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**To cite this article:** Afroditi Zamanidou, Pablo Carnero Melero, Laura Martinez Garcia, Antoniya Novakova, Andrei Vladimir Litiu, Detlef Olschewski, Dragomir Tzanev & Paris A. Fokaides (2024) Enhancing smart readiness of buildings: bridging the knowledge gap to European citizens, *International Journal of Sustainable Energy*, 43:1, 2385632, DOI: [10.1080/14786451.2024.2385632](https://doi.org/10.1080/14786451.2024.2385632)

**To link to this article:** <https://doi.org/10.1080/14786451.2024.2385632>



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Published online: 11 Nov 2024.



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# Enhancing smart readiness of buildings: bridging the knowledge gap to European citizens

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## ABSTRACT

This study delves into the Smart Readiness Indicator (SRI), an innovative measure designed to assess and enhance the smart capabilities of buildings across Europe. Addressing the critical question, ‘How can the SRI be effectively documented, made more accessible to European citizens, continuously monitored, and financially supported to enhance its adoption and understanding?’ This research aims to bridge the gap between the conceptual framework of SRI and its practical implementation for the benefit of European citizens. The study introduces the SRI FAQ Initiative, a pivotal effort aimed at demystifying the SRI through the compilation and dissemination of essential questions and answers. The establishment of the SRI Observatory is another significant outcome, documenting the ongoing development of SRI and providing annual out-looks for future advancements. The research employs a multifaceted methodology, incorporating field research, extensive literature reviews, stakeholder interviews, and both digital and roundtable discussions.

## ARTICLE HISTORY

Received 23 December 2023  
Accepted 21 July 2024

## KEYWORDS


Smart readiness indicator; SRI; smart buildings; smart cities; EPBD; technology observatory

## Abbreviations

EPBD: Energy Performance of Buildings Directive  
EU: European Union  
FAQ: Frequently Asked Questions  
GDPR: General Data Protection Regulation  
RED: Renewable Energy Directive  
SRI: Smart Readiness Indicator

## 1. Introduction

The Smart Readiness Indicator (SRI) is a metric developed by the European Union to evaluate and improve the intelligence of buildings. It measures a building’s capacity to use advanced technologies and electronic systems to adapt its operation to the needs of the occupant, improve energy efficiency, and interact with the grid (European Commission 2020). The SRI assesses aspects like

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<sup>†</sup>In Memoriam: Detlef Olschewski: We dedicate this study to the memory of our esteemed colleague, Mr. Detlef Olschewski, whose invaluable contributions and passionate commitment to the field of smart building technologies profoundly shaped this research.

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automation, control systems, connectivity, and data management. It aims to encourage the integration of smart technologies, enhance the energy performance of buildings, and support the EU's energy and climate goals (EN ISO 52120-1:2022). The SRI helps in benchmarking buildings, guiding investments in smart technologies, and informing building owners and occupants about the smart readiness of their properties (European Commission 2020b). Recent applications of the SRI, as documented by Chatzikonstantinidis et al. (2024) and Plienaitis et al. (2023), illustrate its effective use in benchmarking energy performance across commercial buildings and guiding investment decisions, thereby providing practical examples of its utility beyond theoretical constructs.

The SRI was officially adopted in 2018 as part of the European Commission's Directive 2018/844, which pertains to the energy performance of buildings (EPBD). This directive represents a significant step in enhancing the energy efficiency and smart capabilities of buildings within the EU. According to the EPBD, the implementation of the SRI is a voluntary measure, allowing building owners and stakeholders to opt-in at their discretion. This voluntary status facilitates a gradual adoption and adaptation process, encouraging stakeholders to familiarise themselves with the SRI's framework and benefits (European Commission 2018a). However, it is anticipated in upcoming revisions of the directive that the SRI will transition into a mandatory requirement, especially for buildings with substantial heating capacities, nearing 300 kW (European Commission 2021). This anticipated mandate reflects the EU's commitment to improving building energy performance, reducing carbon footprints, and fostering a more sustainable and technologically advanced built environment (Morkunaite et al. 2022). The move towards mandatory implementation underscores the importance the EU places on integrating smart technology into building infrastructure to achieve broader energy and climate goals. While the literature on the widespread practical use of the SRI remains limited, recent studies by Koltsios et al. (2022) and Apostolopoulos et al. (2022) provide compelling evidence of its selective but significant application, illustrating the SRI's role in enhancing energy efficiency and informing strategic investments in the building sector.

Despite its adoption in 2018, there remains a considerable knowledge gap between the SRI and European citizens (Fokaides, Panteli, and Panayidou 2020b). This gap primarily stems from the fact that the SRI is a relatively new measure and has not yet fully permeated public awareness. Many European citizens are unaware of what the SRI entails or how it is relevant to their lives. This lack of understanding is significant because the SRI is designed to assess and enhance the smart capabilities of buildings, directly impacting energy efficiency, living comfort, and overall environmental sustainability in residential and commercial spaces. The unfamiliarity with the SRI means that most European citizens do not yet grasp how this indicator can influence the way buildings are designed, renovated, and interact with energy systems. Moreover, as the SRI is poised to become more integral in building regulations, its impact on property costs, energy bills, and the quality of living environments will become more pronounced. Therefore, bridging this knowledge gap is crucial. Educating the public about the SRI's objectives, how it functions, and its benefits is essential to ensure its successful implementation and to align public perception with the EU's goals for a smarter, more energy-efficient future. To address the communication challenges associated with the Smart Readiness Indicator (SRI), innovative dissemination methods such as FAQs, observatories, and annual outlooks should be explored. These methods, should be designed to streamline the information flow, ensuring that stakeholders are well-informed and able to leverage SRI effectively.

As with the introduction of any new technology or measure, effective dissemination strategies and policies are crucial for educating the public (Fokaides et al. 2020). This is especially true for the SRI, where there is a distinct need to bridge the knowledge gap between this advanced measure and European citizens. Developing and implementing smart, targeted communication strategies are essential to convey the significance, workings, and benefits of the SRI to the general public. These strategies should aim to simplify complex concepts into accessible information, ensuring that citizens understand how the SRI affects them and the broader goal of enhancing building efficiency and sustainability.

## **Aim**

This study aims to:

- Investigate effective documentation and accessibility of SRI for European citizens.
- Assess current practices for communicating and establishing novel energy policies and measures within the EU citizens.
- Present the SRI FAQ Guide initiative for explaining SRI concepts.
- Introduce the SRI Observatory and the SRI Annual Outlook to document and forecast SRI development.
- Analyze funding schemes for smartness upgrades and propose effective financial practices.
- Examine continuous monitoring and financial support strategies for SRI adoption.

## **2. Theoretical background: essential communication tools for effective policy implementation**

The successful implementation of policies heavily relies on effective communication strategies to ensure public understanding, acceptance, and engagement. Effective communication not only aids in disseminating vital information but also plays a critical role in building trust and transparency between policymakers and the public. In this context, certain tools have proven particularly valuable.

