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Evaluation of the Smart Readiness Indicator for Educational Buildings

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Abstract: The Smart Readiness Indicator (SRI) is an assessment scheme for the intelligence of buildings, which was introduced by the European Commission in the directive for the Energy Performance of Buildings in 2018. Since its introduction, many activities related to the maturation and employment of the SRI have been initiated. One of the adaptation needs of the SRI, revealed through public consultation with relevant stakeholders, is the requirement for a tailored SRI for different types of buildings. The aim of this study is to analyze possible scenarios to optimize the smartness performance, as addressed by the SRI score, in educational buildings. The subject of this study concerned campus buildings of the Kaunas University of Technology, in Lithuania. For the definition of the SRI, the calculation sheet developed by the European Commission was used. The effect of the improvements in the smartness performance of buildings on their energy efficiency was examined with the use of a whole-building, BIM-based energy assessment tool (IDA-ICE). The findings of this study revealed that despite the improvement in the automation and control levels of the building heating system, the maximum SRI values achieved deviate significantly by a high-smartness level. This study revealed the importance of services at a city level towards achieving the optimal smartness levels at a building unit level. It also delivered useful findings related to the linkage between energy and smartness performance of a building. The policy implication of the study findings also covers topics relevant to utilities management at a district level, as well as on the need for tailored SRI services catalogs for different types of buildings.

Keywords: SRI; energy efficiency; whole-building energy analysis; energy performance of buildings; educational buildings

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Citation: Plienaitis, G.; Daukšys, M.; Demetriou, E.; Ioannou, B.; Fokaides, P.A.; Seduikyte, L. Evaluation of the Smart Readiness Indicator for Educational Buildings. *Buildings* **2023**, *13*, 888. https://doi.org/10.3390/buildings13040888

Academic Editor: Osama Abudayyeh

Received: 8 March 2023
Revised: 20 March 2023
Accepted: 26 March 2023
Published: 28 March 2023

1. Introduction

As humanity is transitioning to the era of smart buildings and smart cities, the requirement for the objective definition of the intelligence of building units arises [1]. When referring to the smartness of a building unit, this relates to the ability of a building to document, understand and adapt the performance of the building to user needs. These operations are usually addressed through the performance of the building automation and control systems and are aligned to the building technical systems, rather than the building shell.

The Technical Committee 247 of the European Standardisation Organization (CEN) [2], realizing this need, proceeded to the development of a series of standards which relate to the definition of the smartness of buildings. The EN 15232 standard, initially published in 2008 [3], introduced a method for classifying the smartness of building automation and control systems. This method introduced services and domains, based on which the different building automation and control systems are classified, as well as functionality levels, which mainly classify the smartness of different building technical systems.

This development was particularly significant for society, the market and the building automation and control industry. It was also expected to affect policy decisions, something which occurred a few years later, and particularly in 2018, with the adaptation of the Smart Readiness Indicator (SRI) by the European Commission, a methodology which proposes the definition of smartness of buildings, based on the grounds and principles of the 15232 standards. Since 2007, the 15232 standard was revised once in 2017 and was finally replaced with an ISO EN standard, the EN ISO 52120 standard of 2022 [4], which dominates the techniques and methods used Europe-wide, for the definition of the smartness levels of building technical systems.

In the Energy Performance of Buildings Directive (EPBD) recast of 2018 [5], the European Commission has introduced digitalization as one of the main factors for improving the energy efficiency of European Union (EU) Member States (MS). The digitalization of energy systems is expected to allow the integration of renewable energy into smart grids and smart buildings. It is expected that the efficiency of buildings will increase when electricity systems with their central operators—smart grids—will be connected to the energy systems (cooling and heating systems, gas grids) [6]. As a promotion of energy efficiency through smart building technologies, the EPBD recast introduced the Smart Readiness Indicator (SRI) concept. The SRI aims to provide a harmonized rating scheme for assessing the smartness of buildings across the EU MS and inform the tenants and landlords about the capacities of building automation and control systems (BACS). The SRI addresses both existing and new buildings, and it is anticipated to drive developments in the following years in the field of building upgrades. The SRI is a user-friendly, easy-to-understand tool that can be used by building owners, operators, designers, and other stakeholders. The tool is designed to provide an overview of the energy efficiency potential of a building and its components. Following the work conducted by technical consultants, the legal acts of the SRI scheme were entered into force in October 2020 by the European Commission's (EC) Regulation 2020/2156 [7] by detailing the technical modalities for its effective implementation with provisions for a non-committal test phase by MS.

The SRI services are evaluated based on seven impact categories, which are aligned to their readiness to adapt in response to the needs of the occupant, to facilitate maintenance and efficient operation and to adapt in response to the situation of the energy grid.

