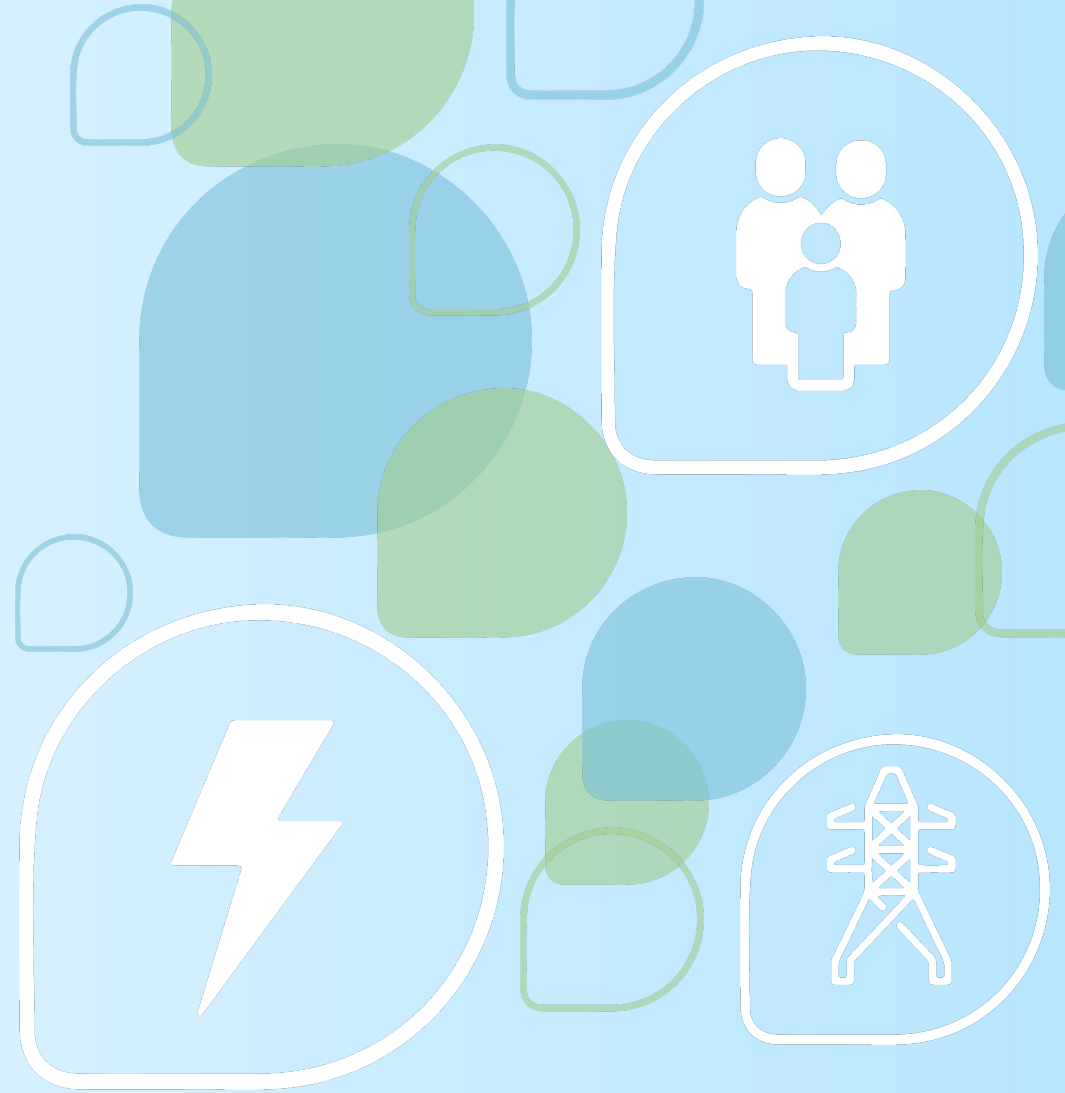


Smart Readiness Indicator (SRI)

Training session for
LIFE and HORIZON projects



Disclaimer

- This document is provided by the SRI support team, comprised of [VITO](#) (Belgium), Waide Strategic Efficiency Europe (Ireland), [Research to Market \(R2M\) Solution](#) (France) and [LIST](#), the Luxembourg Institute of Science and Technology. The SRI support team has been awarded a two-year service contract by the European Commission in order to provide technical assistance to the European Commission services and to Member States in the first phases of the testing and implementation of the SRI.



- This document has been prepared for the European Commission; however, it reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Opening words

Sylvain Robert, CINEA



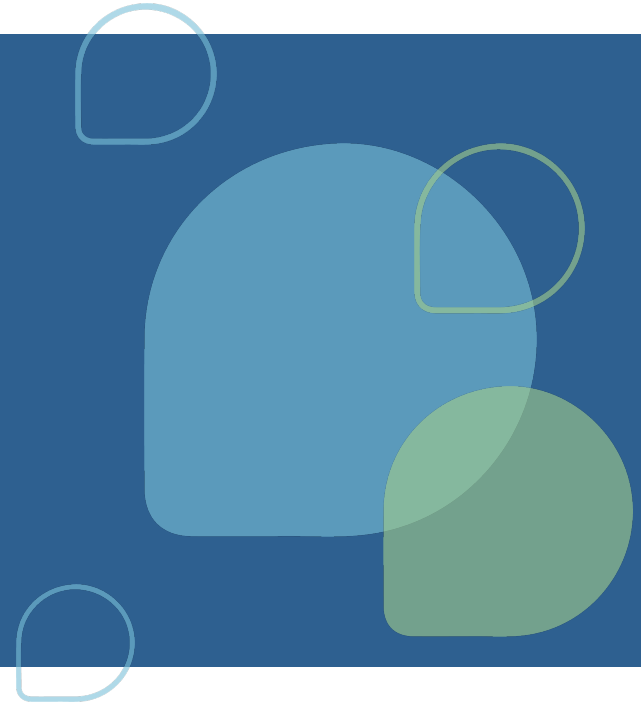


Agenda

10:05	Introduction to the SRI framework	Paul Waide
10:15	Overview of the SRI scoring methodology	Sophie Dourlens-Quaranta
10:20	Overview of existing SRI calculation digital tools	Régis Decorme
10:25	Illustration of the SRI with two practical examples	Sylvain Kubicki
<i>10:40</i>	<i>Q&A session</i>	<i>Moderated by Régis Decorme</i>
10:50	SRI assessment package: users' feedback	Sophie Dourlens-Quaranta, Jan Verheyen
11:10	How to assess the smart readiness of a building: live demo	Yixiao Ma
11:40	Tips & tricks, frequently asked questions	Sophie Dourlens-Quaranta
<i>11:50</i>	<i>Q&A session</i>	<i>Moderated by Régis Decorme</i>

Introduction to the SRI framework

Difference between the legal (binding) framework and the technical (non-binding) framework

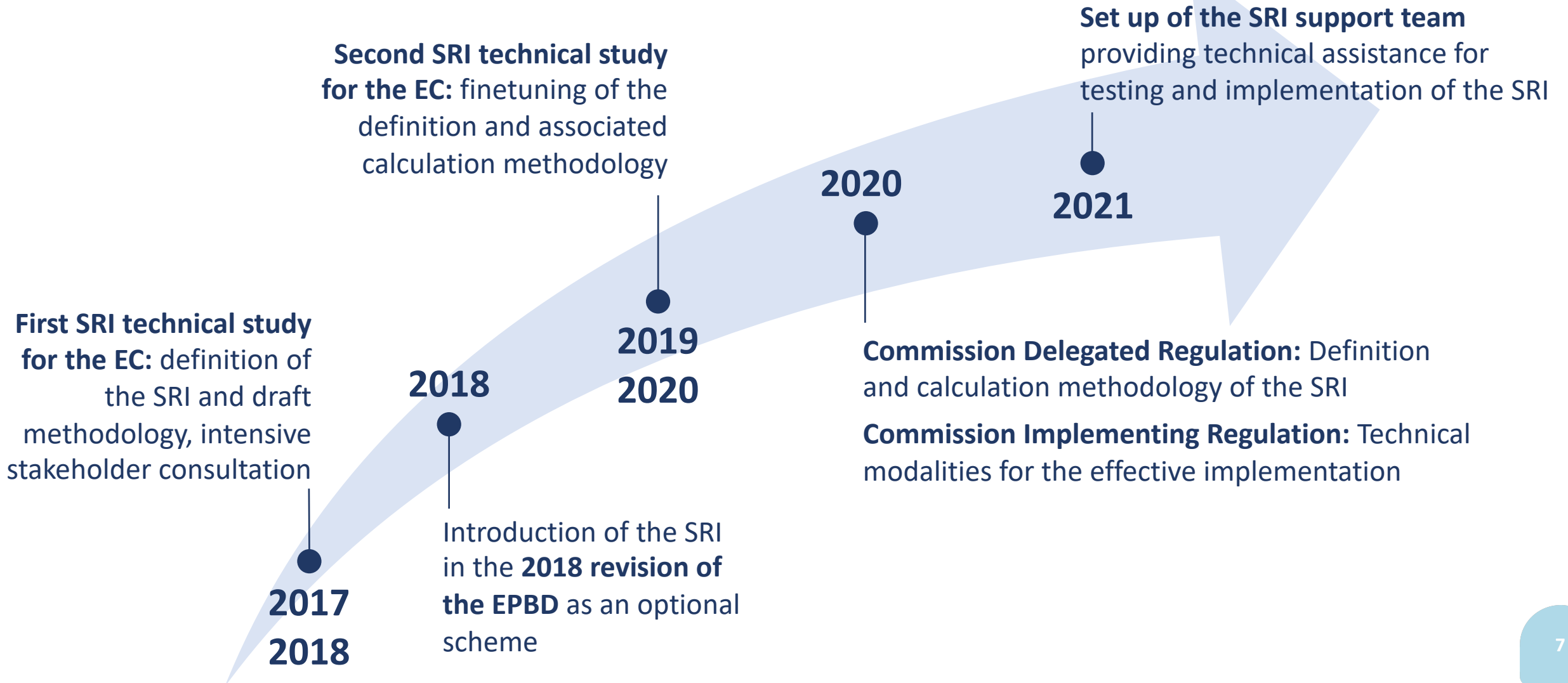




Introduction to the SRI framework

- With the [European Green Deal](#) and the [Renovation Wave](#), the European Union promotes the renovation of buildings, to help people cut their energy bills and energy use
- The [2018 revision of the European Energy Performance of Buildings Directive \(EPBD\)](#) heavily emphasised the potential of smart technologies in the building sector, to improve both energy efficiency and the well-being of people
- EPBD thus introduced the concept of a **“Smart Readiness Indicator” (SRI): a common EU framework for rating the smart readiness of buildings**
- The SRI concept has then been developed in close cooperation with Member States and relevant stakeholders of the building value chain
- Member States are now officially invited to voluntarily implement the SRI (with optionally, a preliminary test phase)

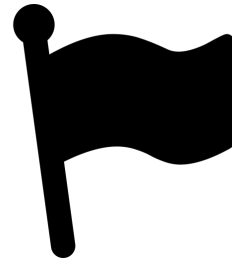
History of the SRI



Present situation

Launch of test phases
by voluntary
countries

2022



**The decision to launch a
test phase or implement
the SRI belongs to EU
Member States**

Only where a government decides
to do so, can formal SRI
assessments be conducted



Private or research stakeholders
not involved in official
implementation or test phases are
welcome to participate in
discussions and to conduct
informal SRI-related activities

However, no formal SRI
certifications can be issued without
prior Member State agreement

The ongoing test phases

Six countries volunteered:



Austria



Czech Republic



Croatia



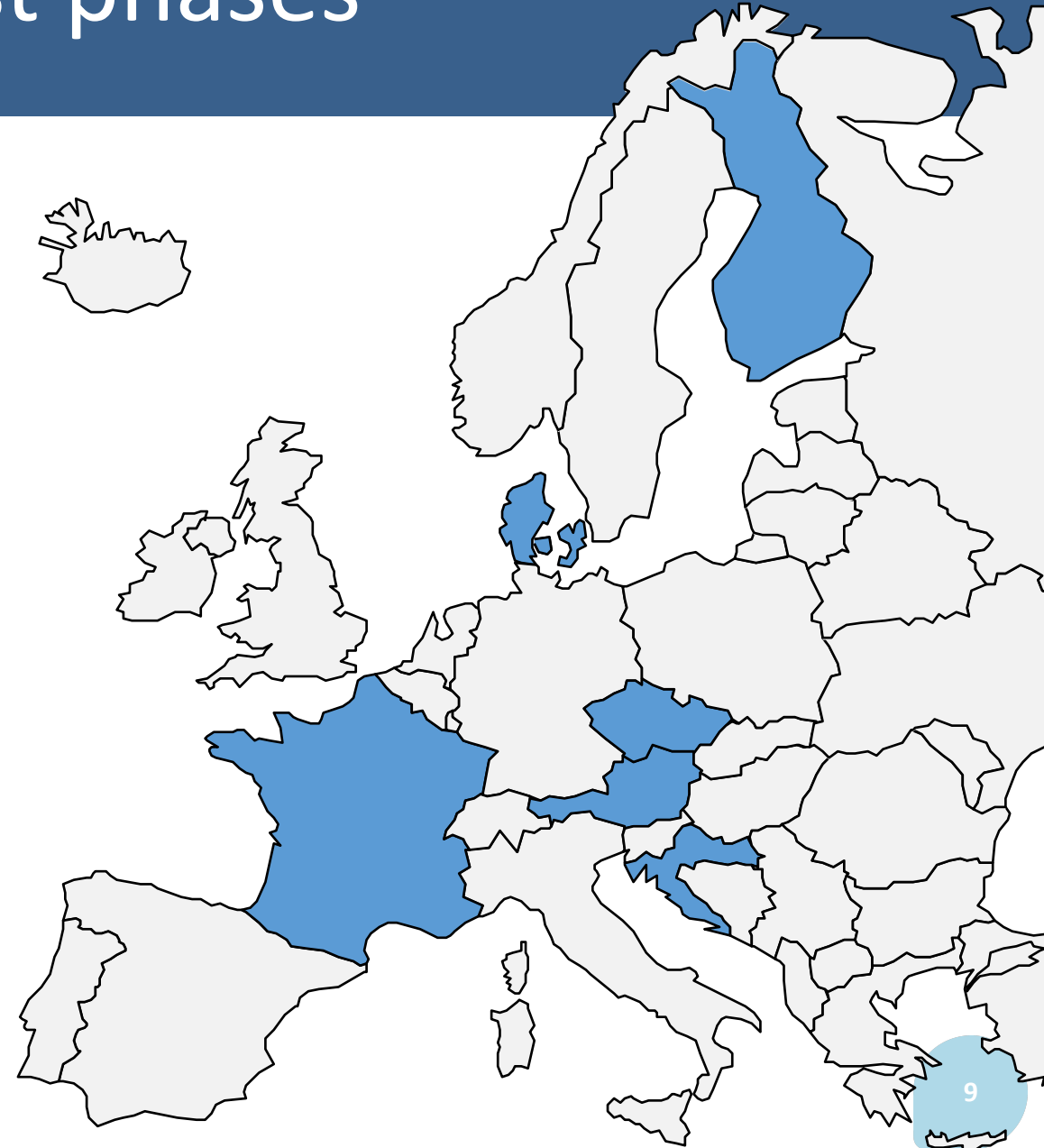
Denmark



Finland




France





Required and optional features of the SRI at national level



**CORE OF THE SRI
METHODOLOGY -
REQUIRED**

Required and optional features of the SRI at national level



1

Optimise energy efficiency and overall in-use performance



2

Adapt their operation to the needs of the occupant



3

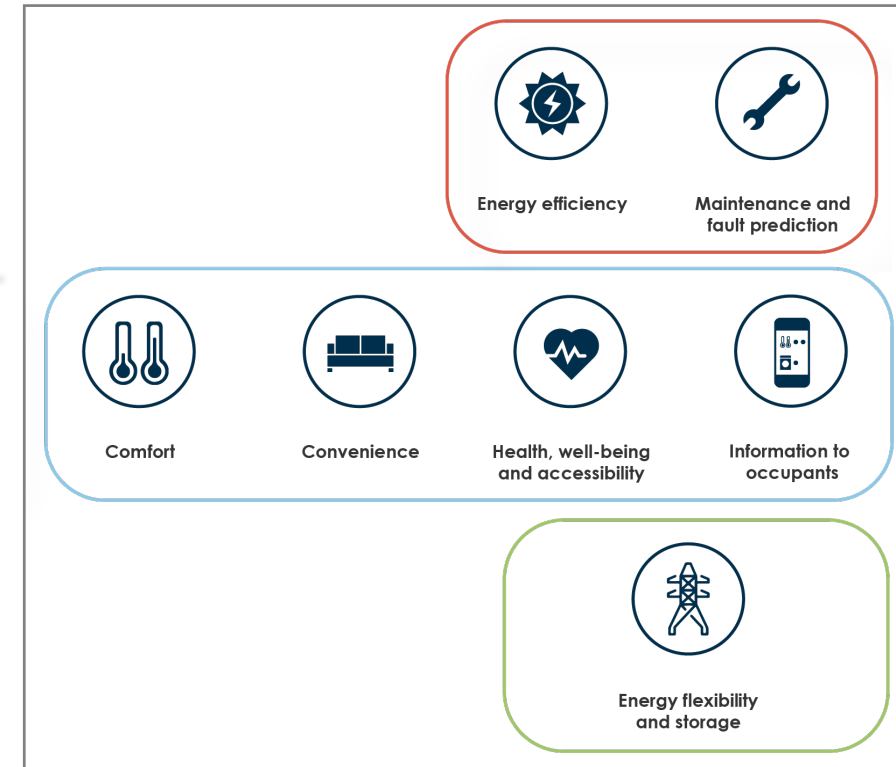
Adapt to signals from the grid (energy flexibility)

