Smarter EPC

Integrated Certification for Energy Performance and Smart Readiness:
A Unified Approach to Building Assessment

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Table of Contents

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Context

The Smart Readiness Indicator (SRI) is a new instrument developed by the European Union, which is going to be progressively implemented in every Member State, starting with big tertiary buildings from June 2027.[1]

It aims to assess the smart readiness of buildings' technical systems, from three main perspectives: operational efficiency, adaptation of occupants' needs, and energy flexibility. It complements the Energy Performance Certificate (EPC), an instrument also introduced by the EU more than 20 years ago and continuously improved since then, with the smartness readiness aspects of building performance.

The two instruments, stemming from the Energy Performance of Buildings Directive (EPBD), have been designed independently, however, to avoid the duplication of efforts and costs, Member States are invited to connect, or integrate, the SRI into EPCs.[2]

In addition, the European Commission is expected to clarify, with an implementing act, the complementary relation of the SRI to EPCs.[3]

It is in this context that the SmarterEPC project[4] has developed a proposal for an integrated certificate, combining energy performance and smart readiness aspects, fully compliant with the provisions of the recast EPBD 2024.

REFERENCES

[1] DIRECTIVE (EU) 2024/1275 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 April 2024 on the energy performance of buildings (EPBD), article 15, paragraph 4.

[2] Commission Delegated Regulation (EU) 2020/2155 of 14 October 2020 supplementing Directive (EU) 2010/31/EU of the European Parliament and of the Council by establishing an optional common European Union scheme for rating the smart readiness of buildings, recital (7).

[3] DIRECTIVE (EU) 2024/1275 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 April 2024 on the energy performance of buildings (EPBD), article 15, paragraph 3.

[4] Cofunded by the LIFE programme of the European Union (Grant Agreement number 101121034). See https://lifeprojects.r2msolution.com/project/smarterepc/.

1. Introduction to visual integration

The integration of the SRI into EPCs represents a significant milestone in harmonizing building assessment tools across Europe. This joint certificate provides a unified framework for assessing both the energy performance and smart readiness of buildings. Its primary goal is not only to align methodologies but also to create a single document that communicates the outcomes of these assessments clearly and effectively to a wide range of stakeholders, including building owners and tenants, policymakers, building technology industry and building professionals.

At this stage, we propose an accessible, intuitive, and user-friendly visual joint certificate. Such integration is crucial since the document will serve as both a technical reference for professionals and an informative tool for non-expert users. The visual design of the certificate plays a central role in achieving this objective, as it determines how the information is presented, understood, and utilized.

Overview of the goal to create a joint certificate

The primary goal of developing a joint EPC and SRI certificate is to bridge the gap between the outcomes of the energy efficiency and the smart readiness assessments, ensuring that building evaluations are comprehensive and forward-looking. Traditionally, the EPC has focused on energy performance, emphasizing aspects such as technical building systems, and overall energy consumption. In contrast, the SRI evaluates a building's capability to integrate smart technologies, addressing factors like building automation, connectivity, and adaptability to occupants' needs.

By integrating the results of these two assessment tools into a single certificate, stakeholders can access a holistic view of a building's performance. This unified approach simplifies processes for end-users and enhances decision-making by presenting a complete picture of a building's efficiency and readiness for future technological advancements. The joint certificate aligns with the European Union's objectives under the recast EPBD (EU/2024/1275) and related regulations, supporting the broader goals of sustainability, energy efficiency, and digital transformation.

The visual design of the joint certificate is crucial to achieving these goals. It must integrate and present the distinct yet complementary metrics of EPC and SRI in a coherent and organized manner. This ensures that users can effectively grasp insights, whether for compliance, investment, or operational purposes.

Importance of visual solutions for user-friendly design

Creating a user-friendly design for the joint certificate is not merely an aesthetic consideration but a functional necessity. Stakeholders engaging with the certificate include individuals with varying levels of expertise, from technical professionals to non-expert building owners and tenants. An optimised visual layout bridges the knowledge gap by presenting complex data in a clear, accessible format.

The joint certificate must prioritize clarity and simplicity. Content should follow a logical sequence, with distinct sections for energy performance and smart readiness indicators. Visual elements, such as graphs, icons, and colour coding, can highlight key data points and differentiate between metrics. For example, a bar graph might illustrate energy consumption breakdowns, while a radar chart could visualize smart readiness scores across technical domains. These tools enhance user engagement and ease of understanding at a glance.

Different stakeholders use the certificate for diverse purposes. For instance, policymakers might focus on compliance with EU directives, while building owners may be more interested in actionable insights for renovation or investment. A modular design approach ensures flexibility, accommodating these varied needs. Key information, such as overall scores, should be prominently displayed on the first page, while detailed data is structured in subsequent sections for deeper analysis.