There are three SRI assessment methods described in the report on technical support for the development of the SRI for buildings:

- Simplified method: based on a checklist approach with a limited, simplified service list. Online self-assessment by end-user (no certification) or on-site inspection by a third-party qualified expert (formal certification). The duration is up to one hour. Used for residential buildings and small non-residential buildings (net surface floor area <500 m^2);
- Expert SRI assessment: based on a checklist approach, covering the full catalog of smart services. Online self-assessment by a technical expert (no certification) or on-site inspection by a third-party qualified expert (formal certification). The duration is half or one day, depending on the complexity. Used for non-residential buildings (and residential buildings if desired);
- In-use smart building performance: based on measured/metered data (potentially restricted set of domains) of in-use buildings. TBS self-reporting their actual performance. Gathering data over a long period. Used for residential and non-residential buildings. Restricted to occupied buildings (not in design phase).

In the SRI service catalogs, services are structured within the following domains: heating, cooling, domestic hot water, controlled ventilation, lighting, dynamic building envelope, electricity, electric vehicle charging and monitoring and control. The smart service impact criteria are energy savings on-site, maintenance and fault prediction, comfort, convenience, health and wellbeing, information for occupants and grid flexibility and storage.

EU MS may decide to implement the SRI in their territory for all buildings or only for certain categories of buildings. MS interested in the SRI scheme can start by launching a non-committal test phase. Feedback from national test phases will allow adjusting the implementation modalities of the scheme. MS must inform the European Commission prior to implementing the SRI test phase in their territory. The scheme is already being tested in Austria, Croatia, Czech Republic, Denmark, Finland and France. There are no specific guidelines from the European Commission for the SRI implementation according to regulation 2156/2020 [7]. This enables the national governing bodies of each MS to have the freedom and the ability to modify the SRI tool for their own testing phase.

2. Theoretical Background, Literature Overview

The field of SRI methodology research is relatively new and has limited research results so far. Nevertheless, some scientific literature is available. In 2020, Al Dakheel et al. [8] investigated various definitions of smartness used in the literature to describe smart buildings. The authors identified the basic features and technologies of smart buildings and highlighted that their minimum features must include the ability to respond to external and internal conditions. The authors proposed 36 KPIs and classified them based on their smartness features, after analyzing different reports, legislation, and research papers. In 2019, Janhunen et al. [6] conducted a study on the applicability of the SRI in Northern Europe, where heating accounts for a significant portion of building energy use due to the cold climate. The study explored three buildings and assessed district heating (DH) as a cold-climate solution to improve energy efficiency. However, the authors found that the SRI's system-oriented approach did not differentiate the unique features of cold-climate buildings, especially those with advanced DH systems. The authors also noted that SRI methodology allows too much subjectivity, which can manipulate scores to obtain more favorable results. A study by Ramezani et al. in 2021 [9] discussed challenges related to implementing SRI methodology and its use in the Mediterranean climate, specifically in Portugal. The study assessed two case buildings in Portugal, including an evaluation of indoor environment quality (IEQ) and energy savings. The authors concluded that the SRI framework is suitable for the Mediterranean climate, but when evaluating the improvement effect of energy and IEQ, SRI methodology did not fully recognize the influence of all implementations.

In 2020, Fokaides et al. presented a study on the impact of the SRI on building energy performance [10]. They evaluated an educational building using SRI methodology, which resulted in a total SRI score of 52%. The authors concluded that SRI methodology covers most aspects of buildings but should be integrated with other energy efficiency assessment processes and expanded to consider specific building types. Vigna et al. in 2020 [11] applied SRI methodology to a nearly zero-energy office building and evaluated it with two parallel groups of experts. They emphasized the importance of collecting data that directly affect the functionality of building services. The authors also highlighted that smartness should enhance buildings' energy efficiency and overall performance and that smartness should be evaluated in terms of how well buildings adapt their operation to the occupants' needs and the grid. In 2022, Apostolopoulos et al. [12], evaluated SRI methodology for residential buildings with different renovation scenarios. The authors assessed renovation costs to increase building smartness and evaluated the resulting SRI score. They concluded that relatively low expenditures are needed to increase the smartness of buildings constructed after EPBD implementation compared to older buildings.

In 2021, Canale et al. [13] applied SRI methodology to residential buildings using three different scenarios: the base scenario (building stock as it is), the energy scenario (simple energy retrofit), and the smart energy scenario (energy retrofit addressing the smartness of the building). The energy scenario resulted in a 15.7% SRI score, while the smart energy scenario resulted in a 27.5% SRI score.

Several studies analyzing building energy consumption and energy performance certificates (EPCs) have highlighted the importance of further developing EPCs and including the SRI in the system. These studies include Li et al. (2019) [14], Märzinger et al. (2019) [15], Koltsios et al. (2022) [16] and Seduikyte et al. (2022) [17]. The inclusion of the SRI in the system can motivate investment in smart technologies and energy savings. However, some SRI studies [9] have indicated that for non-residential buildings, amendments are still necessary to capture specific features, and the revision of weighting factors is required. Additionally, some studies have pointed out that the current SRI mainly focuses on a qualitative assessment of building smartness and does not consider the broader context of the district [18]. Sustainability and smartness are important in the context of smart cities (rapid adoption of emerging technologies, such as smart metering and sensors, load flexibility that will address current trends and challenges), nZEB buildings and renovation of the existing building stock [19–21].