3 key functionalities

**CORE OF THE SRI
METHODOLOGY -
REQUIRED**

Required and optional features of the SRI at national level

3 key functionalities
7 impact criteria
**CORE OF THE SRI
METHODOLOGY -
REQUIRED**



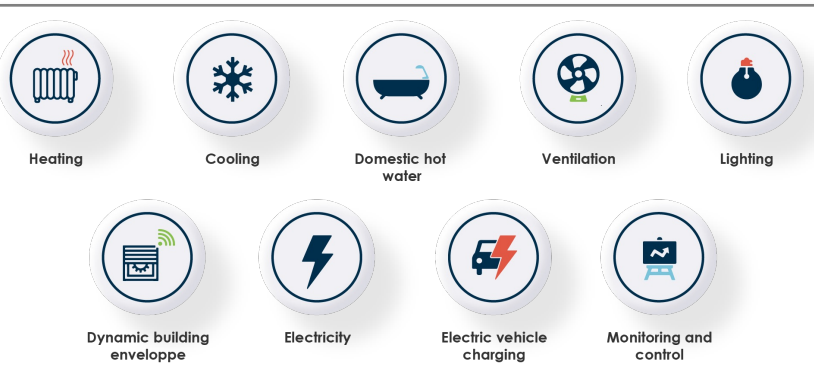
Required and optional features of the SRI at national level

3 key functionalities

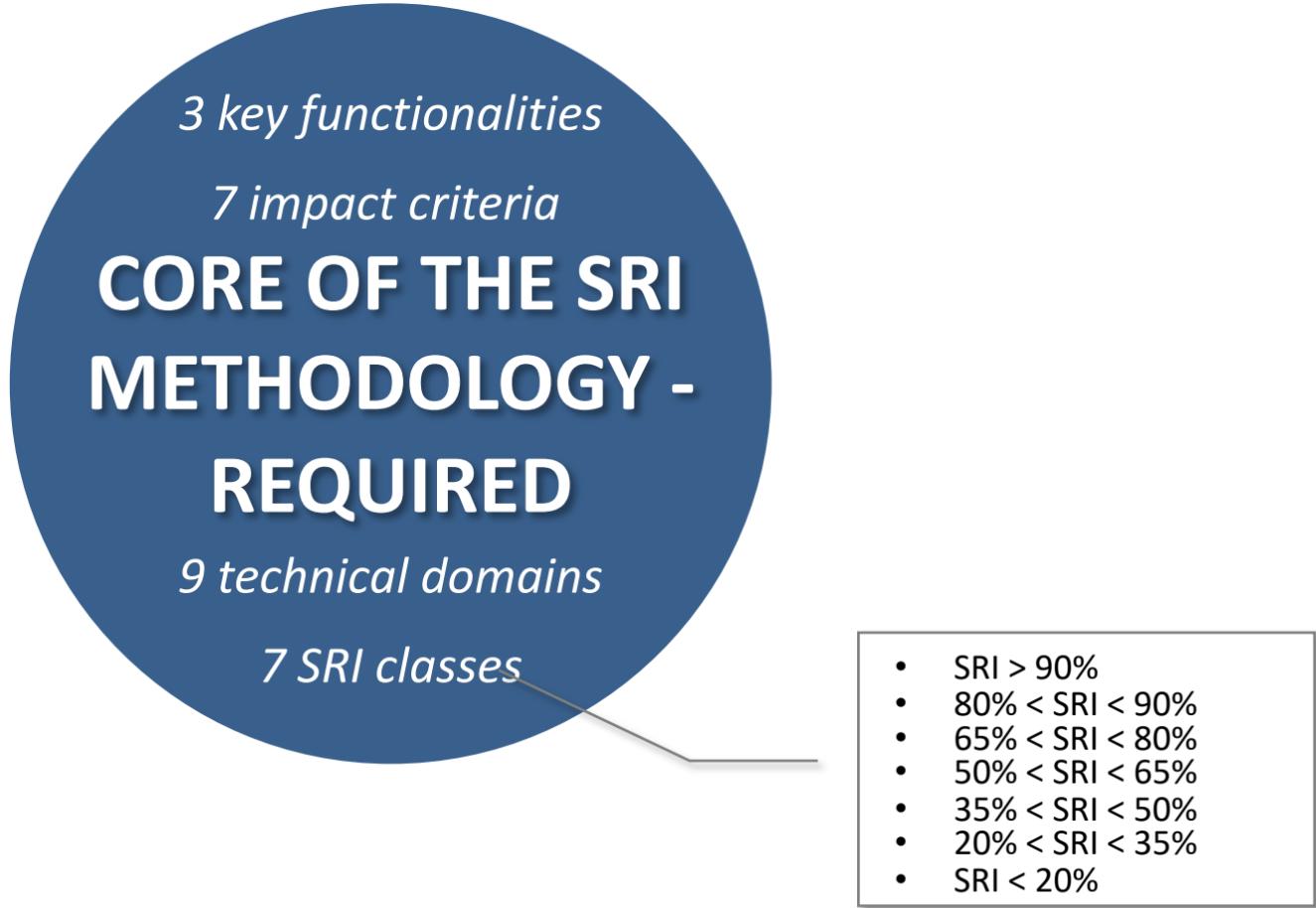
7 impact criteria

CORE OF THE SRI METHODOLOGY - REQUIRED

9 technical domains



Required and optional features of the SRI at national level



3 key functionalities

7 impact criteria

**CORE OF THE SRI
METHODOLOGY -
REQUIRED**

9 technical domains

7 SRI classes

- SRI > 90%
- 80% < SRI < 90%
- 65% < SRI < 80%
- 50% < SRI < 65%
- 35% < SRI < 50%
- 20% < SRI < 35%
- SRI < 20%



Required and optional features of the SRI at national level

3 key functionalities

7 impact criteria

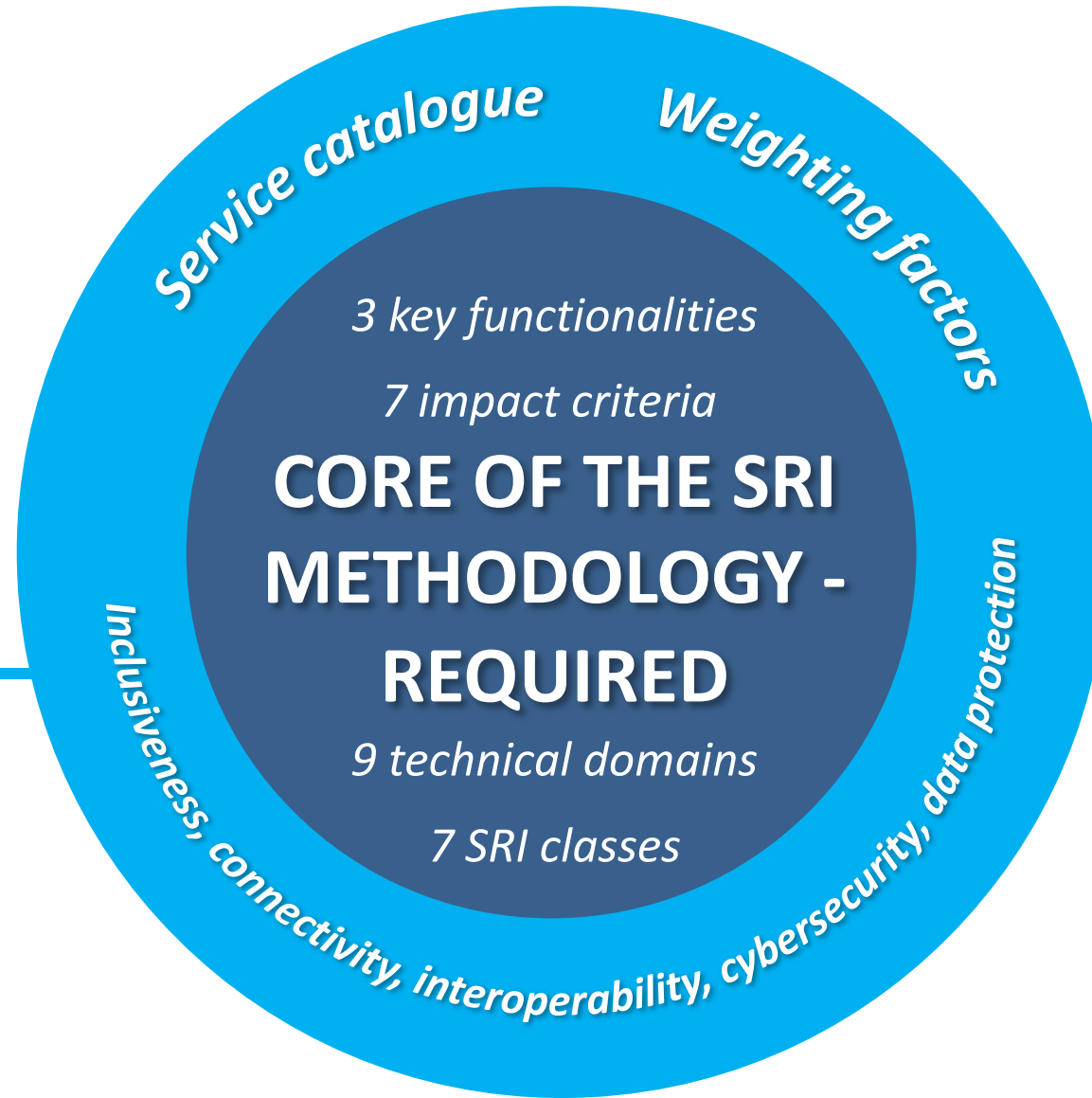
CORE OF THE SRI METHODOLOGY - REQUIRED

9 technical domains

7 SRI classes

Required and optional features of the SRI at national level

Potential
contextual
adaptations



SRI certificates

TESTING

of the SRI framework



According to the [Commission Implementing Regulation \(EU\) 2020/2156](#), all arrangements of the national test phases shall be defined by Member States, including the decision on whether certificates are issued during the test phase.

IMPLEMENTATION

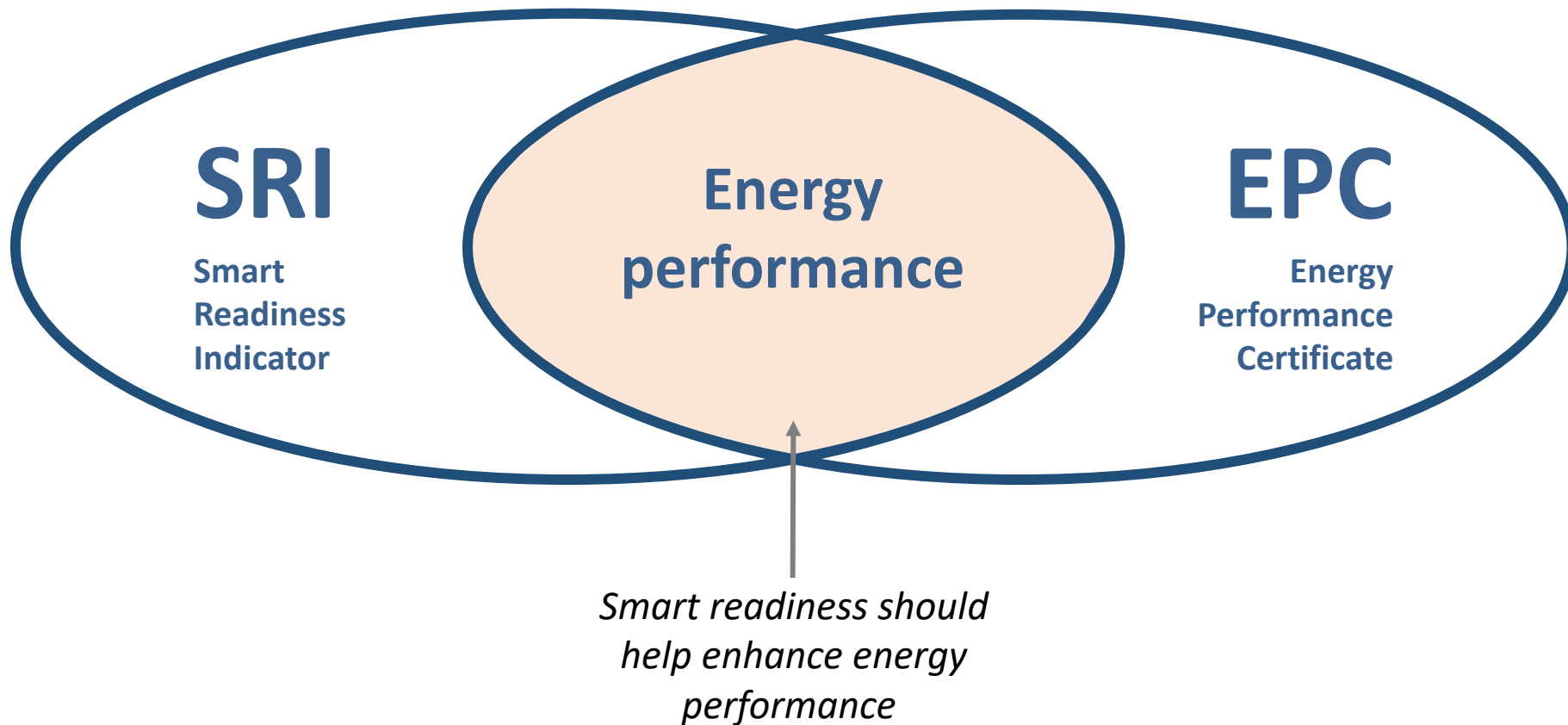
of the SRI framework



The [Commission Delegated Regulation \(EU\) 2020/2155](#) requires that SRI certificates are issued by qualified or accredited experts and details the information to be included in the certificates.

- SRI certificates can be delivered only by organisations endorsed by a Member State
- In other cases (research projects, private initiatives), the word “certificate” should not be used

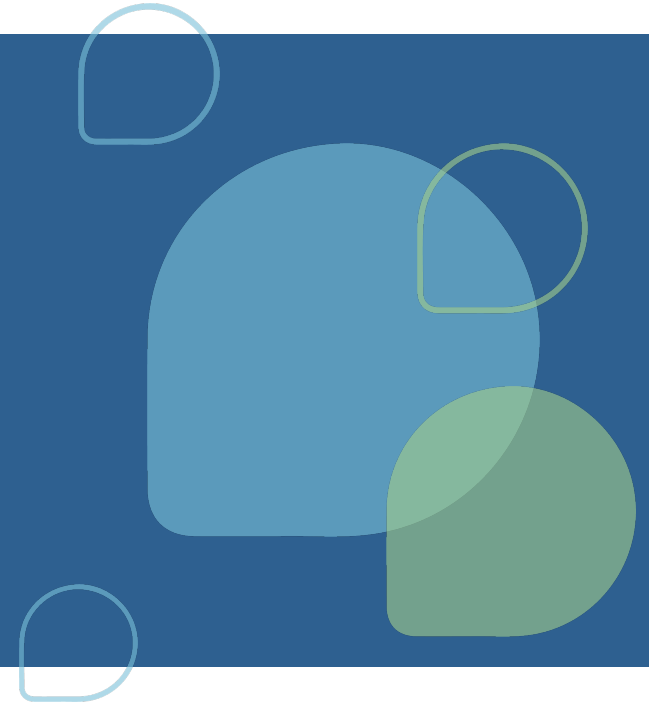
SRI vs EPC



- Experts in charge of issuing EPCs are also competent for issuing SRI certificates
- Member States may couple the issuing of the SRI certificate with their EPC scheme

Overview of the SRI scoring methodology

Review of available training material



Functioning of the scoring methodology

















	<i>From non-smart...</i>			<i>... to a maximum smartness</i>	
	Level 0	Level 1	Level 2	Level 3	Level 4
Service A					
Service B					
Service C					
Service D					
...					

