SRI Gaps and Future Perspectives

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In 2018, the European Commission adopted the Smart Readiness Indicator (SRI) concept in the recast of the directive on the energy efficiency of buildings. The set of SRIs is a measure of the intelligence of buildings systems, and its promotion is expected to contribute to the energy savings of the building sector. T

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1. How Ready Are the Smart Readiness Indicators?

SRIs were developed in 2017 and relied heavily on EN standards [1], as well as on the VITO project delivered in terms of the ENER/C3/2016-554 tender [2]. The development rationale of the indicators was based on a significant sample of building systems and considered common practices in the perception of a system's performance. It is certain, however, that this first approach will need to be revised in the near future. Specifically, the precision of the evaluation based on the proposed levels of functionalities will need to be improved based on the intelligence results obtained from a significant sample of buildings. An observation resulting from the first application of the scheme is that, in the case of small buildings where there are no built-in Building Management Systems (BMS), the results are worse compared to the performance of large buildings that have the ability to install BMS. This result is not objective, as there are cases of residential buildings that incorporate several smart provisions but fail in their assessment due to the lack of a central monitoring and control system. At this stage there is no commonly accepted database from which building designers and engineers can draw data on the intelligence of building systems. This fact includes, in some cases, the element of subjectivity in the evaluation of the devices of buildings, which is currently based on the understanding and the perception of the designer. Therefore, there is a need to create a common database for assessing the intelligence of building systems.

2. SRI Integration into Energy Performance Certificates

Energy efficiency certificates have been at the forefront of European building energy efficiency policy since the early 2000s. The impact of this measure on reducing energy consumption in the building sector in Europe is very significant. This measure has essentially led the developments in this area, and has managed to lead to significant savings in the energy sector. At the present stage of development of SRIs, there is no provision for the integration of this scheme into the energy certification procedure of buildings. The case study presented in Section 3.2 revealed that a building with energy class D revealed a good SRI, proving that steps still need to be made in order to align the SRI with the EPC. This constitutes a major challenge for the energy-related policies of the Member States of the European Union. The development of a comprehensive methodology, by which the intelligence readiness of buildings will be included in the energy class of the building, is of particular importance. This methodology should obviously be based on standardized procedures, therefore there is a need to develop relevant standards that will incorporate this methodology. This should result in the integration of the SRI score of a building to its energy performance certificates, contributing also to the calculation of the energy class of the building. Ideally, in the near future, the SRI evaluation should be an element of the final result of the energy certification of the buildings. Some first efforts to fulfil this gap have already been documented [3].

3. Historic Buildings-Tailored SRI

Around 25% of the building stock in Europe was constructed prior to 1950. These buildings, although they are highly valued for their architectural significance, use inefficient building systems. The need to preserve authenticity restricts recently developed building systems solutions to be adapted for use in historic buildings. The SRIs aim to strengthen energy saving policies and practices in buildings. Under these conditions, one would expect the index to apply to all categories of buildings. However, there is at least one category of buildings to which the SRI rationale does not apply, and

this is historic buildings. As an indicator that is mainly related to building systems, the SRI ignores a large category of buildings in which there are practical difficulties and general limitations. Specifically, the indicator:

- Does not recognize realities such as the general limitations that exist in historic buildings for the installation of advanced building services and automation systems;
- Does not record the potential smart applications for controlling energy consumption in historic buildings;
- Does not propose a different system for assessing the intelligence of historic buildings.

This gap is considered to be quite significant, and widens the gap that currently exists in the field of energy evaluation and energy saving in historic buildings. The solution in such a case would be quite simple, and would be none other than creating a tailored scheme for the smartness assessments of services installed in historic buildings. Such an evaluation system requires the recognition of the practical difficulties that traditional buildings face in the installation of many of the systems characterized in the SRI, but also the recording and classification of potential intelligent system solutions in historic buildings.

4. Requirement for Sectoral SRIs

The discussion concerning the non-applicability of SRIs to historic buildings sheds light on the need for the development of different schemes of SRIs for different types of buildings. Especially if the tertiary sector is concerned, it is obvious that, based on the activity of the user of the building, the requirements for the control and monitoring of building systems will differ significantly. Taking the example of a restaurant's kitchen, the smartness of the equipment will be judged mainly on the technical features of the ovens, the fridges and the dish-washers. At this point, the SRI does not assess this equipment, whereas a detailed assessment of this equipment would have been of no particular interest for an office or an educational building. This rationale is better understood if the paradigms of sustainability schemes such as the LEED [4] or the BREEAM [5] are considered. Under these schemes, the sustainability of buildings is assessed based on different criteria, according to the type of building. To this end, BREEAM schemes include, for instance, new UK construction, international new construction, UK refurbishment and fit-out, and international refurbishment and fit-out. This leads to the conclusion that, sooner or later, sectoral SRIs and evaluation schemes will need to be developed, which will recognize the variance in the building systems, and their significance per building type.

5. SRI Minimum Requirements for New Buildings and Cost Effectiveness

SRI started as a voluntary scheme, which the EU member states were not obliged to transpose to their national legislation. This means that, at this stage, the member states are not required to bring into force regulations, laws and administrative provisions to comply with the SRI scheme. However, this measure will most probably become mandatory, in order to support the energy savings in the building sector. Should that be the case, it is anticipated that the member states will need to define minimum requirements for the SRI total scores for new or refurbished buildings, in a similar manner to the requirements set for the energy performance of buildings. This discussion is anticipated to be initiated in the following years, and it is expected that exercise on a national level will be required to define, in a realistic manner, the minimum levels of SRIs. These indicators might be defined as a total score or even by building device category (for heating, cooling, domestic hot water, etc.). Inevitably the minimum criteria will need to be based on one of the main principles of all European directives for the energy performance of buildings, and that is cost-effectiveness. Therefore, a methodology will need to be defined for the calculation of the cost-effectiveness of building systems' smartness, in a similar manner to the methodology described in Regulation 244/2012 of the European Commission, which establishes a calculation procedure of cost-optimal levels of minimum energy performance requirements for buildings and building elements [6]. This development will lead to the need to monetize the smartness of equipment in terms of energy savings, an exercise which will initiate scientific discussion on this topic.

6. Integrating SRI into Practices of the Sustainable Built Environment

In order to establish SRI as a tool that can assess the intelligent behaviour of buildings, the indicator should gradually be integrated into other existing practices of sustainability of the built environment. The following three practices are indicative:

- Life cycle analysis;
- Building sustainability systems;

- Digitization of building design practices.

In terms of life cycle analysis, the practices of holistic definition of environmental impacts from buildings are well identified and established [7]. It is therefore understandable that the next step will be intelligence indicators to consider the environmental performance of a building, according to its ability to dynamically reduce its impact on the environment, by integrating smartness into LCA indicators. As far as sustainability schemes are concerned, due to the fact that they are also a rating scheme of buildings, it is expected that in the near future they will have to be remodelled in such a way that they will also consider “buildings’ IQ” as a sustainability indicator. This could be accomplished by simply including the SRI as a building assessment indicator, in the same manner as the EPC rate is currently considered, or even by developing a parallel SRI calculation methodology from data collected during building sustainability assessment. The epitome of integrating SRI into building sustainability practices is expected to be the extraction of SRI from data collected during the digitization of buildings, with tools such as digital log books or BIM files. Such a development will simplify the export of the index and will lead to its establishment.

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