program that promotes buildings that are very energy-efficient and meet high standards regarding climate protection and sustainability.

*SRI initiatives in Austria*

The SRI Test Phase in Austria was from the beginning foreseen by the ministry and OIB to get more insight into the existing methodology and which results it delivers. The testing will be done in the frame of one national and four European projects, one is SRI2MARKET. The results and conclusions from this phase are expected to significantly influence the certification process in several ways.

The SRI certificate layout has not been discussed yet, but tendency is to use a similar layout as in the EPC, if it would ever be part of that. The layout is likely to include information on the SRI score for the three key functionalities, areas for improvement, and recommendations for smart technologies having impact on $CO_2$-reduction. The integration of SRI certification into the existing EPC system is the preferred way of implementation and may offer potential cost reductions, although costs cannot be estimated at the present stage.

Austria is currently involved in the following LIFE projects: SRI2MARKET, SRI-ENACT, easySRI and tunES.

### 4.1.2 Croatia

*EPC certification legislative framework*

In Croatia, building energy audits are conducted by certified professionals with a degree from a technical university specializing in architecture, civil, mechanical, or electrical engineering. The auditing as well as the calculation of the energy class is performed following the national methodology [28] for conducting building energy audits. A typical process [29] is followed which includes historical and present data collection, measurements, followed by suggestion of an economically justified order of measures for the improvement of the energy performance of the building. Certified and authorized energy assessors calculate the building's energy performance. Once complete, an Energy Performance Certificate is issued by physical or legal entities authorized by the Croatian Ministry of Physical Planning, Construction and State Assets. It has to be noted that EPC cannot be issued without an energy audit report. Residential and non-residential buildings are categorized into eight energy classes, ranging from A+ to G. The first page of the EPC includes two specific energy classes: the first indicates the calculated annual energy requirements for heating per square meter of useful floor area

(measured in [kWh/(m²a)]), and the second refers to the calculated annual primary energy consumption per square meter of useful floor area (also measured in [kWh/(m²a)]). The Croatian Ministry of Physical Planning, Construction and State Assets oversees the authorization of building energy performance assessors, maintains the register of issued EPCs and control of EPCs, while the actual assessments and issuance of certificates are carried out by the abovementioned authorized third parties (authorised assessors). The cost of the EPC can vary and is typically determined by the building size and complexity of the technical building system. Prices are determined freely on the market, but an average price could be approximated at 1 € per square meter of useful floor area.

*Quality control / quality check*

In Croatia, the quality of EPCs is assessed through a structured process outlined by the Ministry of Physical Planning, Construction, and State Assets. The quality of EPCs is assessed by verifying the accuracy of the provided data, by ensuring the correctness of energy performance calculations, and by checking adherence to national standards and regulations. The Ministry of Physical Planning, Construction and State Assets is responsible for overseeing this quality control process and for ensuring that EPCs comply with the Energy Performance of Buildings Directive (EPBD), while authorised, qualified third parties perform the inspections. EPCs are randomly selected for inspection. Approximately 300 EPCs are inspected annually to maintain quality and compliance.

*Building typologies*

In Croatia, building typologies covered by EPCs include single-family houses, multi-apartment buildings, office buildings, educational facilities (i.e., preschools, primary and secondary schools, and universities), hospitals, hotels, restaurants, sports halls, retail buildings (wholesale and retail) and non-residential buildings that are maintained at a temperature of +18°C, including buildings for transportation, communication, cultural activities, museums, libraries, and other similar uses.

*Qualification, accreditation, and training of experts*

The training program for energy assessors in Croatia is composed of two key parts: the Training Program and the Development Program. The Training Program is divided into two modules. Module 1 focuses on training individuals to conduct energy certification and energy audits for buildings with simple technical systems. Module 2 is designed for those handling buildings with more complex technical systems. Authorization for issuing EPCs is mandatory, and the training programs are a key part of this process. These programs can only be delivered by authorized legal entities, with nine entities approved to conduct this training in Croatia, five of which are universities. The specifics of the training, including content and duration, are detailed in the Ordinance on persons authorized for energy certification, energy audits, and regular inspection of heating and air-conditioning systems (OG 73/15, 133/15, 60/20, 78/21). Each training program concludes with a final exam that participants must successfully pass. To start with simple systems' assessments, assessors must complete Module 1 and hold a college degree in architecture, civil, mechanical, or electrical engineering with a minimum of 10 years of professional experience, or a university degree with at least 5 years of experience. Then, for more complex systems, Module 2 must be completed, and only a university degree with at least 5 years of professional experience is accepted. Once authorized, energy assessors are required to undergo continuous professional development (i.e., Development program). They must participate in a skills upgrading program every two years (since May 2020) to retain their authorization. Unlike the initial training, this ongoing development program does not require a final exam, but failure to attend can result in the loss of authorization.

*Management structure*

The Croatian Ministry of Physical Planning, Construction and State Assets is responsible for the EPC system and (most likely) will also be for the SRI system.

*SRI initiatives in Croatia*

The SRI Test Phase in Croatia is a crucial step towards integrating smart technologies into the building sector. The testing will be done through SRI2MARKET. The results and conclusions from this phase are expected to significantly influence the certification process in several ways.

The layout is likely to include information such as the building's SRI score, areas for improvement, and recommendations for smart technologies. The layout will be designed in a user-friendly manner, providing clear and actionable insights for building owners and occupants. The expected management/structural costs per SRI certificate issued can vary depending on factors such as the complexity of the certification process, administrative overhead, and any additional requirements for SRI certification. Integration of SRI certification into the existing EPC system may offer potential cost reductions. However, precise estimations of these reductions are currently unavailable for Croatia.

Croatia is currently involved in the following LIFE projects, linked to SRI: SRI2MARKET, SRI-ENACT and tunES.

### 4.1.3 Cyprus

*EPC certification legislative framework*

Energy Performance Certificates are issued only by Qualified Experts whose qualifications and obligations are set out in relevant regulations. The Department of Energy Services maintains a register of all Qualified Experts. Part of the register containing the names and contact details of Qualified Experts is available on the Building Energy Certification System. The 'Building Energy Performance Calculation Methodology' and the 'Building Thermal Insulation Guide (2nd Edition)' set out how the energy performance calculation needs to be made by all Qualified Experts for the issuance of the EPC. The software SBEMcy is used for the calculation of the building energy performance and the issuance of the EPC and is available free of charge from the Department of Energy Services. The EPC classifies buildings into energy categories on a scale from A to H, where category A represents the buildings or building units with the highest energy efficiency. An EPC is valid for 10 years from the date of its issuance.

*Quality control / quality check*

Under Regulation 19(3/b) of the Regulation of Energy Performance of Buildings (Energy Certification of Buildings) and Regulations 2009 and 2014 (CPR 164/2009 and CPR 39/2014), an inspection of the part of the register of EPCs of buildings containing building energy performance certificates and recommendations may be carried out upon request by the interested parties.

*Building typologies*

The main building typologies evaluated in Cyprus include buildings and building units under construction, those being put up for sale or that have already been sold, and those that are available for rent or leased to a new tenant. Additionally, buildings whose total useful floor area exceeds 250 $m^2$, and are used by public authorities and are frequently visited by the public, are also evaluated.

*Qualification, accreditation, and training of experts*

In Cyprus, it is mandatory for individuals to pass exams and become Qualified Experts to issue EPCs for residential buildings. To issue EPCs for non-residential buildings, experts must first issue at least 50 EPCs for residential buildings and pass a specialized examination. While training is not required to take these exams, non-government training centres offer support to help candidates prepare.

*Management structure*

In Cyprus, the EPC system is managed by the Department of Energy Services under the Ministry of Energy, Commerce, and Industry.

*SRI initiatives in Cyprus*

The test phase in Cyprus has just started. There is currently no clear information on how SRI assessors will charge for their services, so the expected management or structural costs per certificate issued remain uncertain. It is also unclear how these costs might differ if integrated into the existing EPC system.

It is currently involved in the following LIFE projects: SRI2MARKET, easySRI, Smart Square and SmarterEPC.

### 4.1.4 France

*EPC certification legislative framework*

Energy Performance Certificates [30] are mandatory when a building or dwelling is sold or rented. Certified assessors [31] conduct the assessment during an on-site visit, typically lasting about one hour for a single-family dwelling. The price for this service is unregulated, with an average range of 100-200€. EPC assessors use Ministry-accredited software tools [32] – seven (7) for residential buildings and one (1) for tertiary buildings. The issued certificate follows a national template [33], and all EPCs are stored in a national database managed by ADEME, the national agency for energy and environment. The raw EPC data can be downloaded using the EPC ID [34]. Additionally to EPCs, a more advanced energy audit [35] will become mandatory for the sale of homes classified as G and F by 2023, E by 2025, and D by 2034, offering renovation scenarios to improve energy performance.

In France, residential buildings [36] are classified by energy consumption as follows (excluding colder and mountainous regions where thresholds for classes E, F, and G are slightly higher):

- A: < 70 kWh/m²/year
- B: < 110 kWh/m²/year
- C: < 180 kWh/m²/year
- D: < 250 kWh/m²/year
- E: < 330 kWh/m²/year
- F: < 420 kWh/m²/year
- G: > 420 kWh/m²/year

As for tertiary buildings [37], thresholds vary based on type (offices/schools, hospitals/hotels, theatres/sport/small shops, and shopping malls). Following statistical analyses showing the over-representation of low-class EPCs for small dwellings, thresholds have been corrected for dwellings < 40 m² to make EPCs fairer.

*Quality control / quality check*

EPC assessors undergo the following quality control measures:

- Three document-based controls, which include a review of five EPCs issued by the assessor and any client complaints.
- One on-site control at a client's property, conducted in the presence of the assessor.
- Two on-site controls at a client's property, performed after the assessor's interventions.

If multiple and significant errors are identified during these controls, assessors may be required to undergo additional training. In severe cases, certification may be revoked.

*Building typologies*

Residential buildings evaluated for EPC issuance include existing single-family houses, apartments in existing multi-family buildings (MFBs), apartments based on MFB data, existing MFBs, new single-family houses, apartments in new MFBs, and new MFBs.

For tertiary buildings, the categories include public office buildings, schools, continuous occupation buildings like hospitals and hotels, other buildings such as theatres and sports facilities, shopping malls, and new buildings in the construction phase. Each category has a specific certificate layout (follow link for residential buildings [38] and for tertiary buildings [38]).

*Qualification, accreditation, and training of experts*

In France, EPC assessors are certified for seven (7) years, as per the July 2023 regulations [39]. After this period, they must reapply for certification. These regulations also set the minimum requirements for the certification bodies and training organizations. There are two (2) types of certifications: one for single-family dwellings and a more advanced certification for multi-family and tertiary buildings.

The initial training for assessors lasts at least 56 hours, with an additional 21 hours required for the advanced certification. This includes 28 hours of theoretical courses (plus 7 hours for the advanced certification) and 28 hours of practical training (plus 14 hours for the advanced certification). Regarding practical training, this involves site visits, using software tools, and conducting measurements.

The theoretical exam consists of 75 multiple-choice questions (plus 35 additional questions for the advanced certification), with a required minimum score of 75%. The practical exam involves a case study, which from January 1, 2026, will be replaced by an actual building visit under the supervision of a reviewer.

After certification, assessors must participate in recurrent training sessions to maintain and update their competencies.

*Management structure*

The EPC database is managed by ADEME [40], the national agency for environment and energy.

*SRI initiatives in France*

The SRI test phase in France was conducted in 2022-2023 by the Ministry of Housing and CEREMA, with support from R2M Solution as part of the SRI support team contracted by DG ENER. A specific certificate layout was developed for France, showcasing the SRI class, ranging from the lowest (D) to the highest (A+++) class. The certificate also emphasizes the three domains with the lowest scores, although it does not provide recommendations on how to improve them, which is also an aspect that building owners have expressed interest in.

During the test phase, assessors and building owners freely negotiated the contractual arrangements for the SRI assessment with no intervention from CEREMA nor the Ministry. On average, one SRI assessment took between 1 and 1,5 days (depending on the building size and complexity of technical building systems). One SRI assessment is structured as follows:

- Half of day is dedicated to a physical or virtual site visit;

- Half of day is dedicated to the assessment of the 54 SRI services with some additional e-mail exchanges with the building owner/manager in order to better qualify some services;
- Final restitution of the SRI assessment score to the building owner/manager in order to make them aware about the smartness of their building, as well as the ways of its improvement.

The official test phase was concluded in 2023 and is followed by R2M Solution with the SRI2MARKET tool suite. The SRI2MARKET e-learning programme and evaluation platform have been adapted to align with choices made for the initial test phase (for instance, concerning the requirements to be considered as an SRI assessor, and the SRI technical domains considered mandatory or optional by France). Furthermore, R2M Solution currently coordinates the SmarterEPC LIFE project, which promotes the integration of EPCs and SRI.

### 4.1.5 Greece

*EPC certification legislative framework*

In Greece, the Ministry of Environment and Energy is the responsible entity for the legislation of the EPC framework. The Centre for Renewable Energy Sources (CRES) is managing the energy inspectors' registry and the EPCs' submissions platform. Energy inspectors registered in the EPC registry can issue an EPC. Initially, a physical inspection to the building is conducted, to obtain data for all the applicable domains of the building. Then, the inspector uses a software to calculate the energy performance of the building. The software's calculations are based on the Greek Regulation for the Energy Performance of Buildings, and outputs the energy class of the building, comparing it to a reference building. The energy classes are A+, A, B+, B, C, D, E, F, G with class B corresponding to the reference building. The core calculation engine of the software belongs to the Technical Chamber of Greece, which is the official advisor to the Ministry of Environment and Energy. Private companies producing more user-friendly versions of the software are obliged to use the same core calculation engine, in order to ensure that for the same input the EPC outputs will also be the same. The cost for issuing an EPC is not officially regulated (open market), but indicatively, for a residential building up to 100 m2 the cost is around 100-150 euros.

*Quality control / quality check*

The Departments of Energy Inspection of the Ministry of Environment and Energy are responsible for carrying out random EPC control checks and checks on specific EPCs after complaints.

The checks include:

1. control of the data inputted into the electronic database used for the EPC calculations.
2. on-site inspection of the building in order to verify the data used for the EPC.

The quality check procedure allows a tolerance of 5% from the total primary energy consumption of the existing building or a variation of more than one energy class. Penalties to energy auditors are calculated according to a specially developed algorithm from the Departments of Energy Inspection of the ministry (according to Law 4409/2016, Article 56).