- Observatories, as structured platforms, provide continuous monitoring and dissemination of policy-related information, acting as a reliable source for ongoing developments.
- Annual outlooks serve a complementary role, offering periodic, comprehensive updates that encapsulate policy progress and future directions, aiding in keeping the public informed and involved.
- Furthermore, Frequently Asked Questions (FAQs) play a pivotal role in simplifying complex policy details into digestible, accessible formats, addressing common queries and misconceptions, thereby enhancing public comprehension.

Each of these tools, in their unique capacity, contributes significantly to bridging the gap between policy formulation and public awareness, a critical aspect for the effective implementation of any policy initiative.

### **2.1. Role of observatories in policy communication**

Observatories, in the context of policy dissemination, are institutions or frameworks dedicated to the systematic observation, analysis, and communication of data and information related to specific policy areas (Mackay et al. 2015). They play a crucial role in bridging the gap between policy formulation and implementation, serving as a nexus between government agencies, researchers, and the public. The primary purpose of observatories is to support evidence-based policymaking by providing relevant and timely data, promoting transparency, and facilitating public engagement (Kurian et al. 2016).

Historically, observatories have been effective tools in various policy domains. For instance, the European Environment Agency (EEA) serves as an environmental observatory for the European Union. It provides comprehensive data and analysis on environmental issues, which in turn aids in the formulation and evaluation of environmental policies (European Environmental Agency 2023). Another example is the European Urban Knowledge Network (EUKN), which focuses on urban policy. By sharing knowledge and best practices, EUKN helps cities and regions develop more effective urban policies (European Urban Knowledge Network 2023).

Observatories serve multiple functions in policy dissemination (Engelken-Jorge et al. 2014).

- Firstly, **they collect and analyze data from diverse sources**, ensuring a comprehensive understanding of the policy area. This data collection often involves monitoring key indicators over time, providing insights into the effectiveness of current policies and identifying areas that require attention.
- Secondly, **observatories play a critical role in public engagement and communication**. They often disseminate information through reports, bulletins, and online platforms, making complex data accessible and understandable to the general public. This transparency fosters public trust and encourages civic participation in policy-making processes.
- Furthermore, observatories often **facilitate collaboration between different stakeholders**. By acting as a central hub for information and analysis, they bring together government bodies, academic institutions, NGOs, and the private sector. This collaborative approach is essential for tackling complex policy issues that require input from various sectors.
- Observatories also contribute to **ongoing policy evaluation and revision**. By continuously monitoring policy outcomes and societal trends, they provide feedback to policymakers, helping them understand the impacts of their decisions and make necessary adjustments. This ongoing monitoring is particularly important in dynamic policy areas like climate change and public health, where conditions and challenges can change rapidly.

Observatories play a vital role in policy dissemination. They not only provide crucial data and analysis for evidence-based policy-making but also enhance public engagement and facilitate collaboration among various stakeholders. By continuously monitoring policy outcomes and societal trends, observatories contribute significantly to the development of effective and responsive policies. Their historical success in various domains underscores their importance in contemporary governance.

## **2.2. Importance of annual outlooks in policy updates**

An annual outlook is a comprehensive report or analysis that projects the expected trends, challenges, and developments in a specific field or sector for the upcoming year (Law Inside 2023). It plays a vital role in policy communication by providing stakeholders, including policymakers, businesses, and the general public, with a forward-looking perspective on key issues. The relevance of an annual outlook in policy communication lies in its ability to offer a structured and evidence-based forecast of future scenarios, helping to inform decision-making processes and align strategies with anticipated changes.

Annual outlooks are used in various sectors, such as economics, environment, healthcare, and technology, and they often serve as a barometer for future policy directions. For example, the World Economic Outlook published by the International Monetary Fund provides an analysis of global economic trends and prospects, influencing economic policies worldwide (International Monetary Fund 2023). Similarly, the European Environment Agency's annual report presents an assessment of Europe's environmental status, trends, and prospects, directly impacting environmental policy formulation (European Environmental Agency, 2023).

In terms of updating the public on policy developments, annual outlooks serve as a crucial communication tool. They summarise complex data and analyses into accessible formats, allowing the public to understand the rationale behind certain policies and the expected outcomes. For instance, the annual budget outlook released by governments outlines the financial priorities for the year, explaining how public funds will be allocated across different sectors. This transparency in policy communication enhances public awareness and facilitates a better understanding of government actions.

Annual outlooks also play a significant role in shaping public understanding and acceptance of policies. By providing a clear, data-driven forecast of future trends and challenges, they help to set realistic expectations and prepare the public for upcoming changes or reforms. For instance, an

annual health outlook might highlight emerging public health challenges and the need for specific healthcare policies, thereby fostering public support for such initiatives. Moreover, annual outlooks contribute to an informed public discourse by offering a factual basis for discussions and debates. This is particularly important in a digital age characterised by information overload and sometimes misinformation. A well-researched and unbiased annual outlook can serve as a reliable source of information, helping to counteract false narratives and ensuring that public debate is grounded in facts. The impact of annual outlooks extends beyond mere information dissemination. They often stimulate proactive engagement from various stakeholders, including the private sector, NGOs, and the general public. By outlining future challenges and opportunities, these outlooks encourage collaborative efforts to address anticipated issues, enhancing the overall effectiveness of policy initiatives.

Annual outlooks are essential tools in policy communication. They provide a structured forecast of future trends and challenges, inform and update the public on policy developments, and play a significant role in shaping public understanding and acceptance of policies. Through their comprehensive and evidence-based nature, annual outlooks contribute to informed decision-making and public discourse, thereby enhancing the effectiveness and transparency of policy-making processes.

### ***2.3. FAQs as a tool for simplifying policy understanding***

Frequently Asked Questions (FAQs) are a structured set of questions and answers designed to provide clear, concise information on a specific topic. In the context of policy communication, FAQs play a crucial role in breaking down complex policy information into more digestible, understandable parts. By addressing common questions and concerns, FAQs help bridge the knowledge gap between policy makers and the general public, ensuring that policies are accessible and comprehensible to a wide audience.

One of the prime examples of effective use of FAQs is seen in the communication strategy employed during the rollout of the communication around the European Union's Renewable Energy Directive (RED). This directive was a key part of the EU's strategy to increase the production and use of energy from renewable sources, as part of their broader commitment to combat climate change. Given the complexity and wide-ranging implications of the directive, both for member states and the private sector, the European Commission and various energy agencies developed comprehensive FAQs. These FAQs addressed critical aspects of the directive, such as the targets for different countries, the types of energy sources considered as renewable, support schemes for renewable energy, and the impact on existing energy markets and infrastructure (European Commission 2018b).

