X-tendo

INTRODUCTORY REPORTS

SMART READINESS INDICATOR

MARCH 2021

EXPECTED ADVANTAGES

- Optimised **energy use** as a function of (local) production
- Optimised (local) green **energy storage**
- **Automatic diagnosis** and maintenance prediction
- Improved **comfort** for residents via **automation**

THE SMART READINESS INDICATOR (SRI) WILL MEASURE THE CAPACITY OF BUILDINGS TO USE INFORMATION AND COMMUNICATION TECHNOLOGIES AND ELECTRONIC SYSTEMS TO BETTER SUIT THE NEEDS OF OCCUPANTS AND THE GRID AND IMPROVE ENERGY EFFICIENCY AND OVERALL BUILDING PERFORMANCE.

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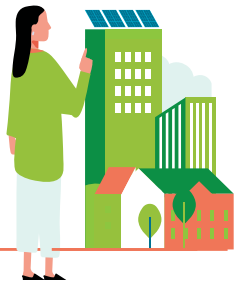
WHY WE DEVELOPED THIS FEATURE

Greater uptake of smart technologies is expected to lead to significant energy savings in a cost-effective way, while also helping to improve indoor comfort and enable the building to adjust to the needs of the user. Smart buildings have been identified as key enablers of future energy systems that will have a larger share of renewables, distributed supply and demand-side energy flexibility. A focal point of the revised Energy Performance of Buildings Directive (EPBD), published in 2018, is to improve the realisation of this potential of smart-ready technologies in the building sector. The SRI is proposed as a voluntary European scheme for rating the smart readiness of buildings. It aims to make the added value of building smartness more tangible for building users, owners, tenants and smart service providers. To increase the visibility and uptake of smart technologies in the European building stock and link them to the current energy performance certificate (EPC) schemes, the SRI has been selected as one of the X-tendo features.

SCOPE OF APPLICATION



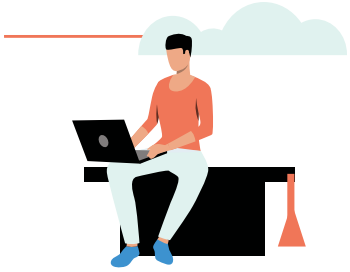
The SRI is intended to raise awareness about the benefits of smart buildings, including energy efficiency, optimised mix of various energy sources, user occupancy experience and grid flexibility. In addition, its implementation is expected to stimulate investments in smart building technologies and support the uptake of technology innovation in the building sector.

The SRI methodology is applicable to all types of buildings – residential and non-residential, existing and new – regardless of their size. Two parallel methodologies have been developed and tested so far to speed up SRI evaluation capabilities. These methodologies vary in the amount of information required and the skills needed by the assessor to quantify the level of smartness. Abbreviated method A is composed of a simplified checklist that can be self-assessed online or by an assessor in 15 minutes, making it ideal for assessing single and multi-family dwellings and small commercial and office buildings. Extended method B relies on an on-site inspection and includes more detailed information about the building smartness components. Its specificity makes it suitable for assessing large private (residential, offices) and public (schools, hospitals, etc.) buildings.

In contrast to other quantification schemes used in existing EPCs, the SRI calculation is intended to follow the same general methodology across all Member States. The content of the SRI is strongly dependent on information and communication technologies, making it more relevant (but not exclusive) to new and renovated buildings.

Building typology	New and existing buildings • Residential, non-residential, tertiary, public **Method A:** Residential (single-family, multi-family) and small non-residential buildings up to 500m² useful area **Method B:** Residential (multi-family), non-residential (offices), public (schools, hospitals) and large buildings more than 500m² useful area
Tenure	Owner occupied, co-operative, private rental, public rental
Property status	Renovating, renting, selling, buying

LEVEL OF EXPERTISE, SKILLS AND TRAINING



The training and skills required for SRI assessment depend on the type of method used and the type and size of the building. While intermediate level of awareness is sufficient to assess SRI levels through method A, method B requires an expert degree of knowledge and can be only performed by SRI certified assessors. Training needs can therefore be divided between guidance and training to support local self-assessment and training of third-party assessors. Training costs are not yet appropriately estimated and will vary across Member States. Potential barriers to delivering a validated accreditation include training costs and the lack of trained assessors during the first stages. The costs associated with establishing a pool of qualified assessors would be reduced if training programmes first target experts already certified through other schemes in Member States.