The penalties foreseen in case of non-compliance remain the same since 2013. They include fines and temporary or permanent suspension, or permanent exclusion of the auditor, depending on the severity of the violation, the consequences, the building floor area and the possibility of reoccurrence. Law 4409/2016 (Article 49, paragraph 4) introduced a new range for the fines, amounting from 200 € to 10,000 €, instead of the previously defined (by Law 4122/2013) range of 1,000 € to 10,000 €.

From 2011 until the end of 2019, there were 43,846 EPCs randomly checked of which 277 were checked on-site. These figures do not include 2019 figures from the Department of Northern Greece, as the relevant

annual report of the Inspection Bodies has not yet been issued. Until the end of 2019, 138 penalties were issued to energy auditors (a combination of fines and yearly suspensions).

*Building typologies*

The building typologies evaluated by EPCs include residential buildings and non-residential buildings for commercial, retail, health, educational use, offices, temporary residence and buildings of public assembly.

*Qualification, accreditation, and training of experts*

Greek energy inspectors are qualified engineers of various specialties (mechanical engineers, civil engineers, architects, etc.) who have received the necessary technical training as well as certification from the Ministry of Environment and Energy. They are members of the Technical Chamber of Greece, and they are classified in three classes:

Class A. They can perform audits and inspections for:

- buildings or building units with a total area up to 250 $m^2$,
- heating systems inspections for heating systems with a heating capacity up to 50 kW,
- AC system inspections for AC systems with a cooling capacity up to 50 kW.

  Eligible: All inspectors already registered in the national energy inspectors' registry. No prior experience is needed for engineers from a polytechnic school while one year experience is required for engineers from a technical school.

Class B. They can perform audits and inspections for:

- buildings or building units up to 1,000 $m^2$,
- heating systems with a heating capacity up to 400 kW,
- AC systems with a cooling capacity up to 400 kW.

  Eligible: Inspectors falling under class A who have conducted at least 30 inspections of Class A, 20% of which for non-residential buildings with heating systems or AC systems larger than 15 kW.

Class C. They can perform audits and inspections for:

- buildings or building units without floorspace limit,
- heating systems with unlimited heating capacity,
- AC systems with unlimited cooling capacity.

  Eligible: Inspectors that have successfully passed the examination foreseen during the years 2012-2015 and fall under Class B who have already conducted at least 10 Class B inspections or have conducted inspections in buildings over 250$m^2$ with a total floorspace over 20,000$m^2$, or have conducted inspections in HVAC systems over 50kW with a total capacity exceeding 5,000kW.

*Management structure*

The Departments of Energy Inspection (for South and North Greece) of the Ministry of Environment and Energy are responsible for the EPC certification system (legislation, quality assurance, etc.). The Centre for Renewable Energy Sources (CRES) is an associated agency of the Ministry, which is responsible for the development, operation and maintenance of the EPC and Energy auditor's platform (buildingcert.gr) under the supervision of the Ministry. It is likely that the same governance structure will be applied to the SRI system.

*SRI initiatives in Greece*

The SRI test phase in Greece has just started with the support of the LIFE projects SRI-ENACT, easySRI, Smart Square and SRI2MARKET. So far there are no results. According to experts, if the SRI is implemented in a mandatory manner in the same cases as the EPCs (i.e., when renting, selling or participating in energy efficiency programmes), the two certificates could be merged. Otherwise, the SRI should be an independent document. The EPC energy inspectors and energy auditors would probably be also SRI inspectors. Currently, the administration fee for issuing EPCs is equal to:

- 5€ for real estate up to 250 $m^2$
- 10€ for real estate 250-1000 $m^2$
- 30€ for real estate larger than $m^2$

which is directly charged to the building owner. Greece was also part of the X-Tendo and iBRoad2EPC Horizon 2020 projects which evaluated the and tested the smart readiness indicator framework. It is currently involved in the following LIFE projects: easySRI, SRI-ENACT, Smart Square, iEPB, SmarterEPC and tunES

### 4.1.6 Portugal

*EPC certification legislative framework*

Current requirements and standards are depicted in Decree-law 101-D/2020 [41]. The system comprises over 2.5 million certificates issued, covering close to 40% of the building stock, overseen by approximately 2,200 Qualified Experts, Portugal's EPC scheme has identified 5 million potential improvement measures, backed by a €12,000 million investment, potentially saving €1,500 million. These EPCs are designed not only to validate and monitor pre- and post-renovation works but also to track energy savings over time. The centralized database, with unique EPC IDs, simplifies data access for technical and non-technical users, thereby streamlining information management effectively. Aggregated data is publicly accessible at SCE portal [42]. The EPC is now key to providing direct access to specific incentives for building renovations and reducing building taxes depending on the energy label (typically A or A+), or when a building's performance improves by two (2) labels after renovation. The final energy performance calculation methodology uses a ratio approach which means each building is compared to a reference building with the same characteristics.

Regarding building smartness related provisions, centralized BACS (Building Automation and Control Systems) systems are mandatory for new and large renovation services buildings and for all services buildings when installed nominal power is >290 kW until December 2025. They should include, at least, supervision, monitoring, command, control and registry of variables. For buildings above 290 kW, the requirements are stricter and include minimum efficiency classes according to EN 15232 (now ISO 52120) [43]: minimum B class in and will be updated to A in January 2025. New and renovated buildings with installed nominal power between 100 and 290 kW are obliged to install BACS at the technical systems level (centralized systems are optional at this power level). There are also provisions on electromobility from an infrastructure point of view that relate to smart readiness of the building.

*Quality control / quality check*

Quality assurance mechanisms is managed by ADENE as detailed in Decree-law 101-D/2020. Two types of EPC quality assessment exist: a short assessment, and a detailed assessment. The short quality assessment involves the qualified expert uploading all EPC-related documents and information into the database, whilst the detailed one is a complete duplication of the necessary calculations that support the EPC, including a second site-visit. The detailed assessment can be triggered at random or whenever needed to better support the quality assessment. Tolerances and out-of-range values are defined in the regulation and are used to quantify the number and severity of errors or mistakes that can exist in an EPC. As a consequence of these analyses,

and if the EPC is to be considered invalid based on deviations from a set of parameters, a reissue by the expert is necessary. Additional penalties might be applicable to the expert if no action is taken to minimise the impact of the errors made.

*Building typologies*

Requirements and standards are divided in these main types of buildings: Residential, Small Non-Residential Buildings with HVAC systems power < 30 kW, Small Non-Residential Buildings with HVAC systems power > 30 kW and Large Non-Residential Buildings (the ones with over 1000 $m^2$). New buildings, major renovations, Large Non-Residential Buildings, buildings on transaction (rental, sale, leasing, donation, etc.), buildings financed for some energy performance improvements and related tax benefits must have an EPC. New buildings and major renovations also must comply with minimum energy performance requirements depending on if they are residential or non-residential buildings:

- New residential buildings - Class A;
- Major renovation on residential buildings - Class C;
- New non-residential buildings - Class B;
- Major renovation on non-residential buildings - Class C.

No major differentiation is made for public buildings in terms of requirements and standards but, public owned and occupied buildings that are frequently visited by the public with an area >250$m^2$, are automatically obliged to have an energy performance certificate. These public buildings are also obliged to display the energy certificate in their premises. For private buildings this is mandatory only for Large Non-Residential Buildings. All buildings must display the energy class when advertising any transaction. There are two different EPC layouts: one for residential and another for non-residential.

*Qualification, accreditation, and training of experts*

ADENE is responsible for the mandatory exams that qualify the professionals for EPC issuing (learning module evaluation defined by law) and to support these professionals. ADENE also provides dedicated training in line with the legal requirements. To sum up, ADENE is responsible training, evaluation and certification but private training entities can also deliver training only. There two main types of experts issuing EPCs:

- RES - PQ I - Energy Performance Course in Residential Buildings and small non-residential buildings
- COM - PQ II - Energy Performance Course in Commercial and Services Buildings

The pre-requisites to be an EPC issuer include: Architect, engineer or technical engineer degree; Five or more years of membership in their professional public association (OA - Architects "Institute"; OE - Engineers "Institute"; OET - Technical Engineers "Institute"); Five years of professional experience in project activities or construction of buildings covered by Decree-Law No. 101-D/2020 of December 7 (after recognition as an effective member of the respective professional public association); Approval in the examination carried out by ADENE. In order to be a qualified expert (PQI and PQII) an exam and minimum classification (50%) is needed. Only PQ-II perform the BACS standard compliance and minimum requirement which is detailed in the EPC manual (Manual SCE) [44], which is included in the respective training modules.

*Management structure*

The Portuguese EPC system has a centralized management system. ADENE is the managing authority for the Portuguese EPC system. Supervision and inspection are a responsibility of the National Energy Directorate (DGEG). ADENE is responsible for managing the EPC database, ensure the quality of the information, define the content and design of the system and outputs in coherence with the legal provisions, make available

information to the owners but also aggregated information for public use and support funding schemes design and monitoring.

*SRI initiatives in Portugal*

Portugal has recently started its official SRI non-committal test phase in close coordination with the EPBD transposition working group, as depicted in order No. 8023/2024 of the Portuguese Republic Diary. It will mainly follow the methodology and work already in development in SRI2MARKET. The Portuguese Long Term Renovation Strategy has 7 areas of intervention, one of which is dedicated to smart buildings. It specifically foresees the introduction of the Smart Readiness Indicator. This indicator is already foreseen in the energy certificate layout which "may include (...) smart readiness indicator(s)" by law. Although it is still to be put in practice, it already allows for this innovation, and it is being pushed forward on the new version of the EPC system. Portugal, through ADENE, has also participated in the X-Tendo and iBRoad2EPC projects Horizon 2020 project which evaluated the and tested the smart readiness indicator framework.

### 4.1.7 Spain

*EPC certification legislative framework*

The main legislative procedures in Spain are depicted in

- Royal Decree 235/2013 on the Energy Certification of Buildings; updated in 2022 (RD 390/2022)
- Royal Decree 238/2013 on Thermal Installations of Buildings; updated in 2021 (RD 178/2021)
- The Technical Building Code, Order 1635/2013 of the Ministry of Development; updated in 2019 (RD 732/2019).

The minimum requirements for the energy performance of buildings are established in Spain in the last document (ins Spanish CTE – Código Técnico de la Edificación) [45] and provides also complementary guidelines for a better application of the regulatory requirements and a better understanding of the requirements by professionals. This document was on public consultation until October 2024 for an update which will already include EPBD transposition provisions among other proposed changes including a rescaling of the EPC classes

There are 7 classes A-G with different scales for the residential and tertiary sector. There are different scales for residential according to climatic zone (12 peninsular climatic zones) and building typology (i.e. SFH and MFB).). For the tertiary typology, the system is self-referenced, so a detailed scale is calculated for each assessment object according to the results of the reference building. There are five official computer software programmes which are mandatory for energy certification. Some programmes include the possibility of evaluation of smart services and functionality levels common to the SRI technical framework, but this is not mandatory

The information of the EPCs is collected and registered for each of the 17 Autonomous Communities and in the 2 Autonomous Cities of Spain. This information is included in the EPC databases, but there is not yet an integrated database.

*Quality control / quality check*

The common framework for the scheme is stablished by the central Government via the competent Ministries (i.e. the Ministry for the Ecological Transition and the Ministry of Transport, Mobility and Urban Agenda). The responsible of the quality check is the regional government, which must establish the control mechanism that they consider appropriate.

*Building typologies*

Building typologies in Spain are divided in the following categories:

- **Residential:** single family house, multi-apartment block or individual dwelling of a multi-apartment block.
- **Tertiary:** small and big size, whole building or building unit.

The certificate layout is exactly the same for all building typologies. The common data format is based on a xml includes all information and results to be uploaded to the web visor which will generate the certificate layout based on a common template. However, calculation procedure could differ from one typology to another to be able to include more complex and detailed installations.

*Qualification, accreditation, and training of experts*

The qualification required to be an EPC expert is only dependent on previous academic or professional grade in building sector according to a specific list of university degrees.

There is no official training in Spain, still, several voluntary training options from public authorities and professional associations are available. The training is designed by the training entity itself and focuses on the practical use of certification software programmes.

*Management structure*

The central government via the corresponding Ministry is responsible of stablishing the common scheme and mandatory requirements though regulation/law. But the responsibility of EPC registration and quality control is decentralised and responsibility of the regional government (autonomous communities)

*SRI initiatives in Spain*

Spain is currently conducting the official test phase. It is led by the Ministry for the Ecological Transition and the Demographic Challenge with the support of SRI2MARKET and CENER. The test phase should last 21 months and the report regarding the official test phase will be available by July 2025 approximately, so there is still limited structured information on its outcomes. Spain was represented in the E-Panacea Horizon 2020 project which included a detailed feedback process with workshops to gather end-user perceptions. A common layout was explored, where additional information like the SRI to the current EPC content was evaluated. It was also part of the iBRoad2EPC project Horizon 2020 project which evaluated the and tested the smart readiness indicator framework. It is currently involved in the following LIFE projects: easySRI, SRI-ENACT, iEPB.

## 4.2 Aggregated analysis of EPC certification processes in targeted countries

Even though all countries follow the framework defined within the EPBD and have largely common features such as the trigger points for issuing EPC (selling, renting, new buildings and major renovations) and the use of Energy Performance of Buildings standards as reference, there is a myriad of different approaches in terms of calculation approaches, energy performance classes, experts' qualification, training and inspections procedures, management structures and certificate design options. Some countries (Portugal, Greece, Cyprus and France) rely on more centralized management systems usually through the ministry responsible for energy issues and, usually, national energy agencies provide operational support. In Austria, although the ministry and the energy agency provide the framework and operational support, regional governments also have a strong role by defining its own regulations, bodies and requirements and links with existing regional building codes. In Spain regional governments are responsible for quality and control mechanisms and apply very different administrative fees. Some countries such as Portugal link clearly and in mandatory terms BACS requirements and standards for some buildings to the EPC system, while others do not have BACS or control

requirements such as Cyprus. In number and thresholds of energy performance classes the approaches are relatively different among countries and in terms of certificate design, layout and contents, some countries have one similar certificate layout for all buildings (Spain, Greece and Croatia) and others have different layouts for residential and non-residential buildings and additional variants (Portugal, France and Austria for example) as depicted in Figure 7. Some rely on the experts to produce the energy certificate according to a pre-defined template (France and Croatia), while others have dedicated tools where energy auditors upload the results of their energy performance assessment, and the certificate is produced automatically and included in the database (Portugal).