The overview concerning the studies conducted in the field of SRI assessment reveals the need for the implementation of research activities related to the adaptation of the SRI to specific building types. Moreover, the research reveals that there is still a vague link between the SRI scores and the energy efficiency of buildings. Research work is still required to align the significance of the energy efficiency improvement with the optimization of the SRI score. Recognizing these gaps, this study aims to investigate the link between the improvement of the SRI score and energy efficiency.

The approach of this research was to investigate the influence of changes in the engineering systems on the SRI score and energy consumption of educational buildings.

The purpose of this study is to quantify the realistic limits that may be reached concerning the optimization of the SRI. The article is structured into four sections. The introductory section is followed by the materials and methods section, in which the research methods of the study are presented. The discussion and results section presents the findings of the SRI assessment for the pilot building, as well as the relation between the SRI improvement and the energy efficiency enhancement of the pilot building. The major findings of this study are summarized in the conclusions section.

3. Methods

In this section, the methods employed in this study are presented. In particular, the tools and conditions for implementing the SRI and the energy assessment of the investigated building unit are elaborated. In this section the case study building is also presented.

3.1. Smart Readiness Indicator (SRI) Assessment

The SRI assessment of the case study building was conducted in compliance with the content of the EU delegated Regulation 2020/2155, which establishes the definition of the SRI and a common methodology by which it is calculated. For the calculation of the SRI, the EU Commission Calculation Sheet Version 4 was employed. The calculation procedure was divided into three steps:

- Initially, general information concerning the building unit, its location and its employed systems was provided;
- In the second stage, the functionality levels of the selected building services were defined. For the definition of these services, field research was conducted, and input from the pilot's facility manager was received;
- The last stage of the calculation procedure comprised the implication of the findings, as well as a sensitivity analysis with the variation of the weighting factors of the assessment criteria.

In the SRI service catalogs, services are structured within the following domains: heating system, domestic hot water, cooling system, controlled ventilation, lighting, dynamic envelope, electricity, electric vehicle charging and monitoring and control. Mentioned domains cover fifty-two smart-ready services, and each service can be implemented with various degrees of smartness, that is, functionality levels. The functionality level 0 indicates a nonsmart service implementation. The highest functionality level leads to the highest smartness of the service. It means that this particular service offers more value-added impacts to building occupants or to the grid in comparison with services of lower functionality levels. Each domain has an impact on different categories: energy savings on site, flexibility for the grid and storage, comfort, convenience, wellbeing and health, maintenance and fault prediction and information available to occupants.

SRI methodology provides default weighting factors which depend on the building type (residential, non-residential) and the climate zone (e.g., Northern Europe, Western Europe, etc.).

The smart readiness score of a building is a percentage of how close (or far) the building is to the maximum smart readiness that it could reach.

The results are provided graphically, whereas the bar charts delivered by the calculation sheet are also used in this study to present the SRI assessment results.

3.2. Whole-Building Energy Assessment

For the calculation of the energy performance of the investigated building unit, the IDA ICE tool was used. IDA ICE allows the implementation of whole-building energy assessment. IDA ICE is a simulation application for the multi-zonal and dynamic study of indoor climate phenomena as well as energy use, supporting IFC BIM models. In particular, the building technical systems were simulated in detail, allowing for the implementation of parametric scenarios related to the upgrade of the investigated building's automation and control systems. In terms of this study, the use of thermostatic heads was investigated. The simulation delivered information related to building's energy consumption under diverse scenarios.

The geometrical model of the analyzed building is presented in Figure 1. Dynamic simulations were used to quantify the thermal energy used during the heating season under two scenarios: the business-as-usual scenario (BAU) and the scenario of installing thermostatic valves in the radiators. With regard to the calculation assumptions, it was considered that the amount of supply air was 18 $m^3/(hm^2)$ with an area per student of 2 m^2, and heat due to the lightning of 5 W/m^2. The heating was considered to start when the outdoor temperature was below 10 °C, and the temperature of the heat carrier was considered to be regulated according to the outdoor temperature sensor. For the operational schedule of the building, it was considered that students were present in the classrooms Monday to Friday, from 9 a.m. to 5 p.m.