	Fundamental awareness (basic knowledge)	**Novice** (limited experience)	**Intermediate** (practical application)	**Advanced** (applied theory)	**Expert** (recognised authority)
Method A (abbreviated)			✓		
Method B (extended)					✓

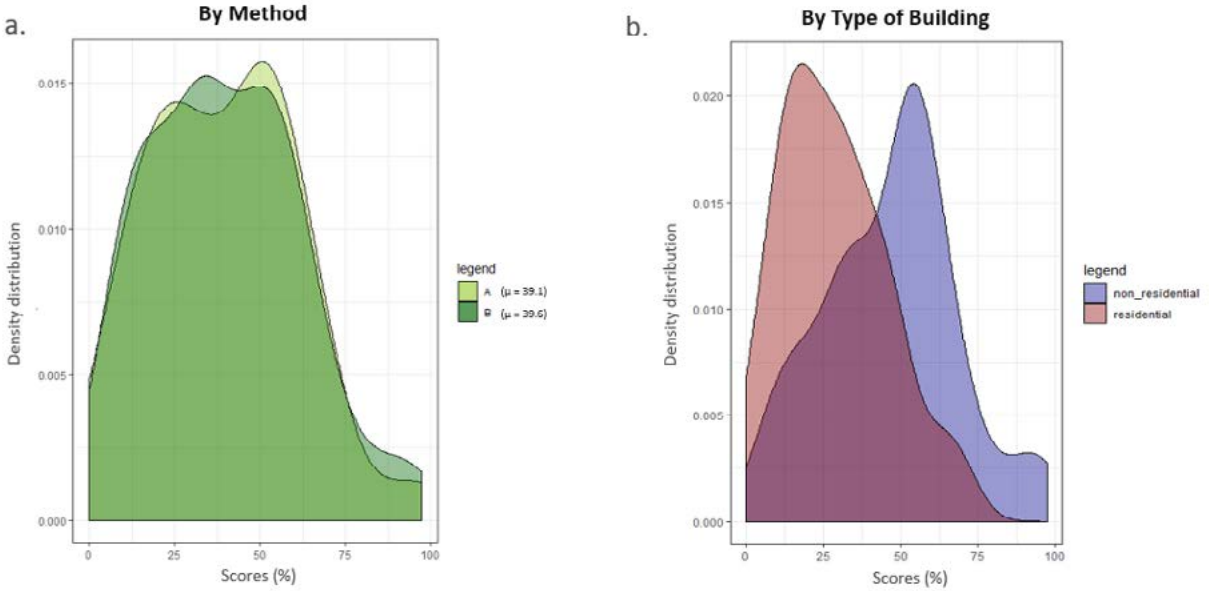
GOOD PRACTICES

Buildings are dynamic environments with broad impacts in terms of comfort, health, and interaction with occupants and the surrounding built environment. Identifying and framing these benefits within the SRI scheme is expected to boost both building retrofitting and smart services utilities markets. In addition, it could accelerate the deployment of smart meters and boost EPC assessment. Key aspects of good SRI implementation are:

- Integrating the SRI with other existing schemes to reduce costs and provide complementary information.
- Developing an understandable way to communicate the different smartness levels of the building to the general public, e.g. by with a main SRI score broken down into sub-scores for different aspects.
- Opening new market opportunities and creating business models for existing and future stakeholders.
- Increasing the accessibility of information through digitalisation of the service, in line with the development of digital building logbooks.

Pilot testing performed in the "3rd interim report of the 2nd technical support study on the smart readiness indicator for buildings" showed that the SRI methodology is suitable for assessing smartness levels for residential and non-residential buildings.

Figure 1 - Comparison of assessment results of Method A and Method B.