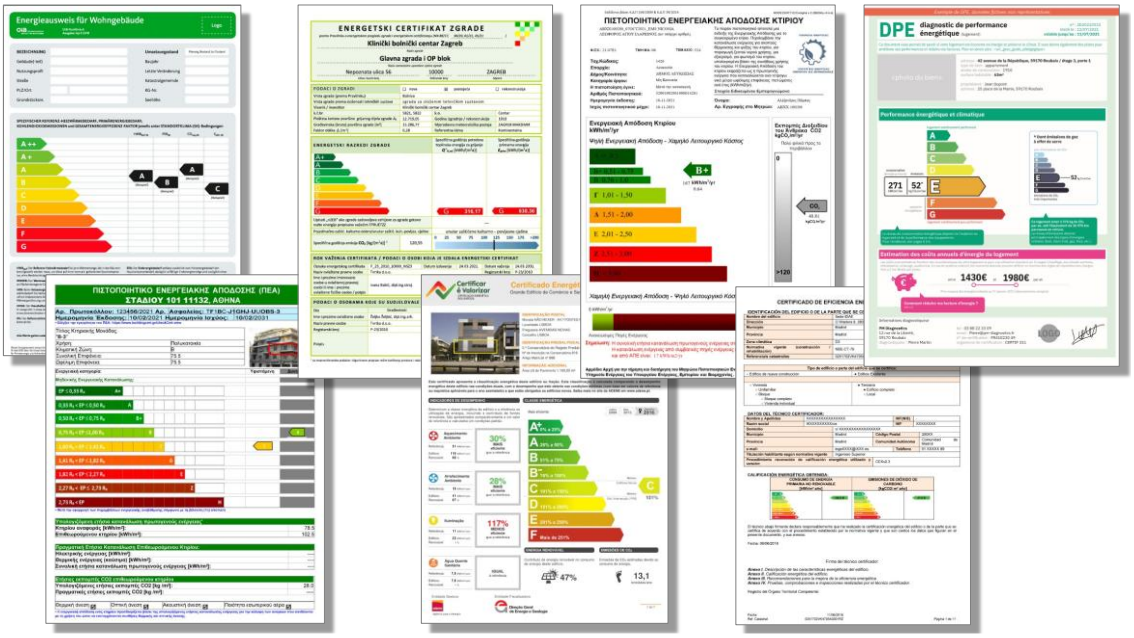



*Figure 7 - Different approaches to EPC certification highlighted in EPC certificates in SRI2MARKET countries (From left to right: Austria, Greece, Croatia, Portugal, Cyprus, Spain and France).*

This quite different landscape implies that the SRI certification pathways and possible integration with the EPC should be carefully evaluated per country and there is no one-size-fits-all solution. It should be mentioned, though, that the new EPBD foresees some coherence between the different systems (for instance, a harmonised scale of energy performance), even if leaving enough flexibility for countries to adapt the framework to its national circumstances and policy priorities. This means that, when setting up the current schemes the increased EU harmonization context should be taken into account. Table 2 provides a summary with highlights per country and similarities.

*Table 2 - Summary table with highlights per country and similarities.*

| | Austria | Croatia | Cyprus | France | Greece | Portugal | Spain |
|---|---|---|---|---|---|---|---|
| Quality control / quality check | Approximately 5% of all EPC's are randomly quality checked annually | Approximately 15% of all EPC's are randomly quality checked annually | Upon request by the interested parties | Quality checks off and on-site | Random EPC control checks and on specific EPCs after complaints | Two assessments trough documents and duplication of the necessary calculations that support the EPC | Each regional government, must establish the control mechanisms that they consider appropriate |
| Qualification, accreditation, and training of experts | Different training programs and certifications for auditors | Training program requiring professional experience | Training program and 50 residential EPCs requirement before issuing non residential | Different certifications that expire every 7 years. | Different training programs and certifications for auditors | Training program requiring professional experience and university degree | No official training, qualification is dependent on academic or professional grade |
| Management structure | Governmental, both central and regional and assisted by the Austrian Institute of Construction Engineering | Governmental | Governmental | Governmental and managed by ADEME | Governmental and assisted by the Centre for Renewable Energy Sources | Governmental and managed by ADENE | Governmental, both central and regional |
| SRI initiatives | Official test phase<br><br>LIFE projects: SRI2MARKET; SRI-ENACT; easySRI; tunES.<br><br>Horizon projects: E-Panacea. | Official test phase<br><br>LIFE projects: SRI2MARKET; SRI-ENACT; tunES. | Official test phase<br><br>LIFE projects: SRI2MARKET; easySRI; Smart Square; SmarterEPC. | Official test phase<br><br>LIFE projects: SRI2MARKET; SmarterEPC. | Official test phase<br><br>LIFE projects: SRI2MARKET; easySRI; SRI-ENACT; Smart Square; iEPB; SmarterEPC; tunES.<br><br>Horizon projects: X-Tendo; iBRoad2EPC; E-Panacea. | Official test phase<br><br>SRI included in the LTRS and possible in the EPC certificate<br><br>LIFE projects: SRI2MARKET.<br><br>Horizon projects: X-Tendo; iBRoad2EPC. | Official test phase<br><br>LIFE projects: SRI2MARKET; easySRI; SRI-ENACT; iEPB.<br><br>Horizon projects: E-Panacea; iBRoad2EPC. |

# 5. Bridging SRI and EPC certification

## 5.1 Coordination with other EU schemes, policy instruments and standards

As it was indicated in the Commission Implementing Regulation (EU) 2020/2156 [46], Member States that decide to implement the Smart Readiness Indicator (SRI) scheme may couple the issuing of its certificate with their energy performance certification scheme or with the inspection of heating, air-conditioning and combined heating or air-conditioning and ventilation systems under Directive 2010/31/ EU, or with their scheme for energy audits under Directive 2012/27/EU. The coordinated implementation of the SRI scheme with existing assessments and inspections was further emphasised in Directive (EU) 2024/1275 [1]. The most recent EPBD recast called for a standardized approach to implementing the SRI, alongside EPCs, renovation passports, and inspections of heating and air-conditioning systems by qualified and/or certified accredited experts. Also, a joint independent control system is posed to ensure the quality and consistency of SRIs and related assessments.

### 5.1.1 SRI and EPB Assessments and Certification Schemes

There are topical and procedural similarities between the SRI and EPB assessments. Particularly, the assessed object (i.e., building or building unit) is common, and there are some overlaps in the considered aspects (e.g., assessor information, building information, technical building systems, etc.). Also, there are topical synergies, as the technical building systems and building services object of EPB assessments bear remarkable similarities with SRI's technical domains and smart-ready services. In addition, the expertise required to perform the assessment is similar, fostering that EPB assessors can also issue SRIs. Other administrative synergies may exist, such as display of certificates, online availability in databases, independent control system, etc.

The concrete coupling mechanism of the SRI and the energy performance certification scheme will be different for each Member State, on account of each having its own procedure and methodology to perform energy performance of buildings assessments and issue related EPCs.

In the next section, an overview of the overlaps between the EPB assessment methodologies, as defined in the set of EPB standards and the SRI scheme as defined by the EC is presented.

*EPB standards*

To assess the overall energy performance of a building, the CEN has established a set of standards and accompanying technical reports to support the EPBD [1]. These standards are called the energy performance of buildings standards or "set of EPB standards". They are aimed at the international harmonisation of the methodology for assessing the energy performance of buildings.

The set of EPB standards have a modular structure, which enables the identification of all required parts of the assessment procedure, the modules covered by the EPB standards, and the connection between the EPB standards. The overarching modular structure has the following four main areas.

- M1. Overarching standards.
- M2. Building as such.
- M3-M11. Technical Building Systems under EPB (M3-Heating, M4-Cooling, M5-Ventilation, M6-Humidification, M7-Dehumidification, M8-Domestic Hot Water, M9-Lighting, M10-Building Automation and Control, M11-Electriciy production).
- M12-M13. Other systems or appliances (non-EPB).

Each main module is divided into sub-modules, as indicated in Table 3. A comprehensive overview of the standards linked to each EPB Standards modules and submodules is included in EN ISO 52000-2 [47].

*Table 3 - EPB Standards modules and submodules. Reproduced from EN ISO 52000-1 [47].*

| Main area | Overarching | Building as such | Technical Building Systems |
|---|---|---|---|
| Module | M1 | M2 | M3-M11 |
| Submodule | Description | | |
| 1 | General | General | General |
| 2 | Common terms and definitions; symbols; units and subscripts | Building Energy Needs | Needs |
| 3 | Applications | (Free) Indoor conditions without systems | Maximum load and power |
| 4 | Ways to Express Energy Performance | Ways to Express Energy Performance | Ways to Express Energy Performance |
| 5 | Building Functions and Building Boundaries | Heat Transfer by Transmission | Emission & control |
| 6 | Building Occupancy and Operating Conditions | Heat Transfer by Infiltration and Ventilation | Distribution & control |
| 7 | Aggregation of Energy Services and Energy Carriers | Internal Heat Gains | Storage & control |
| 8 | Building Zoning | Solar Heat Gains | Generation & control |
| 9 | Calculated Energy Performance | Building Dynamics (thermal mass) | Load dispatching and operating conditions |
| 10 | Measured Energy Performance | | |
| 11 | Inspection | | |
| 12 | Ways to Express Indoor Comfort | | BMS |
| 13 | External Environment Conditions | | |
| 14 | Economic Calculation | | |

[a] as indicated in EN ISO 52000-1, all EPB standards provide a certain flexibility regarding the methods, the required input data, and references to other EPB standards, by the introduction of a normative template in Annex A and Annex B with informative default choices.

In general, the input data requested for each module can be of the following types:

- Product data.
- System design data.
- Operating data and boundary conditions.
- Other data.

The **topical synergies between some modules and submodules of the EPB Standards and the SRI assessment methodology is remarkable**, as depicted in Table 4.

*Table 4 - Topical synergies between SRI and EPB Standards.*

| SRI | | | EPB Standards | |
|---|---|---|---|---|
| Technical domain | Smart-ready service | Code | Module name | Module code |
| Heating | Emission control | H-1a, H-1b | Emission & control | M3-5 |
| | Storage and shifting of thermal energy | H-1c | Storage & control | M3-7 |
| | Control of distribution pumps in networks | H-1d | Distribution & control | M3-6 |
| | Thermal Energy Storage control | H-1f | Storage & control | M3-7 |
| | Generation control | H-2a, H-2b | Generation & control | M3-8 |
| | Sequencing of different generators | H-2d | | |
| | Information to occupants and facility managers | H-3 | Not covered | |
| | Flexibility and grid interaction | H-4 | Not covered | |
| Domestic hot water | Storage charging control | DHW-1a, DHW-1b, DHW-1c, | Storage & control, Generation & control | M3-7, M3-8 |
| | Sequencing of different generators | DHW-2b | Generation & control | M3-8 |
| | Information to occupants and facility managers | DHW-3 | Not covered | |
| Cooling | Emission control | C-1a, C-1b | Emission & control | M4-5 |
| | Control of distribution network chilled water temperature | C-1c | Generation & control | M4-8 |
| | Control of distribution pumps in networks | C-1d | Distribution & control | M4-6 |
| | Interlock | C-1f | | |
| | Thermal Energy Storage control | C-1g | Storage & control | M4-7 |
| | Generation control | C-2a | Generation & control | M4-8 |
| | Sequencing of different generators | C-2b | | |
| | Information to occupants and facility managers | H-3 | Not covered | |
| | Flexibility and grid interaction | H-4 | Not covered | |
| Ventilation | Supply air flow control | V-1a | Emission & control | M5-5 |

| SRI | | | EPB Standards | |
|---|---|---|---|---|
| | Air flow or pressure at air handler level | V-1c | Distribution & control | M5-6 |
| | Heat recovery control | V-2c | Distribution & control, Generation & control | M5-6, M5-8 |
| | Free mechanical cooling | V-3 | Distribution & control, Generation & control | M5-6, M5-8 |
| | Supply air temperature control by AHU | V-2d | Distribution & control, Generation & control | M5-6, M5-8 |
| | Information to occupants and facility managers | V-6 | Not covered | |
| Lighting | Occupancy control | L-1a | Emission & control[a] | M9-5 |
| | Light level/daylight control | L-2 | Emission & control[a] | M9-5 |
| Dynamic building envelope | Window control | DE-1 | Solar heat gains | M2-8 |
| | Window control | DE-2 | Heat transfer by infiltration and ventilation | M2-6 |
| | Information to occupants and facility managers | DE-4 | Not covered | |
| Electricity | Local electricity production. Reporting information | E-2 | Not covered | |
| | Local electricity production. Optimisation | E-5 | Generation & control | M11-8 |
| | CHP generation control | E-5 | Generation & control | M11-8 |
| | Electricity storage | E-3 | | |
| | Electricity storage. Reporting information | E-11 | Not covered | |
| | Demand side management control | E-8 | | |
| | Electricity consumption. Reporting information | E-12 | Not covered | |
| Electric vehicle charging | EV charging | EV-15 | Not covered | |
| | EV charging | EV-16 | Not covered | |
| | EV charging | EV-17 | Not covered | |

| SRI | | | EPB Standards |
|---|---|---|---|
| Monitoring and control | Heating and cooling systems interaction control | MC-3 | Not covered |
| | Technical Building Systems. Fault detection | MC-4 | Not covered |
| | Technical Building Systems. Occupancy detection | MC-9 | Not covered |
| | TBS performance and energy use. Reporting information | MC-13 | Not covered |
| | Smart grid interaction | MC-25 | Not covered |
| | Demand side management. Reporting information. | MC-28 | Not covered |
| | Demand side management. Override control. | MC-29 | Not covered |
| | Single platform | MC-30 | Not covered |

[a] as indicated in [47], this submodule provides assessment approaches to control the electric lighting system. Methods to describe and rate constant illuminance control, presence detection systems and daylight dependent controls are provided.

Table 4 reveals the **significant synergies between the SRI assessment and EPB assessments, as defined by the EPB Standards**.

*Focus on BACS standard*

A large part of the services evaluated under the service catalogue proposed within the SRI technical framework, originated from EN 15232-1:2017 'Energy Performance of Buildings — Impact of Building Automation, Controls and Building Management' [48] which is part of Module 10, detailed above. This standard has been replaced by the current ISO standard 52120-1:2021 "Energy performance of buildings — Contribution of building automation, controls and building management" [47], from now on named "BACS standard".