*Attribution of scores to each impact criterion
with some weightings factors*

**Detailed and aggregated values of the SRI
and SRI class**

















Scores calculated at different levels

The assessment provides detailed scores by domain and impact criterion (up to 57 scores)...

	 Energy efficiency	 Maintenance and fault prediction	 Comfort	 Convenience	 Health, well-being and accessibility	 Information to occupants	 Energy flexibility and storage
 Heating	%	%	%	%	%	%	%
 Cooling	%	%	%	%	%	%	%
 Domestic hot water	%	%	%	%	%	%	%
 Ventilation	%	%	%	%	%	%	%
 Lighting	%	%	%	%	%	%	%
 Dynamic building envelope	%	%	%	%	%	%	%
 Electricity	%	%				%	%
 Electric vehicle charging		%		%		%	%
 Monitoring and control	%	%	%	%	%	%	%

















Scores calculated at different levels

... but also aggregate scores for each of the nine technical domains...




















	 Energy efficiency	 Maintenance and fault prediction	 Comfort	 Convenience	 Health, well-being and accessibility	 Information to occupants	 Energy flexibility and storage	
 Heating	%	%	%	%	%	%	%	%
 Cooling	%	%	%	%	%	%	%	%
 Domestic hot water	%	%	%	%	%	%	%	%
 Ventilation	%	%	%	%	%	%	%	%
 Lighting	%	%	%	%	%	%	%	%
 Dynamic building envelope	%	%	%	%	%	%	%	%
 Electricity	%	%				%	%	%
 Electric vehicle charging		%		%		%	%	%
 Monitoring and control	%	%	%	%	%	%	%	%

Scores calculated at different levels

... aggregate scores for each of the seven impact criteria...











		%	%	%	%	%	%	%
		 Energy efficiency	 Maintenance and fault prediction	 Comfort	 Convenience	 Health, well-being and accessibility	 Information to occupants	 Energy flexibility and storage
 Heating		%	%	%	%	%	%	%
 Cooling		%	%	%	%	%	%	%
 Domestic hot water		%	%	%	%	%	%	%
 Ventilation		%	%	%	%	%	%	%
 Lighting		%	%	%	%	%	%	%
 Dynamic building envelope		%	%	%	%	%	%	%
 Electricity		%	%				%	%
 Electric vehicle charging			%		%		%	%
 Monitoring and control		%	%	%	%	%	%	%

Scores calculated at different levels

	%		%				%	
	 Optimise energy efficiency and overall in-use performance 1		 Adapt its operation to the needs of the occupant 2				 Adapt to signals from the grid (energy flexibility) 3	
	%	%	%	%	%	%	%	
	 Energy efficiency	 Maintenance and fault prediction	 Comfort	 Convenience	 Health, well-being and accessibility	 Information to occupants	 Energy flexibility and storage	
 Heating	%	%	%	%	%	%	%	%
 Cooling	%	%	%	%	%	%	%	%
 Domestic hot water	%	%	%	%	%	%	%	%
 Ventilation	%	%	%	%	%	%	%	%
 Lighting	%	%	%	%	%	%	%	%
 Dynamic building envelope	%	%	%	%	%	%	%	%
 Electricity	%	%				%	%	%
 Electric vehicle charging		%		%		%	%	%
 Monitoring and control	%	%	%	%	%	%	%	%

... aggregate scores for each of the three key functionalities...

Scores calculated at different levels

Overall SRI score (%) + SRI class							
%		%				%	
<div><div>1</div>Optimise energy efficiency and overall in-use performance</div>		<div><div>2</div>Adapt its operation to the needs of the occupant</div>				<div><div>3</div>Adapt to signals from the grid (energy flexibility)</div>	
%	%	%	%	%	%	%	
<div><div>Energy efficiency</div></div>	<div><div>Maintenance and fault prediction</div></div>	<div><div>Comfort</div></div>	<div><div>Convenience</div></div>	<div><div>Health, well-being and accessibility</div></div>	<div><div>Information to occupants</div></div>	<div><div>Energy flexibility and storage</div></div>	
%	%	%	%	%	%	%	
%	%	%	%	%	%	%	
%	%	%	%	%	%	%	
%	%	%	%	%	%	%	
%	%	%	%	%	%	%	
%	%	%	%	%	%	%	
%	%				%	%	
	%		%		%	%	
%	%	%	%	%	%	%	

... and the overall SRI score together with the corresponding SRI class (seven classes, from SRI < 20% to SRI > 90%)



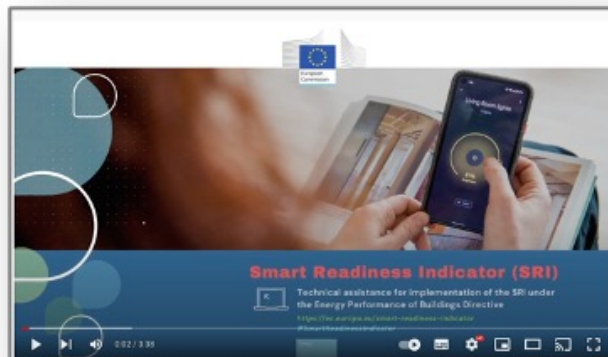
Available training material

- In English:
 - [Full training slide deck](#)
 - [Shorter version](#) & [Video](#)
- In German:
 - [Full training slide deck](#)
- In French: [Information related to the ongoing test phase](#)
- Material provided by the SmartBuilt4EU project:
 - In French: [Slides](#) [Video](#)
 - In Italian: [Slides](#) [Video](#)
 - In Spanish: [Slides](#) [Video](#)

Available communication material

● To start:

[Introductory video](#)

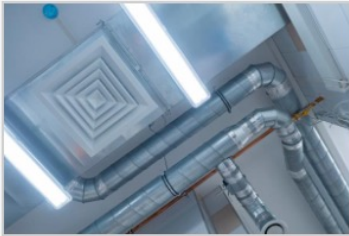


[Introductory brochure](#)



Available communication material

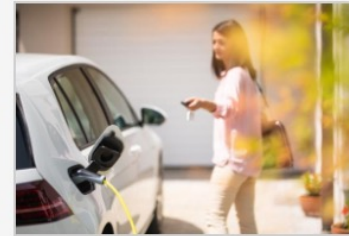
● Factsheets to go deeper:



**A focus on
ventilation
systems (June
2022)**



**A focus on
lighting
systems
(August 2022)**



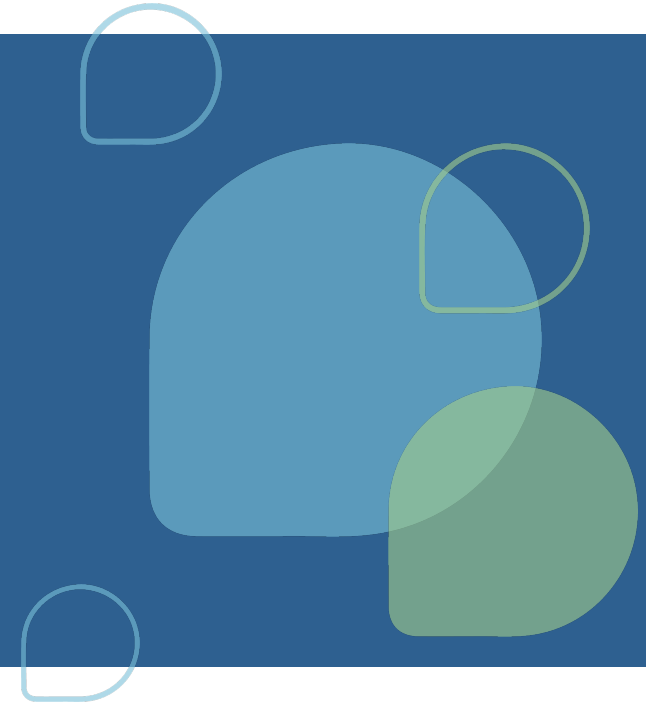
**A focus on
electric vehicle
charging
systems
(October 2022)**



**A focus on
heating system
(December
2022)**

More factsheets will be uploaded soon!

Overview of existing SRI calculation digital tools


















Overview of existing SRI calculation digital tools

- **Online spreadsheet template** circulated by the SRI support team to characterise existing SRI calculation digital tools
- **13 organisations / projects already contacted:** *EPB Center / U-CERT, SRI2MARKET, crossCERT, TIMEPAC, CollectIEF, EUB SuperHub, IsZEB / D^2EPC / EasySRI, SMART2B, EPC-RECAST, Euphyia / SMART²*
- **5 tools already described**
- Non-confidential information about these tools will be made available on the EC SRI website

Overview of existing SRI calculation digital tools

Smart-Ready-Go! ®	Smart performance assessment & Advisor (SPA&A)	Building Performance Module-SRI Calculation Subcomponent	Smart Readiness Indicator (SRI) digital tool	SRI2MARKET platform
 	  	 	  	  

Smart-Ready-Go!®

● Short description:

- Smart-Ready-Go!@ allows **self and on-line assessment** of building units, in compliance with Method A and Method B of the SRI Methodology.
- A cloud-based tool which aspires to become an established application for the assessment of the smartness of buildings.
- Numerous elements of innovation, including the **ability to extract building systems related information from IFC documents**, as well as features to **inform users on a real time basis** on the actual smartness performance of the building unit, and informed recommendations on improving the smartness performance, based on a cost-optimal approach, in compliance with existing CEN standardised methods.

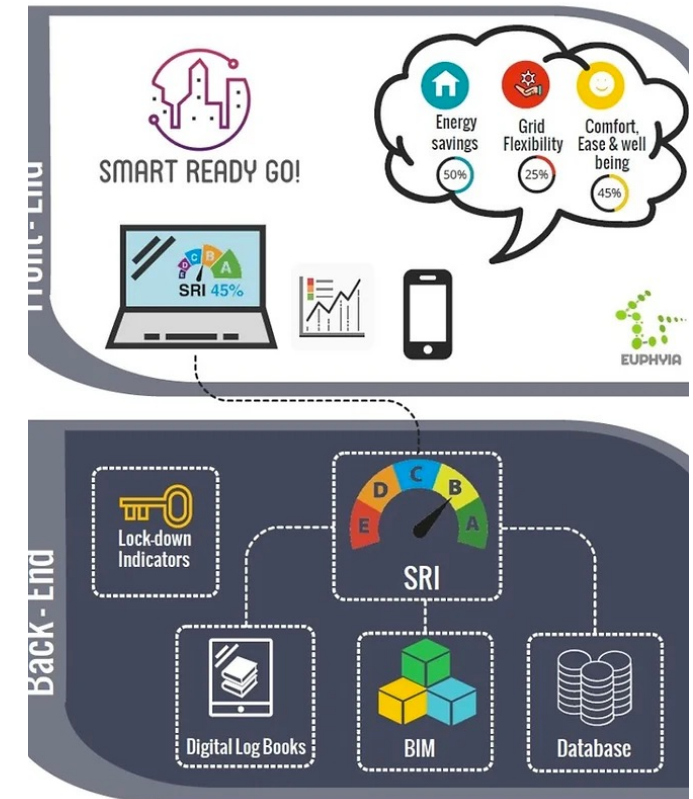
● **Targeted users:** Assessors, building owners, facility managers, building occupants, public authorities

● **Type of tool:** online

● **Languages supported:** currently English. Target: all 24 EU languages

● **Current technology readiness level:** TRL7

● **Envisaged exploitation model:** Commercial and open source





Smart performance assessment & Advisor (SPA&A)

● **Short description:**

SPA&A will provide building users with data-driven insights about the current smartness of the building, suggest improvement actions to increase the upgrading of the building in line with the SRI definition, and show their economic and environmental impacts. Five main functionalities:

- 1. A **fully automated data-driven dynamic self-assessment** of actual building smartness performance according to the principles of the SRI. Through the post-processing of the monitored data, the functionality levels of various smart ready services are considered, in line with the definition of the three SRI key functionalities.
- 2. Generation of **suggested actions to improve the smartness performance** of the building in line with the three SRI key functionalities.
- 3. Determination of **economic and environmental impacts** of suggested smartness performance improvements.
- 4. Implementation of services within an integrated framework including a data platform and an application with **graphical user interfaces** to provide easy access to the above-mentioned information for the building users.
- 5. **Interactive communication stimulating awareness raising, activation of user engagement** in the building smart performance and instigation of building user behaviour change in relation to the building smartness performance.

● **Targeted users:** Building owners; Facility managers; Building occupants

● **Type of tool:** online

● **Languages supported:** English, Portuguese, Spanish, German

● **Current technology readiness level:** TRL7

● **Envisaged exploitation model:** Commercial



Building Performance Module

SRI Calculation Subcomponent

● **Short description:**

- The D^2EPC Building Performance Module facilitates the calculation of 4 sets of indicators related to the building's smart-readiness, indoor environment, environmental and financial performance. It provides end-users with a better informed holistic set of static and dynamic indicators on their asset's energy performance.
- The online SRI calculation service is a dedicated sub-module, which integrates the concept of smart-readiness in the broader domain of EPCs. In this way, the end-user can have a clearer view of how that asset's smartness level relates to the rest of the energy and non-energy aspects of the building's operation and lifecycle.
- For SRI calculation, method B has been chosen to deliver a more detailed representation of the building's technical infrastructure.
- Ability to extract information from existing BIM files to shorten and simplify the building documentation process. Moreover, dedicated APIs can provide third-party access to the tool's calculation services.

● **Targeted users:** Assessors ; Building owners ; Facility managers; Building occupants

● **Type of tool:** online

● **Languages supported:** English


● **Current technology readiness level:** TRL7

● **Envisaged exploitation model:** Not decided yet



- U-CERT SRI digital tool brings the official SRI assessment spreadsheet in a [cloud web environment offering improved user-experience](#) both on the data input side (for SRI assessors) and on the results interactive visualization side (for decision-makers).
- Enhanced by a subscription based integrated service which will include [training](#) (and certification) [process for SRI assessors](#) via a Learning Management System and support. All SRI assessment data currently stored in datafiles on the computer of the user. These can be used in another U-CERT tool to generate a [combined EPC-label including the assessed SRI](#).
- In a next version (expected in 2024), data will be stored in a secure and GDPR compliant cloud repository with different data depth access rights (e.g. aggregated data <-> detailed SRI assessment data) depending on the user type. This will make possible the implementation of the «input data only once» principle and catalyze the integration of all building performance related instruments (Digital Building Logbooks, EPCertificates, Building Renovation Passports, Level(s) etc.)





OVERZICHT

Building information

Assessor information

General building information

Methodology

Assessment date

Domains

User defined weightings

Results

Smart Readiness Indicator

ASSESSOR INFORMATION

Assessor information

Name

Organisation

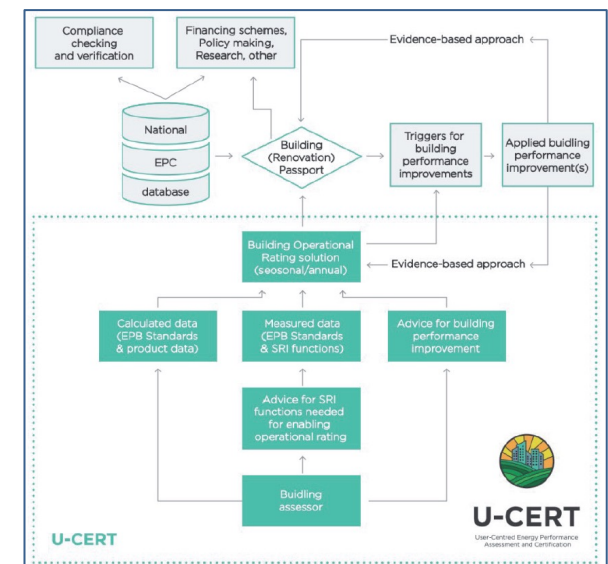
Contact information

E-mail address

Telephone number (optional)

< VORIGE

VOLGENDE >





SRI2MARKET platform

● **Short description:**

The SRI2MARKET platform is a **multilingual web-based platform** under development, following the SRI methodology provided at the EU level. It will feature:

- **Easy customisation** to national languages, national adaptations of the SRI calculation and relevant technologies.
- **User-friendly interface** open allowing users to conduct SRI assessments and save them under a pre- registered user account.
- **Sections with recommendations** based on smart and novel technologies, and EPC relevant information to carry out a cross analysis for each assessment object.
- **Functionality to dynamically create scorecards** according to pre-defined filters (e.g. filters that specifically highlight load flexibility capabilities or filters that highlight HVAC adaptability to internal or external conditions).
- **e-learning lessons** on SRI and its assessment methodology in multiple languages.