To ensure broad applicability, the design must align with EU directives, regulations and standards in force. This includes incorporating mandatory fields specified in regulations such as the EPBD and the SRI Delegated Regulation. Customization options should reflect specific national requirements and/or additional stakeholder preferences, balancing standardization and flexibility.

A visually appealing certificate encourages engagement and interaction. By incorporating user-centric design elements, such as intuitive navigation and consistent formatting, the joint certificate could transform from a static document into a dynamic tool. Digital versions of the with interactive elements could enable users to explore specific metrics or simulate the impact of potential upgrades.

Lastly, the visual solutions should promote transparency and trust. By presenting information openly and clearly, the certificate helps users make informed decisions. Clear labelling of indicators and scores, straightforward explanations of metrics, and links to supporting guidelines or methodologies reinforce the joint certificate's credibility and utility.

2. Elements of the joint certificate

The joint EPC and SRI certificate integrates mandatory and optional fields to provide a comprehensive evaluation of building performance. In light of the EPBD, which establishes a new framework for both mandatory and voluntary indicators, the focus of the EPC elements has shifted towards capturing detailed energy performance and renovation data in line with the EU's ambitious climate and energy goals. These mandatory and voluntary elements define the scope of the EPC component, ensuring alignment with national building renovation plans, as outlined in Article 3 of the Directive. Concerning the SRI, the Delegated Regulation 2020/2155 provides guidance on the elements to be considered in SRI certificates. The mandatory and optional elements to be displayed in the respective certificates are as follows.

EPC mandatory indicators defined by the recast EPBD 2024 (Annex V)

The recast EPBD 2024 mandates specific indicators for national building stock reporting and renovation strategies. These indicators are categorized under distinct themes, forming the backbone of the EPC framework. They aim to standardize data collection and reporting, fostering transparency and comparability across Member States.

Energy performance metrics:

1. Energy performance class: Indicates the building's overall energy efficiency level, typically represented on a scale (e.g., A to G), with "A" being the most efficient.

2. Calculated annual primary energy use (kWh/(m²y)): Represents the total energy required for the building's operation, including energy losses in production and transportation.

3. Calculated annual final energy use (kWh/(m²y)): Reflects the energy consumed directly by the building's systems (e.g., heating, cooling, lighting).

4. Renewable energy produced on-site (%): Specifies the percentage of total energy use covered by renewable energy sources generated on the property.

5. Operational greenhouse gas emissions ($kgCO_2/(m^2y)$): Measures the building's carbon footprint during its operational phase.

6. Life-cycle Global Warming Potential (GWP): If available, provides a broader assessment of the building's environmental impact, accounting for all phases of the building's life cycle (construction, operation, demolition).

Additional mandatory elements:

1. Annual primary and final energy consumption (kWh or MWh): Quantifies the building's total yearly energy requirements for operation in absolute terms.

2. Renewable energy production (kWh or MWh): States the actual amount of energy generated from on-site renewable sources. Includes information on the main energy carrier and the type of renewable energy source (e.g., solar, wind).

3. Calculated energy needs (kWh/(m^2y)): Reflects the theoretical energy demand for heating, cooling, and other services based on standard conditions.

4. Reactivity to external signals: A Yes/No indication if the building can adapt its energy consumption in response to external signals (e.g., grid demand).

5. Efficiency of heat distribution system: A Yes/No indication whether the heat distribution system operates at lower or more efficient temperature levels, enhancing overall efficiency.

6. One-Stop Shop for renovation advice: Provides contact details for a centralized service offering guidance and support for energy efficiency improvements or renovations.

EPC voluntary indicators tailored for national and stakeholder preferences

In addition to mandatory indicators, the recast EPBD 2024 defines optional fields, enabling Member States to customize in a consistent and coherent manner the certificate based on national priorities and stakeholder needs. These fields enhance the certificate's versatility and relevance, particularly in addressing local climate conditions, market dynamics, and policy goals.

1.Energy use, peak load, size of generator/system, and energy carrier: Provides specific details for heating, cooling, domestic hot water, ventilation, and in-built lighting systems. Includes information on the primary energy carrier (e.g., electricity, gas) and the type of system or generator used.

2.Greenhouse gas emission class: Indicates the classification of the building based on its greenhouse gas emissions.

3.Carbon removals: Information on carbon sequestration or temporary storage of carbon within the building materials or on the property.

4.Renovation passport: A Yes/No indication of whether a renovation passport, which outlines a roadmap for energy efficiency improvements, is available.

5. U-Values of building envelope: Average U-value for opaque elements (e.g., walls, roofs). Average U-value for transparent elements (e.g., windows, glass facades). Type of the most common transparent element (e.g., double-glazed windows).

6. Overheating risk: Results of any analysis conducted to assess the building's vulnerability to overheating, if available.