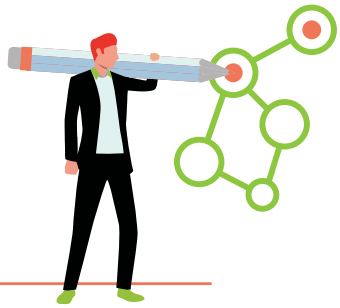


There are however some facts worth mentioning:

- **Equivalent assessment outcomes between methods:** Figure 1a shows that there were comparable means and distributions between methods A and B for the buildings tested. SRI scores are calculated as a percentage where 100% represents a building with perfect capacity to interact with its occupants and the energy networks/grids.
- **Higher SRI for non-residential buildings:** Results of the pilot study indicated that non-residential buildings score better overall than residential ones (Figure 1b.).

The results of this first pilot study were confirmed by a recent research paper that also proposed SRI as a good indicator to quantify the load shifting potential of buildings.[1]

[1] Märzinger, T. and Österreicher, D. 2019. Supporting the Smart Readiness Indicator—A Methodology to Integrate A Quantitative Assessment of the Load Shifting Potential of Smart Buildings. Energies 12: 1955.



METHODS AND ASPECTS INCLUDED

1. The smart readiness score of a building is a percentage that expresses how close (or far) the building is from maximal smart readiness. The higher the percentage, the smarter the building. The total SRI score is based on a weighted average of scores allocated on seven impact criteria, each evaluated within nine domains (this generates a 7x9 evaluation matrix).
2. The seven impact criteria are: Energy Efficiency, Maintenance and fault prediction, Comfort, Convenience, Health and well-being, information to occupants and Energy flexibility and storage.
3. The nine domains are: Heating, Cooling, Domestic hot water, Controlled ventilation, Lighting, Dynamic building envelope, Electricity, Electric vehicle charging and Monitoring and control.
4. The final SRI score is provided in the form of a percentage and subdivided in three subcategories matching EPBD objectives: Energy Savings & Maintenance; Comfort, Ease & Well-being; and Grid flexibility.
5. Buildings have different theoretical maximums. Parameters such as type or characteristics will determine the criteria according to which the building will be evaluated. For example, a building without space to integrate an electric vehicle (EV) charging point will not be evaluated on this service, so has a lower theoretical maximum.
6. Buildings have different weighting factors. Geographical location influences the impact of the different services – for example, the heating domain would gain importance in northern areas of Europe, whereas the relative importance of the cooling domain would increase in southern areas of Europe.

Method A is considered as the reference SRI assessment method within the X-tendo project because it produces equivalent outputs to the more detailed Method B (see pilot test results above) with a shorter assessment time.

HOW WE WILL IMPLEMENT IT

The SRI scheme is already in a late phase of development and first testing results are very promising regarding the validity of the method and the large field of opportunities that it will open. The "in-building" testing in X-tendo will help to evaluate the viability of collecting data relevant for both EPC and SRI schemes and to quantify the eventual savings in costs and time. In addition, the process will include the systematic collection of qualitative data from SRI assessors and building owners/managers on their view of the new process/indicator. To ensure a good cover of the different European climates, testing buildings will be located in countries across the three prevailing climate zones (Austria, Estonia, Greece and Romania).

As stated in the "3rd interim report of the 2nd technical support study," one of the biggest challenges of the SRI scheme will be to deliver a significant volume of assessments within the first years of implementation. The best way to ensure good market penetration would be to combine the scheme mandatorily with other existing schemes such as the EPC. Linking the SRI to new buildings and major renovations could also accelerate its positioning. A third promising approach is to develop a market-based voluntary scheme in which self-assessment is supported by online tools or in which certified professionals are hired to perform the evaluation (remunerated by owners and/or state agencies).

OVERALL EVALUATION

LESSONS LEARNT

- The SRI assessment scheme is a good way to boost retrofit and smart utility markets and bring new opportunities to improve comfort and health of occupants and to optimise energy use in the building and the local grid.
- Non-residential buildings have overall better SRI scores, often as a result of their management systems.
- Abbreviated method A is as effective as extended method B (which is longer and more expensive) to estimate SRI levels in residential buildings. Further testing is needed for commercial buildings, for which method B would be initially more appropriate.