When developing the SRI proposed methodology, it was identified that the use of current standardized solutions should be used as much as possible. As mentioned in the EU commissioned final technical report on the development of the SRI [5], EN 15232-1:2017 "*standard is the overarching standard that models the impact of BACS on a building's energy consumption. The standard is developed by CEN/TC 247 and part of a series of standards aiming at international harmonization of the methodology for the assessment of the energy performance of buildings, called "EPB set of standards". This standard contains a list of BACS and technical building management (TBM) functions and categorises them in line with the modular structure defined by the over-arching EPB standard (EN ISO 52000-1).*". Table 5 details the overlap in the several technical domains assessed. Looking at common technical domains between the BACS standard and the SRI framework (Heating, Domestic Hot Water, Cooling, Ventilation and Lighting) there is a strong prevalence of services sourced on the BACS standard. The percentage of commons services varies between 50% and 83% across these technical domains with a total overlap of 74%.

*Table 5 - Overlap between SRI services in proposed service catalogue EN 15232-1:2017 ("BACS standard").*

| Technical domains | SRI services # | Sourced on "BACS Standard" # | Overlap (%) |
|---|---|---|---|
| Heating | 11 | 8 | 73% |
| Domestic Hot Water | 6 | 4 | 67% |
| Cooling | 10 | 8 | 80% |
| Ventilation | 6 | 5 | 83% |
| Lighting | 2 | 1 | 50% |
| ***Sub-total (common technical domains)*** | ***35*** | ***26*** | ***74%*** |
| Dynamic Envelope | 3 | 0 | 0% |
| Electricity | 7 | 0 | 0% |
| Electric Vehicle Charging | 3 | 0 | 0% |
| Monitoring and Control | 8 | 0 | 0% |
| Total | **56** | **26** | **46%** |

It is therefore clear that there is a high level of coordination and possible synergies between the SRI and the BACS standard, as will be also made clear in chapter 5.2.

### 5.1.2 LEVEL(s) and smart readiness

LEVEL(s) is a European Commission initiative which provides a common language for assessing and reporting on the sustainability performance of buildings. It is based on six macro-objectives that address key sustainability aspects over the building life cycle:

1. Greenhouse gas emissions along a building's life cycle
2. Resource efficient and circular material life cycles
3. Efficient use of water resources
4. Healthy and comfortable spaces
5. Adaption and resilience to climate change
6. Optimised life cycle cost and value

The sustainability indicators within each macro-objective describe how the building performance can be aligned with the strategic EU policy objectives in areas such as energy, material use and waste, water, indoor air quality and resilience to climate change [49].

It focusses its approach on a layered conceptual model comprised of 3 main levels (Level 1 – Conceptual design; Level 2 – Detailed design and construction; Level 3 – As-built and in-use) which can be assessed on a modular approach and independently for each macro-objective and indicator depending on the needs, objectives and capacities for each building and project.

LEVEL(s) has two main focuses when dealing with related smart technologies and services: monitoring of the impact of design options and control, mainly referring to EPB standards compliance and assessments. It also provides a framework to close the performance gap (i.e. the difference between energy performance assessments and real energy consumption on operation).

Monitoring activities are specified, as well as accompanying reference standards. This includes a focus on testing of the building fabric, testing of the HVAC systems, metering of energy and water consumption,

measurement of indoor air, both at handover and occupation, thermal conditions upon occupation, and the contribution and quality of daylight and artificial light. Smart monitoring and control are specifically dealt with in indicator 1.1 – "Use stage energy performance".

On Level 1 – "Conceptual design" for indicator 1.1 – "Use stage energy performance", and as mentioned in the LEVEL(s) [49], one should identify opportunities to install intelligent systems that can:

- Provide users and building managers with timely information about the building's energy use, whilst also allowing them to learn how to meet occupier energy needs with less energy.
- Be used to maximise the potential for self-consumption of renewable energy generated by the building.

On Level 2 – "Detailed design and construction", there is a specific provision on the use of the BACS standards (see chapter 5.1.1) which should be used specifically in assessing the impact of these technologies in the energy performance of the building.

On Level 3 – "As-built and in-use", a monitoring and metering strategy should in place. This shall include "the correct calibration of meters and the recompilation of sub-meter readings (if installed) with the main meters and the logs of Building Automation and Control Systems and/or Building Energy Management Systems (if installed)". Although LEVEL(s) is mainly focused, in Level 3, on monitoring and cross-checking of previous assessments against operational data, special attention should be put in in the way this information can be used to manage the energy use of a building and adapt control strategies.

Analysing these specific characteristics, SRI overlap with LEVEL's is relevant and there is a strong relation and potential for complementarity, namely in the relation with building management and self-consumption optimization reducing the buildings overall environmental impact.

## 5.2 SRI and EPC input data overlap

The SRI and EPC input data overlaps were analysed to check to which extent the SRI assessment is an additionality to the EPC (i.e. providing extra information but also requiring additional assessment time) or fully compatible with current EPC systems (i.e. providing a framework for smart readiness calculation but based mainly on already existing inputs, with less additional assessment time). This type of analysis has already been performed in the E-Panacea and X-Tendo projects [50,51], and the findings seemed to indicate there was little overlap. SRI2MARKET approach addresses the same issue for its target countries, but also refines the scope by checking differences between 3 building typologies (residential, non-residential <290 kW, non-residential >290 kW effective rated output) and by analysing potential overlaps. This means that, besides strict input data compatibility, the potential was also evaluated in cases where:

1. technical system/services are evaluated but not totally in terms of control/functionalities.
2. it is only applicable in some buildings.
3. the evaluation exists but is not mandatory.

It followed a categorization of inputs on auditor details, administrative and general building data, technical building systems and the SRI services catalogue on a total of 66 parameters (ANNEX B - Input data EPC_SRI). The inputs were categorized following several sources and EPC data harmonization initiatives such as those included in the E-Panacea, iBRoad and iEPB projects but also a JRC report framework under the INSPIRE directive (Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community [50,51]. This allows not only a streamlining of the current evaluation across countries but also comparison with pre-existing evaluations and easy incorporation of data in future initiatives. The full list of

parameters, categorization and results per country can be found in ANNEX C - Input data EPC_SRI full results per country.

The results of the first part of the analysis are summed up in the following chart:

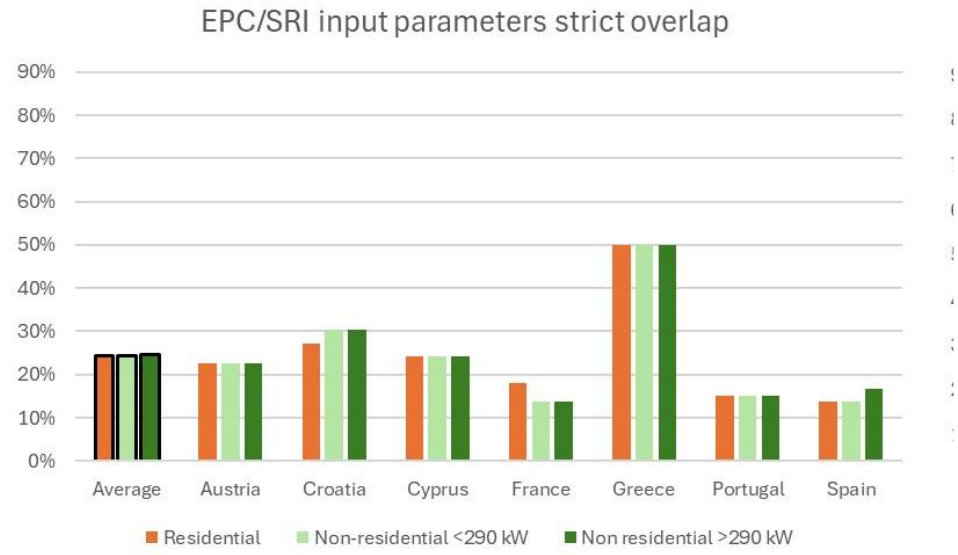



*Figure 8 - EPC and SRI input parameters **strict** overlap on targeted countries and Greece, for 3 buildings typologies (residential, non-residential <290 kW, non-residential >290 kW effective rated output).*

It is clear that, except for Greece, **the strict overlap between parameters is low** (on average 25% independent of the building type). A more detailed analysis revealed that they are strongly correlated with general building data used on EPC and SRI and very little on actual smart ready services analysed.

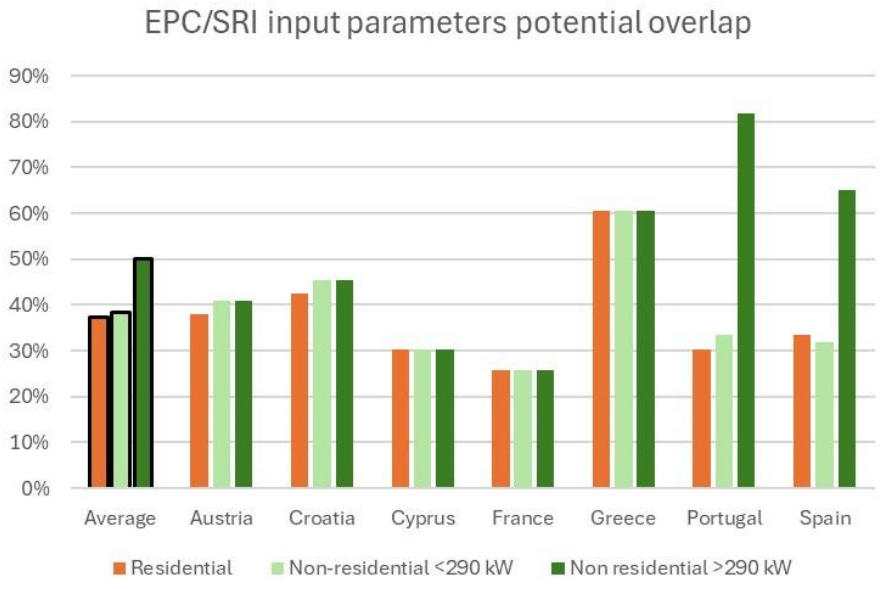



*Figure 9 - EPC and SRI input parameters **potential** overlap on targeted countries and Greece, for 3 buildings typologies (residential, non-residential <290 kW, non-residential >290 kW effective rated output).*

**When evaluating the overlap potential, the picture changes, and a higher correlation is quite visible**. This becomes obvious in non-residential buildings with and effective rated output >290 kW and in countries such

as Spain and Portugal although for different reasons. The common practice of use of centralized automation and control systems in new buildings as well as the positive implication these systems have on inspection procedures and the higher potential for cost-effective energy reduction impact, partially explain these results. In the case of Spain, the higher correlation is explained by the use of some assessment methods (software) for EPC issuing which include the evaluation of several SRI related services. It is therefore mainly a voluntary option some assessors use. The case of Portugal is quite different as there are mandatory BACS requirements for new buildings with an effective rated output >290 kW which are strictly related to the "Energy performance of buildings - Contribution of building automation, controls and building management" standard [48]. These buildings must have a centralized system, and it must comply with the following requirements: energy efficiency class B, if installed by 31 December 2024, and with energy efficiency class A, if installed from 1 January 2025. The energy reduction potential from these systems is also included in the EPC calculations either through the dynamic simulation software used or using the default energy impact factors defined in the BACS standard. Given the fact that most of the services evaluated on the SRI service catalogue are based on the BACS standard and respective functionality levels, this means that there is a high compatibility of inputs between SRI and the Portuguese EPC issuing for these types of buildings. In practical terms, it means an almost full SRI pre-assessment is already made in some cases implying little effort to perform a full SRI assessment.

## 5.3 Available tools and projects for SRI and EPC Integration and evaluation

Across Europe there are several projects and initiatives that support the EU countries in the implementation of the Energy Performance Certificates and the Smart Readiness Indicator, promote the market up-take of both instruments and explore the synergies between them.

Some of these projects have resulted in or are currently collaboratively working on the development of complementary tools that aim to support different target groups across different levels of the SRI implementation. When tools are developed by several projects simultaneously, it can be overwhelming and become harder for stakeholders to find and realise the complementarities. Table 6 provides a simple overview of the available tool solutions developed by different European projects and the existing interactions between EPCs and SRI.

*Table 6 - Summary of developed tools by SRI initiatives.*

| Project | Output | Tool/Study Description | EPC Integration | Link |
|---|---|---|---|---|
| LIFE Program | | | | |
| SRI2MARKET | Calculation and benchmarking tool<br><br>E-learning platform<br><br>SRI upgrade recommendation tool for owners. | Online application to carry out and store SRI assessments, with an advanced benchmarking module, and currently working on a user-friendly feature to provide recommendations on SRI upgrades to building owners.<br><br>Training program available in 7 languages, that provides e-learning lessons on the SRI and its assessment methodology | Assessment of different options and scenarios for integration of the SRI into the different national energy certification systems | https://sri2market.eu/ |
| easySRI | Calculation tool | Web platform that offers services for the automated calculation of the SRI | Inclusion of its outcomes in new or future standards and will investigate links with other EU initiatives such as | https://www.easysri.eu/en |

| | | | | |
|---|---|---|---|---|
| | | | EPCs, B-Logs and renovation passports | |
| tunES | Study | EU-level: an EPC & SRI practice collection describing a wide range of practices trialled to improve the efficiency and effectiveness of the instruments<br>National level: seven national policy measure packages to set the pathway for the upcoming EPBD transition | Goal is to maximise the impact of upcoming national policy measures on both instruments (EPC's and SRI), exploiting synergies of their integration | https://empirica.com/tunes/ |
| SRI-ENACT | Calculation tool | Web-based toolkit, implementing the proposed SRI driven methodology | | https://srienact.eu/ |
| SmartSquare | Calculation tool<br>&<br>Observatory | Cloud based open platform for assessing the intelligence of buildings<br>&<br>Web platform to publish latest SRI policy developments at the EU level, track and compare national implementation statuses, and learn about the most relevant research advancements in building smartness | Aims to create a standardized procedure for SRI calculation | https://www.smartsquare-project.eu/<br>https://www.smart-ready-go.eu/ |
| SmarterEPC | Hub<br>&<br>On-site audit standardized procedure | The hub will ease access to updated EPC and SRI assessment tools as well as e-learning materials available in several EU languages | One of the project's goals is to integrate smart readiness aspects into buildings' energy certification processes. In particular an "EPC & SRI on-site audit procedure" will be developed to integrate EPC and SRI data collection into a standardised & harmonized procedure for on-site building audits, building on the work carried out in the SmartSquare project. | https://lifeprojects.r2msolution.com/smarterepc-building-evaluation/ |
| iEPB | Shared Data Model | Development of a shared data model for Energy Performance Building Assessments, which holds the potential for future expansion to incorporate additional assessments | Aims to enhance the energy performance of the EU's building stock by enhancing synchronization among existing Energy Performance Certifications (EPC) and other instruments. | https://iepb-project.eu/about/ |
| Horizon related Programmes | | | | |