Another case study is the European Union's General Data Protection Regulation (GDPR). The GDPR introduced sweeping changes to data privacy laws, affecting businesses and individuals across the EU and beyond. To assist in compliance and understanding, the EU published detailed FAQs that clarified the obligations of businesses, the rights of individuals, and the implications of the regulation. This effort significantly aided businesses and the general public in navigating the complex legal landscape introduced by the GDPR (European Commission 2016).

Best practices in designing and disseminating FAQs involve several key aspects (House Digital 2023):

- **Understand the Audience:** Before drafting FAQs, it is crucial to understand the target audience's knowledge level and concerns. This understanding helps in formulating questions that are relevant and pitched at the right level of complexity.
- **Clarity and Conciseness:** FAQs should be written in clear, simple language, avoiding jargon and technical terms as much as possible. Each answer should be concise yet comprehensive, providing essential information without overwhelming the reader.

- **Logical Structure:** Organizing FAQs in a logical manner, either by topic or in order of importance, helps users navigate the information easily. Grouping related questions can also assist users in understanding the broader context of individual answers.
- **Regular Updates:** Policies often evolve, and so should the FAQs. Regularly updating the FAQs to reflect the latest changes is crucial in maintaining their relevance and accuracy.
- **Accessibility:** Making FAQs easily accessible is key. This can be achieved through multiple channels like websites, social media, print materials, and even interactive tools like chatbots. Ensuring that FAQs are accessible to people with disabilities is also essential, which may involve providing information in different formats like audio or large print.
- **Feedback Mechanism:** Incorporating a way for users to provide feedback or ask further questions can help identify gaps in the FAQs and guide future updates.

FAQs are an invaluable tool in policy communication, effectively bridging knowledge gaps and enhancing public comprehension of complex policies. By following best practices in their design and dissemination, policy makers can ensure that these FAQs serve their purpose of making policy information more accessible and understandable to the public.

#### **2.4. Comparative analysis, challenges and considerations**

Each communication tool – observatories, annual outlooks, and FAQs – has its unique strengths and applications, and their effectiveness can vary depending on the scenario.

- **Observatories** are most effective in scenarios requiring continuous monitoring and long-term data collection. They excel in fields like environmental policy or urban development, where ongoing trends and changes need to be tracked over time. However, observatories might be less effective for immediate, rapidly changing situations due to their focus on long-term data.
- **Annual outlooks**, in contrast, are particularly useful for providing a structured snapshot of policy developments and future projections. They are highly effective in sectors where annual trends and forecasts can significantly influence policy and public perception. However, the once-a-year nature of these outlooks might not capture the nuances of fast-evolving situations.
- **FAQs** are versatile tools that can be rapidly updated and disseminated, making them ideal for addressing immediate concerns and clarifying complex policy details in an accessible manner. They are especially useful during the rollout of complex policies, such as new healthcare laws or data protection regulations, where there is a need to address widespread public questions and concerns quickly. However, FAQs might not provide the in-depth analysis or long-term perspective offered by observatories or annual outlooks.

Table 1 provides a comparative assessment of the different communication tools elaborated in the theoretical background section.

The synergistic use of these tools can create a comprehensive policy communication strategy. Observatories can provide the foundational data and ongoing monitoring, annual outlooks can offer a yearly comprehensive review and future forecast, and FAQs can address immediate questions and clarify complex aspects of the policy. Together, they can ensure continuous, multi-faceted, and accessible communication. However, there are challenges in using these tools effectively. Ensuring accuracy and timeliness, especially in rapidly evolving scenarios, can be difficult. Additionally, making these tools accessible and understandable to diverse audience demographics requires careful consideration of language, format, and dissemination channels. Tailoring these tools to different policies and audience demographics involves understanding the specific information needs and comprehension levels of the target audience. For instance, communication about environmental policies might require a different approach compared to economic policies.

**Table 1.** Comparative Analysis of different communication tools.

Criteria	Observatories	Annual Outlooks	FAQs
Purpose	Continuous monitoring and long-term data analysis	Providing structured annual updates and future projections	Simplifying and clarifying complex policy details
Best for Scenarios	Long-term policy areas like environmental monitoring or urban development	Sectors where annual trends significantly influence policy, like economics or public health	Situations requiring immediate clarification, such as new policy rollouts
Effectiveness in Rapid Changes	Less effective due to focus on long-term data	Moderately effective; may not capture fast-evolving nuances	Highly effective for addressing immediate concerns
Depth of Information	In-depth, long-term analysis	Comprehensive yearly review	Focused, concise explanations
Update Frequency	Continuous or periodic, depending on the field	Annually	As needed, often frequently during policy changes
Audience Engagement	Requires audience investment in long-term follow-up	Engages audiences with annual insights and future outlooks	Directly addresses public questions and concerns, high engagement
Complexity of Information	Often technical and detailed	Balances detail with accessibility	Simplified for broader public understanding
Challenges	Keeping data updated and relevant; complexity for the general public	Balancing detail with conciseness; annual updates may miss rapid changes	Ensuring accuracy and timeliness; avoiding oversimplification
Customization for Audience	Tailored based on the policy field and stakeholder needs	Adapted to sector-specific trends and forecasts	Highly adaptable to immediate public queries and diverse demographics

Similarly, the language and complexity of the information should be adjusted based on whether the target audience is the general public, experts, or policymakers.

In conclusion, while observatories, annual outlooks, and FAQs each have their distinct advantages and ideal scenarios of use, their combined application can lead to a more effective and comprehensive policy communication strategy. However, the challenges of accuracy, timeliness, and audience-specific tailoring must be carefully managed to maximise their impact.

## 2.5. Summary of the theoretical background

Effective policy implementation depends heavily on strategic communication tools that ensure public understanding, acceptance, and engagement. Observatories, annual outlooks, and FAQs are key instruments that provide continuous monitoring, periodic updates, and simplified information respectively, each contributing uniquely to bridging the gap between policy formulation and public awareness. These tools are essential in promoting transparency, facilitating stakeholder engagement, and ensuring that policies are both accessible and effectively communicated to the public.

## 3. Methods and materials

The methodology of the study was multi-dimensional, encompassing various data collection and analysis techniques to ensure a thorough understanding of the SRI's implementation, impact, and future potential. This description outlines the methodological framework, detailing the field research, stakeholder interviews, roundtable sessions, targeted interviews, and literature survey that collectively contributed to the study's depth and breadth.

### 3.1. Field research: stakeholder interviews and roundtable sessions

The study employed a rigorous field research approach, focusing primarily on stakeholder interviews and roundtable sessions. These methods were instrumental in developing the SRI FAQ and gathering insights for the SRI annual outlook.

**Stakeholder Interviews:** A series of interviews were conducted with a diverse range of stakeholders involved in the implementation and impact of the SRI. This included policymakers, industry experts, technology developers, building owners, and end-users across various European regions. The interviews aimed to gather qualitative data on the stakeholders' experiences, perceptions, challenges, and suggestions regarding the SRI. These interviews were semi-structured, allowing for open-ended responses that provided in-depth insights into each stakeholder's unique perspective.