PREREQUISITES

- Implementing the SRI scheme requires a synergy of assessment with other existing schemes such as EPCs.
- Market creation with business opportunities for private stakeholders.
- Significant differences between Member States demand a high degree of flexibility when it comes to implementation rules.

REPLICATION

- Need for a cost-effective business model as neither the Member States nor the EU can cover related costs on a permanent basis.
- Need to tackle country-specific legislation and market maturity of smart utilities.
- Friendly and easy-to-understand communication with a main score divided into sub-scores needed to promote public understanding.

PROS

- Increases energy efficient renovation, emphasising the use of smart-ready technologies as an opportunity for the energy transition.
- Complements existing EPC schemes with new information.
- Improves health and comfort of occupants.

CONS

- Increases the assessment costs and time when combined with the EPC.
- Requires specific training for assessors with additional related costs.

RISKS

- GDPR (e.g. data privacy) and citizen security (e.g. cybersecurity risks).
- Might increase the technological gap between Member States.
- Could increase disproportionately the real estate value of new buildings compared to existing ones.

RECOMMENDATIONS

- Ensure a flexible EU scheme to allow for the varying internal capabilities of Member States.
- Tailor support plans to different Member States to facilitate a relatively even implementation across countries.
- Create a common assessment framework with EPC and create market opportunities for private actors.

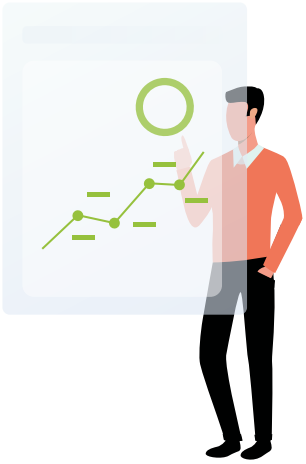
NEXT STEPS

- Additional pilot studies to certify the validity of the method developed.
- Selection and testing of the scheme in some targeted areas within the EU territory: large piloting approach.
- Elaborate on further tools and comprehension to solve main implementation issues: assessment costs, national divergence, market value, etc.

COMPLEXITY

- Increased assessing time and costs if combined with EPC.
- Potential divergencies in the calculation of SRI at the level of large buildings: some buildings may not have the same smartness capacity although can have similar SRI scores (methodological limitation).
- Smart utility solutions are a fast-developing market. SRI method should be updated when needed to include new technologies.

COMPLIANCE WITH CROSS-CUTTING CRITERIA



QUALITY AND RELIABILITY OF EPCS

If well coordinated with EPC assessment, SRI scheme might provide not only new information but help improve current EPC evaluation quality and reliability. This is because some of the input data needed to assess both is the same or comes from the same source.

USER-FRIENDLINESS

SRI scores need to be easily shared with the general public, not only experts. For this purpose, SRI will be communicated using a logo to immediately visually brand it in users' minds and create an identity for the scheme. The logo will be accompanied by numbers indicating the SRI score. In addition, the SRI will be subdivided in three subcomponents indicating in more detail the building readiness for (1) energy savings and maintenance, (2) comfort, ease and wellbeing, and (3) grid flexibility.

CONSISTENCY WITH STANDARDS

The identification and analysis of the possible options for implementing the SRI at EU level and at Member State level involved the examination of equivalent frameworks as possible templates for the SRI's adoption. Some models of other initiatives which are instructive for the SRI's governance include the Ecolabelling scheme, and CEN/CENELEC standardisation bodies.

ECONOMIC AND POLITICAL FEASIBILITY

Technical support studies have developed and tested a viable definition and assessment methodology for the SRI. The approach is aligned with the objectives set out in the EPBD, produces consistent results, can be readily implemented and has been shown to provide useful information to building users. It has been extensively reviewed and appears to enjoy broad-based support across a wide range of stakeholders, suggesting that it could be an adequate basis to support an effective implementation. While the methodology is ready, some further aspects regarding economic and political feasibility, such as the assessment costs or the different EU Member States' maturity levels on smartness, still need to be evaluated and decided.

X-tendo

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