| | | | | |
|---|---|---|---|---|
| X-tendo | Study | X-tendo and its toolbox introduce ten features (including the SRI) of the next generation of energy performance certificates, to provide public authorities with improved compliance, reliability, usability and convergence of next-generation energy performance assessment and certification | X-tendo developed and tested next-generation EPC features in 9 countries around Europe covering 40% of the EU building stock and assist the implementation of the features into the existing EPC schemes. | https://x-tendo.eu/ |
| iBRoad2EPC | Study | iBRoad2EPC aimed to bridge the Building Renovation Passport with the Energy Performance Certificate (EPC), and expand, improve and broaden their format and joint scope to consider additional features, including the SRI | The aim was to improve reliability, usefulness and effectiveness, thereby establishing the next generation of EPCs that will support Europe's decarbonisation | https://x-tendo.eu/ |
| ePANACEA | Cloud platform | ePANACEA comprises the creation of a prototype (the Smart Energy Performance Assessment Platform) making use of the most advanced techniques in dynamic and automated simulation modelling, big data analysis and machine learning, inverse modelling or the estimation of potential energy savings and economic viability check | ePANACEA linked EPC schemes with the SRI, while its methodology development included the energy related impact of smart technologies at different levels | https://epanacea.eu/ |
| D^2EPC | Calculation tool | Calculation suite that facilitates the calculation of 4 sets of indicators related to the building's smart-readiness, indoor environment, environmental and financial performance | The SRI calculation is facilitated by a dedicated sub-module, the "SRI calculation sub-module," which integrates the concept of smart readiness in the broader domain of EPCs | https://www.d2epc.eu/en |
| EPC RECAST | Toolbox | Software components aimed at supporting SRI assessment using IFC format BIM models | Objective was to support the work of professional EPC assessors to achieve improved EPC reliability, comparability in between building assets and more user-friendliness | https://epc-recast.eu/ |
| Smart2B | Web service | Smart2B Smart performance assessment & Advisor (SPA&A) provides the building users with data-driven insights about the current smartness of the building, suggests improvement actions to increase the upgrading of the building in line with the SRI definition, | | https://smart2b-project.eu/ |

| | | | | |
|---|---|---|---|---|
| | | and shows their economic and environmental impacts | | |
| U-CERT SRI | Tool | Digital tool that brings the official SRI assessment spreadsheet into a cloud-based web environment, enhancing the user experience on both the data input side and the results' interactive visualization. The main aim is twofold: to simplify and streamline the entire assessment process, and to highlight the added value and benefits of smart building technologies, thereby guiding asset owners toward informed decisions | U-CERT team has prepared 3 interrelated and interlinked documents containing recommendations for the evolution of building performance assessment and certification processes most notably in EU's Member States and overall European countries | https://u-certproject.eu/ |
| EVELIXIA | Tool | The SRI Advisor tool provides Building Owners and Managers with tailored recommendations on how to improve their SRI score. The tool performs different sensitivity analyses based on results of initial SRI assessment, possible technology renovation packages and/or different flexibility scenarios, with a view to determining the most cost-effective building upgrades to achieve a higher SRI score-performance | Recommendations to upgrade the SRI score in the most cost-efficient manner could be integrated with recommendations to improve energy efficiency from an EPC perspective. | https://www.evelixia-project.eu/ |

As shown in Table 6, the development of complementary tools by various projects provides valuable resources for different stakeholders at different stages of SRI roll out. The projects and initiatives currently supporting the implementation of EPCs and the SRI demonstrate a collective effort towards enhancing the implementation of both instruments. Ensuring that stakeholders can easily identify and leverage the complementarities between EPCs, and SRI tools, strengthens the EU Member States efforts towards integrating the SRI into the current national regulatory framework for buildings.

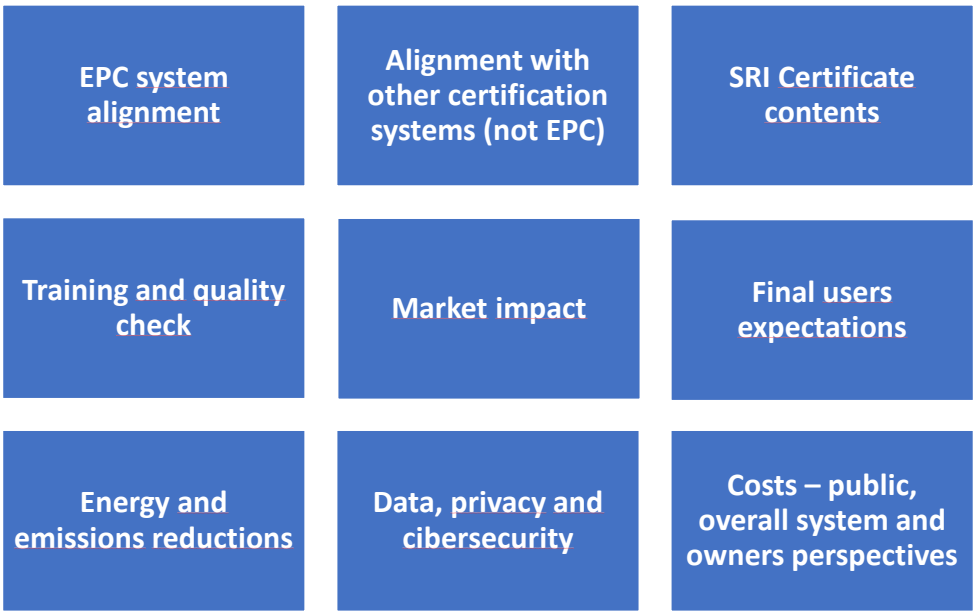
# 6. SRI Certification Pathways

## 6.1 Simplified multicriteria analysis methodology

With the information available on the SRI2MARKET target countries on EPC certification systems and potential input parameters overlap, together with feedback gathered from national stakeholders and, in some cases, feedback from ongoing or finished test phases, a simplified multicriteria evaluation was performed for each country by national experts and cross validated with national stakeholders (policy makers and/or EPBD implementing bodies) directly or indirectly though the results of stakeholders interactions held during the National Expert Panel's and National Working Groups discussions developed in the stakeholder engagement activities of SRI2MARKET (Work Package 4). It implied rating the importance of 49 different features/characteristics/criteria (on a range of 0 to 5 in topics such as EPC system alignment, training and quality check, market impact, final users' expectations, data issues, energy and emissions reductions and costs), along three different possible SRI certification implementation scenarios according to its EPC system integration level:

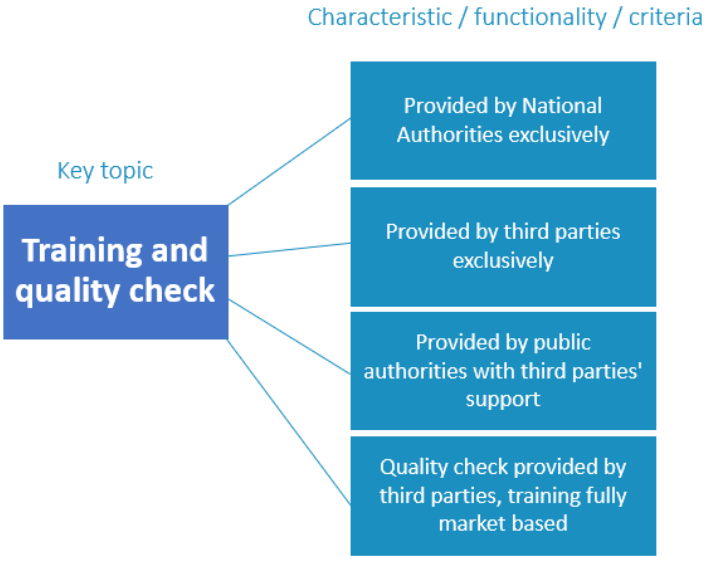
| Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|
| SRI is fully embedded in EPC certification system and is part of the EPC certificate | Features of SRI are integrated in the EPC system. For instance, some information might be part of the certificate, qualification of experts and quality control systems are the same. But SRI can be assessed independently. | There is a national framework for the SRI certificate, but its market implementation is fully independent of EPC system on all stages. Some information for SRI can still be placed in the EPC, if it exists |

The 9 key topics analysed for each scenario were based on previous aggregations and topical evaluations made under the EU commissioned final technical report on the development of the SRI and the analysis performed in E-Panacea and X-Tendo projects [5,50,51], and each contains between 3 and 8 features to be analysed:




The following picture depicts an example of one of the 9 key topics addressed and the split among the respective features/characteristics/criteria. In this specific example, the topic on training and quality control

system is evaluated according to the type of entities providing these services. The detailed list is available on ANNEX D - Multicriteria evaluation template.




### 6.1.1 Scenario I "Fully Integrated"

The first scenario that was evaluated is the "Fully integrated" scenario. In this scenario, SRI assessments are made within and jointly with EPC assessments which means the calculation tools and data input should be embedded in the same platform (either made available by software providers or national authorities), the certificate design is fully embedded and coherent with the EPC design, qualified technicians and quality control and verification are common to both systems and the legislative framework is also common. It still allows for voluntary issuing of the SRI, but when issued, it is fully integrated in the EPC system.

### 6.1.2 Scenario II "Mildly Integrated"

In the mildly integrated scenario, features of SRI are integrated in the EPC system. For instance, some information might be part of the certificate, qualification of experts and quality control systems are the same, but SRI can be assessed independently, have its own certificate design, processes and stakeholders if necessary. Obviously, a common national legislative-framework coherent with the EPBD provisions is still the basis of all the system. Data interoperability is critical in this scenario.

### 6.1.3 Scenario III "Solo"

In the solo scenario, there is a national framework for the SRI certificate, but its market implementation is fully independent of EPC system on all stages. This means there is a decoupling between the EPC and SRI systems even if data exchange is still mandatory on a restricted number of parameters (existence of SRI certificate and main results). This scenario allows for greater market creativity and additional features and implies that the SRI market attractiveness is the basis of the development of the system, irrespectively of EPBD provisions, but, obviously, not putting in risk national compliance.

## 6.2 Results of the assessment per partner country

In the following tables, a summary of the results of the assessment per country is presented. It should be noted that the information received was cross-checked in bilateral exchanges with country's experts and the contextual information provided by the same experts. This means that simply looking at the importance rating

from 1 to 5 provided for each feature/characteristics/criteria is not enough to draw conclusions. It also means that direct comparison between countries is not always possible as the underlying assumptions or specific framework in which the valuation is made can influence the conclusions. Hence, in the next tables a coherent approach based on country specificities is made, ensuring as much as possible that the conclusions are consistent. Still, detailed charts with the ratings for each feature/characteristics/criteria and key topic is available for each country in ANNEX E - Multicriteria evaluation detailed results per country.

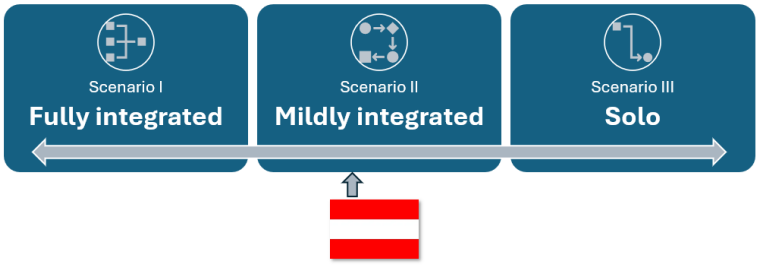
It should also be noted that, even though SRI2MARKET focus on six (6) Member States (Austria, Croatia, Cyprus, France, Portugal, and Spain) the analysis presented was also expanded to include Greece given the relevance of the subject and the existence of a relevant and interest of the Greek partner in the consortium: the University of Piraeus Research Center.

# Austria: outputs summary

**Key highlights from current EPC system and SRI initiatives**

- ⇒ Mixed management structure with core responsibility under the Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology and with the 9 regional governments which have to legally implement, collect and control the EPCs in their respective region
- ⇒ Additional voluntary building certification systems on sustainability available (e.g. klimaaktiv – government programme, ÖGNI and ÖGNB)
- ⇒ Several EPC layouts according to building typology
- ⇒ SRI official test phase conducted

**Overall position in implementation scenarios according to SRI level of integration in EPC**




**Key topic identified as most important across scenarios**

The evaluation made in Austria points that the key topic to address irrespectively of the scenario, is **Energy and Emissions Reductions**, i.e., the real impact of Smart Readiness on energy savings of the building stock, the contribution to national $CO_2$ reduction targets, contribution to a decarbonized building stock in 20250, the renewable energy production impact, and facilitating monitoring and operation at building level and evaluating public policies real impact. A reference should also be made to the importance **of Costs on the building owner perspective.**

**Key topic with highest difference in importance across scenarios**

**EPC system alignment** is the key topic with the most rating difference across scenarios linking directly, and intuitively, the higher importance of this alignment in the integrated scenario. On the other hand, in what concerns the **SRI certificate contents**, these gain much more importance in the solo scenario, probably because additional effort needs to be put in place to be attractive enough to achieve higher market impact.

**Features/characteristic/criteria**

**Top 5 most important**

Under topic **EPC system alignment**, the **data exchange with the EPC system** (input and output) is considered highly relevant, alongside with the **certificate display and visual appearance,** the **empowerment of the consumer on its energy expenditure and the energy system,** the **provision of training and quality check by public authorities with the support of third parties** and the associated **real energy savings and renewable energy production increase.**

**Most important independently of implementation scenario**

**Data exchange with the EPC system** (input and output), alongside with the **certificate display and visual appearance** are of extreme relevance irrespectively of the implementation scenario

**Top 5 least important**

The provision of **training and quality checks provided exclusively by third parties** is considered not admissible. On the other hand, there is also little relevance on **being provided exclusively by public authorities**. All 3 features under the **Alignment with other existing certification scheme (not EPC)** topic are not considered relevant in Austria even, or despite of, these systems being extensively used in Austria.

**Highest difference in importance across scenarios**

Although data exchange between the EPC system is considered very relevant, the **SRI reliance on EPC data** on a "solo" scenario was not welcomed but was essential in the integrated scenario. The same happens for the **SRI visual identity**. On the other hand, the **increased assets value perception** is highly important in the "solo" scenario but not very relevant in a fully integration scenario.