● **Targeted users:** Assessors, Building owners, Facility managers

● **Type of tool:** online

● **Languages supported:** Expected: English, French, Spanish, Greek, Portuguese, German, Croatian

● **Current technology readiness level:** N.A.

● **Envisaged exploitation model:** Not decided yet

Overview of existing SRI calculation digital tools

- **Are you aware of additional initiatives ?**
- Then send us an email at:
support@smartreadinessindicator.eu
- You will receive the online spreadsheet template to complete



Illustration of the SRI with two practical examples



SRI : NON-RESIDENTIAL EXAMPLE

Evaluating the Smart Readiness Indicator - the Neobuild building

Sylvain Kubicki, LIST

19/01/2023

SRI : NEOBUILD BUILDING

01 Description

02 Appying the SRI

03 Potential improvements

04 Conclusions

CONTEXT

About the NeoBuild building

Located in Bettembourg (Luxembourg), this office building hosts several startups and allows testing novel technologies, materials and building components.

Energy profile

- EPC class A
- Heat pumps (ground to water & air to air)
- Solar panels (thermal & PV) cover the roof and several sides
- Energy storage on site
- No active cooling

Specificities

- Pilot project for environmental performance and renewable energy production.
- Several experimental technologies are installed

Important points	
Typology	Offices & test spaces
Year of construction	2014
Net surface	≈ 2200 m ²
Occupancy	Variable, depends on tests



CONDUCTING SRI : NON-RESIDENTIAL → METHOD B

Method A (simplified)

**Catalogue of simplified services:
27 services to evaluate**

For basic buildings

A 'check-list' approach

Duration of evaluation < 4 hours

Method B (detailed)

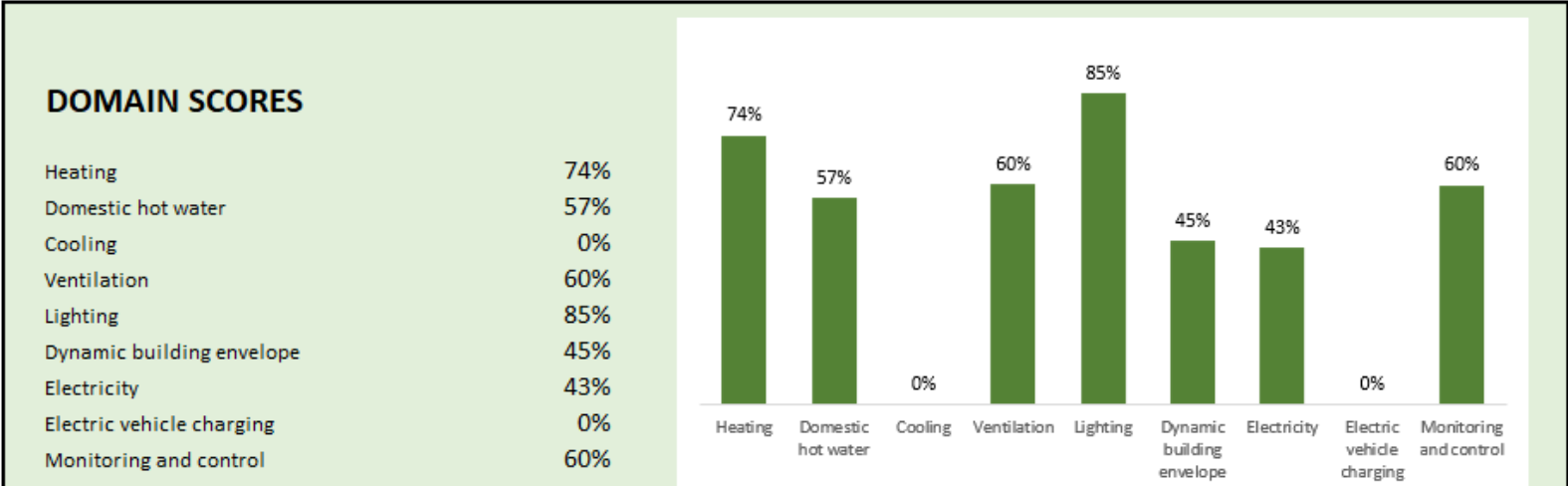
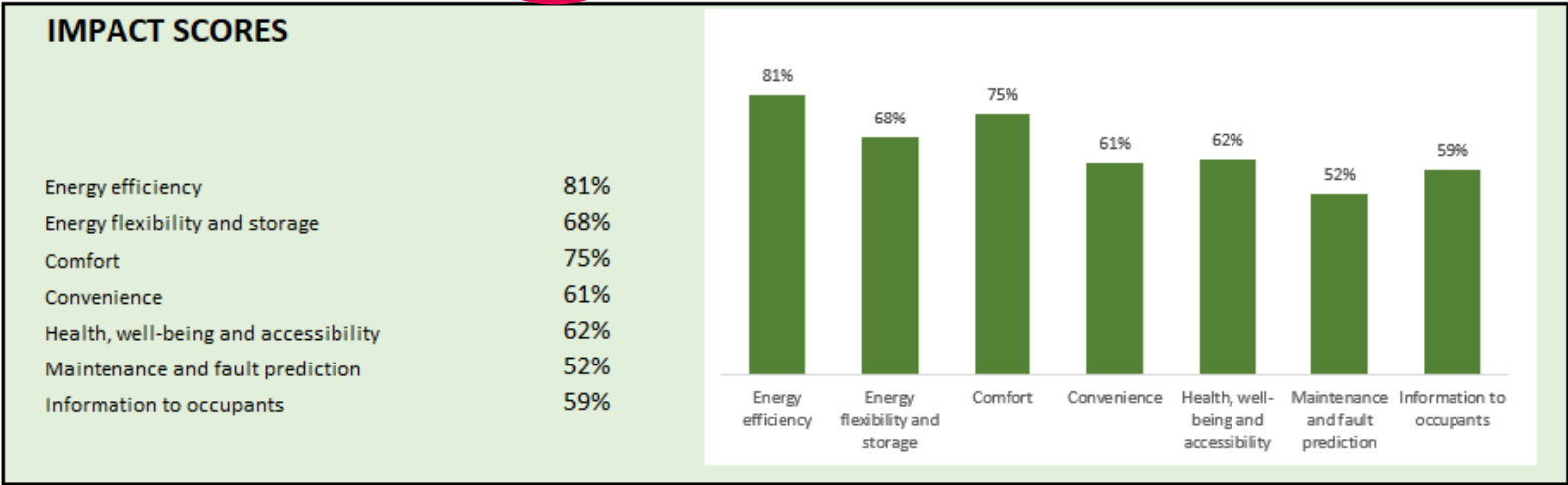
- Complete Catalogue of detailed services : 54 services to evaluate
- For complex buildings
- Site visit necessary
- Duration of evaluation < 1 day

The evaluation process is the same for both methods. For each service, the evaluator is investigating the level of functionalities of the building.

SRI RESULTS: NON-RESIDENTIAL BUILDING






9 technical domains 7 impact criteria

TOTAL SRI SCORE	67%	SRI CLASS	C
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FOCUSING ON ONE CRITERION

DE-4 Reporting information regarding performance of dynamic building envelope systems

Functionality level 0 (as non-smart default)	Functionality level 1	Functionality level 2	Functionality level 3	Functionality level 4
				
No reporting	Position of each product & fault detection	Position of each product, fault detection & predictive maintenance	Position of each product, fault detection, predictive maintenance, real-time sensor data (wind, lux, temperature...)	Position of each product, fault detection, predictive maintenance, real-time & historical sensor data (wind, lux, temperature...)



Station météo.

Température du vent : 1.4 °C

Direction vent : 129.3 °

Vitesse vent : 0.7 m/s

Humidité relative : 88.2 %

Précipitations : 0.0 mm

Précipitations moy. Jour : 71.8 mm/j

Température acoustique : 0.9 °C

Luminosité Nord : 1989.0 lux

Luminosité Est : 1905.0 lux


Luminosité Sud : 1874.0 lux

Luminosité Ouest : 1947.0 lux

Pression absolue : 98316.0 hPa

Pression relative : 101691.0 hPa

Point de rosée : 1.4 °C

Précipitation active (éteint = non) : 

Type de précipitation : 40

40 = aucune

51 = Bruine faible ; 53 = Bruine modérée ; 55 = Bruine forte

61 = Pluie faible ; 62 = Pluie modérée ; 63 = Pluie forte

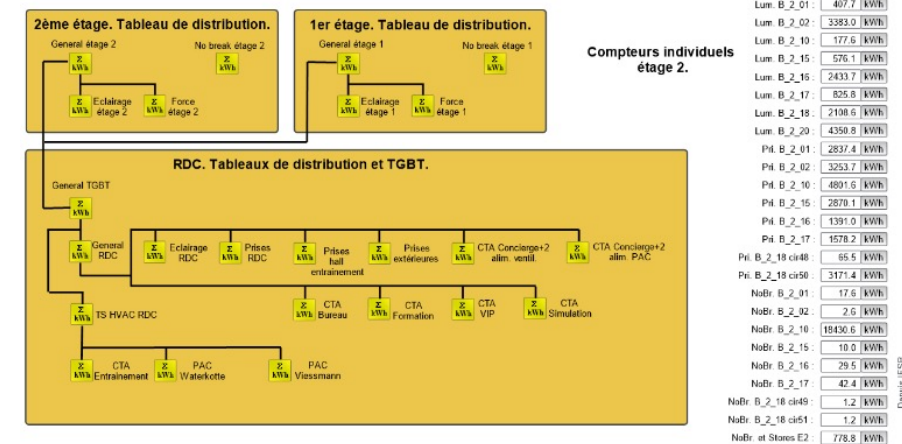
67 = Pluie+neige faible ; 68 = Pluie+neige modérée

71 = Neige faible ; 72 = Neige modérée ; 73 = Neige forte

74 = Grêle ; 89 = Grêle forte

ASPECTS POSITIVELY IMPACTING THE EVALUATION

- Heating control by space/room
- Variable velocity circulation pump and smart control
- Predictive control of hot water storage (for heating)
- Smart DHW management in conjunction with renewable energy generation (depends on supply/demand)
- Air quality indicators per zone/space/room
- Lighting – smart actuation with presence sensors
- Smart blinds system management and fault detection
- Smart electric energy storage and optimisation of self-consumption
- PV production
- Energy reporting via a common application or repository for the other involved (smart) systems
- Single platform for smart management of HVAC, blinds and lighting



IMPROVEMENT POTENTIAL

1) Smart grid implementation: building systems responding to electric grid signal

Advised actions

1) Involvement of the DSO and configuration of systems

1) 67% → 81% Class C → B

2) Predictive management & occupant feedback for the following systems: blinds, heating, domestic hot water, ventilation and battery charging. Smart control depending on occupancy and weather conditions

2) Data analysis and prediction models to develop and deploy

3) Intelligent charging stations on at least 10% of parking spaces (user indication of charge and control at vehicle level)

3) Installation of a sufficient number of adequate EV charging stations

1) + 2) + 3) 81% → 91% Class B → A

SRI : RESIDENTIAL EXAMPLE

Evaluating the Smart Readiness Indicator - the Elmen building

Sylvain Kubicki, LIST

19/01/2023



LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY



SRI : ELMEN BUILDING

01 Description

02 Appying the SRI

03 Potential improvements

04 Conclusions

CONTEXT

Elmen Social housing in Olm

Demo house within a neighbourhood of 700 planned houses. The Elmen project aims to become a model of sustainable construction in Luxembourg.

Energy profile

- EPC class B
- Heating, cooling, ventilation and domestic hot water managed by a 4-in-1 heat pump
- Heating mainly via ventilation
- Electric floor heating system if needed
- PV solar panels system and Li-Ion batteries

Specificities

- Pilot project for energy community
- Energy monitoring ongoing under EPC RECAST project

Important points	
Typology	2 family houses
Year of construction	2020
Net surface	≈ 200 m ²
Occupancy	Partial : real-estate agents office



CONDUCTING SRI : RESIDENTIAL → METHOD A

Method A (simplified)

Catalogue of simplified services:
27 services to evaluate

For basic buildings

A 'check-list' approach

Duration of evaluation < 4 hours

Method B (detailed)

- Complete Catalogue of detailed services : 54 services to evaluate
- For complex buildings
- Site visit necessary
- Duration of evaluation < 1 day

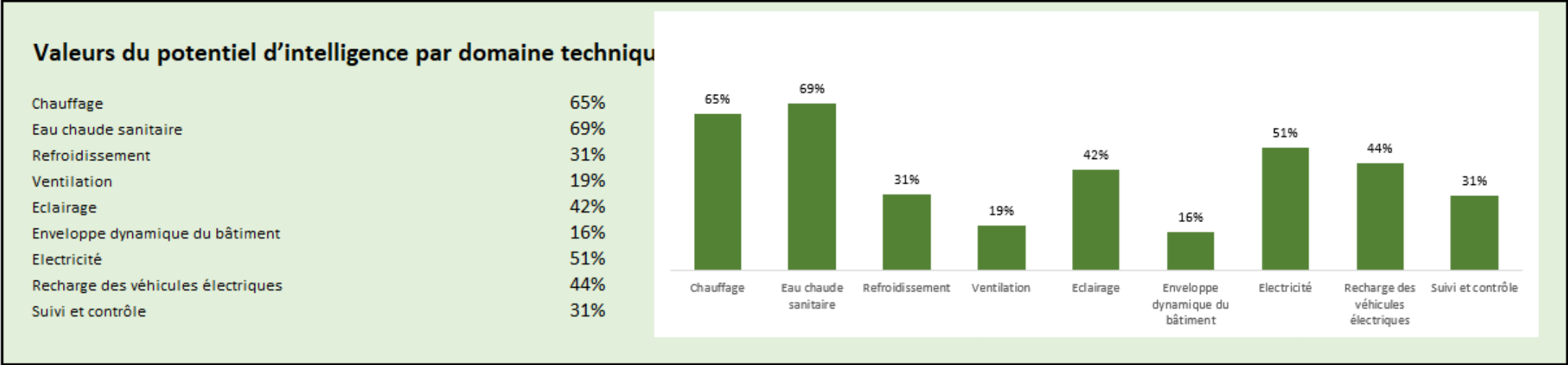
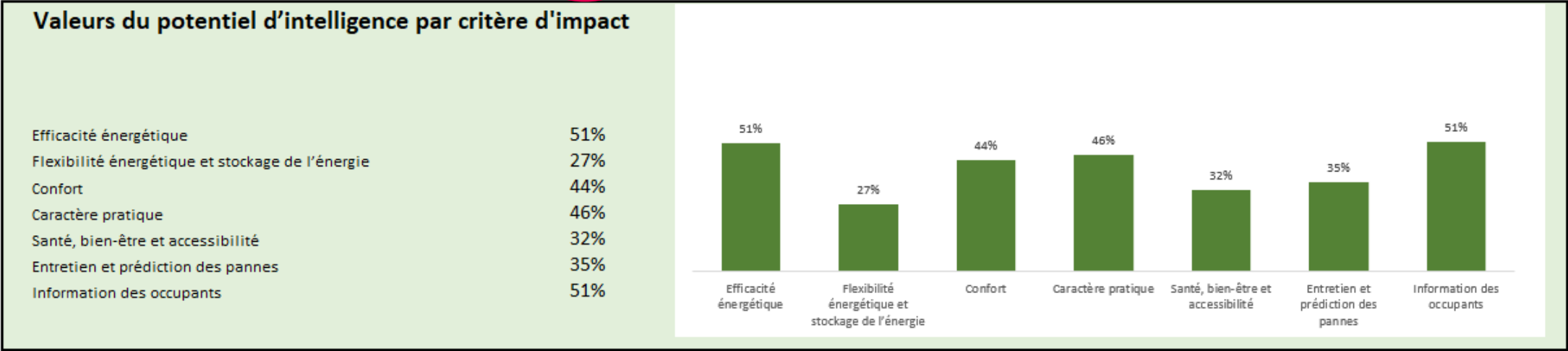
The evaluation process is the same for both methods. For each service, the evaluator is investigating the level of functionalities of the building.