7.Indoor Environmental Quality (IEQ) monitoring and controls: Presence of fixed sensors for monitoring indoor air quality parameters (e.g., temperature, humidity, CO_2 levels). Presence of automated controls that respond to monitored IEQ levels.

8.Electric vehicle recharging points: Number and type of EV recharging points available on-site.

9.Energy storage systems: Presence, type, and size (capacity in kWh) of energy storage systems on the property.

10. System lifespan and adaptability: Expected remaining lifespan of heating, air-conditioning systems, and appliances. Feasibility of adapting systems (heating, DHW, and air-conditioning) to operate at more efficient temperature settings.

11. Metered energy consumption: Actual recorded energy usage, based on metered data.

12. District heating and cooling connection: Indication of a connection to a district heating/cooling network. Feasibility of connecting to an efficient district heating/cooling system, if applicable.

13. Local energy and carbon factors: Local primary energy factors and associated carbon emission factors for district heating and cooling systems.

14. Operational fine Particulate Matter (PM2.5) emissions: Data on fine particulate matter emissions generated during building operation.

Links to other initiatives:

1. Smart Readiness Assessment: Yes/No indication of whether a Smart Readiness Indicator (SRI) assessment has been carried out. The SRI value, if available.

2. Digital Building Logbook: Yes/No indication of the presence of a Digital Building Logbook, which consolidates information about the building's performance and maintenance.

SRI mandatory fields defined by the SRI Delegated Regulation (Annex IX)

SRI certificates must include the following elements:

1. Unique ID of the certificate,

2. Date of issue and date of expiry of the certificate,

3. An informational text clarifying the scope of the smart readiness indicator, in particular with regard to energy performance certificates,

4. General information on the building or building unit (type of building or building unit, surface area, year of construction and where relevant, of renovation, location),

5. Smart readiness class of the building or building unit,

6. Smart readiness scores along the three key functionalities of the SRI

7. Smart readiness score per impact criterion,

8. An informational text clarifying that the certificate reflects the smart readiness at the date of issuance and that any significant modifications to the building and its systems would affect smart readiness and would therefore require an update of the information given on the certificate.

In addition, where possible, they should include:

9. Available information on connectivity, in particular on the existence of high-speed-ready in-building physical infrastructure, such as the voluntary 'broadband ready' label,

10. Available information on interoperability, cybersecurity of systems and data protection, including where relevant on conformity to commonly agreed standards, and information on related risks,

SRI voluntary fields defined by the SRI Delegated Regulation (Annex IX)

1. Total smart readiness score of the building or building unit,

2. Scores of each technical domain for each impact criterion,

3. Recommendations on how to improve the smart readiness of the building or building unit taking into account, where relevant, the heritage value.

4. Additional information on the assumptions made in the calculation of scores such as weighting factors of impact criteria used for calculating smart readiness scores for key functionalities.

3. Design principles

The design principles for the joint EPC and SRI certificate prioritize modularity, standardization, and user-centricity. These principles ensure that the certificate is intuitive, informative, and adaptable, meeting the needs of diverse stakeholders, including building owners and tenants, policymakers, building technology industry and building professionals.

Emphasis on modularity, standardization, and user-centricity

1. Modularity is at the heart of the joint certificate's design. This approach divides the document into distinct sections, each focusing on specific performance metrics, such as energy efficiency, smart readiness, and greenhouse gas emissions. The modular structure allows for:

- Sections can be customized or expanded to accommodate national or regional requirements without disrupting the overall format.
- Users can quickly locate relevant information, such as building scores or renovation recommendations, without needing to scan the entire document.
- Additional modules, such as lifecycle assessments or renewable energy contributions, can be seamlessly integrated into the certificate in the future.

2. Standardization ensures consistency across Member States, enabling reliable comparisons of building performance. The design adheres to the requirements of the EPBD and related SRI regulations, emphasizing:

- Standardized terms and indicators, such as energy performance classes and smart readiness domains, ensure clarity and uniformity.
- A consistent visual format across all certificates, including fonts, colours, and layout, enhances readability and reduces confusion.
- The design incorporates mandatory fields specified by regulations while providing space for optional fields that reflect local needs.

3. User-Centricity ensures the certificate is accessible and meaningful to a broad audience, regardless of technical expertise. Key elements include:

- The certificate avoids technical jargon, using plain language to explain performance scores and recommendations.
- Clear headings, well-organized sections, and visually distinct elements guide users through the document.
- The certificate provides recommendations for improvements, such as energy-saving measures or smart technology upgrades, empowering users to take informed actions.

4. Design overview

The proposed certificate combines the EPC and the SRI into a unified and coherent framework, offering a comprehensive assessment of a building's energy efficiency and smart capabilities. This joint certification aims to streamline evaluation processes, providing a holistic view of a building's performance in both energy consumption and smart technological readiness.