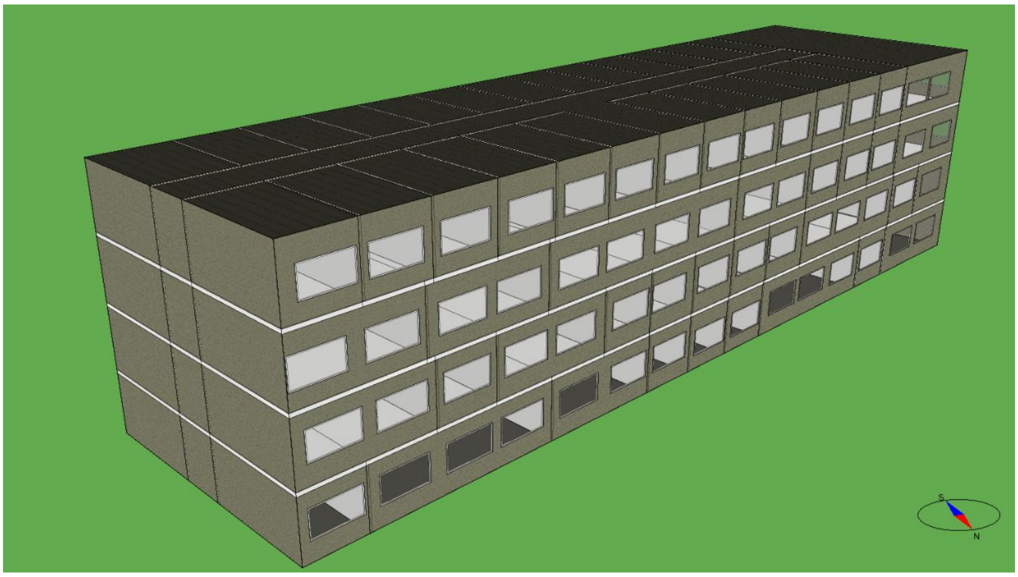

Figure 1. Geometrical model of analyzed case study building.

3.3. Case Study Building

The investigated concept of this study was applied to a building of the Kaunas University of Technology (KTU), located in Kaunas, Lithuania. The building is used by the Faculty of Civil Engineering and Architecture of the university, and it also hosts the library of the institution.

The building (Figure 2), constructed in 1965, is of energy class C and has a total area of 14,824 m^2. Information related to the building technical systems are provided in Table 1.

Figure 2. Case study: an educational building of Kaunas University of Technology.

Table 1. Case study building: Technical systems information.

Building Technical System	Description
Heating	Energy carrier: District Heating Automation: Compensation sensor Circulation system: Variable speed Terminals: Radiators, without individual control
Sanitary hot water	Water heaters for toilets Individual heating system for canteen and gym
Lighting	Individual control at room level
Electricity	Grid-connected A roof-top grid-connected PV system is connected under net metering conditions

4. Results and Discussion

4.1. Calculation of Case Study Building SRI

Figure 3 presents the total score, as well as the impact scores and the domain scores of the SRI calculation of the test case building. In particular, the test case building was calculated to have a total SRI core of 26%, whereas the individual impact scores were calculated to be 54% for energy savings on-site, 5% for flexibility for the grid and storage, 36% for comfort, 19% for convenience, 14% for wellbeing and health, 19% for maintenance and fault prediction and 45% for the information for the occupants.