SRI RESULT : RESIDENTIAL BUILDING

7 impact criteria

9 technical domains

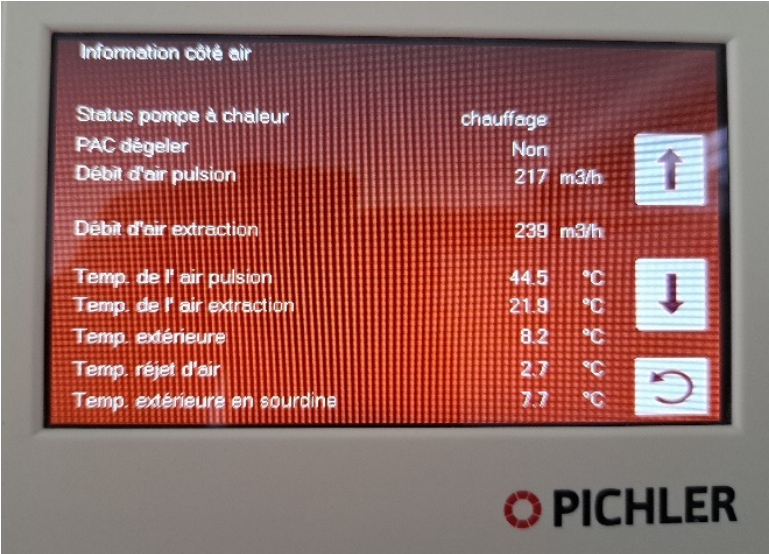
Valeur totale du potentiel d'intelligence	40%	Classe du potentiel d'intelligence	E
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FOCUS ON ONE CRITERION

MC-13 Central or remote reporting of real-time energy use per energy carrier, combining TBS of at least 2 domains in one interface

Functionality level 0 (as non-smart default)	Functionality level 1	Functionality level 2	Functionality level 3
None	Central or remote reporting of realtime energy use per energy carrier	Central or remote reporting of realtime energy use per energy carrier, combining TBS of at least 2 domains in one interface	Central or remote reporting of realtime energy use per energy carrier, combining TBS of all main domains in one interface



ASPECTS POSITIVELY IMPACTING THE EVALUATION

- Heat control by room (ventilation supplemented by floor heating)
- Combined system for HVAC and DHW systems with control and providing feedback to users
- General switch board for lighting, areas with dimming, areas with occupancy detection
- Automatic blinds management (depending on sunlight and wind)
- Energy storage and self-consumption optimisation
- PV production
- Electric vehicle charging (shared garages)



IMPROVEMENT POTENTIAL

- 1) Occupant feedback on various systems* – a more complete energy monitoring, benchmarking, predictions, fault detection and predictive maintenance
- 2) Integrating the different systems into one single platform
- 3) Ventilation management based on air quality and occupant information

Advised actions

- 1) Light software and hardware solutions with gateways
- 2) Installation of a single Building Operating System
- 3) Installation of sensors and data analysis

1) + 2) + 3) 40% → 57% Class E → D

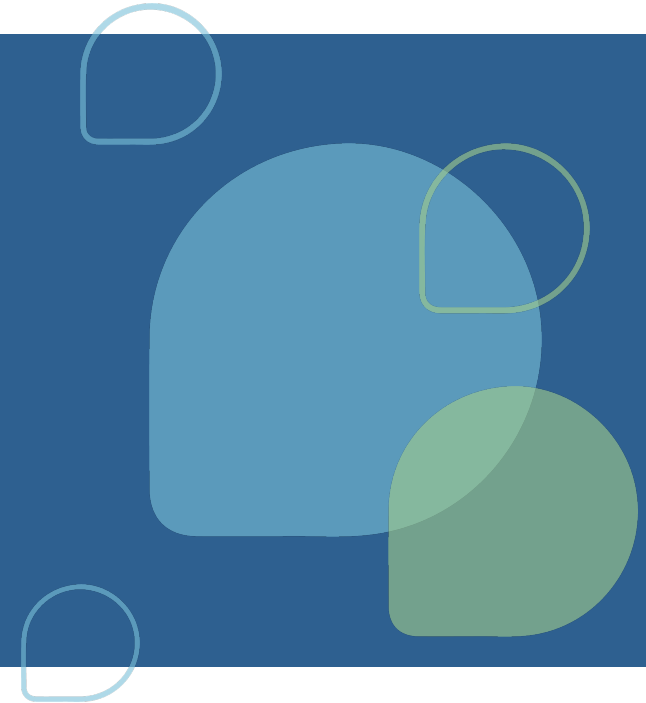
- 4) Smart grid implementation: building systems responding to electric grid signal

- 4) Involvement of the DSO and creation of a micro-grid

1) + 2) + 3) + 4) 57% → 70% Class D → C

** By decreasing order of importance: heating, PV production, EV, DHW, ventilation, blinds, lighting, cooling*

Q&A



SRI assessment package: users' feedback



Context

Feedback from the users of the SRI assessment package has been collected

- To conduct statistical analyses on the testing of the tool
- To elaborate guidance and communication material by providing useful case studies



The survey is still active! Inputs are still welcome

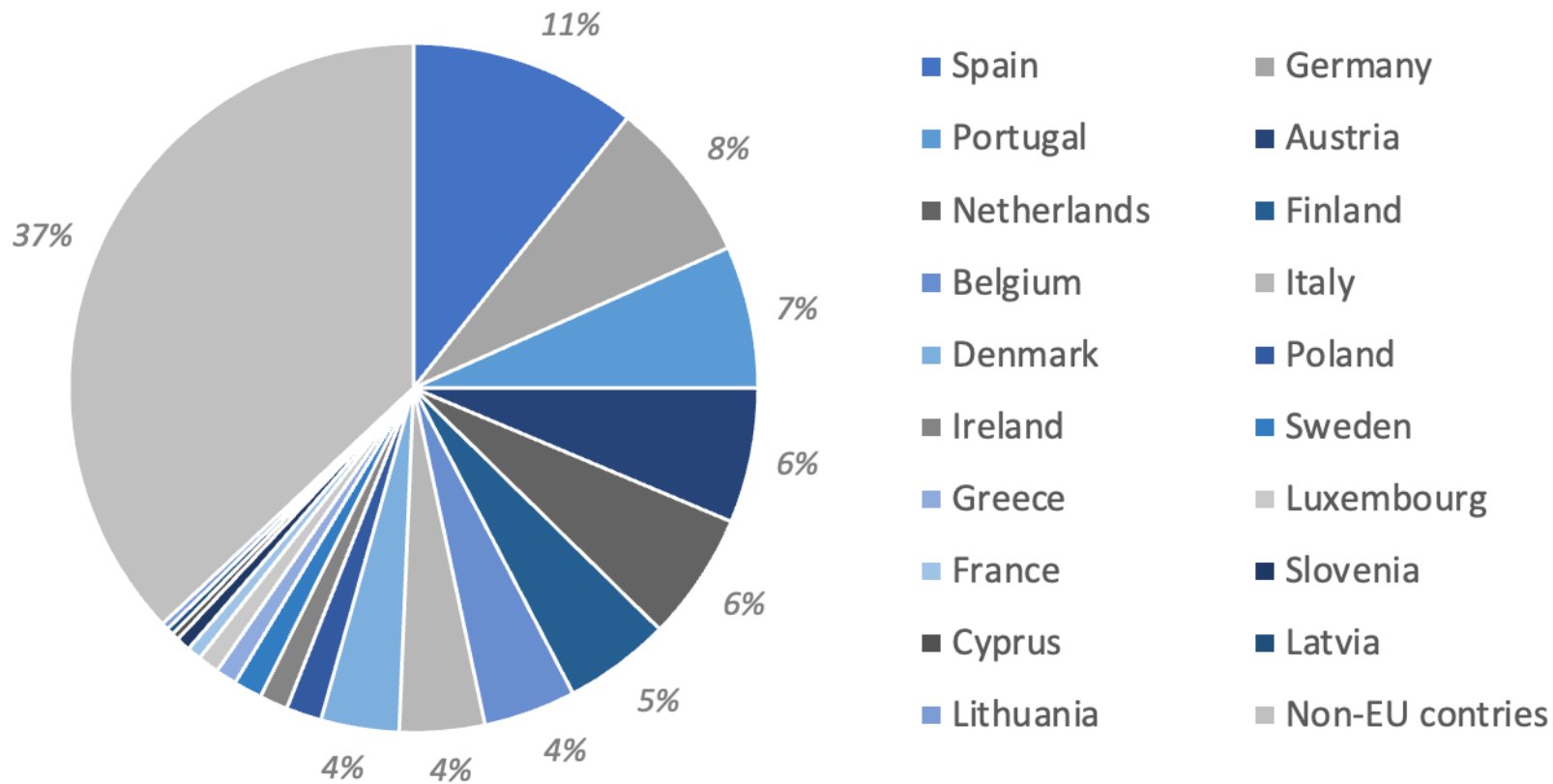
<https://ec.europa.eu/eusurvey/runner/SRI-assessment-feedback>



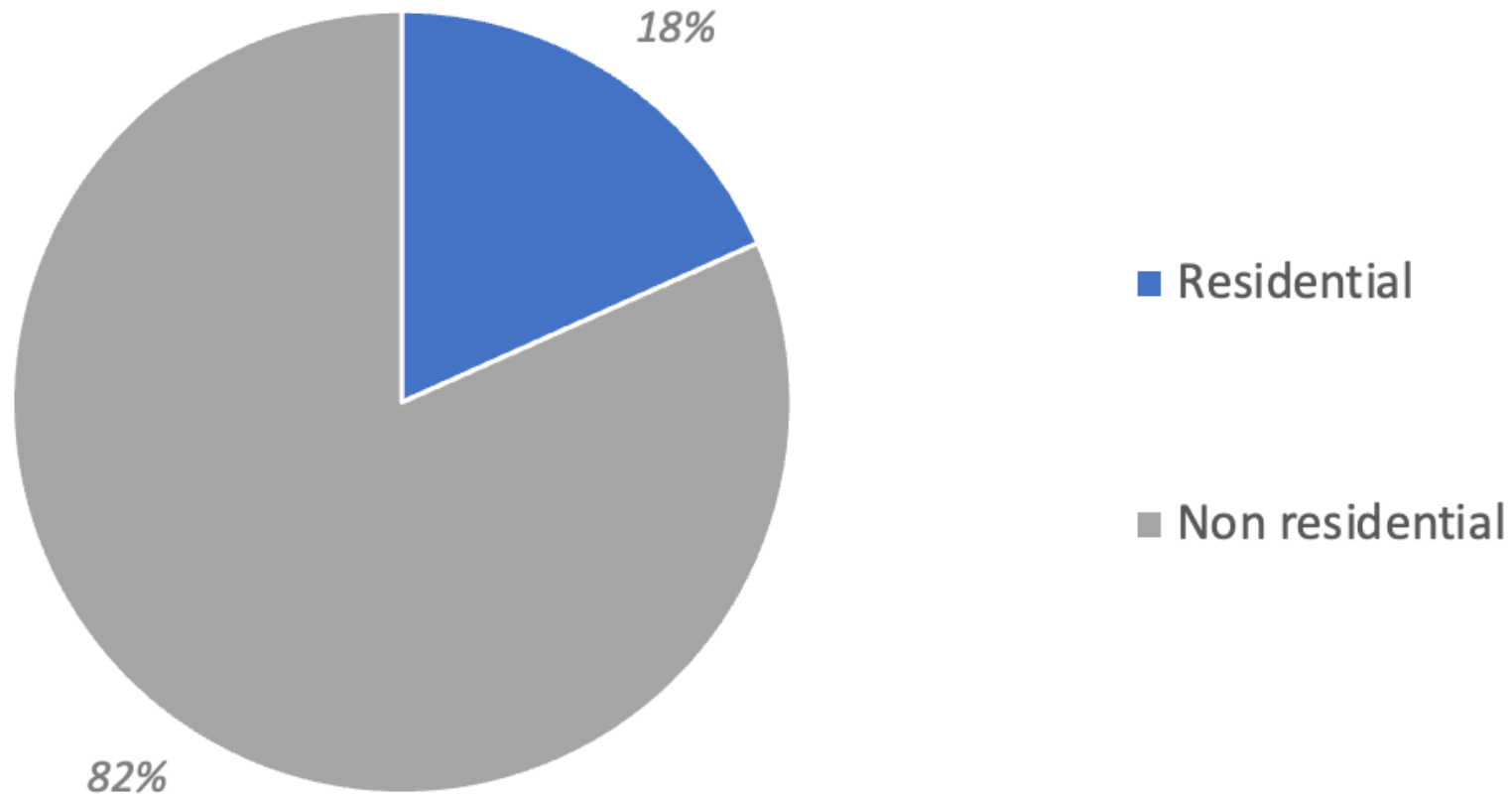
Answers received so far

- Number of answers to the questionnaire: **46**
- Corresponding number of SRI assessments conducted: **282**
- Corresponding number of SRI assessors trained: **51**

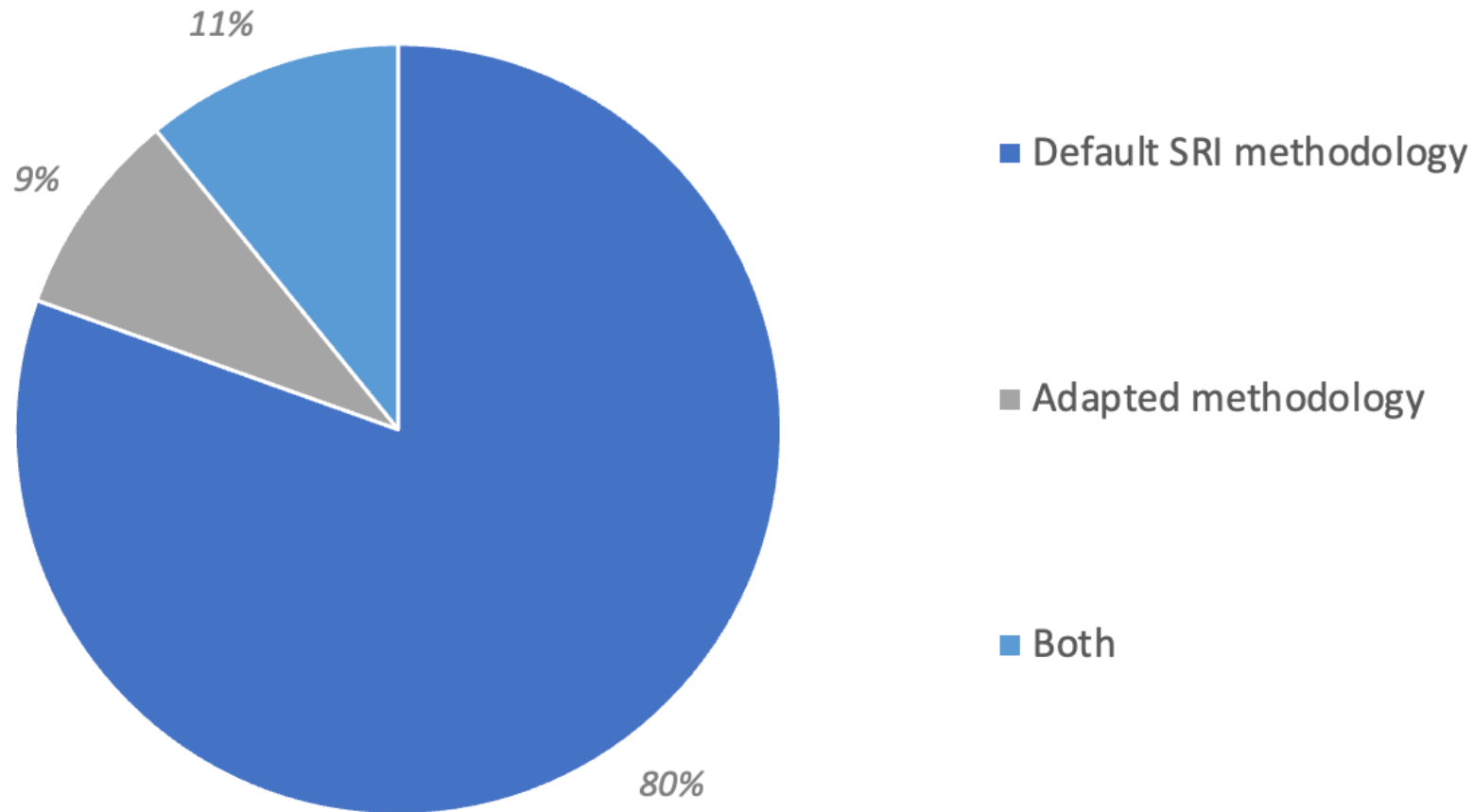
Number of assessments reported per country