The proposed joint certificate for EPC and SRI is designed as a concise two-page document, combining mandatory and voluntary elements to provide a comprehensive yet user-friendly overview of a building's energy performance and smart readiness.

The integrated certificate includes key energy performance metrics, such as the calculated annual primary and final energy use per square meter, the share of renewable energy produced on-site, and greenhouse gas emissions (operational and, if available, life-cycle GWP). It classifies the building's energy performance and emission levels on standardized scales, supporting compliance with nearly zero-energy or zero-emission building standards.

In parallel, the Smart Readiness Indicator evaluates the building's ability to optimize energy use, adapt to grid signals, and enhance occupant comfort and convenience. It incorporates technical domain scores for critical systems like heating, cooling, ventilation, lighting, and energy storage, alongside detailed insights into smart features, such as indoor air quality monitoring, automated controls, and EV charging capabilities.

Energy Performance Certificate elements

This section represents the Energy Performance Certificate (EPC) component of the proposed joint EPC and SRI certificate. It focuses on the EPC-related elements, which provide a comprehensive evaluation of a building's energy efficiency and environmental performance. Below, we detail the key components and their significance in supporting energy performance analysis.

1. Building identification and general information

The EPC begins with general information about the building, providing essential context for the assessment:

- **Building ID and name:** A unique identifier for the building.
- **Assessment date:** The date on which the evaluation was conducted, ensuring the relevance of the data.
- **Assessor details:** Includes the name of the certified professional conducting the assessment.
- **Building characteristics:** Specifies the building type (residential/non-residential), usage (e.g., educational, office), location, net floor area, and year of construction.

2. Energy performance metrics

The EPC includes several core indicators of the building's energy performance:

- **Calculated annual primary energy use:** Measured in kWh/(m^2y), this metric reflects the total energy required, including losses in energy generation and distribution.
- **Calculated annual final energy use:** Also measured in kWh/(m^2y), this metric represents the energy consumed directly by the building systems, such as heating, cooling, and lighting.
- **Metered energy consumption**: Provides real-world consumption data in kWh/(m^2y), offering insights into the building's operational performance.
- **Renewable energy production:** Indicates the percentage of the building's energy use covered by on-site renewable energy sources, promoting sustainability.
- **Greenhouse gas emissions indicator:** Expressed in kgCO_2/(m^2y), this metric highlights the building's contribution to greenhouse gas emissions, supporting alignment with environmental goals.

3. Energy classification and reference standards

The certificate categorizes the building's energy performance using a standardized scale (e.g., A to G):

- **Building energy rating:** Visualized through a classification system, this rating allows stakeholders to quickly understand the building's energy efficiency.
- **Reference values:** Benchmarks are provided for minimum energy performance standards, nearly zero-energy building requirements, and zero-emission building goals, offering a point of comparison to gauge compliance and future improvements.

4. Operational and system metrics

The EPC also includes detailed insights into the building's energy systems and operational capabilities:

- **Annual energy consumption:** Presented in both kWh and MWh to quantify energy usage for primary and final energy.
- **Main energy carrier:** Specifies the type of energy source used (e.g., electricity, natural gas) and its role in supporting the building's energy needs.
- **Calculated energy needs:** Highlights the theoretical energy demand for services such as heating, cooling, and lighting, expressed in kWh/(m^2y).
- **System features: I**ndicates whether the building has the capacity to react to external signals (e.g., grid demand). Specifies whether the heat distribution system operates efficiently at low temperature levels.

5. Building envelope and additional features

The EPC assesses the thermal performance and additional characteristics of the building envelope:

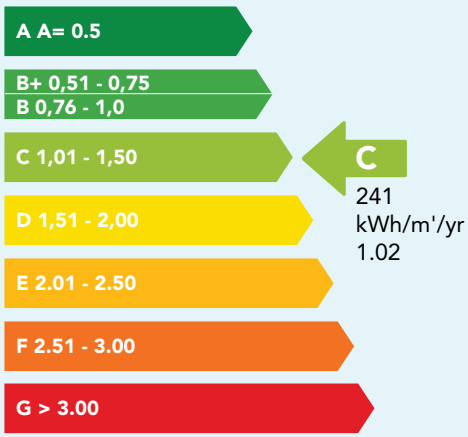
- **U-values for opaque and transparent elements**: Average thermal transmittance values for walls, roofs, and windows provide insight into the building's insulation quality.
- **Type of transparent elements:** For example, the presence of double-glazed windows is noted as an indicator of energy efficiency.
- **Overheating risk:** Includes the results of any analysis on the building's vulnerability to overheating, if available.

6. Optional features

The EPC also presents optional details for advanced assessment:
Renovation passport: Indicates whether a roadmap for energy-efficient renovation exists.