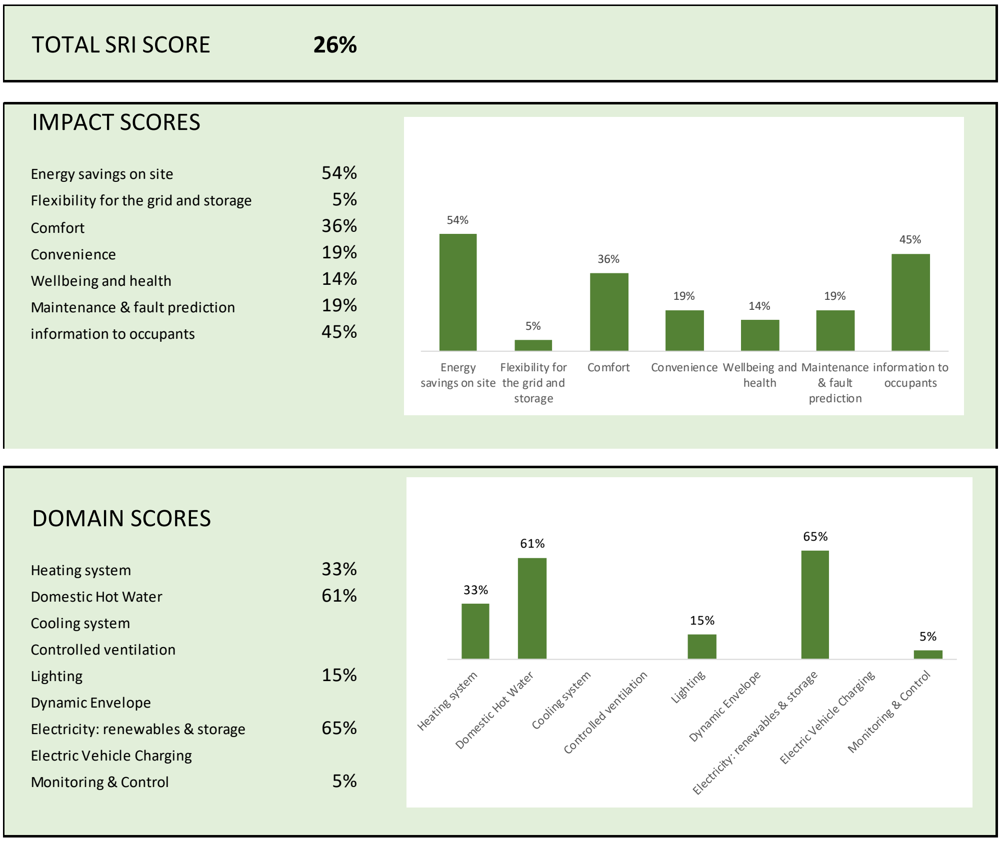

Figure 3. Results of a pilot building calculated SRI.

Concerning the domain scores, the following results were documented:

- The hot water system at the university building achieved a score of 61%, thanks to its ability to collect data on system performance and energy consumption;
- The electrical system score, with the inclusion of a smart solar power plant with an energy storage tank, was 65%, while it would have been only 13% without it;
- The technical areas of heating, lighting and monitoring and control were the lowest scoring areas, achieving 33%, 15%, and 5%, respectively;
- The flexibility of the grid and storage scored 5%, due to the lack of communication between the centralized heat and electricity networks and local building management systems;
- Scores for well-being and health, convenience, maintenance and fault prediction, comfort, and energy savings on-site were 14%, 19%, 19%, 36%, and 54%, respectively;
- The information-for-occupants criterion has the potential to reach up to 45%;
- Increasing the smartness of the heating and lighting areas could potentially increase the comfort of the rooms up to three times, and the building has the potential to save about half of the energy consumed.

4.2. Calculation of Whole-Building Energy Assessment

Figure 4 presents the results of IDA-ICE simulations for the amount of energy used for heating an educational building in two scenarios. The modernized system, which included the installation of radiator valves with thermostatic heads, showed a 12.2–22.2% reduction in energy consumption in the autumn and spring months and an 8.9–10% decrease in the winter months.

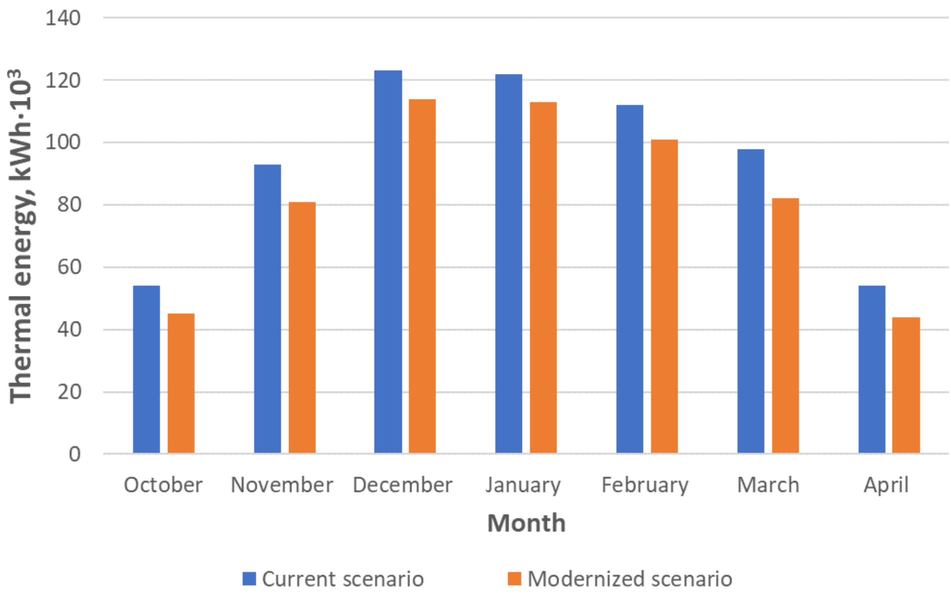

Figure 4. Heating energy of a pilot building under the two investigated scenarios.

4.3. Calculation of SRI Score with Building Energy Upgrade

By incorporating radiator valves with thermostatic heads into the educational building's heating system, an alternative scenario was created and analyzed using IDA-ICE. The SRI score of this modernized system was then computed and visualized in Figure 5.