**Roundtable Sessions:** To supplement the individual interviews, roundtable discussions were organised. These sessions brought together multiple stakeholders in a forum to discuss the SRI collaboratively. The roundtable format encouraged interactive dialogue, idea exchange, and debate, offering a more holistic view of the diverse opinions and experiences surrounding the SRI. These discussions were particularly valuable in identifying common concerns, misconceptions, areas of consensus, and lack of information which were crucial in developing the SRI FAQ. Over 50 roundtable discussions and digital interactions were organised, involving a diverse range of participants. The focus was on capturing the public's perception of SRI, identifying prevalent misconceptions, and understanding their specific informational needs. The format of the roundtables was modelled on successful strategies used in previous international projects, involving small group discussions and interactive sessions (D2EPC 2023).

### **3.2. Targeted interviews for SRI outlook**

In addition to the broader stakeholder interviews, targeted interviews were specifically conducted to collect material for the SRI annual outlook. These interviews focused on individuals and organisations directly involved in documenting, monitoring, and analysing the SRI's progress and impact over the past year. The targeted interviews aimed to gather detailed, specific information that fed into the annual outlook, providing an up-to-date and comprehensive view of the SRI's status and future directions.

### **3.3. Literature survey for SRI observatory and outlook**

A thorough literature survey formed a key component of the study, particularly for understanding the case of the SRI observatory and supporting the development of the SRI outlook.

**SRI Observatory:** The literature survey for the SRI observatory involved an extensive review of academic journals, technical reports, policy documents, and previous studies related to the SRI. This review provided a theoretical and historical context for the SRI, helping to frame its development and current status within the broader landscape of smart readiness and technology in Europe. The literature also helped identify gaps in current knowledge and understanding, which the SRI observatory aimed to address.

**SRI Outlook:** For the SRI outlook, the literature survey included an analysis of recent developments, trends, and forecasts in the field of smart readiness. This involved reviewing not only specific literature on the SRI but also broader sources related to smart technologies, energy efficiency, and European policy developments. The survey ensured that the annual outlook was grounded in a solid theoretical foundation and reflected the latest research and insights in the field.

### **3.4. Methodological integration and analysis**

The integration of these diverse methodologies – field research, stakeholder interviews, roundtable discussions, targeted interviews, and literature surveys – ensured a comprehensive and multi-faceted approach to the study. This integration allowed for enhancing the reliability and validity of the findings. The analysis of the collected data was conducted through qualitative methods

such as thematic analysis for interviews and discussions, and quantitative methods for any statistical data gathered.

The study's methodology was designed to cover all aspects of the SRI – its documentation, accessibility, monitoring, and financial support mechanisms. By employing a combination of field research, targeted interviews, and extensive literature surveys, the study ensured a thorough exploration and understanding of the SRI, paving the way for actionable insights and recommendations for future policy and implementation strategies.

## 4. Results: bridging the knowledge gap between SRI and EU citizens

This section delves into the effectiveness of various tools and strategies implemented to enhance the accessibility and understanding of the Smart Readiness Indicator (SRI) among European citizens. It critically evaluates the outcomes of the SRI FAQ Initiative, the establishment of the SRI Observatory, and the impact of the SRI Annual Outlook, offering insights into how these tools have successfully addressed the informational needs of the public and stakeholders in the realm of building smartness. Through a structured presentation of results, this section aims to demonstrate the tangible benefits these tools have brought to enhancing SRI's visibility and usability across Europe.

### 4.1. The SRI FAQ initiative

The SRI FAQ provides clear, concise answers to the most frequently asked questions about SRI, effectively bridging the knowledge gap identified during our public engagement phase (Figure 1). The tool serves as an easily accessible platform for the dissemination of this information, facilitating informed decision-making among European citizens regarding SRI (Smart Square 2023a).

The SRI FAQ was developed following the methodology outlined in Section 3, which included conducting over 50 interviews and roundtable discussions. These sessions were pivotal in collecting a diverse range of questions that were instrumental in shaping the FAQ content. The procedure followed during these sessions emphasised open discussion, allowing participants to freely express their thoughts, concerns, and queries. The discussions were structured to allow for free-flowing conversation, encouraging participants to express their views, seek clarifications, and pose questions about SRI. A broad spectrum of topics and questions emerged from these interactions, reflecting the diverse backgrounds and experiences of the participants. This process enabled the identification of key areas where public understanding of SRI was lacking, informing the content of the FAQ guide. This approach fostered a rich dialogue, providing valuable insights into the general understanding and perception of smart buildings among the participants. In addition to the open discussions, specific open-ended questions were posed to document the participants' overall understanding of smart buildings. These questions also aimed to elicit their specific inquiries regarding the SRI.

The data gathered from these interactions were crucial in identifying the key areas of interest and confusion among the public. This, in turn, informed the creation of the SRI FAQ, ensuring that it addressed the most pertinent and frequently raised questions, thereby effectively bridging the knowledge gap identified in the public engagement phase of the study. A review process was undertaken to refine and categorise the questions. This process involved merging repetitive questions, eliminating incoherent or irrelevant inquiries, and selecting the top 100 questions that hold the most significance for European citizens. The finalised questions were categorised into several themes. The categorisation of questions into specific themes allows for easier navigation and comprehension of the subject matter (Figure 2). The themes include:

- Fundamental definitions, purposes, and frameworks of SRI.
- Benefits, obstacles, and challenges associated with SRI.
- Complexity and mandatory aspects of SRI.

 SRI FAQ Guide

## Find here the answer to common questions about SRI.

This FAQ site is part of the Smart Square project, which aims to develop and deliver the appropriate tools and applications to enable the promotion and establishment of intelligence assessment of buildings in Europe, through the SRI scheme.

### Find Categories from here...






















- |  |  |  |
|--|--|--|
|  Definition                               |  Benefits                                       |  Obstacles & challenges |
|  Complexity                               |  Mandatory                                      |  Calculation            |
|  Assessment                               |  Assessor                                       |  Methodology            |
|  Users                                    |  Certification                                  |  Building types         |
|  Building performance & energy efficiency |  Climate zones                                  |  Domains                |
|  Programs & Incentives                    |  Availability & implementation in Member States |  Documentation & tools  |
|  Energy companies / other companies       |  Devices  |  Regulation             |

Figure 1. SRI-FAQ landing page – [www.sri-faq.eu](http://www.sri-faq.eu).