# Croatia: outputs summary

**Key highlights from current EPC system and SRI initiatives**

- ⇒ Centralized management system
- ⇒ Strong quality control system in place
- ⇒ Robust qualification, accreditation, and training of experts' system coupled with energy audits, and regular inspection of heating and air-conditioning systems
- ⇒ Official SRI test phase in progress

**Overall position in implementation scenarios according to SRI level of integration in EPC**


**Key topic identified as most important across scenarios**

According to Croatian's experts' evaluation, the key topic to address irrespectively of the scenario, is **Energy and Emissions Reductions**, i.e., the real impact of Smart Readiness on energy savings of the building stock, the contribution to national $CO_2$ reduction targets, contribution to a decarbonized building stock in 2050, the renewable energy production impact, and facilitating monitoring and operation at building level and evaluating public policies real impact.

**Key topic with highest difference in importance across scenarios**

**Costs for implementing, running and issuing SRI certificates** both from public expenditure, overall system and building owner perspectives had the most relevant differences across scenarios hinting at significant synergies and lower costs on a more integrated scenario.

**Features/characteristic/criteria**

**Top 5 most important**

Under topic "Energy and Emissions Reductions", the real impact of Smart Readiness on the **contribution to national $CO_2$ reduction targets**, **contribution to a decarbonized building stock in 20250, real energy savings, renewable energy production** and under topic "Market Impact" **the boost on renovation, smart grids and technologies.** A **simplified design of the certificate and the quality check** was also deemed very important.

**Most important independently of implementation scenario**

All of the features/characteristics/criteria referred above, are deemed of high importance independently of the implementation scenario.

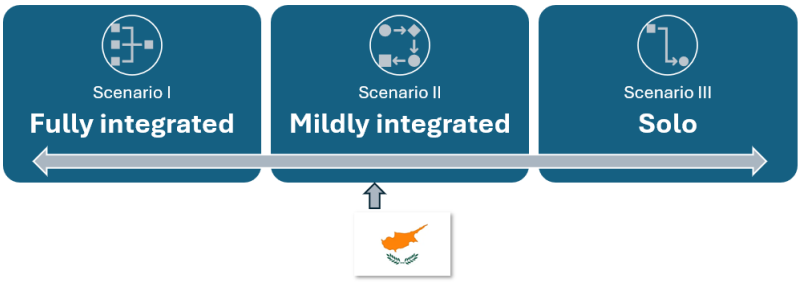
**Top 5 least important**

The analysis did not include additional certification systems, as there no relevant official certification in Croatia. Within this scope and assumption, the features related to "Alignment with other certification systems" namely **Adaptability, comparability and compatibility with other certification systems**, **Added value in comparison other certification systems – differentiation**, and **Cross sectoral added value (possible use of information on water, energy, mobility, urban services, utilities…)**, were the least important. Also referred as not critical were the **assets increased value related to a higher SRI valu**e and **detailed data provided on the certificate.**

**Highest difference in importance across scenarios**

Under "EPC system alignment" topic typically differs across scenarios. Specifically, under **SRI assessment focused on existing data needs for EPC and foreseen provisions of EPBD** it seems clear that a combined SRI/EPC assessment would minimize discrepancies since in the remaining scenarios alignment with EPC data becomes less critical.

# Cyprus: outputs summary

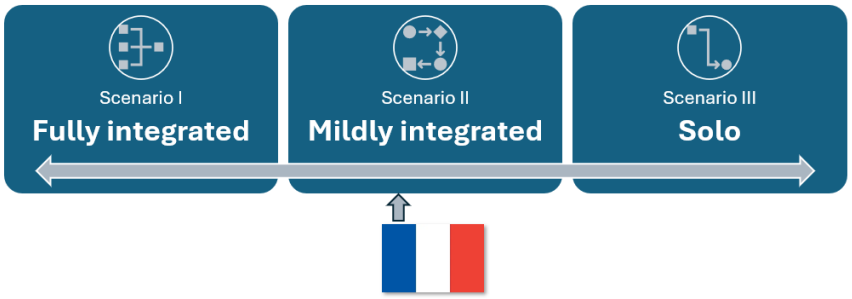
| | |
|---|---|
| Key highlights from current EPC system and SRI initiatives | ⇒ Centralized system on the responsibility of the Department of Energy Services under the Ministry of Energy, Commerce, and Industry<br>⇒ Unique, official and freely available software, for buildings energy performance calculations<br>⇒ Quality and control check upon request<br>⇒ SRI test phase ongoing |
| Overall position in implementation scenarios according to SRI level of integration in EPC |  |
| Key topic identified as most important across scenarios | No single key topic clearly stands out on the Cyprus framework evaluation. Still, the **Costs on the building owner perspective, Market impact, Energy and Emissions Reductions and EPC system alignment** were the most important with some differences across scenarios |
| Key topic with highest difference in importance across scenarios | No major differences across the possible scenarios were identified, still, the **Costs from a public expenditure perspective,** was identified as extremely relevant in the solo scenario**.** It was assumed that, to regulate and launch a new system, additional initial investments would be needed in comparison with the integrated model, even if ran by third parties.<br>Also, the **final user's expectations**, especially the link between SRI and energy/maintenance costs reductions and the added value for selling/renting operations should be more critical in an integrated system. |
| Features/characteristic/criteria — Top 5 most important | Under topic "**EPC system alignment**", the **data exchange with the EPC system** (input and output) is considered highly relevant, alongside with the **costs of implementing improvement measures**, user **friendliness of data management and clear ownership, data reliance on EPC database**, **consumer empowerment and display and visual appearance** |
| Features/characteristic/criteria — Most important independently of implementation scenario | All of the features/characteristics/criteria referred above, are deemed of high importance independently of the implementation scenario. |
| Features/characteristic/criteria — Top 5 least important | All features under the **Alignment with other existing certification scheme (not EPC)** topic are not considered applicable in Cyprus since there no complementary building sustainability official certification systems in place. Related features on possible synergies are also not relevant for the same reason. Data sharing between different market actors such as financing institutions, suppliers was also not considered due to possible national legislation restrictions. This can be read as a possible challenge and not a "not important" feature *per se*. |
| Features/characteristic/criteria — Highest difference in importance across scenarios | SRI certificate contents using **simplified approaches and focus on communication** (minimum information but maximum visibility) is highly important in the "fully integrated" scenario but not very relevant in a "solo" scenario. The same applies for the link between SRI and energy/maintenance costs reductions |

# France: outputs summary

**Key highlights from current EPC system and SRI initiatives**

⇒ Mandatory detailed energy audits for sales.
⇒ Minimum Energy Performance Standards on rental
⇒ Centralized management system
⇒ EPC assessors use Ministry-accredited software tools
⇒ Raw EPC data available with EPC ID

**Overall position in implementation scenarios according to SRI level of integration in EPC**




**Key topic identified as most important across scenarios**

Several key topics are highlighted in France's evaluation: **Costs from the building owner and public expenditure perspectives are critical-** alongside with **Data Issues** (Cybersecurity risks and coping strategies, Personal data protection risks, Access and interoperability with existing databases/datasets, User friendliness managing data and control, Data sharing between different market actors such as financing institutions, suppliers, compatibility with Digital Building Logbooks) were the most important with slight differences across scenarios

**Key topic with highest difference in importance across scenarios**

Topic **"Energy and Emissions Reductions",** i.e. the real impact of Smart Readiness on the contribution to national CO2 reduction targets, contribution to a decarbonized building stock in 20250, real energy savings and renewable energy production was found to be very critical in the fully integrated scenario and not relevant in a "solo" scenario. This means SRI could have a stronger role in monitoring and contributing for public policies and strategies in a fully integrated scenario.

**Features/characteristic/criteria**

**Top 5 most important**

**Cybersecurity risks and coping strategies** and **Personal data protection risks** are considered highly relevant, alongside with data exchange with EPC system, visual appearance and communication power, and the importance of third parties providing training and quality check.

**Most important independently of implementation scenario**

All of the features/characteristics/criteria referred above, are deemed of high importance independently of the implementation scenario.

**Top 5 least important**

All features under the **alignment with other existing certification scheme (not EPC)** topic are not considered very relevant. The assumption relies on EPC and SRI needing to be the foundational grounds of all other certification systems, i.e., they should build and expand on these official systems and not the other way around. **Training and quality check provided by National Authorities exclusively or with third parties support** is not considered compatible with current EPC practices in France.

**Highest difference in importance across scenarios**

The real **impact of Smart Readiness on the contribution to national CO2 reduction targets, contribution to a decarbonized building stock in 20250, real energy savings and renewable energy production** was found to be very critical in the fully integrated scenario and not relevant in a "solo" or "mildly integrated" scenario. This means SRI could struggle to effectively monito and contributing for public policies and strategies in these scenarios

# Greece: outputs summary

**Key highlights from current EPC system and SRI initiatives**

⇒ Centralized management system: Ministry of Environment and Energy is the responsible entity for the legislation of the EPC framework with the operational support from Centre for Renewable Energy Sources (CRES)

⇒ Common core calculation engine (market can supply user friendly versions)

⇒ Strong quality check and verification procedures in place

⇒ SRI test phase ongoing

**Overall position in implementation scenarios according to SRI level of integration in EPC**


**Key topic identified as most important across scenarios**

The **EPC system alignment** was clearly identified as the most relevant topic across all scenarios. This is somehow consistent with the overall positioning in Greece where the fully integrated scenario is favoured. Either way, and irrespectively of the implementation scenario, alignment with EPC system should be a top priority.

**Key topic with highest difference in importance across scenarios**

Topic **"Costs – Building owner perspective",** had the highest difference across scenarios and deemed much more relevant in the fully integrated scenario than in the remaining scenarios. This could mean that a fully integrated scenario could significantly lower costs and create synergies with improvement measures on EPCs therefore creating conditions for wider acceptance.

**Features/characteristic/criteria**

**Top 5 most important**

The features/characteristic/criteria included in EPC system alignment topic were definitely ranked as the priorities (**SRI assessment focused on existing data needs for EPC and foreseen provisions of EPBD, SRI relies on additional information and provides additional outputs, Triggers for SRI issuing should be the same as EPC, SRI relies on and feeds EPC databases, SRI certificate visual identity linked to EPC system, Building EPC results or EPC statistics influence the weighing factors of technical domains.**) – this strengthens the strong lean to a fully integrated scenario foreseen as most likely in Greece. Also highlighted were the **display and visual appearance** of SRI certificate and **data ownership by users ensuring also data provision to market actors**.

**Most important independently of implementation scenario**

All the features/characteristics/criteria referred above, are deemed of high importance independently of the implementation scenario

**Top 5 least important**

All features under the **alignment with other existing certification scheme (not EPC)** topic are not considered very relevant.

**Highest difference in importance across scenarios**

features/characteristic/criteria included in Topic "Costs – Building owner perspective", specifically **SRI certificate issuing** and **Implementing improvement measures** had the highest difference across scenarios and deemed much more relevant in the fully integrated scenario than in the remaining scenarios.

# Portugal: outputs summary

**Key highlights from current EPC system and SRI initiatives**

- ⇒ The Portuguese EPC system has a centralized management system. ADENE is the managing authority for the Portuguese EPC system. Supervision and inspection are a responsibility of the National Energy Directorate (DGEG)
- ⇒ Strong quality check and verification procedures in place
- ⇒ Minimum BACS requirements, based on ISO 52120, for new or renovated buildings above 290 kW, minimum B class (class A from January 2025)
- ⇒ SRI test phase ongoing and legal provisions promoting SRI on EPC legislation and on the Long-Term Renovation Strategies

**Overall position in implementation scenarios according to SRI level of integration in EPC**


**Key topic identified as most important across scenarios**

The **SRI certificate contents** topic was identified as the most relevant across all scenarios, which suggests a strong focus should be put in place on communication and the certificate document itself to ensure positive feedback and engagement from users

**Key topic with highest difference in importance across scenarios**

The **EPC system alignment** topic had the highest difference between scenarios. It was assumed that the fully integrated scenario would need, obviously, a strong alignment with current EPC system. But the less integrated scenarios could also work with less alignment with the EPC system. This "misalignment" could be balanced by stronger data sharing and exchanges procedures as this was highlighted with special relevance on the "solo" scenario.

**Features/characteristic/criteria**

**Top 5 most important**

The **certificate display and visual appearance,** under topic **SRI certificate contents,** was, by far, the most relevant features/characteristic/criteria. The **coherence with EU taxonomy, portfolio evaluation and due diligence,** the **training and quality check provided by national authorities with third parties' support,** the **cross sectoral added value (possible use of information on water, energy, mobility, urban services, utilities…)** and **personal data protection risks** were also highlighted as very relevant.

**Most important independently of implementation scenario**

Reinforcing the identified focus on communication efforts and the certificate contents itself the **certificate display and visual appearance,** under topic "**SRI certificate contents"** was highlighted as the most relevant across scenarios.

**Top 5 least important**

The **cost of issuing the SRI certificate from an overall system perspective** was found to be not relevant. Since there is already functionality levels evaluation under the BACS standard for some buildings, the issuance of the certificate is not a relevant additional cost. Similarly, the **Cost of running the system** is not relevant even if, in the "solo" scenario, it should be taken higher account. With the exiting **training and quality check systems** in Portugal, it is not foreseen that **provision by third parties** is acceptable in any scenario.

**Highest difference in importance across scenarios**

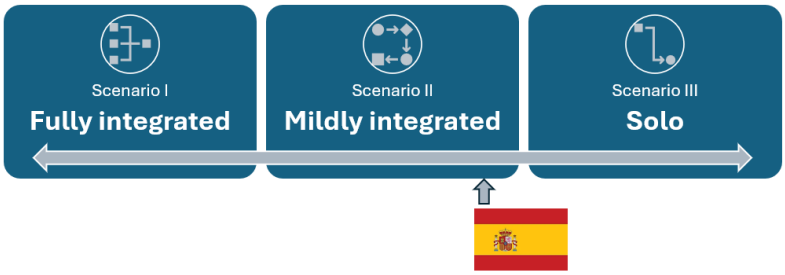
Features/characteristic/criteria related to **added value in comparison with other certification systems** and **data sharing between market actors** are far more relevant if the SRI certification system is less integrated with the EPC system. On the other hand, **similar triggers for issuing** and **strong reliance on EPC databases** are more important on a fully integrated scenario that in other cases.