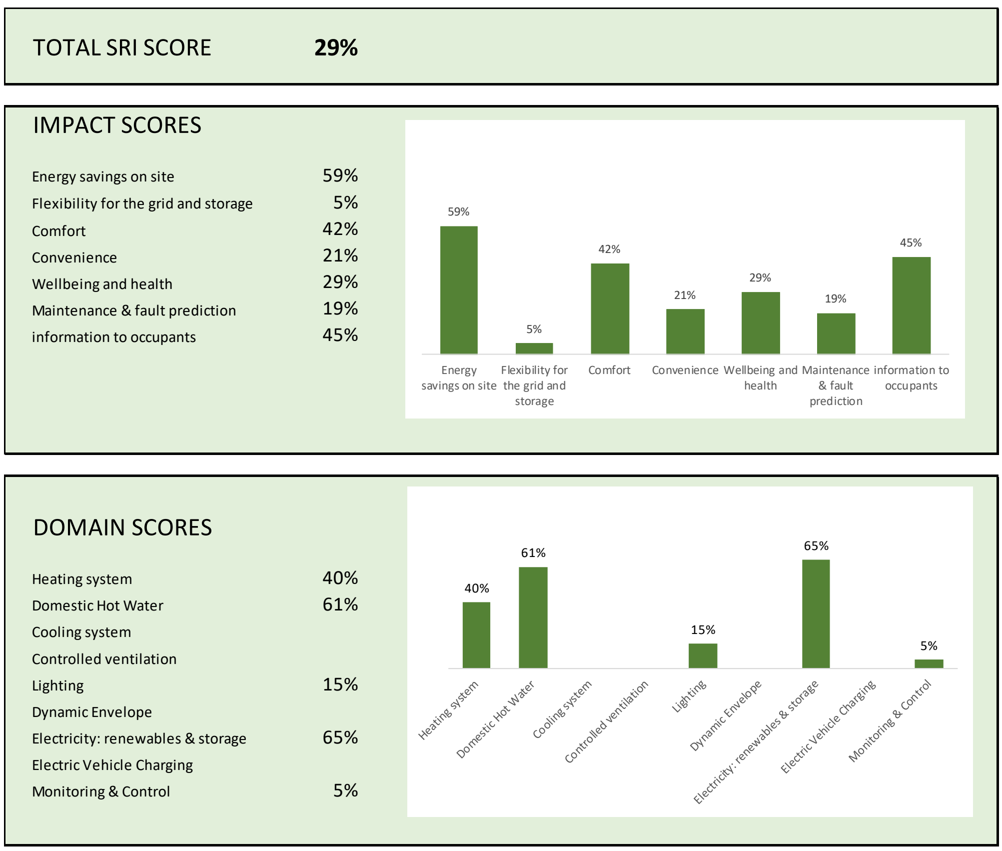

Figure 5. Results of a pilot building calculated SRI with upgraded heating system.

After performing SRI calculations to evaluate the existing educational building and a modernization scenario with installed radiator valves and thermostatic heads, the SRI score increased from 26% to 29%. Alternative solutions were then considered to further evaluate how they could influence the SRI score. The proposed alternative solutions for the engineering systems are presented in Table 2.

Table 2. Alternative solutions for the engineering systems of a pilot building.

Engineering System	Proposed Alternative Solutions
Heating	Heat source: City's centralized heat network Outdoor sensor: Regulates temperature of supplied heat carrier Variable speed circulation pumps: Connected to building management system Heating devices: Floor heating; each room controlled separately; connected to building management system
Sanitary hot water	Hot water is prepared at a heating point with smart automation.
Cooling	Variable refrigerant flow cooling system with indoor units in each room Controllers installed in each room separately System connected to building management system
Controlled ventilation	Ventilation system with heat recovery. Each room has a variable air volume ventilation system controlled by a room sensor based on CO_2.
Lighting	The lighting systems are controlled in each room separately by an automatic switch with the possibility of changing the light intensity.
Electricity system	No changes in the existing system.
Dynamic building envelope	External blinds are provided on the windows of the building, operating according to a solar illuminance sensor.
Electric vehicle charging	There are two charging points for electric cars in the faculty courtyard; you can choose the departure time there.

The calculated result of the SRI with an alternative solution for the investigated building is presented in Figure 6. Total SRI score is 67%.

When comparing the original SRI score of the educational building under investigation (Figure 3) to the score achieved with alternative solutions (Figure 6), it is evident that there were significant changes in the domain scores. Notably, the Monitoring and Control score increased from 5% to 67%, which could be attributed to the installation of fully automated engineering systems that offer better monitoring and control capabilities. Additionally, the Lighting score improved from 15% to 85%, following the provision of automatic switches with the ability to adjust light intensity. To achieve the maximum score in this domain, the lighting system should also be able to adjust the hue of the light.