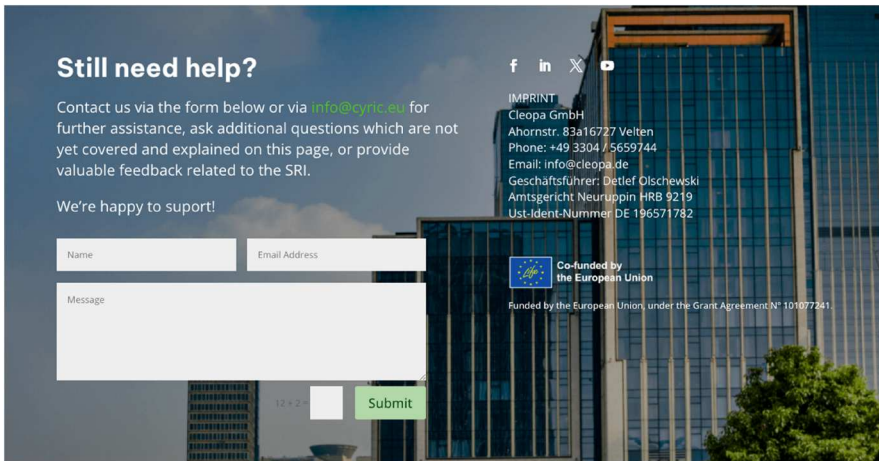


Figure 2. SRI-FAQ UI – technical support.

- Methods of calculation and assessment.
- Information on assessors and methodologies.
- The role of users, energy and other actors.
- Building types, performance, energy efficiency, and relevant climate zones.
- Domains, programmes, incentives, and implementation across Member States.
- Documentation, tools, and certification process.
- Devices and regulations.

SRI FAQ website reflects a thoughtful approach to user interface and experience design (Figure 3). This digital platform has been carefully crafted to cater to a wide audience, encompassing



**Figure 3.** The SRI Annual Outlook Cover Page.

individuals with varying degrees of familiarity with SRI concepts. Key features of the website design include:

- **User-Friendly Interface:** The website prioritises simplicity and intuitive navigation, essential for accommodating a diverse user base.
- **Accessible Content:** Special emphasis is placed on the website's accessibility, ensuring that information is reachable and understandable for all users. This includes the use of clear, concise language to demystify complex SRI concepts.
- **Responsive Design:** The website boasts a responsive design, ensuring seamless viewing and interaction across a range of devices, thereby accommodating users with different technological access.
- **Structured Information:** The SRI-FAQ guide within the website is organised efficiently, with an effective categorisation system. This structure allows users to swiftly locate specific information, enhancing the usability of the site.
- **Interactive Elements:** A dedicated contact section is included, offering users the opportunity to request further assistance, submit additional inquiries about SRI, or provide feedback. This feature fosters user engagement and allows for continuous improvement of the resource.

Overall, the website's design and structure are tailored to provide an optimal and informative online experience for individuals seeking knowledge about SRI.

#### **4.2. Establishment of the SRI observatory – The SRI annual outlook**

In this section, we examine the dissemination of information on the SRI policy developments at the EU level, along with the progress of national non-committal test phases, implementation efforts, and key research advancements in the domain of building smartness. This information is made accessible to the public through two primary channels: annual reports known as SRI Outlooks (Smart Square 2023c), and a continuously updated interactive website, the SRI Observatory (Smart Square 2023b).

The SRI Outlooks serve as static, annual reports documenting the year-by-year evolution of the SRI (Figure 3). These reports provide a tangible resource that can be printed for offline consultation.

However, they possess certain limitations. The static nature of these reports means they do not capture the ongoing, inter-year advancements in the field. Given their finite and periodic format, the information in some areas is inevitably partial and may not reflect the most current developments. In contrast, the SRI Observatory (Figure 4) is a dynamic, online platform. It offers continuously updated information on the status of SRI, presented in a user-friendly format. This digital resource allows for real-time dissemination of the latest findings and developments in the field of building smartness.

The dual approach of using both the SRI Outlooks and the SRI Observatory addresses different needs and preferences of the audience. While the SRI Outlooks provide a structured, annual summary of developments, suitable for offline reference, the SRI Observatory offers a more fluid and current view of the field. The combination of these tools ensures a comprehensive dissemination strategy, catering to a broad audience spectrum. The static nature of the SRI Outlooks, though limiting in terms of immediacy and completeness, provides a reliable historical record of developments. On the other hand, the SRI Observatory's dynamic and interactive nature makes it an essential tool for stakeholders requiring up-to-date information. This importance of employing diverse communication strategies in disseminating complex and evolving information in the field of smart building technologies is therefore highlighted.

The knowledge made available through the SRI Outlook and SRI Observatory is structured in three main pillars: policy development at the EU level, implementation at the national level, and research in the field of building smartness.

**Policy Development at the EU Level:** This pillar encompasses the ongoing policy initiatives and regulatory developments at the European Union level pertaining to SRI. It includes detailed analyses of policy frameworks, legislative evolutions, and strategic directives that shape the landscape of building smartness within the EU. The status of SRI policy developments at the EU level is documented through analysis of the 2018 revision of the European Energy Performance of Buildings Directive (EPBD), and subsequent delegated and implementing regulations. As a result, a summary on the history of the SRI as well as the main features of the common-EU voluntary scheme to rate a building smartness are outlined in a structured fashion.

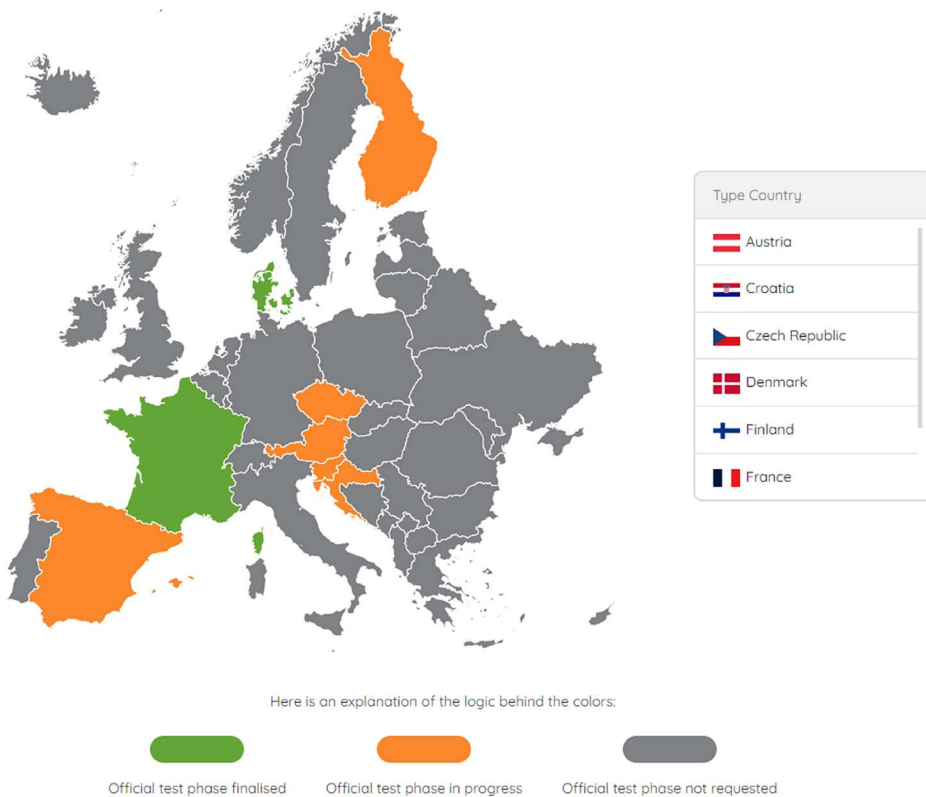
**Implementation at the National Level:** This segment focuses on the application and execution of SRI-related policies across various EU member states. It provides insights into the different approaches, challenges, and successes encountered in the national implementation phases. The diverse methodologies and outcomes of these national endeavours are documented, offering a comparative perspective across the EU. Detailed pages were created for each member state involved in a non-committal test phase of the SRI at national level. For each country, details are given for the test phase: overall assessment, coordination, timeline, and activities performed. As a result, it is possible to cross-compare national progress and experience. With a view to facilitating that purpose the SRI Transposition Tracker has been created as a visual map (Figure 5). As member states finalise the voluntary test-phases and advance towards SRI implementation, the data in the SRI Transposition Tracker shall be enriched enabling to make more complex cross-country comparisons and analysis.