# Spain: outputs summary

**Key highlights from current EPC system and SRI initiatives**

- ⇒ The central government via the corresponding Ministry is responsible for establishing the common EPC scheme. The responsibility of EPC registration and quality control is on regional governments. EPCs are collected and registered but there is not yet an integrated database.
- ⇒ EPC layouts similar on all buildings but different calculations methodologies for residential and non-residential
- ⇒ 5 software's licensed for energy certification. Some include the possibility of evaluation of features common to SRI (not mandatory)
- ⇒ SRI test phase ongoing

**Overall position in implementation scenarios according to SRI level of integration in EPC**




**Key topic identified as most important across scenarios**

The **Certificate Contents** topic was deemed as the most relevant to be addressed, specifically in what concerns the simplification and attractiveness of the information to guarantee high impact.

**Key topic with highest difference in importance across scenarios**

Topic **"Energy and Emissions Reductions",** i.e. the real impact of Smart Readiness on the contribution to national CO2 reduction targets, contribution to a decarbonized building stock in 20250, real energy savings and renewable energy production was found to be very critical in the fully integrated scenario and not relevant in a "solo" scenario. This means SRI could have a stronger role in monitoring and contributing for public policies and strategies in a fully integrated scenario.

**Features/characteristic/criteria**

**Top 5 most important**

Data issues, specifically **interoperability with existing databases (including EPC), compatibility with Digital Building Logbooks, and data control and management user friendliness were ranked as highly important**. Also very relevant are the display and visual appearance and a simplified SRI certificate focused on communication and less on detailed technical information (which can be a relevant add-on)

**Most important independently of implementation scenario**

All of the features/characteristics/criteria referred above, are deemed of high importance independently of the implementation scenario.

**Top 5 least important**

All features under the **alignment with other existing certification scheme (not EPC)** topic are not considered very relevant. **Training and quality check provided by National Authorities or by third parties exclusively** is not considered compatible with current EPC practices in Spain. There is a consolidated pathway in Spain, that should be replicated in SRI, of having third parties provide training and quality by regional governments (autonomous communities).

**Highest difference in importance across scenarios**

The real **impact of Smart Readiness on the contribution to national CO2 reduction targets, contribution to a decarbonized building stock in 20250, real energy savings and renewable energy production** was found to be very critical in the fully integrated scenario and not relevant in a "solo" or "mildly integrated" scenario. This means SRI could struggle to effectively monitor and contributing for public policies and strategies in these scenarios. The inverse applies to all **cost categories** evaluation where these values can be critical for success as we progress to a more independent SRI system.

## 6.3 Cross-analysis of results and preferred certification pathways

Looking at the overall positioning of the analysed countries within the scope of the different scenarios of SRI integration in EPC certification systems, the approach can vary according to the existing framework, current policies and implementation strategies for the future. The methodology and subsequent analysis revealed that it is not possible to define clearly one of three specific scenarios for each country but rather a range positioning between them:

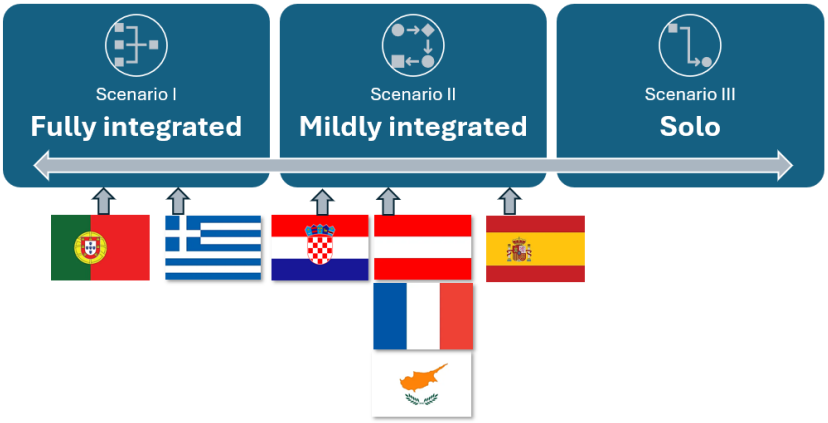



*Figure 10 – Countries relative positioning against the different implementation scenarios in relation to SRI integration in EPC systems.*

Most countries favoured a mildly integrated solution where partly integration is key, but SRI certification can also be developed independently of the EPC assessment leaving more flexibility for certificate issuing, either by a specific communication format, different trigger points, cross sectoral links not strictly linked to energy performance or other specific characteristics. Still, even under this scenario, some countries tend to prefer a deeper integration (Croatia) while others point to a more independent system (Spain). Austria, France and Cyprus converge in a really "Mildly integrated" scenario. In all these cases, data exchange and database interoperability are critical to ensure coherence between systems and to allow ease of transition if for instance, one country decides to start with a mildly integrated scenario and shifts to a fully integrated scenario once mandatory provisions are in place.

Portugal and Greece are the countries that have been identified with a greater full integration potential. This is also coherent with the parameter input potential overlap analysis detailed in chapter 5.2, where both countries revealed both a high existing correlation between current EPC systems but also higher potential overlap between input parameters, allowing for little additional effort in including SRI in EPC assessments.

It should be noted that a fully independent SRI certification system ("solo" scenario), even if still allowing restricted data sharing between systems, was not deemed relevant for any of the countries analysed. Also, the link or preset with other market-based certification systems was deemed not relevant. As one expert explained: EPC and SRI, which are based on common ground regulated under the EPBD, should form the foundational grounds for other certification systems if they are willing to include these provisions and not the other way around. Data exchange and databases interoperability will serve the purposes of integration if, and when needed.

From the results analysed some general conclusions can be drawn:

1. Although on an overall evaluation there are strong differences between countries, there is a **strong preference for a pathway that follows a range between scenario I - fully integrated and Scenario II - mildly integrated**.

2. Regardless of the scenario, there are **topics that seem to be critical** to the SRI certification process, namely: **impact on energy and emissions reductions, the certificate format and contents, and the overall costs of implementing and running the scheme.**
3. On the other hand, the **alignment or complementarity with other market-based building certification systems was not considered very relevant for the definition of the certification pathway.**

Going into more detail, there are specific features that have been commonly rated with very high importance irrespective of the scenario and country, namely:

1. Information from the buildings EPC or information from the national **EPC database should influence the weighing factors for technical domains across impact criteria**.
2. **SRI relies** on additional information from **EPC databases and provides additional outputs** to the EPC databases.
3. **Display and visual appearance** of the SRI certificate contents.
4. **If the preferred pathway is scenario I** - fully integrated **or scenario II -** mildly integrated with the EPC system**, then SRI certificate visual identity should be linked to EPC visual identity**.

This means a **strong effort should be placed on the final format and graphic layout of the SRI certificate**, effective **communication platforms and data exchange between SRI and EPC systems** should be put in place and the visual identity of the SRI should follow, as much as possible, the EPC visual identity.

## 6.4 Costs analysis

Research on related costs of integrated EPC/SRI assessments has been carried out by several initiatives such as E-Panacea project [50,51] and the EC "Final report on the technical support to the development of a smart readiness indicator for buildings" [50,51], although at very different scales and scopes. The main outcomes of these evaluations are as follows:

E-Panacea (focus on residential sector and the assessment method A with a simplified assessment of 27 services – some countries also part of SRI2MARKET were included)

1. An SRI assessment with method A could take about 45 to 60 minutes per building.
2. Having in mind overlaps in procedures and data, additional time to include SRI in an EPC assessment varies between 35 and 50 minutes.
3. This additional time includes only the assessment itself and could impact the certificate issuing in a magnitude of +10%.
4. Administration costs are assumed to be roughly 5 to 10% of the overall costs, which could be deemed as not significant on the overall increase. The same applies to travel and overhead costs.
5. Management/structural costs per certificate could have a range of reduction by 10-15€ per SRI certificate or ~5% the cost of EPC assessment price when it is integrated in EPC system.
6. Countries with overlapping data are more prone to have less increase in additional costs but will depend on type of data analyzed.

The EC's commissioned report on SRI has a larger scope and the main findings are:

1. Even considering all the relevant impacts of the EPBD on energy savings, SRI could be responsible for up to 5% of these savings in 2050.
2. Increased investment in smart-ready technologies in the EU vary across different SRI implementation scenarios, starting at 75 billion euro until 2050 and reaching the maximum potential in a full integration with EPC: 126 billion euro.

3. In this integrated scenario, SRI assessment costs are estimated at 560 million euro while annual net cost savings from implementing the SRI in 2050 are projected to range up to 12.9 billion.
4. Additional benefits (e.g. health and well-being) are estimated at an increased value of 3.8 billion euro
5. Up to 198 TWh of energy savings by 2025 and 32 million tons of avoided GHG emissions per year are estimated. Additional material related to environmental impacts are also evaluated.

Based on the information gathered from the countries' experts and the previous assessments namely the additional cost range depending on data and procedure overlap potential, the following table allows for a simplified evaluation of SRI additional cost estimate in each framework. For simplification and comparability, a simplified assessment (method A) in a residential building is considered.

| | Austria | Croatia | Cyprus | France | Greece | Portugal | Spain |
|---|---|---|---|---|---|---|---|
| EPC certificate issuing costs | 165€ | Estimated at 150 – 250€ | Estimated at 250 – 350€ | Estimated at 100 – 200€ | Estimated at 100 – 150€ | Estimated at 150 – 250€ | Estimated at 150 – 250€ |
| Administrative costs/fees | None | None | None | None | 5 € | 55 € | Between 5 and 35 € depending on the region |
| Estimated additional cost of SRI certificate issuing when integrated in EPC | 23 € | 20 € | 30 € | 15 € | 12 € | 17 € | 17 € |
| Estimated additional cost of SRI certificate when not integrated in EPC | 32 € | 31 € | 47 € | 23€ | 22 € | 28 € | 28 € |

Reliable and comparable data on non-residential buildings for assessment method B was not available as it is also strongly dependent on the type of building cost range and more dependent on each country auditing practices. Still, based on data provided by the French partner (R2M) (see chapter 4.1.4), assuming a relatively small non—residential building (1000 $m^2$) and a daily rate of about 600€ (France reference for a EPC technician), some rough extrapolations can be made. For these buildings, additional costs of SRI certificate issuing when integrated in EPC can vary between 9% and 14% (0,17 to 0,23 €/$m^2$) of the EPC cost depending on country framework and input data overlap. When not integrated, the additional value can be around 14 to 20% (0,28 to 0,32 €/$m^2$). Additional research and data from the field tests is needed in order to provide more accurate data on increased costs.

# 7. Conclusions and recommendations

## 7.1 Recommendations/conclusions for each country

In **Austria,** given the previous experience with an extensive test phase and the complexity of the EPC governance structures it is expected that integration with EPC system will be done in a flexible manner allowing for the inclusion of additional features and adaptations, namely in what concerns the impact of smart technologies in energy savings and GHG emissions reductions. A special focus should be put on the certificate display, visual appearance and communication of ancillary benefits. This flexible integration will allow for future deployment of mandatory provision in a smooth manner but also leaving space for existing market players to take the lead on SRI certificate implementation and innovative features related to impact, public policies evaluation and optimization of energy use.

In **Croatia,** the existence of a centralized EPC system and a robust quality control system coupled with qualification, accreditation, and training of experts linked to energy audits and regular inspections hint that it is more likely to have a more integrated SRI assessment in the EPC system. As in Austria, a focus should be placed on the impact on energy savings and emissions reductions and public policies impact evaluation. This in fact is in line with the new provisions of the EPBD recast which gives a major focus to the real impacts of smart technologies, namely by and additional key functionality dedicated to these issues. Given the relevant costs for EPC issuing, and the importance given to the costs of implementing, running and issuing SRI certificates, an integrated SRI/EPC approach will likely take advantage of the existing system and infrastructure reducing additional costs of issuing SRI assessments which are very relevant in Croatia.

As for **Cyprus**, the lack for previous experiences related to smart readiness in buildings (a clear example is the little importance of BACS evaluation in EPC) paints a more uncertain picture on the most effective pathway. Therefore, a similar approach to Austria in positioning (a truly mildly integrated scenario) seems to be the safest way to proceed and prepare. Still, in order to ensure an effective approach to SRI, strong effort should be placed in ensuring data exchange with the EPC system and that the final users remain in total control of the shared data. Another relevant topic is the cost of implementing improvement measures which could explore synergies with EPC improvement measures. Finally, given the relative low penetration of smart readiness, but most importantly, SRI awareness among final users and stakeholders, it is important to provide simplified and effective communications processes and certificate. This is especially relevant when the level of integration is bigger which can happen at a later stage following the expected evolution of the EPC system in the next years.

In what concerns **France**, it is clear that the official test phase has brought some knowledge and lessons learned on how to proceed with SRI certification. In the case of France, a specific layout and SRI classes profile has been already detailed. Although the preferred pathway may lean to a mildly integrated scenario, France is including advanced integration features such as the definition of weighting factors based on the energy balance of each building which are derived directly from the EPC assessment. In France, there is relevant experience in developing advanced standards in EPC and leveraging them as support for public policy. A clear example is the Minimum Energy Performance Standards on rental transactions. This experience also supports the previous conclusions that, when integration with EPC is not fully attained, strong efforts should be placed on data exchange, interoperability and availability. France ensures a mildly integrated scenario with strong integration features by using, for instance, the availability of raw EPC data available with the EPC ID. This allows for the market to develop and innovate on the tools while keeping hard links with the EPC whenever available.

For **Greece,** a fully integrated scenario is envisaged. This is supported by the fact that this country's EPC system has the highest rate of data overlap with -SRI parameters, there is a centralized management system and a common core calculation engine. This context clearly favours a fully integrated scenario taking advantage of the existing infrastructure. On top of this, Greece has strong quality checks and verification processes to ensure the credibility of the system. Although centralized and restricted there are several software providers

delivering user friendly tools which can be a trigger for market innovation and an advantage when looking at the need to ensure effective communication.

In **Portugal**, the picture is very similar to Greece and a fully integrated scenario becomes even more obvious. Besides the very detailed and broad EPC system framework and ecosystem, the historical use of EPC and database for policy design and monitoring, the SRI referrals in several building policies and legislation, Portugal also has one of the most advanced requirements in relation to BACS. In fact, on top of BACS general requirements Portugal established minimum efficiency requirements, based on ISO 52120, for new or renovated buildings above 290 kW, minimum B class which will be upgraded to class A from January 2025. This means that for the buildings which are likely to be the main target of SRI, and which will have mandatory provisions from 2027 onwards, the smart functionalities evaluation is already made and there is little additional effort to be put in place by the auditors.