Number of assessments reported per building type

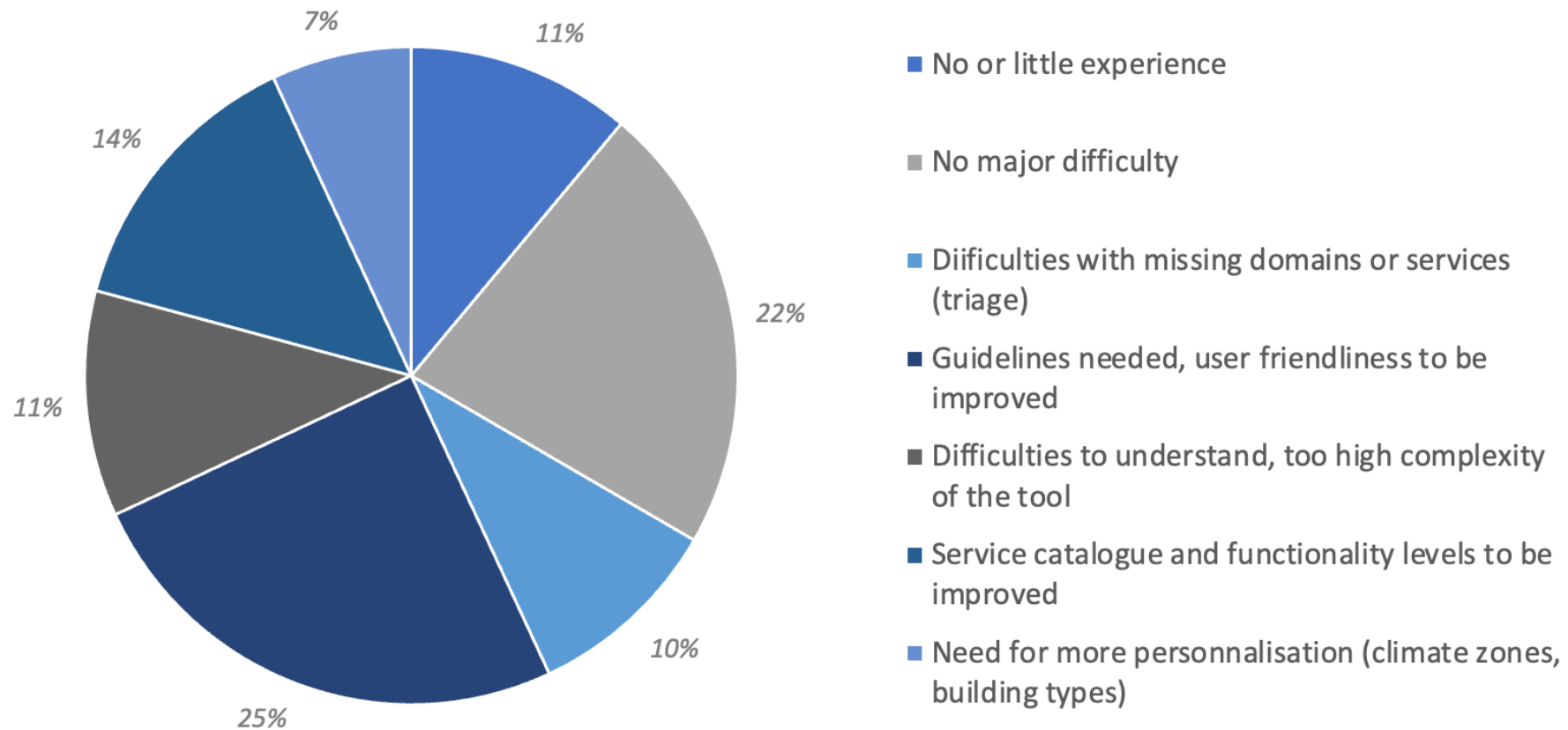


Generic vs. adapted configuration of the SRI methodology



Qualitative feedback

- Assessment process: Have you faced difficulties in conducting assessments? What could be improved within your views?





Qualitative feedback

● Some quotes about the assessment process

"The Excel tool is easy to use"

"Very long training period for first-time use"

"A clear definition of what is applicable or not should be defined. It has a large impact on scores"

"Improve the spreadsheet with more granularity of the climatic zones that are specific for each country"

"For buildings with deficient documentation, more time is needed (up to 2-3 days for an assessment of an average commercial building)"

"The assessor needs a very broad and deep knowledge for the correct assessment of the different systems"

"The difference between functionality level 0 and the absence of a service should be more consequent and coherent"

"It would be better to clarify how to proceed when some systems are missing (for example summer cooling)"

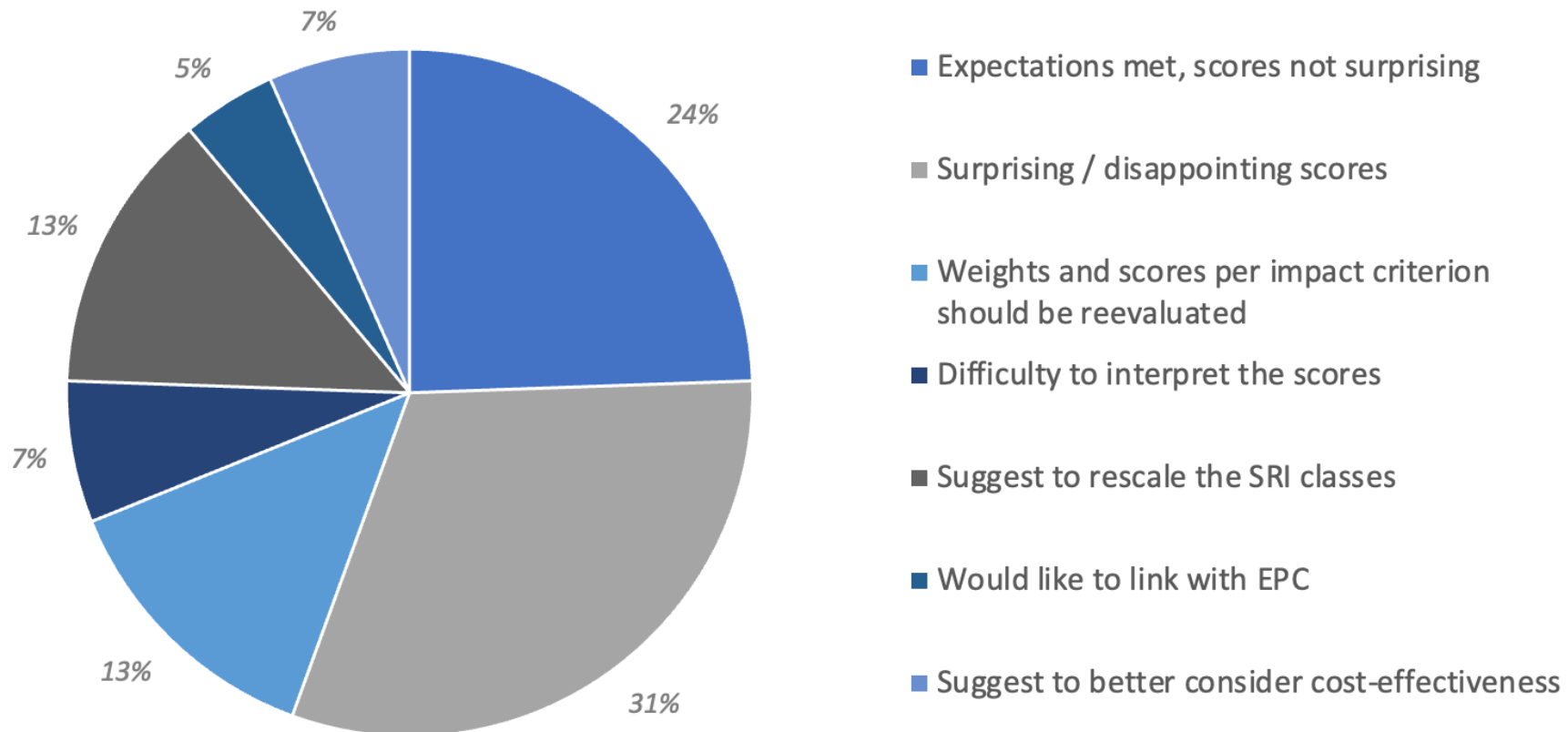
"Define an optimized catalogue of services for each specific type of buildings (i.e. schools, hospitals, offices, ...)"

"It would be helpful to have a list with regard to the proper equipment for each Functionality Level"

"Add more practical and detailed information about each smart service proposed in the SRI assessment package, to avoid interpretation bias"

Qualitative feedback

- Scores obtained: Are they in line with expectations? What has surprised you the most?





Qualitative feedback

● Some quotes about the scores obtained

"The SRI scores seem to be in line with expectations"

"We regret that without a DSM the best score we obtained is around 60%"

"52% seems not a lot for a building that's just 8 years old where already a lot of recent technological advancements are being applied"

"After assessing a building, the client will ask questions how to score higher"

"It was surprising how non-residential buildings that appear to have more readiness in some domains can score so much lower than residential buildings that seem to be in a less mature state"

"One surprise was that to achieve the maximum score, the SRI suggests implementing smart controllers for almost all domains. In reality or practicality, this is almost never the case as it would require extensive knowledge about the building and is highly costly"

"What does Energy Efficiency x% means in practice? (the house's energy performance is class A)? What can be the conclusion, feeling and decisions knowing those scores?"

"Buildings that are considered smart from other methodologies, have a really low score with SRI because of the really advanced services"



Analysis of SRI assessment spreadsheets received so far

■ Sample of SRI assessment files

- Approach: Statistical data analysis
- SRI assessment files ≠ official SRI assessments
- n=43 retained for analysis
 - Non-residential (15 offices, 1 educational, 6 other), Residential (8 MFH-S, 5 MFH-L, 8 SFH)
 - Method B (37), Method A (2), Custom services mix (3), n.a. (1)
 - Default Weighting (42), n.a. (1)

➤ Average total SRI score=27%

- Residential 19%
- Non-residential 34%

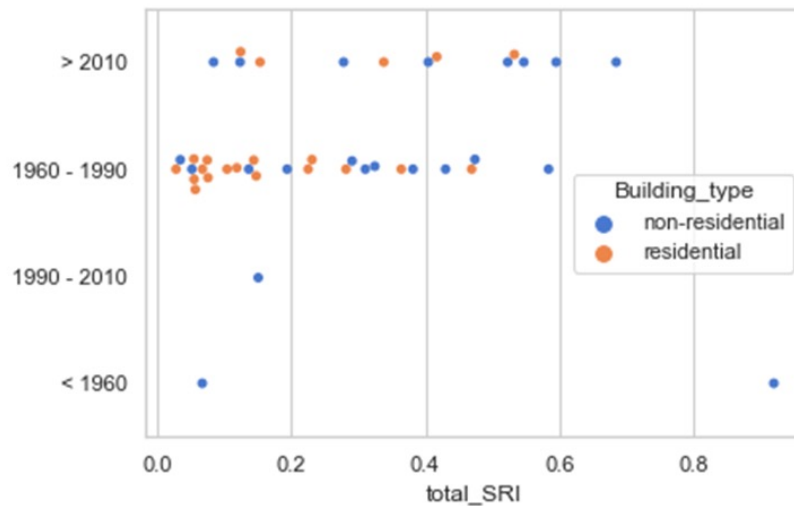
➤ Majority of total SRI scores ≤ 60%

- only 2 non-residential buildings;
 - Total SRI score=92%; Office, 500-1.000m², <1960, Renovated, Netherlands; Custom services catalogue, Default weighting
 - Total SRI score=69%; Other, 1.000-10.000m², >2010, Original, Luxembourg; Method B, Default weighting

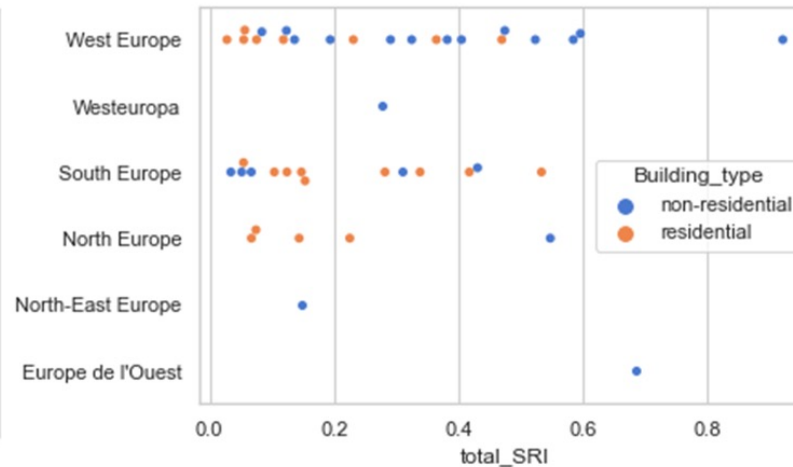
Analysis of SRI assessment spreadsheets received so far

Overall scores

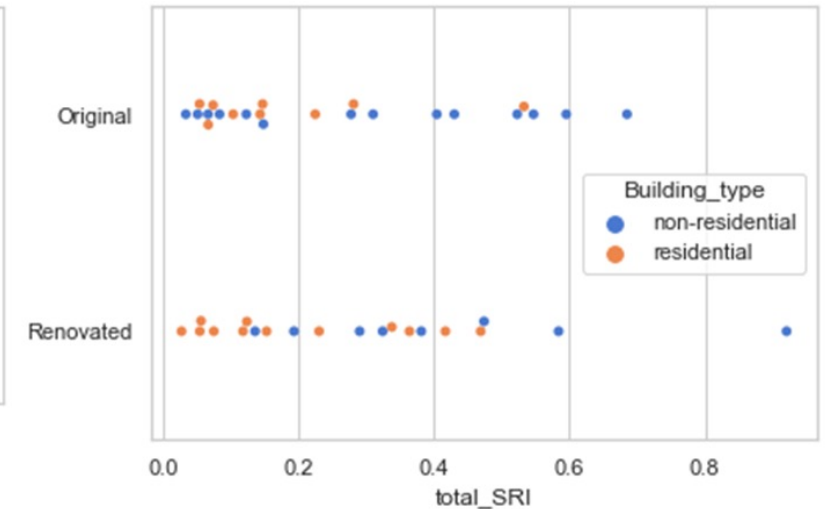
Construction years



Climatic zones

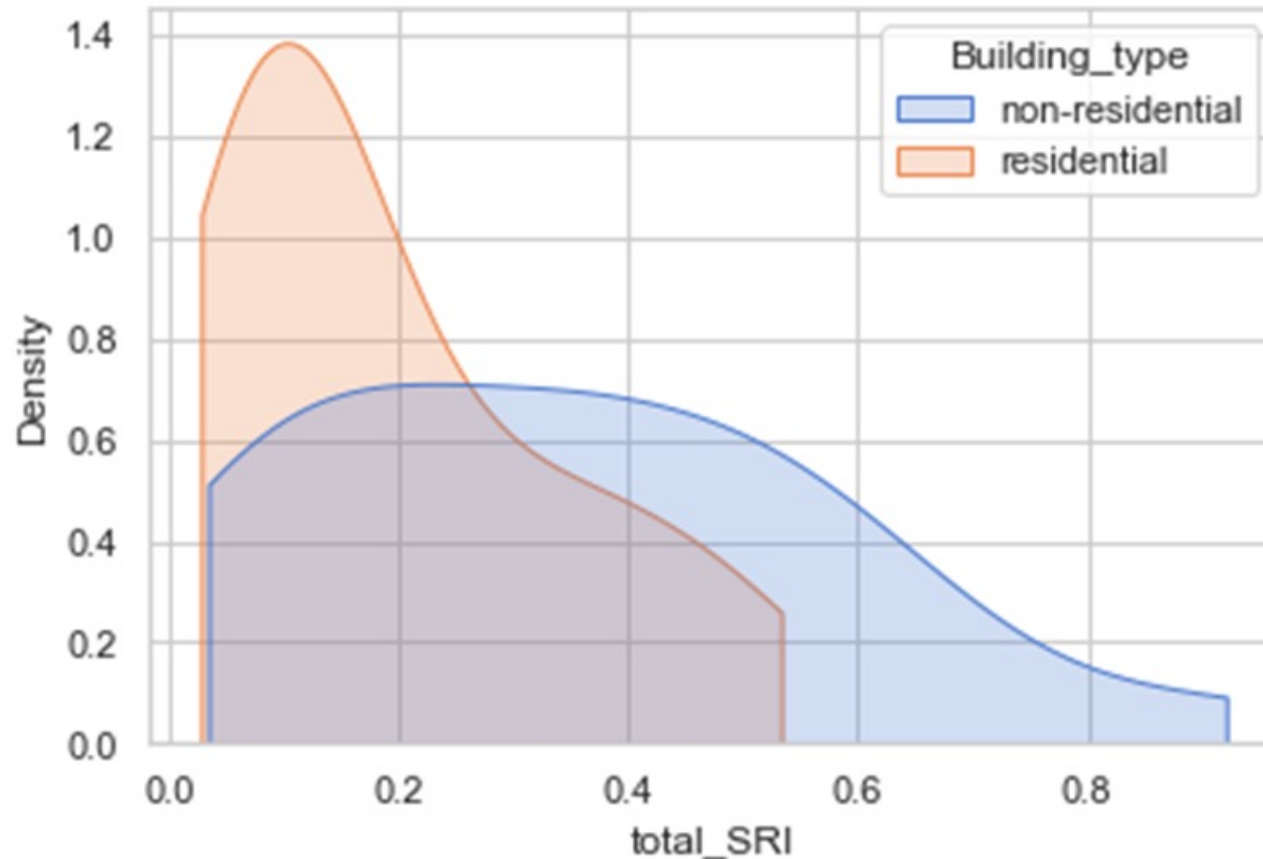


Original / Renovated



Analysis of SRI assessment spreadsheets received so far

- Overall scores: Distribution (residential & non-residential)