**Research in the Field of Building Smartness:** The final pillar highlights the latest research and technological advancements in the domain of building smartness. It covers a range of topics, including innovation in smart technologies, energy efficiency, and sustainable building practices. This section also reviews and synthesises the most significant and recent academic studies, providing a comprehensive overview of current research trends and future directions.

The structured approach in presenting this information ensures a comprehensive and clear dissemination of knowledge, catering to stakeholders, policymakers, and researchers involved in the field of SRI and building smartness. This format facilitates an in-depth understanding of the multifaceted aspects of SRI, from policy formulation to practical implementation and cutting-edge research. The research in the field of building smartness is split into EU-funded projects and scientific research. The former lists the main initiatives funded under the various European programmes focused on topics aimed at creating the conditions for a global improvement of smart readiness of

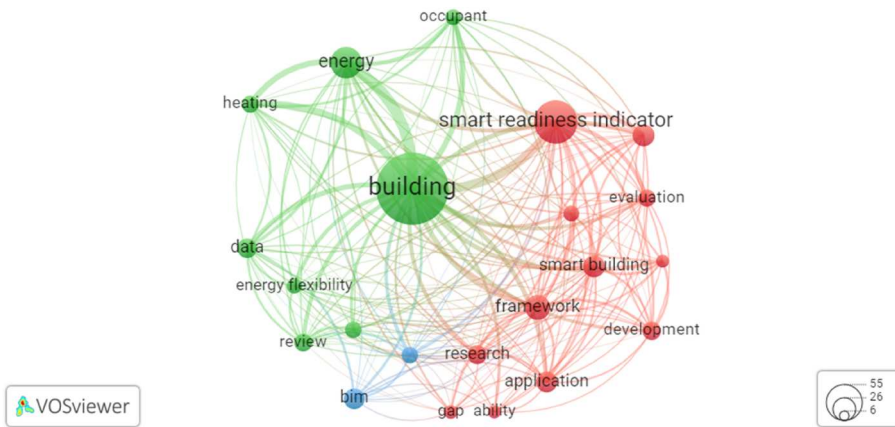


**Figure 4.** SRI Observatory landing page – [www.sriobservatory.eu](http://www.sriobservatory.eu).



**Figure 5.** SRI-Transposition Tracker.

European buildings, and other related endeavours such as energy performance certificates. The latter is focused on gathering, classifying, and digesting the ever-growing body of peer-reviewed scientific knowledge in the field of building smartness. Consequently, in the SRI Outlook term maps are made available (Figure 6), together with a shortlist of scientific articles, conference proceedings and book sections. Several functions to improve the user experience have been included to facilitate



**Figure 6.** Building Smartness Research Tracker.

searching through the selected scientific research. They are keyword search and filtering by document type, journal, and publication year.

### 4.3. Assessing the tools

Table 2 provides a comprehensive comparison of the three tools, highlighting their distinct features and utility in disseminating information about SRI. The SRI FAQ Initiative is designed to answer common queries, the SRI Annual Outlook provides a yearly summary, and the SRI Observatory offers a current and interactive platform for SRI information.

The SRI FAQ Initiative, SRI Annual Outlook, and SRI Observatory serve distinct roles in disseminating information on SRI. The SRI FAQ provides clear answers to common SRI queries, developed from extensive interviews and discussions, and is structured thematically for ease of navigation. The SRI Annual Outlook, in a static report format, documents the yearly evolution of SRI and serves as a historical reference. In contrast, the SRI Observatory is a dynamic, online platform offering real-time updates on SRI, with content structured around EU policy, national implementation, and research. While the SRI FAQ and Observatory are user-friendly and accessible online with interactive features, the Annual Outlook is designed for offline reference. The Observatory additionally includes research and technology focus areas like EU-funded projects and scientific research, making it ideal for stakeholders needing current information.

## 5. Policy implications of advancing SRI: insights and strategies from the SRI FAQ initiative, annual outlook, and observatory

In this section we explore the significant impact of SRI FAQ Initiative, Annual Outlook, and the SRI Observatory on shaping smart building policies within the European Union. This section delves into how the dissemination of knowledge through the SRI FAQ Initiative, observatory, and annual outlooks directly informs and influences legislative and strategic decisions, highlighting specific areas where policy adjustments and enhancements are needed to further the adoption and effectiveness of smart building technologies.

**Table 2.** Comparative Analysis of SRI promotion tools.

Feature/Aspect	SRI FAQ Initiative	SRI Annual Outlook	SRI Observatory
Purpose	To provide clear, concise answers to frequently asked SRI questions	To document the yearly evolution of SRI	To offer continuously updated information on SRI status
Methodology	Developed from over 50 interviews and roundtable discussions	Static, annual report format	Dynamic, online platform with real-time updates
Content Structure	Categorised into themes for easy navigation	Offers a historical record of SRI developments	Structured in three main pillars: EU policy, national implementation, and research
User Interface	User-friendly, intuitive navigation, accessible content	Tangible, printable format	User-friendly, responsive design for various devices
Information Accessibility	Accessible online, emphasises ease of understanding	Suitable for offline reference	Online platform with interactive features
Interaction & Feedback	Includes interactive elements and contact section	Limited to static content	Interactive elements for user engagement
Audience	Broad, including individuals with varying SRI familiarity	Suitable for stakeholders requiring historical data	Ideal for stakeholders needing up-to-date information
Research and Technology Focus	-	-	EU-funded projects, scientific research, term maps, and research trackers

### 5.1. Policy implications

Introducing the SRI FAQ Initiative, SRI Annual Outlook, and SRI Observatory, provides a critical foundation for understanding the policy implications in the context of enhancing building smartness across the European Union. The initiative's success in disseminating knowledge about SRI highlights several key policy directions that European legislators and stakeholders must consider, particularly concerning the financing mechanisms for smart building upgrades.