- **Digital Building Logbook:** Notes the availability of a comprehensive digital record for the building's performance and maintenance.
- **Energy storage and EV charging:** Details on the presence and specifications of energy storage systems and electric vehicle recharging points, supporting a transition to sustainable energy use.

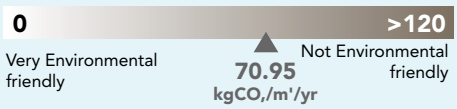
Building Energy Rating kWh/m'/yr



Reference values

• Minimum energy performance requirements	B
• Minimum energy performance standards	A
• Nearly zero-energy building requirements	A
• Zero-emission building requirements	A

Carbon Dioxide (CO_2) Emissions Indicator kgCO,/m /yr



Greenhouse gas emission class: D

Building Envelope and Systems

Average U-value for the opaque elements (W/m²K)	2
Average U-value for the transparent elements (W/m²K)	1.5
Type of transparent elements	Double-glazed window
Number of recharging points for electric vehicles	0
Type of recharging points for electric vehicles	N/A
Energy storage systems	Yes / No
Type of energy storage systems	N/A
Size of energy storage systems (kWh)	0
Sensors that monitor the indoor environmental quality	Yes / No
Controls that respond to the levels of indoor environmental quality	Yes / No

Energy Consumption and Renewable Production

Calculated annual primary energy use in kWh/(m2.y)	241
Calculated annual final energy use in kWh/(m2.y)	241
Metered energy consumption kWh/(m2.y)	310
Renewable energy produced on-site in % of energy us	0

Operational Energy Metrics

	Heating	Cooling	DHW	Ventilation	Lighting
Energy use (kWh/m²/year)	125	20	15	60	30
Peak load (kW)	2500	800	200	500	300
Energy carrier	Natural Gas/ Electricity	Electricity	Electricity	Electricity	Electricity

Energy Consumption, Production, and System Features Overview

Calculated annual primary energy consumption MWh/year	5,000
Calculated final energy consumption MWh/year	4,800
Renewable energy production (kWh)/year	0
Main energy carrier and type of renewable energy source	N/A
Calculated energy needs in kWh/(m².y)	241
React to external signals and adjust the energy consumption	Yes/No
Heat distribution system is capable to work at low or more efficient temperature levels	Yes/No
Renovation passport is available	Yes/No
Digital Building Logbook is available	Yes/No

Fig. 1: Energy Performance Certificate (EPC) elements of the Joint Certificate

Smart Readiness Indicator certificate elements

The attached document represents the Smart Readiness Indicator (SRI) component of the proposed joint EPC and SRI certificate. This section focuses exclusively on the SRI-related elements, which evaluate a building's ability to utilize smart technologies for energy efficiency, occupant comfort, and grid interaction. Below, the key components of the SRI are described.

1. Building identification and general Information

The SRI section begins with basic details that identify the building and provide context for the smart readiness evaluation:

- **Building ID and name:** A unique identifier for the assessed building.
- **Assessment date:** Specifies when the SRI evaluation was conducted.
- **Assessor information:** The name of the professional responsible for the evaluation.
- **Building details:** Includes type (residential or non-residential), usage (e.g., educational, office), location, net floor area, and year of construction.

2. Smart Readiness Indicator overview

The SRI evaluates the building's capacity to leverage smart technologies. Key aspects include:

- Total SRI score: Expressed as a percentage and categorized into a class (e.g., A to G) to indicate the building's smartness level.

- Primary evaluation criteria:

- **Optimizing energy efficiency and performance:** Assesses the building's ability to improve energy usage through smart systems.
- **Adapting to signals from the grid:** Evaluates flexibility in adjusting energy consumption based on grid demands.
- **Adapting to occupant needs:** Measures responsiveness to user preferences and comfort requirements.

3. Impact criteria

The SRI incorporates broader performance areas to assess the building's overall functionality and adaptability:

- **Energy efficiency:** How effectively smart systems enhance energy performance.
- **Energy flexibility and storage:** The ability to manage energy storage and adjust to fluctuating demands.
- **Comfort and convenience:** Evaluates how smart features improve occupant experience.
- **Health, well-being, and accessibility:** Assesses systems that enhance air quality, lighting, and accessibility for all users.
- **Maintenance and fault prediction:** Measures the building's capability for predictive maintenance through smart technologies.
- **Information to occupants:** Reflects the availability of real-time data to occupants for informed decision-making.

4. Technical domains

The SRI evaluates specific building systems for their smart readiness:

- **Heating, cooling, and Domestic Hot Water:** These systems are assessed for their ability to adapt to energy-saving settings and user needs.