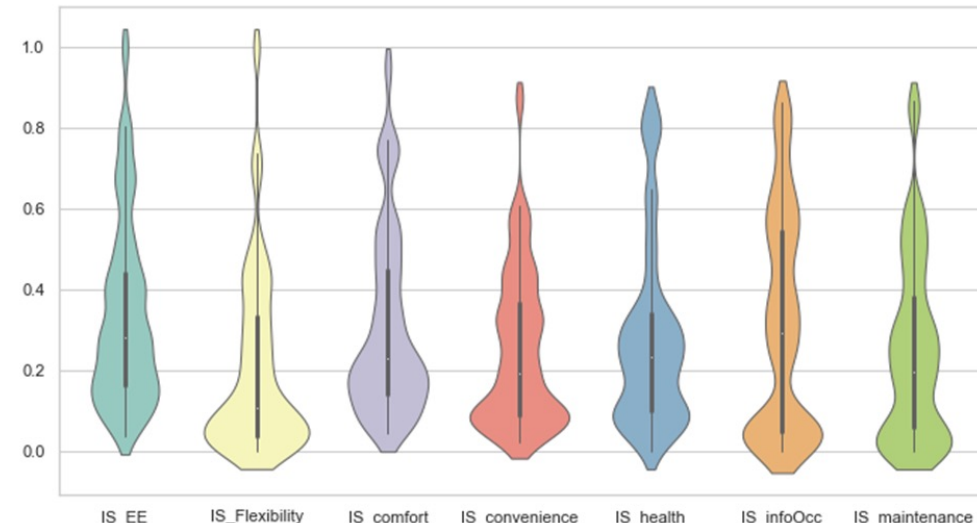


Analysis of SRI assessment spreadsheets received so far

Impact Scores

• Energy Efficiency	34%
• Info to Occupants	32%
• Comfort	31%
• Health	28%
• Maintenance	25%
• Convenience	25%
• Flexibility and Storage	21%

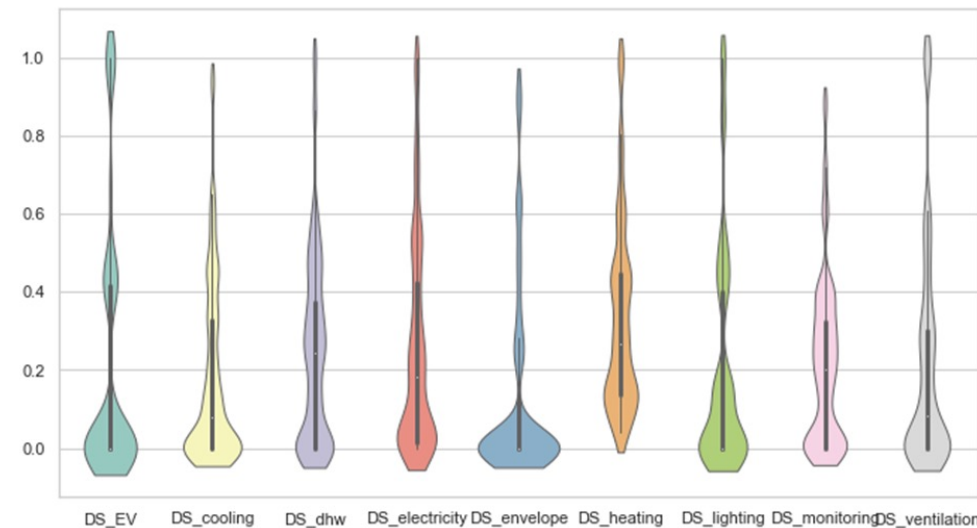
Average



Domain Scores

• Heating	33%
• Electricity	26%
• Domestic Hot Water	25%
• Monitoring	22%
• Electrical Vehicle Charging	21%
• Ventilation	21%
• Lighting	20%
• Cooling	17%
• Envelope	13%

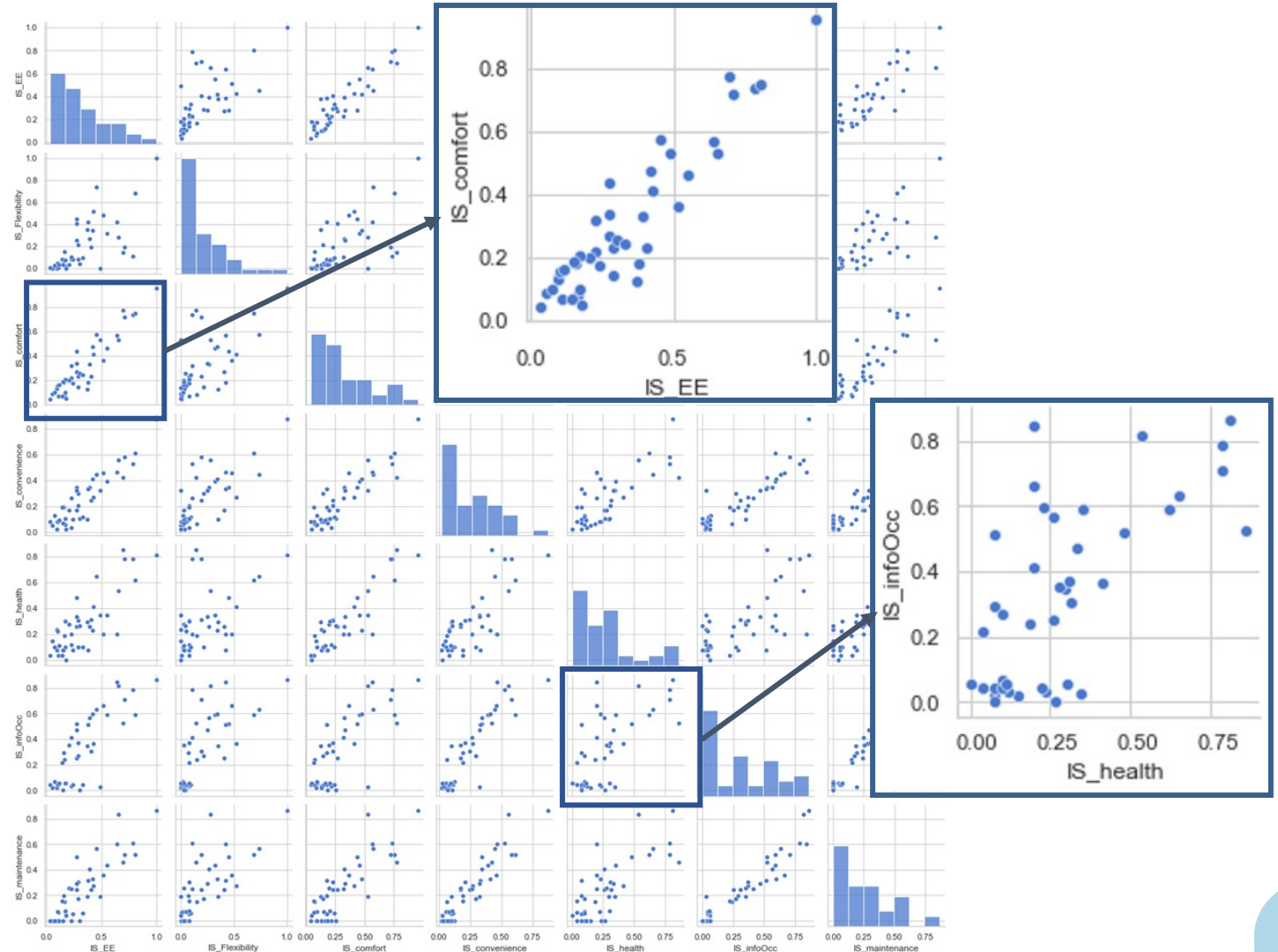
Average



Analysis of SRI assessment spreadsheets received so far

Impact Scores

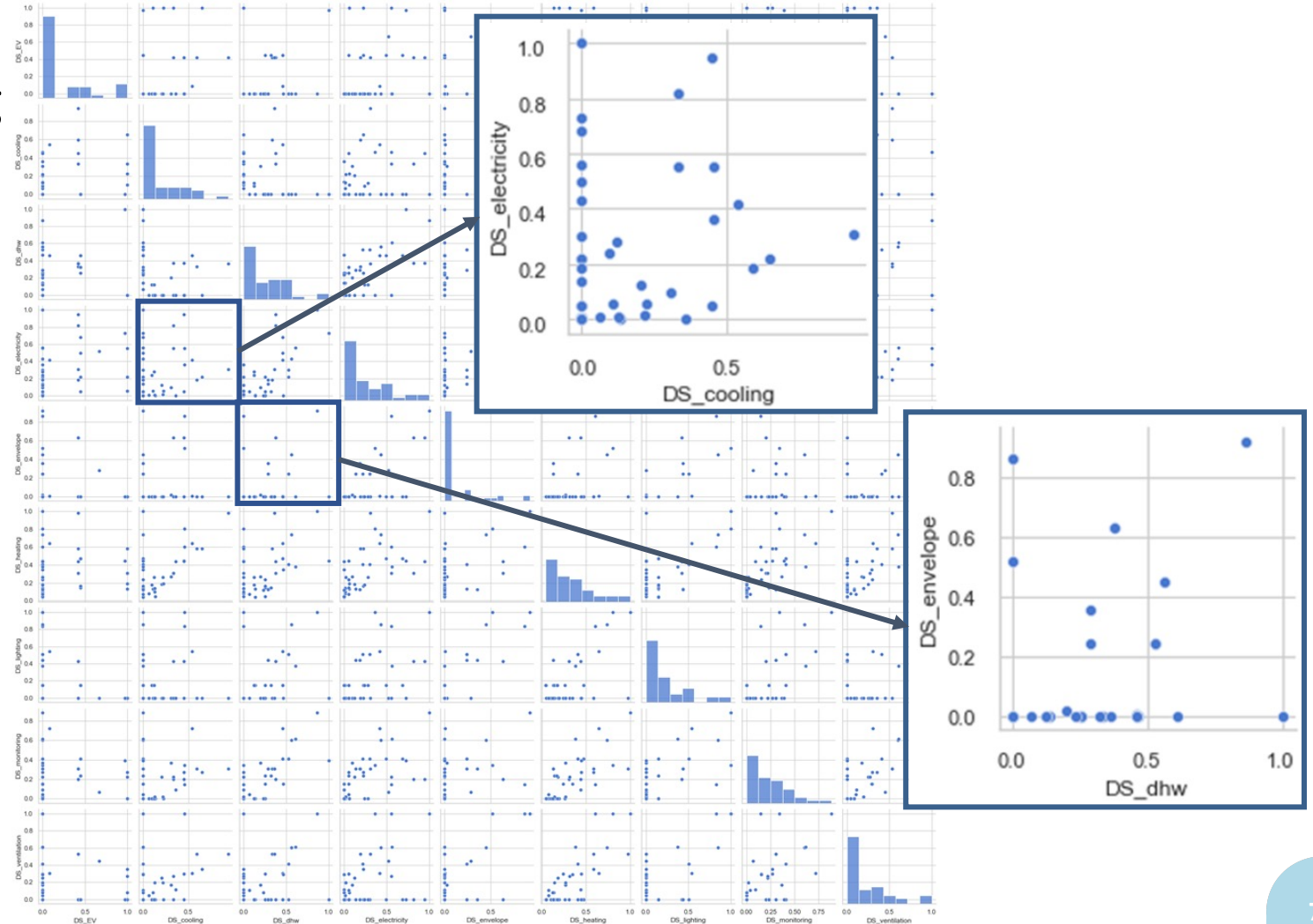
- Energy Efficiency
- Flexibility
- Comfort
- Convenience
- Health
- Info to Occupants
- Maintenance



Analysis of SRI assessment spreadsheets received so far

Domain Scores

- Electric Vehicle charging
- Cooling
- Domestic Hot Water
- Electricity
- Envelope
- Heating
- Lighting
- Monitoring
- Ventilation





Lessons learnt

- Results **confirm** premise of 'Low Total SRI scores'
 - Total SRI score is on average **27%**; majority <60%
 - Total SRI scores of residential are on average lower compared to non-residential buildings (19% vs. 34%), variation also is smaller
- **High potential for smart readiness improvements** in all technical domains and impact criteria
 - Technical domains: highest potential for Envelope, lowest for Heating
 - Impact criteria: highest potential for Flexibility and storage, lowest for Energy efficiency
- Nearly **entire range of scoring is represented** for all technical domains and impact criteria

!! Disclaimers

- **Limited number** of assessment spreadsheets in the sample. ***Please share with us more assessment sheets via <https://ec.europa.eu/eusurvey/runner/SRI-assessment-feedback>***
- Assessment spreadsheets have **not** been **validated**

How to assess the smart readiness of a building: live demo





Two methods: A (simplified) and B (detailed)

Method A (simplified)

- Simplified service catalogue
- Typically for **existing residential buildings** or **small non-residential buildings** (low complexity)
- Check-list approach
- Assessment time < 1 hour
- Self-assessment possible

Method B (detailed)

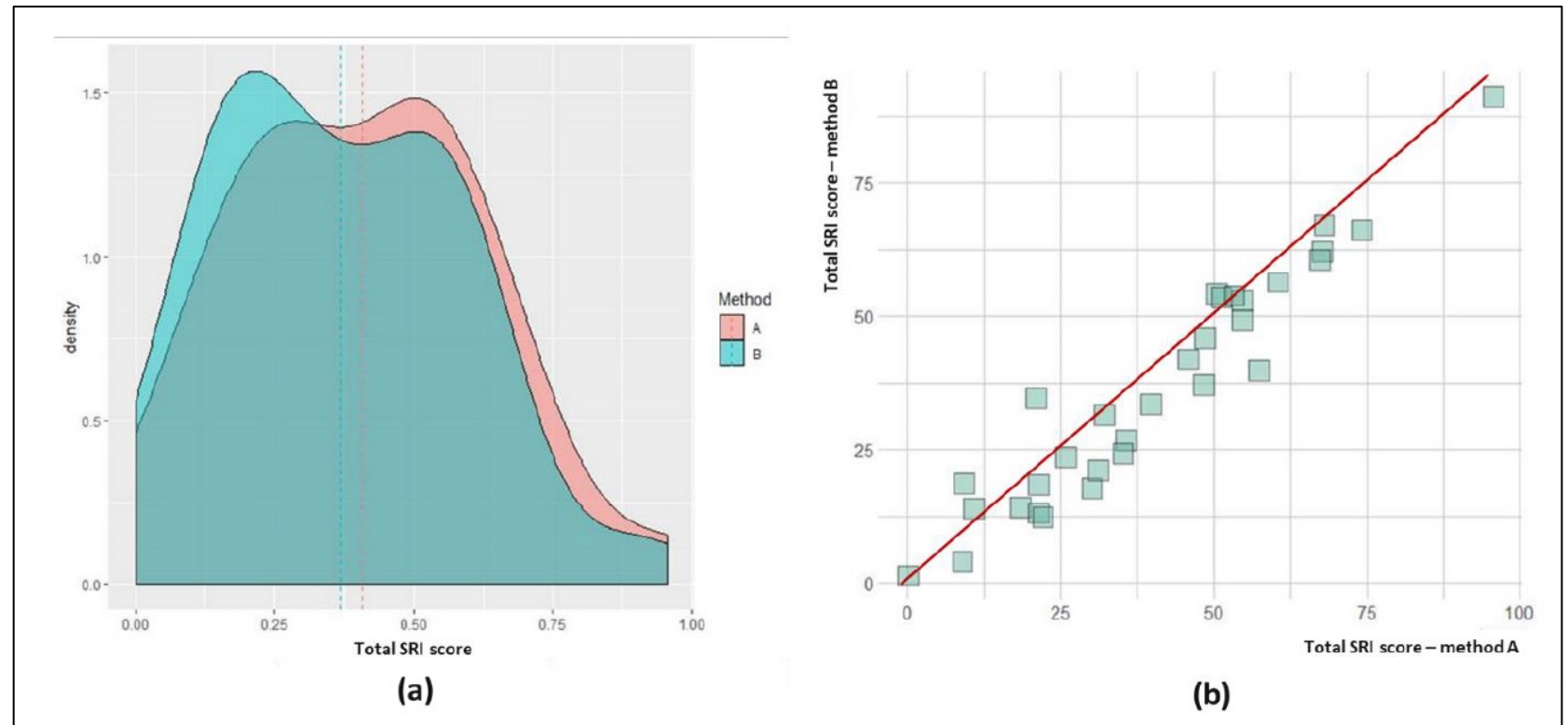
- Full, detailed service catalogue
- Typically for **new buildings** and **non-residential buildings** (higher complexity)
- On-site inspection / walk-through needed
- Assessment time < 1 day
- Necessary involvement of an expert, with support from a facility manager