- Enhancing Public Awareness and Participation:** One of the primary policy implications of this study is the need for continuous public education and engagement. The SRI FAQ initiative's effectiveness in addressing common queries about building smartness demonstrates the public's desire for accessible, comprehensive information. Policymakers must capitalise on this interest by developing more robust educational campaigns and participatory platforms, thereby ensuring that citizens are not just informed but actively engaged in the conversation about smart buildings.
- Standardising Smart Building Practices:** The diverse range of questions and topics addressed in the SRI FAQ Initiative indicates a need for standardising smart building practices and technologies. Policymakers should work towards harmonising regulations and guidelines across EU member states. This effort would not only facilitate smoother implementation of smart building technologies but also aid in developing a unified market for smart building solutions, making it easier for investors and developers to navigate and invest in smart building projects. While the EU Commission's website already hosts a webpage titled 'Your questions about the SRI,' there is a clear need to enrich and expand this resource to address the emerging queries and concerns more comprehensively (European Commission 2023).
- Incentivizing Smart Building Upgrades:** The study underlines the importance of incentivizing building owners and developers to upgrade to smarter, more energy-efficient systems. Policies that offer financial incentives, tax rebates, or subsidies for smart building upgrades can significantly motivate the adoption of such technologies. These incentives could be particularly effective in retrofitting existing buildings, which constitute a significant portion of Europe's building stock and are often less energy efficient.
- Financing Mechanisms for Smartness Upgrades:** Perhaps the most critical policy implication arising from this study is the need to develop robust financing mechanisms for smartness upgrades in buildings. The EU can play a pivotal role in creating funds or financial products

specifically tailored to support the smart retrofitting of buildings. These financial instruments could include low-interest loans, grants, or public-private partnerships, offering a range of options suitable for different types of building projects and owners.

- **Integrating Smart Building Goals with Climate Policies:** The upgrading of building smartness should be integrated into broader EU climate and energy policies. Smart buildings play a crucial role in reducing energy consumption and greenhouse gas emissions. Policymakers should therefore ensure that initiatives aimed at increasing building smartness are aligned with the EU's climate targets, creating a synergy between environmental sustainability and technological advancement.
- **Fostering Research and Development:** The study's emphasis on the role of ongoing research in the field of building smartness points to the need for increased funding and support for research and development. Investing in cutting-edge research on smart building technologies not only drives innovation but also helps in understanding the long-term impacts these technologies can offer.
- **Collaborative Approach Among Stakeholders:** Finally, the implementation of these policy recommendations requires a collaborative approach among various stakeholders, including governments, industry players, financial institutions, and the public. Policymakers should facilitate platforms for dialogue, ensuring that the transition to smarter buildings is a collective effort.

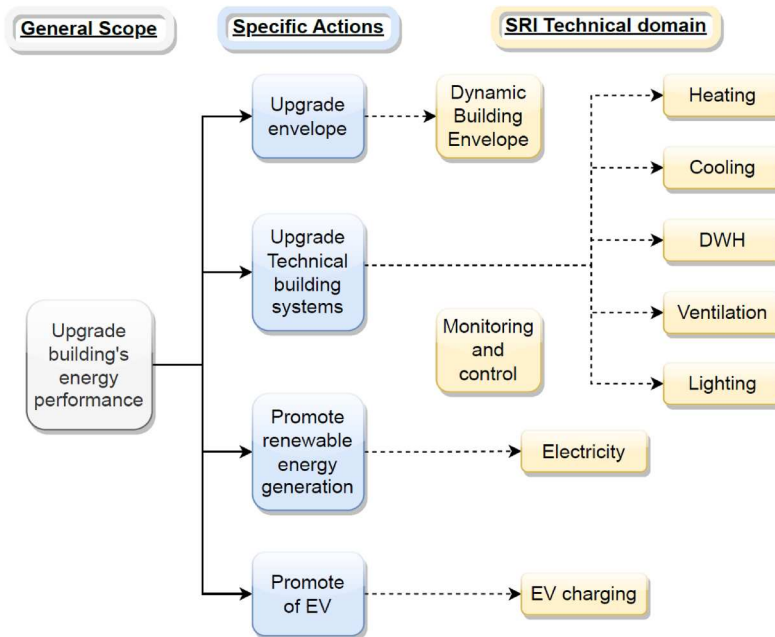
A concise overview of the policy implications derived from the study, outlining key areas of focus for enhancing building smartness in the EU are presented in a tabulated format (Table 3).

## 5.2. Financing building smartness upgrade

The EU's strategy for financing the smartness upgrade of buildings should be comprehensive, strategic, and tailored. By leveraging a combination of national and regional programmes, establishing clear evaluation criteria, and focusing on measurable outcomes, the EU will be well-positioned to make significant strides in building smartness. This strategy will not only promote energy efficiency and sustainability but also pave the way for the future of smart building technologies in Europe. Figure 7, illustrates the critical link between energy performance upgrade funding schemes and

**Table 3.** Main Policy Implications for bridging the knowledge gap between EU Citizens and the SRI.

Policy Implication	Description
Enhancing Public Awareness and Participation	Emphasises the need for continuous public education and engagement. Advocates for robust educational campaigns and participatory platforms to inform and actively involve citizens in the smart buildings dialogue.
Standardising Smart Building Practices	Highlights the necessity to standardise smart building practices and technologies. Calls for harmonised regulations and guidelines across EU member states, aiding in smoother implementation and a unified market for smart building solutions.
Incentivizing Smart Building Upgrades	Underlines the importance of financial incentives, tax rebates, or subsidies to motivate building owners and developers to adopt smarter, energy-efficient systems. Effective especially for retrofitting existing, less efficient buildings.
Financing Mechanisms for Smartness Upgrades	Stresses the critical need for robust financing mechanisms to support smart retrofitting of buildings. Suggests EU's role in creating suitable funds or financial products, like low-interest loans, grants, or public-private partnerships.
Integrating Smart Building Goals with Climate Policies	Proposes integrating smart building upgrades with broader EU climate and energy policies. Aims for a synergy between environmental sustainability and technological advancement in reducing energy consumption and emissions.
Fostering Research and Development	Emphasises the need for increased funding and support for research and development in smart building technologies. Focuses on driving innovation and understanding the long-term impacts and efficiencies of these technologies.
Collaborative Approach Among Stakeholders	Advocates for a collaborative approach among governments, industry players, financial institutions, and the public. Encourages creating platforms for dialogue and partnership for a collective transition to smarter buildings.



**Figure 7.** Link between energy performance upgrade funding schemes and SRI promotion.

SRI promotion, providing a visual representation of how strategic financial planning supports the advancement of smart building technologies across Europe.