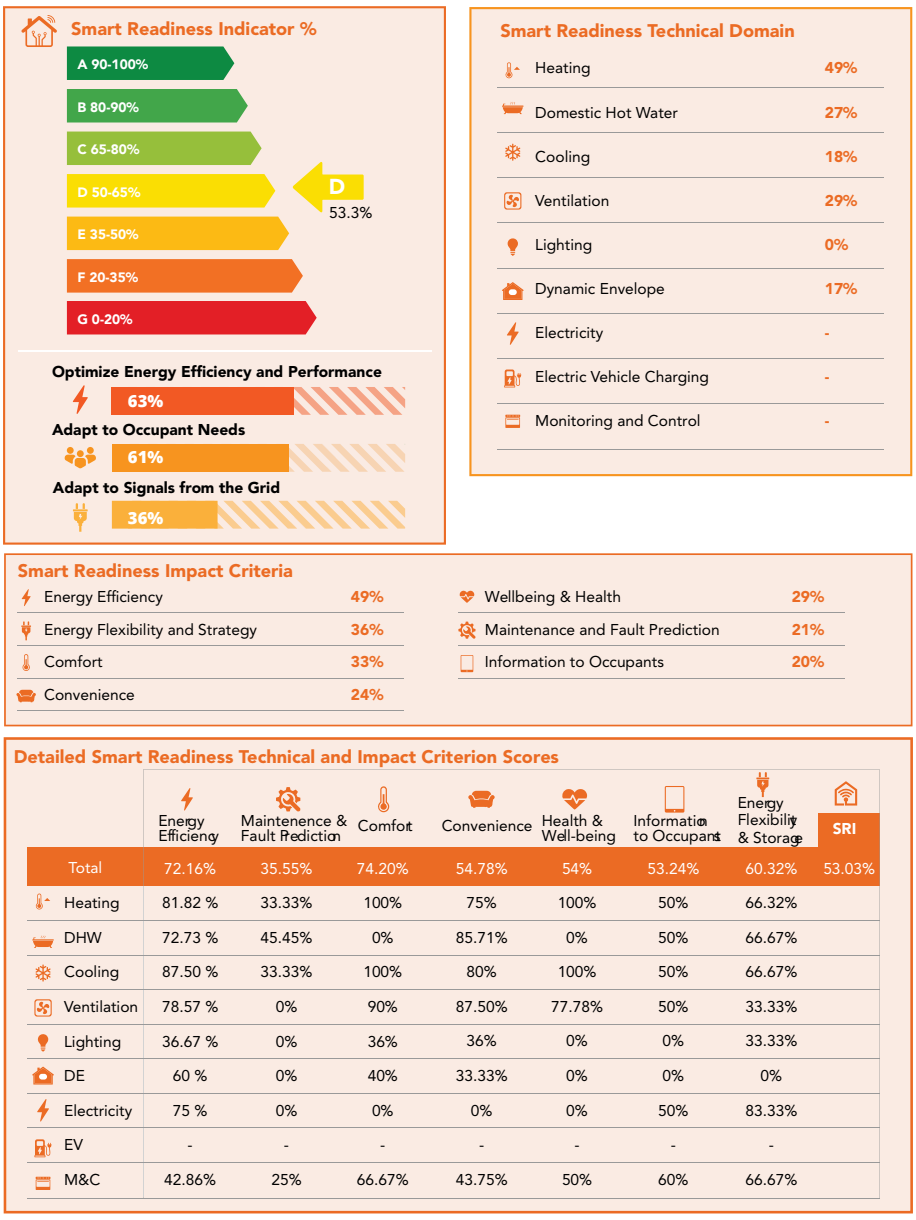
- **Ventilation and lighting:** Includes advanced control systems to enhance energy efficiency and occupant comfort.
- **Dynamic building envelope:** Evaluates the use of adaptable building components such as smart shading or insulation.
- **Electricity and energy storage:** Focuses on the integration of energy management systems and renewable energy.
- **Electric Vehicle charging:** Assesses the presence and functionality of charging infrastructure.

Monitoring and control systems: Measures the capability to monitor and respond to energy and environmental conditions dynamically.

5. Presentation of results

The SRI results are presented in an accessible format:

- **Classification scale:** A visual representation of the overall score within a standard scale (A to G).
- **Criteria scores:** Breakdown of scores across impact and technical domains to offer a detailed understanding of the building's smart readiness.