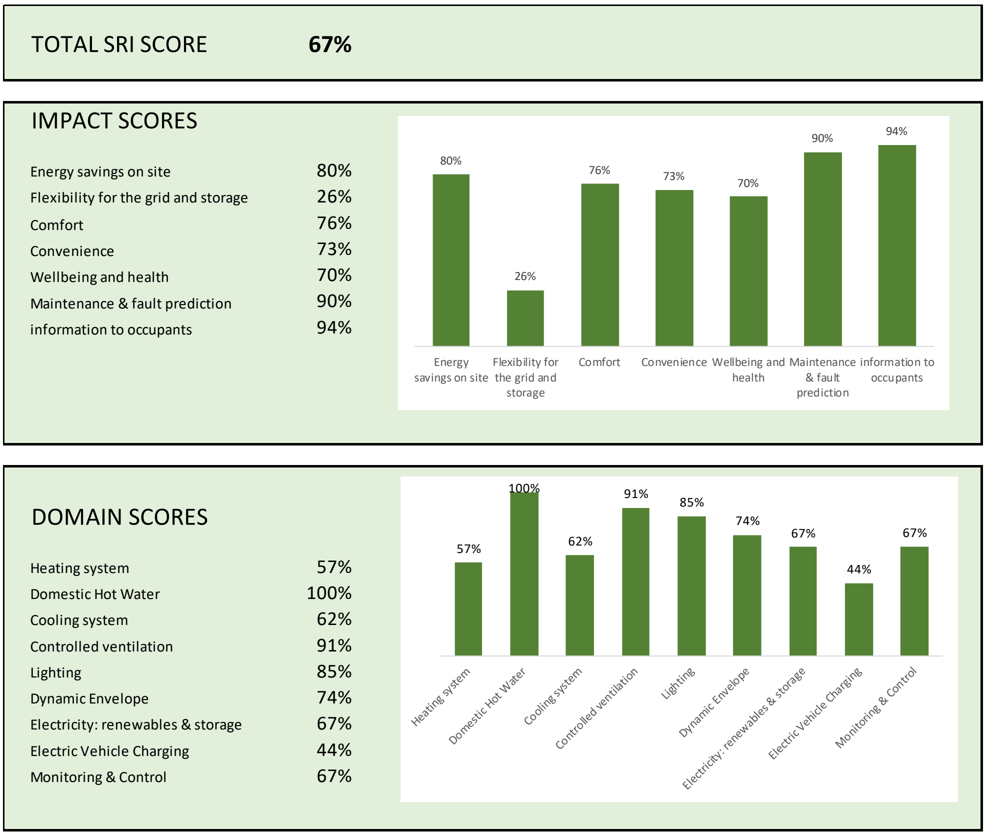

Figure 6. Results of a pilot building calculated SRI with upgraded building automation and control systems.

The Heating score also improved from 32% to 57%. However, to reach the maximum score like the Cooling system (which reached 62%), the heating/cooling should be based on occupancy sensors, and the system should be able to communicate with the city's centralized networks. The Electricity score remained relatively unchanged, while the Domestic Hot Water score reached the maximum score of 100%. However, the Electric Vehicle Charging score was the lowest among the alternative solutions investigated. To achieve the maximum score in this domain, electric car charging stations must make up more than 50% of the parking space, and the charging system should operate optimally based on a load of centralized electricity networks. Furthermore, it should be able to utilize electricity from electric cars.

5. Policy Implication of Study Findings

5.1. Need for Building-Type SRI Service Catalogs

The SRI takes into account various technical systems and indicators related to their automation and control levels. However, this study has shown that the methodology used to calculate the SRI needs to be adapted to different types of buildings. The study revealed that the technical systems installed in buildings differ depending on their intended use. For example, dwelling buildings have different technical systems compared to commercial or educational buildings. Therefore, the SRI methodology needs to be adapted to accurately reflect the smartness level of each type of building. The need for adapting the SRI methodology to different types of buildings has also been recognized at a national level. Several EU MS have already started working on the integration of the SRI into their building regulations and certification schemes. Adapting the SRI methodology to different types of buildings is significant because it allows for a more accurate measurement of the smartness level of buildings. This, in turn, can help identify areas where improvements can be made to increase energy efficiency and human comfort. It can also help promote the integration of renewable energy sources and smart technologies, leading to a more sustainable and comfortable living and working environment.

5.2. The Significance of Smartness Assessment in Regard to Utilities Management at City Level

One of the key pillars of the SRI is a building's ability to interact with smart grids, which allows for the transmission of information related to energy consumption and production. This interaction is particularly relevant in the case of quarantine or lockdown, where there is a need to manage the use of utilities such as energy, water, and waste production. The ability to interact with smart grids allows buildings to become prosumers, where they can both produce and consume energy. The SRI, therefore, can be a useful tool for managing building utilities at a city level. This is especially important during times when there is a strain on energy resources, such as during a lockdown. By accurately calculating the SRI, it is possible to identify buildings that can contribute to the generation of energy and manage the utilities in terms of generation, transmission and distribution. Public buildings, such as educational buildings, are particularly significant in this regard. The calculation of the SRI for public buildings is of great importance in managing the utilities during quarantine or lockdown. This allows for a smoother management of energy and other resources, ensuring that they are being used effectively and efficiently.