To ensure the success of the EU's strategy for financing the smartness upgrade of buildings, several key components of the funding strategy must be carefully designed and executed, as detailed in the following points:

- **Structural Analysis of Funding Programmes:** It is crucial to conduct a detailed analysis of the rationale, structure, and sources of funding programmes. This step is key to ensuring the financial viability and strategic alignment of these programmes with broader objectives such as energy efficiency and smart building upgrades. Careful scrutiny will guarantee effective utilisation of funds in areas yielding the most significant impact.
- **Project Funding and Evaluation Criteria:** Developing criteria for evaluating and qualifying projects for funding is central to the success of these programmes. Prioritising funding for projects that focus on upgrading building smartness will ensure that investments significantly contribute to the advancement of SRI across the EU.
- **Impact of Investment Schemes on SRI:** An analysis of the investment schemes available in EU Member States should be conducted to identify their potential for replication and contribution to SRI promotion. This approach will benchmark best practices and encourage the adoption of successful models in different regions, thereby enhancing the effectiveness of SRI initiatives.
- **National Programmes Scope and Funding:** It's important to assess and tailor various national programmes and instruments, each with its unique goals, duration, eligible beneficiaries, and sources of funding. Such tailored programmes will ensure that the diverse needs and challenges of different Member States are effectively met.
- **Application Process and Public Procurement:** Streamlining the application process and public procurement within these programmes is crucial for facilitating easy access and transparency. This streamlined approach is expected to encourage broader participation and ensure that the best solutions are selected for funding.

- **Measurable Results and SRI Integration:** Emphasis should be placed on programmes that explicitly support installations and upgrades to enhance building smartness, such as automation systems and intelligent shading. Integrating SRI criteria into these programmes will demonstrate a commitment to practical solutions and focus on measurable results and effective implementation.

## 6. Conclusion

This study underscored the necessity for continued collaborative efforts in research, policymaking, and stakeholder engagement. Such efforts are vital to fully leverage the capabilities of SRI, paving the way for a smarter, more sustainable future in Europe's building sector.

By tackling the pivotal question of how to effectively document, make accessible, monitor, and financially support the SRI, this research bridged the gap between theoretical frameworks and practical application, ultimately benefiting European citizens. Key to this endeavour is the SRI FAQ Initiative, which plays a critical role in clarifying and disseminating vital information about SRI,

**Table 4.** Comprehensive overview of financial measures for enhancing SRI in EU buildings.

Financial measure	Description	Additional features
Structural Analysis of Funding Programmes	Detailed analysis of rationale, structure, and sources of funding programmes to ensure financial viability and alignment with energy efficiency and smart building upgrades.	– <b>Transparency and Accountability:</b> Ensure funding programmes are transparent and accountable. – <b>Long-term Viability:</b> Assess long-term sustainability and impact of programmes. – <b>Adaptability:</b> Ensure programmes can adapt to evolving technologies and market conditions.
Project Funding and Evaluation Criteria	Development of criteria for evaluating and qualifying projects. Focus on funding projects that upgrade building smartness to significantly contribute to SRI advancement.	– <b>Inclusivity:</b> Criteria should accommodate a range of projects, from small-scale innovations to large-scale renovations. – <b>Scalability:</b> Evaluation metrics that can be scaled according to project size and impact. – <b>Innovation Encouragement:</b> Special emphasis on funding innovative and pioneering approaches.
Impact of Investment Schemes on SRI	Analysis of existing investment schemes to identify their potential for replication and contribution to SRI promotion. Aims to benchmark best practices for broader adoption.	– <b>Diversity of Schemes:</b> Include a variety of funding mechanisms (grants, loans, incentives). – <b>Regional Tailoring:</b> Customise schemes to regional needs and capabilities. – <b>Stakeholder Engagement:</b> Involve a range of stakeholders in scheme development and implementation.
National Programmes: Scope and Funding	Assessment and tailoring of various national programmes and instruments to meet specific goals, durations, eligible beneficiaries, and funding sources. Ensures diverse needs of Member States are met.	– <b>Flexibility:</b> Programmes should be flexible to accommodate national priorities and contexts. – <b>Collaborative Approach:</b> Encourage collaboration between national and EU-level initiatives. – <b>Continuous Monitoring and Adjustment:</b> Regularly monitor and adjust programmes for effectiveness.
Application Process and Public Procurement	Streamlining of application processes and public procurement to facilitate ease of access and transparency. Encourages broad participation and selection of the best solutions for funding.	– <b>User-Friendly Application Systems:</b> Simplify application processes to encourage wider participation. – <b>Fair and Transparent Procurement:</b> Ensure procurement processes are equitable and clear. – <b>Capacity Building:</b> Provide support and training for applicants to increase quality submissions.
Measurable Results and SRI Integration	Emphasis on programmes supporting smart building installations and upgrades (e.g. automation systems, intelligent shading). Integration of SRI criteria to ensure practical solutions and measurable results.	– <b>Quantitative and Qualitative Metrics:</b> Use a mix of quantitative and qualitative measures to assess impact. – <b>Feedback Mechanisms:</b> Incorporate feedback loops for continuous improvement. – <b>Best Practices Dissemination:</b> Share successful outcomes and case studies for broader learning and adaptation.

thereby demystifying its complexities. Equally important is the establishment of the SRI Observatory, which documents ongoing developments and provides annual outlooks, charting the future trajectory of SRI advancements. The SRI Annual Outlook, offers an insightful and structured summary of the yearly progress and future prospects of Smart Readiness Indicator initiatives, serving as a valuable resource for tracking the evolution and impact of SRI in the European context.

This research adopted a comprehensive methodology, blending field research, literature reviews, stakeholder interviews, and a mix of digital and face-to-face discussions to gather a broad spectrum of insights. The findings of this study draw out significant policy implications and offer actionable recommendations to policymakers and stakeholders. A major focus is on the financial aspects of smartness upgrades in buildings, underscoring the importance of ensuring the long-term viability and sustainability of SRI implementation. The study highlights the need for ongoing research and development, particularly in areas of technological innovation and policy integration, to fully realise the potential of SRI.

In addressing the limitations of our study, it is important to note that the primary reliance on qualitative methods, while rich in detailed insights, may not capture the full spectrum of quantitative data that could further validate the Smart Readiness Indicator's effectiveness across different contexts. Additionally, the geographical scope of our research was limited to certain EU member states, which may not fully represent the diverse implementation challenges and successes of SRI across all European regions. Finally, the rapid evolution of smart building technologies and policies may outpace our study's findings, suggesting a need for ongoing research to continuously update and validate our conclusions (Table 4).

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding

This study is part of the dissemination activities of the research project 'Smart Tools for Smart Buildings: Enhancing the intelligence of buildings in Europe (Smart Square)' (Grant ID Number 101077241), funded under the Horizon Europe call LIFE-2021-CET-SMARTREADY.

## Data availability statement

Data associated with this publication will be made available to other researchers upon reasonable request, as per the journal's policy, with the discretion to define the reasonableness of the request residing with the author.

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