Finally, in **Spain**, the relatively complex nature of the EPC management structure with responsibilities split among national and regional governments, the fact that there is strong push and interest for SRI by private stakeholders, even if with full support from national authorities, and the existence of current evaluation of SRI features when making an EPC assessment but on voluntary basis, point to a mildly integrated scenario leaned more to the solo scenario. As in other countries that point to a relatively less integrated or dependent on EPC SRI certification system, in Spain the availability of data exchange and database interoperability, links with digital buildings logbooks and data management and control is critical for the success. This should be coupled with strong data control and empowerment from users on how to share safely their data. This set-up favours market innovation and development without compromising interlinkages with the EPC system and makes the certificate contents and simplification and attractiveness of the information to guarantee high impact and market adoption.

## 7.2 Lessons from certification pathways for replication

The evaluation made within SRIMARKET and presented in this report, points to potential certification pathways that may be realised in European countries with different contexts. It also highlights which aspects are to be considered and prioritized for different implementation scenarios considering the national EPC framework. This does not mean other pathways are not possible or desirable in each country.

Still, it clear that the categories analysed, and the pathways suggested are consistent among groups of countries, levels of maturity and existing framework. In this sense it is possible to derive possible implementation scenarios and priorities for other countries with relevant similarities in their EPC framework. A two-step approach for relevant categories is presented below as a first blueprint for the certification pathways in other countries interested in implementing SRI certification.

*EPC management systems*

Countries with heavily centralized EPC management systems, with a strong history and credibility of this same system tend to be more prone to follow a fully integrated scenario between EPC and SRI. On the other hand, countries where the management is dispersed, for instance across national and regional authorities, prefer a mildly integrated scenario which allows for more flexibility.

| | | | |
|---|---|---|---|
| STEP 1 - check/diagnose/identify: Evaluate your countries EPC management system | Centralized EPC management system with already existing smart technologies evaluation | Mixed EPC management system (e.g. responsibility scattered between regional and national authorities) | Centralized EPC management system with very little evaluation of smart technologies |

| | | | |
|---|---|---|---|
| Step 2 – Action/decision/pathway | A fully integrated scenario is most likely to ensure successful implementation. Take advantage of the set-up installed | A mildly integrated scenario offers more flexibility. Compensate the less integration with strong data interoperability standards. | A mildly integrated scenario offers more flexibility and allows shifting to a fully integrated scenario in the future if relevant |

*Qualification, accreditation, and training of experts*

Regarding the qualification, accreditation, and training of experts it is clear that the existing schemes and infrastructures should be kept increasing the level of trust and diminishing disruption. This is independent of the implementation scenario, the use of more centralized (based on national authorities and agencies) approaches or use of third parties to deliver qualification, accreditation, or training. Still, if the system or parts of systems have already identified handicaps, countries should be prepared to upgrade the quality of qualification, accreditation, and training of experts, also having in mind the new EPBD provisions. Either way the format should be kept and similar for EPC and SRI.

| | | |
|---|---|---|
| STEP 1 - check/diagnose/identify: Qualification, accreditation, and training of experts | Check if there is a strong system for qualification, accreditation, and training of experts. Identify if it is run by national authorities or with third parties. | Evaluate if part of the qualification, accreditation, and training is underperforming. Identify if it is run by national authorities or with third parties. |
| Step 2 – Action/decision/pathway | Irrespectively of the implementation scenario maintain the existing EPC systems for SRI. If significant additional features are needed simply upgrade existing infrastructures and do not build a parallel system. | Make sure all future upgrades are in line with the new EPBD provisions (take advantage of the transposition process to tackle outstanding issues) and keep a coherent and common approach for EPC and SRI. |

*Quality control / quality check*

Similarly to the qualification, accreditation, and training of experts, quality control and quality check should be consistent between SRI and EPC. It is noteworthy that the EPBD allows for different independent systems, but the analysis taken in SRI2MARKET points to maintaining coherence in the quality control systems for SRI and EPC irrespectively of the framework and future SRI implementation scenario.

| | | | |
|---|---|---|---|
| STEP 1 - check/diagnose/identify: Quality control / quality check | Check if there is a strong system for quality control / quality check. Identify if it is run by national authorities or with third parties. | Evaluate if part of the quality control / quality check is underperforming. Identify if it is run by national authorities or with third parties. | Identify synergies with audit procedures and technical systems inspection procedures. |
| Step 2 – Action/decision/pathway | Irrespectively of the implementation scenario maintain the existing EPC systems for SRI. If significant additional features are needed simply upgrade existing infrastructures and do not build a parallel system. | Make sure all future upgrades are in line with the new EPBD provisions (take advantage of the transposition process to tackle outstanding issues) and keep a coherent and common approach for EPC and SRI. | Irrespectively of the implementation scenario maintain the existing EPC systems for SRI or build from them. |

# REFERENCES


[1] The European parliament and the Council of the European Union. DIRECTIVE (EU) 2024/1275 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 April 2024 on the energy performance of buildings. 2024.

[2] European Commission. Commission Implementing Regulation (EU) 2020/2156 of 14 October 2020 detailing the technical modalities for the effective implementation of an optional common Union scheme for rating the smart readiness of buildings. 2020.

[3] European Commission. Commission Delegated Regulation (EU) 2020/2155 of 14 October 2020 supplementing Directive (EU) 2010/31/EU of the European Parliament and of the Council by establishing an optional common European Union scheme for rating the smart readiness of buildings. 2020.

[4] European Commission. LIFE projects supporting SRI - European Commission n.d. https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/smart-readiness-indicator/life-projects-supporting-sri_en (accessed November 22, 2024).

[5] Verbeke S, Aerts D, Reynders G, Ma Y, Waide P. Final report on the technical support to the development of a smart readiness indicator for buildings. 2020. https://doi.org/doi/10.2833/600706.

[6] European Commission. EU Building Stock Observatory 2016.

[7] European Parliament and the Council of the European Union. Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast). 2010.

[8] European Parliament and the Council of the European Union. Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance. 2012.

[9] Verbeke et all. SRI Certificate Survey 2020. https://ec.europa.eu/eusurvey/runner/SRIsurvey (accessed November 25, 2024).

[10] French certificate retrieved from SRI Platform "SRI Platform Plenary #3". Smart Readiness Indicator 2023. https://circabc.europa.eu/ui/group/54384127-eb1d-445e-9b6e-ef5ef14fe429/library/10f207e9-fee0-4386-966f-d20613b3d8ac?p=1&n=10&sort=modified_DESC. (accessed December 16, 2024).

[11] Fragoso R, Monteiro C, ADENE. Concerted Action - Energy Performance of Buildings - (CT5) Certification and Training. 2022.

[12] Tzani D, Kliafas L, Flamos A. SRI2MARKET Project – Paving the way to adoption of the SRI into national regulation and market - D.2.1 Policy context for the SRI. 2024.

[13] Österreichischen Institut für Bautechnik nach Beschluss in der Generalversammlung. RICHTLINIEN DES ÖSTERREICHISCHEN INSTITUTS FÜR BAUTECHNIK. 2023.

[14] Netzwerk Energieberatung Steiermark n.d. https://www.net-eb.at/ (accessed November 27, 2024).

[15] GEQ - Zehentmayer Energieausweis Software n.d. https://www.geq.at/ (accessed November 27, 2024).

[16] Qualitätssicherung Energieausweise – Energie Agentur Steiermark n.d. https://www.ea-stmk.at/qualitaetssicherung-energieausweise/ (accessed November 27, 2024).

[17] ZEUS – Online-Datenbank zur Verwaltung von Energieausweisen n.d. https://www.energieausweise.net/ (accessed November 27, 2024).

[18] Arbeitsgemeinschaft Energie-Berater/innen-Ausbildung – ARGE-EBA n.d. https://arge-eba.net/arbeitsgemeinschaft-energie-berater-innen-ausbildung/ (accessed November 27, 2024).

[19] Austrian Economic Chambers - WKO n.d. https://www.wko.at/austrian-economic-chambers (accessed November 27, 2024).

[20] Federal Ministry of Labour and Economy n.d. https://www.bmaw.gv.at/en.html (accessed November 27, 2024).

[21] Befugnis zur Erstellung von Energieausweisen - WKO n.d. https://www.wko.at/gewerberecht/befugnis-erstellung-energieausweise#heading_Wer_ist_zur_Ausstellung_als_Selbst_ndiger_befugt_ (accessed November 27, 2024).

[22] Bundes-Energieeffizienzgesetz (EEffG) n.d. https://www.bmk.gv.at/themen/energie/effizienz/recht/effizienzgesetz.html (accessed November 27, 2024).

[23] Elektronische Liste der Energieauditorinnen und Energieauditoren – Energieeffizienz-Monitoringstelle n.d. https://www.energieeffizienzmonitoring.at/veroeffentlichungen/eliste_auditor-innen/ (accessed November 27, 2024).

[24] Austrian Institute of Construction Engineering | OIB n.d. https://www.oib.or.at/en/homeen (accessed November 27, 2024).

[25] Die Kriterien, klimaaktiv n.d. https://www.klimaaktiv.at/bauen-sanieren/gebaeudedeklaration.html (accessed November 27, 2024).

[26] ÖGNI n.d. https://www.ogni.at/?cn-reloaded=1 (accessed November 27, 2024).

[27] ÖGNB - Startseite n.d. https://www.oegnb.net/ (accessed November 27, 2024).

[28] Ministarstvo prostornoga uređenja graditeljstva i državne imovine. METODOLOGIJA PROVOĐENJA ENERGETSKOG PREGLEDA ZGRADA. 2021.

[29] Ministarstvo prostornoga uređenja graditeljstva i državne imovine. Energetsko certificiranje zgrada n.d. https://mpgi.gov.hr/o-ministarstvu/djelokrug/energetsko-certificiranje-zgrada-8304/8304 (accessed November 25, 2024).

[30] Ministère du Partenariat avec les territoires et de la Décentralisation Ministère de la Transition écologique de l'Énergie, du C et de la P des risques M du L et de la R urbaine. Diagnostic de performance énergétique - DPE n.d. https://www.ecologie.gouv.fr/politiques-publiques/diagnostic-performance-energetique-dpe (accessed November 25, 2024).

[31] Page d'accueil [Annuaire en ligne des diagnostiqueurs immobiliers certifiés] n.d. https://diagnostiqueurs.din.developpement-durable.gouv.fr/index.action (accessed November 25, 2024).

[32] Evaluation des logiciels | RT-RE-bâtiment n.d. https://rt-re-batiment.developpement-durable.gouv.fr/evaluation-des-logiciels-a647.html?lang=fr (accessed November 25, 2024).

[33] Ministère du Partenariat avec les territoires et de la Décentralisation Ministère de la Transition écologique de l'Énergie, du C et de la P des risques M du L et de la R urbaine. COMPRENDRE MON DPE. n.d.

[34] ADEME - Observatoire DPE - Audit (Diagnostic de Performance Énergétique Audit Energétique) n.d. https://observatoire-dpe-audit.ademe.fr/accueil (accessed November 25, 2024).

[35] ADEME - Observatoire DPE - Audit (Diagnostic de Performance Énergétique Audit Energétique) n.d. https://observatoire-dpe-audit.ademe.fr/faq (accessed November 25, 2024).

[36] DPE Logement | RT-RE-bâtiment n.d. https://rt-re-batiment.developpement-durable.gouv.fr/dpe-logement-a786.html#H_DPE-dans-le-collectif (accessed November 25, 2024).

[37] DPE tertiaire | RT-RE-bâtiment n.d. https://rt-re-batiment.developpement-durable.gouv.fr/dpe-tertiaire-a785.html (accessed November 25, 2024).

[38] Modèles des DPE | RT-RE-bâtiment n.d. https://rt-re-batiment.developpement-durable.gouv.fr/modeles-des-dpe-a788.html (accessed November 25, 2024).

[39] Arrêté du 20 juillet 2023 définissant les critères de certification des diagnostiqueurs intervenant dans le domaine du diagnostic de performance énergétique, de leurs organismes de formation et les exigences applicables aux organismes de certification et modifiant l'arrêté du 24 décembre 2021 définissant les critères de certification des opérateurs de diagnostic technique et des organismes de formation et d'accréditation des organismes de certification - Légifrance n.d. https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000047927747 (accessed November 25, 2024).

[40] ADEME - Observatoire DPE - Audit (Diagnostic de Performance Énergétique Audit Energétique) n.d. https://observatoire-dpe-audit.ademe.fr/accueil (accessed November 25, 2024).

[41] Presidência do Conselho de Ministros. Decreto-Lei n.º 101-D/2020. Ambiente e Ação Climática; 2020.

[42] ADENE. Estatísticas - Sistema de Certificação Energética dos Edifícios n.d. https://www.sce.pt/estatisticas/ (accessed December 10, 2024).

[43] International Organization for Standardization. ISO 52120-1:2021 - Energy performance of buildings — Contribution of building automation, controls and building management. 2021.

[44] ADENE. Legislação - Sistema de Certificação Energética dos Edifícios n.d. https://www.sce.pt/legislacao/ (accessed November 26, 2024).

[45] Dirección General de Agenda Urbana y Arquitectura del Ministerio de Vivienda y Agenda Urbana. Código Técnico de la Edificación de España 2022. https://www.codigotecnico.org/ (accessed November 26, 2024).

[46] European Commission. COMMISSION IMPLEMENTING REGULATION (EU) 2020/2156 of 14 October 2020 detailing the technical modalities for the effective implementation of an optional common Union scheme for rating the smart readiness of buildings. 2020.

[47] International Organization for Standardization. ISO 52000-1:2017 - Energy performance of buildings — Part 1: General framework and procedures 2017. https://www.iso.org/standard/65601.html (accessed November 26, 2024).

[48] CEN/TC 247. EN 15232-1:2017 Energy Performance of Buildings - Impact of Building Automation, Controls and Building Management. 2017.

[49] Dodd N, Donatello S, Cordella M. Level(s) indicator 1.1: Use stage energy performance. 2021.

[50] Borragán G, Legon A-C. Guidelines on how national Energy Performance Certificates (EPCs) schemes and the Smart Readiness Indicator (SRI) could be linked. 2021.

[51] Verheyen J, Pedraz G. X-tendo Feature 1: Smart Readiness Indicator (SRI) - Insights from testing of the Smart Readiness Indicator methodology for integration in EPC schemes. 2022.

# ANNEX A – QUESTIONNAIRE FOR PARTNERS

# ANNEX B - INPUT DATA EPC_SRI

# ANNEX C - INPUT DATA EPC_SRI FULL RESULTS PER COUNTRY

# ANNEX D - MULTICRITERIA EVALUATION TEMPLATE

# ANNEX E - MULTICRITERIA EVALUATION DETAILED RESULTS PER COUNTRY


December 2024

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