5.3. The Linkage between the SRI and the Energy Efficiency of Buildings

The main purpose of this study was to examine the relationship between the smartness levels of buildings and their energy performance. According to the findings of the study, the energy performance of buildings is related to the level of building automation and control systems for the building technical systems. The study revealed the need to consider both assessments in parallel to provide a more comprehensive evaluation of a building's overall performance. This aspect could have further policy implications, particularly in relation to the new design of energy performance certificates (EPCs). The study suggests that the SRI level of a building should be included in the EPC assessment to provide a more accurate picture of a building's energy performance. In the future, energy audits could also include smartness walk-through audits, and measures for energy upgrades could be adapted to include smartness upgrades. There is a need for further integration of the SRI into the energy efficiency assessment of buildings. This will require decision making at various levels, including the joint issuance of EPCs and the SRI and the integration of SRI findings into EPCs. By integrating the SRI into energy efficiency assessments, it will be possible to obtain a more comprehensive evaluation of building performance, which will aid in achieving energy efficiency goals and promoting sustainable development.

5.4. SRI Restrictions Related to District-Level Managed Services

The SRI scheme may not recognize the restrictions that district-level managed services, such as district heating, may introduce regarding the maximum SRI that can be achieved. This deficiency of the SRI scheme has also been identified in national testing phases. To address this issue, actions need to be taken to improve the conditions of the SRI calculation. It is not fair to blame a building if the level of service at a city level does not allow it to achieve its maximum smartness performance. Improving the SRI calculation conditions will enable a fairer evaluation of a building's smartness level and its ability to interact with city-level services, promoting sustainable development in cities.

6. Conclusions

The performed study did not only evaluate the SRI score of the educational building but also investigated the influence of changes in the engineering system on the SRI score and energy consumption.

The educational building in question was analyzed and found to have an SRI score of 26%. After implementing a modernized heating system, the SRI score increased to 29%, and with alternative engineering solutions, it reached 67%. While all impact scores for the alternative solutions scenario were above 70%, the flexibility for the grid and storage criteria remained the lowest, at 26%. It is important to note that each criterion is interrelated and can affect more than one impact criterion. However, achieving the maximum SRI score in Lithuania or other EU countries may not be possible due to centralized heating and cooling systems that lack smart networks. The assumption was made that a building with engineering systems that supports high thermal comfort classes would achieve the highest comfort criterion score. While modern engineering systems can achieve a high SRI score related to human comfort, the comfort criterion depends on the quality of design, installation work, and clothing allowed in the workplace. As a result, the calculated comfort score may not accurately reflect the comfort level maintained indoors. Additionally, differences may arise between the energy efficiency class of the building and the SRI score, as energy efficiency calculations do not take into account engineering system possibilities and characteristics. The IDA-ICE simulations indicated that minor modifications to the existing heating system could reduce the energy used for heating of the analyzed educational building.

The need for adapting the SRI methodology to different types of buildings is supported by both this study and the work conducted at a national level for the integration of the SRI in EU member states. By accurately measuring the smartness level of buildings, we can take steps towards a more sustainable and comfortable built environment. Additional indoor environment measurements are needed, to have accurate information about the comfort level in the premises. The study also revealed that the SRI is a valuable tool for managing building utilities at a city level. The ability of buildings to interact with smart grids and become prosumers is particularly relevant during quarantine or lockdown. By accurately calculating the SRI, it is possible to manage utilities effectively and ensure a sustainable use of resources. The study also highlights the need to consider building smartness levels alongside energy performance in the assessment of buildings. This will have policy implications, particularly in relation to the design of energy performance certificates. The integration of the SRI into energy efficiency assessments will require further action at various decision-making levels, and steps will need to be taken in the near future to achieve this. The study revealed that the SRI score is affected by the level of automation and control of services managed at a city level, such as district heating systems. These systems are managed at a central level, which can restrict a building's ability to achieve its maximum smartness level.

As digitalization is one of the main factors for improving the energy efficiency of the EU, the SRI rating system can help in assessing the smartness of buildings and inform responsible stakeholders about the capacities of building automation and control systems. From 2022, volunteer EU countries were able to launch the test phase or implement the SRI. The volunteering countries were Austria, Czech Republic, Croatia, Denmark, Finland and France. From the experience of the voluntary countries, more information or possible further development of the SRI methodology in research and the practical field is expected.

Author Contributions: Conceptualization, L.S.; data curation, M.D.; formal analysis, G.P.; funding acquisition P.A.F.; investigation, G.P. and E.D.; project administration, P.A.F.; supervision, L.S.; validation, B.I.; writing—original draft, G.P. and E.D.; writing—review and editing, L.S. and P.A.F. All authors have read and agreed to the published version of the manuscript.

Funding: This study gratefully acknowledges the financial support provided by the European Union's Horizon 2020 research and innovation program. Specifically, the "Development of Utilities Management Platform for the case of Quarantine and Lockdown" project funded under the Marie Sklodowska-Curie grant agreement No. 101007641.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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