	Energy Efficiency	Maintenance & Fault Prediction	Comfort	Convenience	Health & Well-being	Information to Occupants	Energy Flexibility & Storage	SRI
Total	72.16%	35.55%	74.20%	54.78%	54%	53.24%	60.32%	53.03%
Heating	81.82 %	33.33%	100%	75%	100%	50%	66.32%	
DHW	72.73 %	45.45%	0%	85.71%	0%	50%	66.67%	
Cooling	87.50 %	33.33%	100%	80%	100%	50%	66.67%	
Ventilation	78.57 %	0%	90%	87.50%	77.78%	50%	33.33%	
Lighting	36.67 %	0%	36%	36%	0%	0%	33.33%	
DE	60 %	0%	40%	33.33%	0%	0%	0%	
Electricity	75 %	0%	0%	0%	0%	50%	83.33%	
EV	-	-	-	-	-	-	-	
M&C	42.86%	25%	66.67%	43.75%	50%	60%	66.67%	

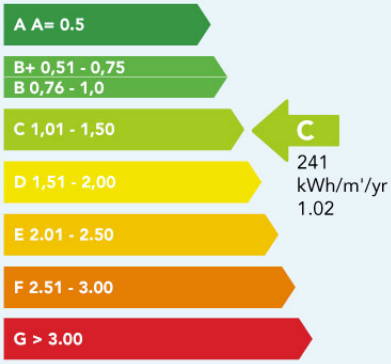
Fig. 2: Smart Readiness Indicator (SRI) certificate elements of the Joint Certificate

5. Joint EPC & SRI Certificate

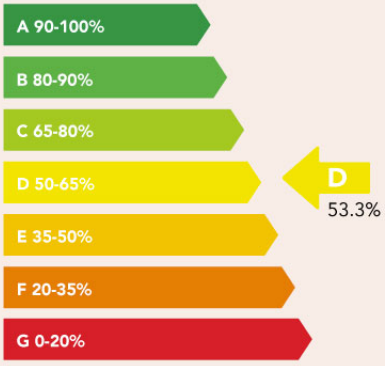
Integrated Certification for Energy Performance and Smart Readiness Indicator

Building ID University1	**Date of Assessment** 24-10-2024	**Assesor Name** Theoklitos Klitou	**Building Type** Non Residential
Building Usage Educational	**Location** Nicosia, Cyprus	**Net Floor Area** 20000m²	**Year of Construction** 2003

Building Energy Rating kWh/m'/yr



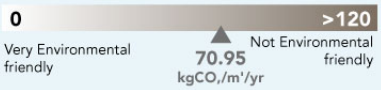
Smart Readiness Indicator %



Reference values

- Minimum energy performance requirements — B
- Minimum energy performance standards — A
- Nearly zero-energy building requirements — A
- Zero-emission building requirements — A

Carbon Dioxide (CO_2) Emissions Indicator kgCO_2/m /yr



Greenhouse gas emission class: D

Energy Consumption and Renewable Production

Calculated annual primary energy use in kWh/(m2.y)	241
Calculated annual final energy use in kWh/(m2.y)	241
Metered energy consumption kWh/(m2.y)	310
Renewable energy produced on-site in % of energy us	0

Optimize Energy Efficiency and Performance

Adapt to Occupant Needs

Adapt to Signals from the Grid

Smart Readiness Impact Criteria

Energy Efficiency	49%
Energy Flexibility and Strategy	36%
Comfort	33%
Convenience	24%
Wellbeing & Health	29%
Maintenance and Fault Prediction	21%
Information to Occupants	20%

Energy Consumption, Production, and System Features Overview

Calculated annual primary energy consumption MWh/year	5,000
Calculated final energy consumption MWh/year	4,800
Renewable energy production (kWh)/year	0
Main energy carrier and type of renewable energy source	N/A
Calculated energy needs in kWh/(m².y)	241
React to external signals and adjust the energy consumption	Yes/No
Heat distribution system is capable to work at low or more efficient temperature levels	Yes/No
Renovation passport is available	Yes/No
Digital Building Logbook is available	Yes/No

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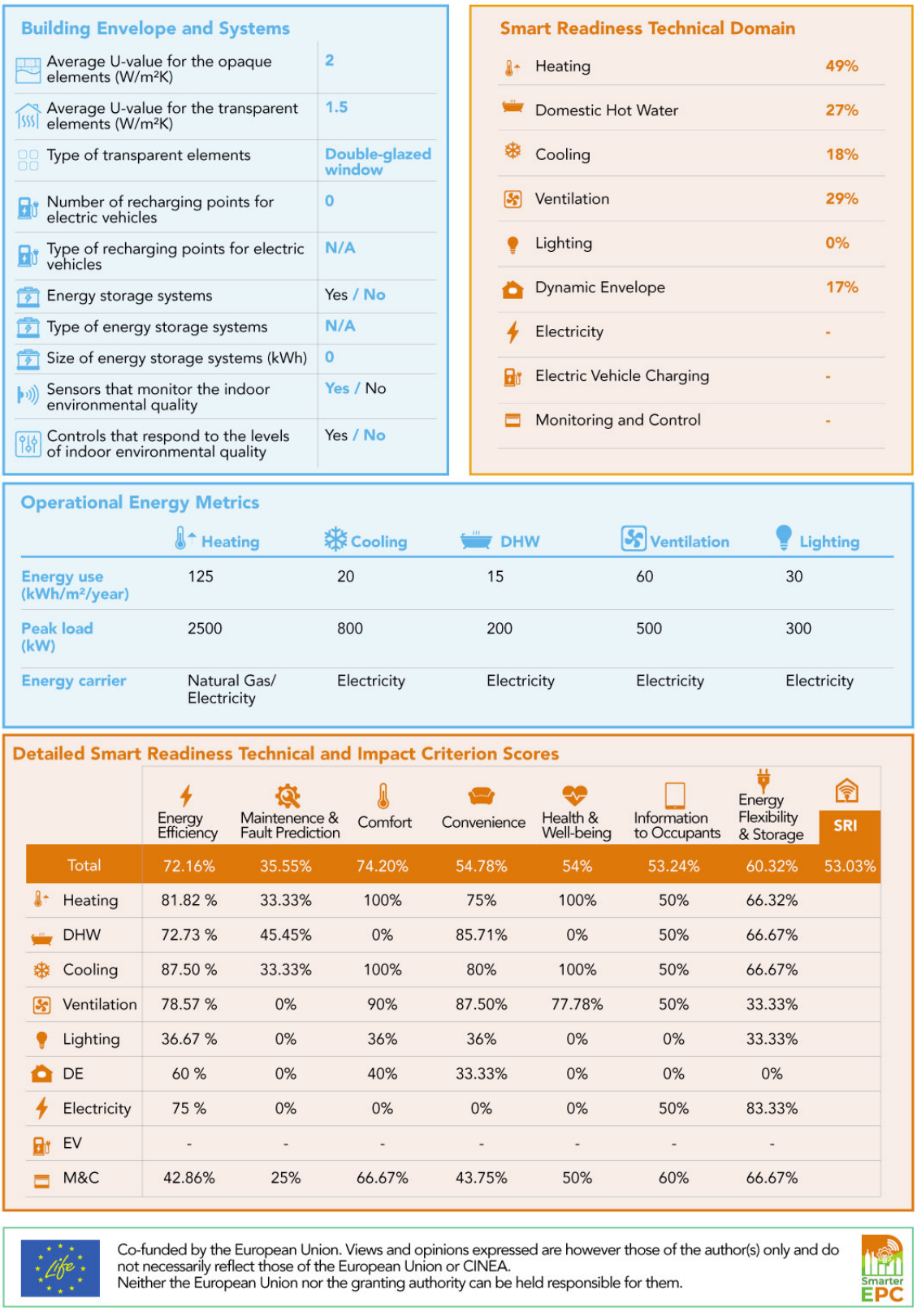

Building Envelope and Systems

Average U-value for the opaque elements (W/m²K)	2
Average U-value for the transparent elements (W/m²K)	1.5
Type of transparent elements	Double-glazed window
Number of recharging points for electric vehicles	0
Type of recharging points for electric vehicles	N/A
Energy storage systems	Yes / No
Type of energy storage systems	N/A
Size of energy storage systems (kWh)	0
Sensors that monitor the indoor environmental quality	Yes / No
Controls that respond to the levels of indoor environmental quality	Yes / No

Smart Readiness Technical Domain

Heating	49%
Domestic Hot Water	27%
Cooling	18%
Ventilation	29%
Lighting	0%
Dynamic Envelope	17%
Electricity	-
Electric Vehicle Charging	-
Monitoring and Control	-

Operational Energy Metrics

	Heating	Cooling	DHW	Ventilation	Lighting
Energy use (kWh/m²/year)	125	20	15	60	30
Peak load (kW)	2500	800	200	500	300
Energy carrier	Natural Gas/ Electricity	Electricity	Electricity	Electricity	Electricity

Detailed Smart Readiness Technical and Impact Criterion Scores

	Energy Efficiency	Maintenence & Fault Prediction	Comfort	Convenience	Health & Well-being	Information to Occupants	Energy Flexibility & Storage	SRI
Total	72.16%	35.55%	74.20%	54.78%	54%	53.24%	60.32%	53.03%
Heating	81.82 %	33.33%	100%	75%	100%	50%	66.32%	
DHW	72.73 %	45.45%	0%	85.71%	0%	50%	66.67%	
Cooling	87.50 %	33.33%	100%	80%	100%	50%	66.67%	
Ventilation	78.57 %	0%	90%	87.50%	77.78%	50%	33.33%	
Lighting	36.67 %	0%	36%	36%	0%	0%	33.33%	
DE	60 %	0%	40%	33.33%	0%	0%	0%	
Electricity	75 %	0%	0%	0%	0%	50%	83.33%	
EV	-	-	-	-	-	-	-	
M&C	42.86%	25%	66.67%	43.75%	50%	60%	66.67%	

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Fig. 3 Smarter EPC proposal for the Joint EPC-SRI Certificate


Smarter
EPC