- The assessment process is the same for both methods
- The service catalogue is different, which means the level of expertise required to conduct the assessment is different

Two methods: A (simplified) and B (detailed)

- Within a previous study, 31 buildings were assessed with both the simplified method A and the more detailed method B

- It was concluded that the results for both methods A and B were generally well-aligned



Comparison of methods A and B, applied to the same buildings during the public beta test



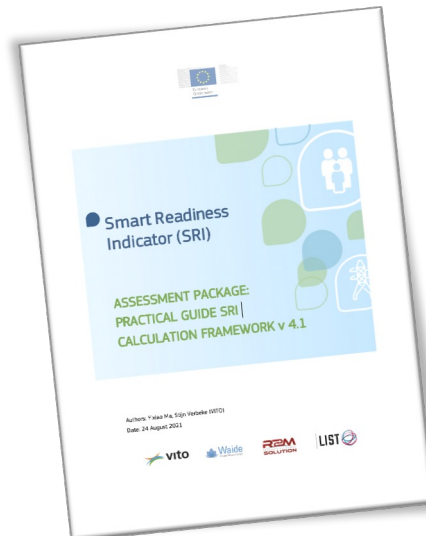
Customized method

- A customized method is also possible
 - In this case:
 - The applicable services are chosen one by one in the existing service catalogue
 - Additional services can be defined within each technical domain
- The choice between regular methods (A or B) or a customized one depends on country specificities, upon the decision of the Member State undertaking the SRI test or implementation phase
 - Research projects are particularly invited to test different customized approaches

The SRI assessment package

- The SRI assessment package is available upon request by filling [this form](#).
- It is based on the generic SRI methodology developed at the EU level, and it can be adapted to specific contexts
- It includes:

**A practical guide
(PDF)**



**A calculation sheet
(Excel)**





**Live demo of the
calculation tool**

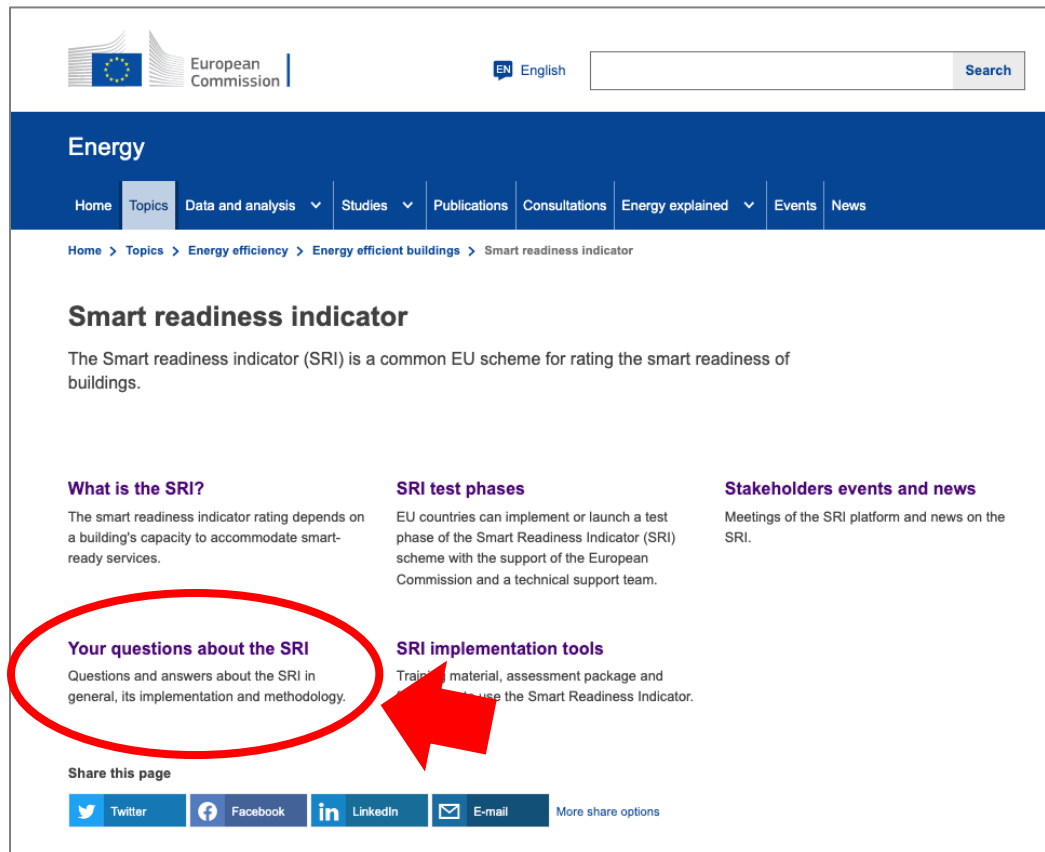
Tips and tricks

Frequently asked questions



Frequently asked questions (F.A.Q.)

- An F.A.Q. section is available on the SRI webpage:
<https://ec.europa.eu/smart-readiness-indicator>

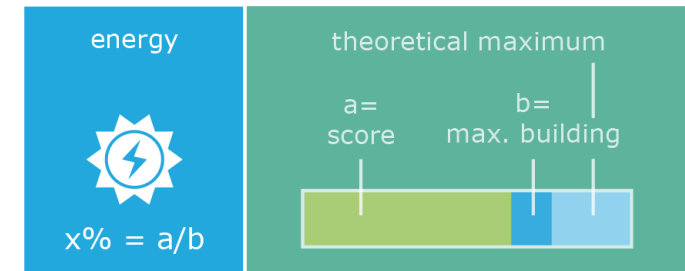


- Always check it first
- Questions can be sent to the SRI support team at support@smartreadinessindicator.eu
- The F.A.Q. is going to be updated to include more technical questions

What is the normalisation of the SRI score?

- The **SRI score** is the ratio of the impact scores from the assessed smart ready services versus the 'maximum obtainable score'; i.e. the sum of all impacts in case all smart services are implemented at the highest functionality level

CALCULATION OF SRI SCORE



- The maximum obtainable score can depend on some characteristics of the building (and possibly also some choices made by the Member State implementing the SRI scheme). Some of the services can be considered not relevant for a particular building, thus don't impact the maximum obtainable score (*see triage process on next slides*)

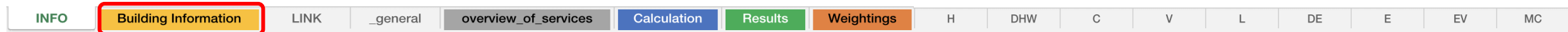
Example: A residential building might not need cooling in some climates. It would be unfair to penalise the SRI score of such building for not having smart cooling controls. Instead, the maximum obtainable score (i.e. the denominator in the ratio determining the SRI score) does not take into account the possible impacts of smart cooling control.



What is the triage process?

- The triage process identifies the relevant services for a specific building
- Smart services can be:
 - **Not relevant for this particular building**
 - ***Examples:** services on controlling a heat pump, when no heat pump is present; or services on electrical vehicle chargers when there are no parking spots available*
 - Such services are not taken into account in the calculation (this can be indicated in the calculation sheet, tab 'overview of services')
 - **Relevant because they are present**
 - In the SRI score ratio, the actual impacts are assessed (numerator of the ratio) and compared to the maximum impacts of those services (denominator of the ratio)
 - **Relevant because they should be present (from a policy perspective)**
 - ***Example:** even though there is not battery storage available, the potential impacts can be taken into account for defining the maximum obtainable score (denominator of the SRI score ratio)*

How to apply the triage process at domain level?



A domain is not represented in a building.

Is it a mandatory domain?

NO

Example: A residential building has no cooling system, and this is not mandatory

In this case:

- Tick "0" in the building information page under "Domains present"
- In the calculation tab, the services corresponding to this technical domain are automatically discarded
- **The weights are adjusted** so that this domain is not considered in the assessment (the building score is not impacted)

YES

Example: An office building has no EV charging system, and this is mandatory for new buildings

In this case:

- Tick "2" in the building information page under "Domains present"
- In the calculation tab, the services corresponding to this technical domain are automatically discarded
- **The weights are not adjusted:** the score of the building for these services is zero (the building score is impacted)

What if some services are not uniformly present in the building?


Example: Control of artificial lighting power based on daylight levels may be installed in the open office space, but not in corridors

Columns K and L in the Calculation tab enable testing partial compliance of a building to the main functionality level:

Code	Service group	Smart ready service	Service applicable in your building? - to be assessed by the assessor: 1 - applicable; 0 - not applicable	Main functionality level as inspected by SRI assessor	K	L
					share (default = 100% means applicable throughout the building)	Optional: additional functionality level in part of the building
L-2	Control artificial lighting power based on daylight levels	Control artificial lighting power based on daylight levels	1	3	60%	0

In this case, the functionality level is 3 for 60% of the net surface floor area, and is 0 for the remaining 40%

- For each service, no more than two functionality levels are accommodated by the calculation sheet
- No possibility to model a situation in which a service is available in one part of a building and not available in another part (for instance some parts of a building not being heated)



Can the SRI methodology be applied to a single flat (part of a bigger building)?

- The SRI methodology can be applied both to:
 - parts of a building (**examples**: *a flat; a restaurant*)
 - the building as a whole

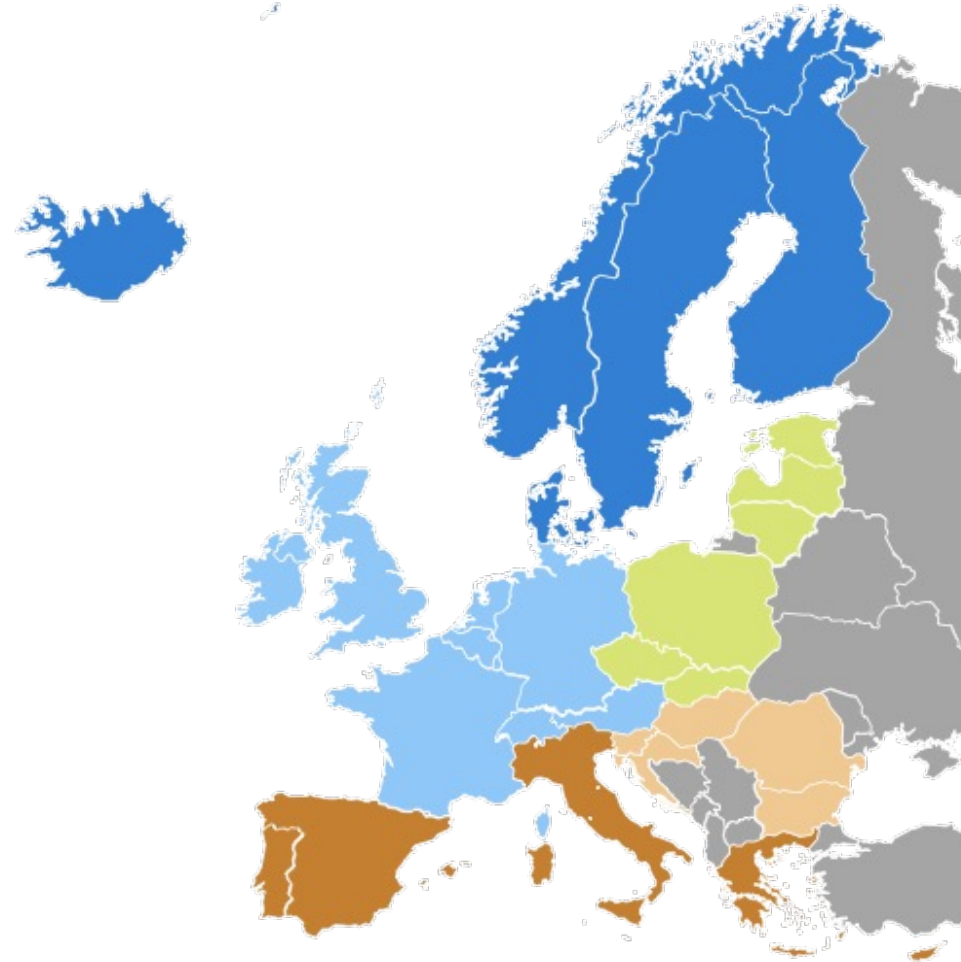
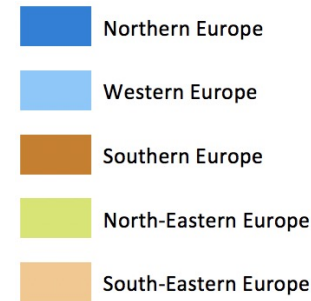
Examples:

- In a multi-family building, the SRI score can be the surface-weighted average of the scores of the individual flats
- In a multi-purpose non-residential building, different SRI scores can be calculated for each part of the building (for instance: restaurant, hotel rooms, sport facilities,...) and then aggregated into a single score at building level by weighting the different scores by the corresponding surface areas.

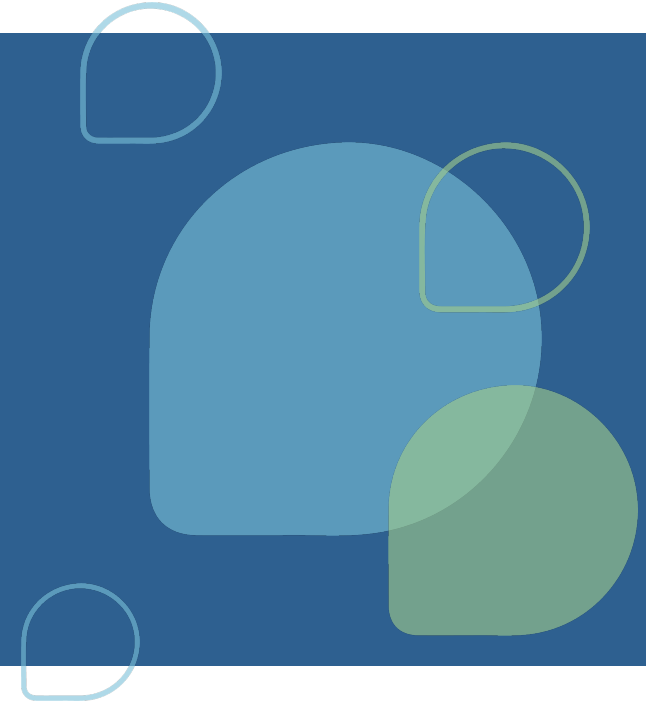
- The legal acts at EU level do not address this topic
- Experience feedback from the field is welcome

How are the different climate zones of the EU taken into account?

- 5 macro climate zones have been defined
- In the SRI calculation, weighting factors depend on the climate zone:
 - Typically, the heating domain has more importance in Northern areas of Europe
 - And the relative importance of the cooling domain increases in Southern areas of Europe
- **The assessment tool can be adapted with smaller climate zones!**



Q&A

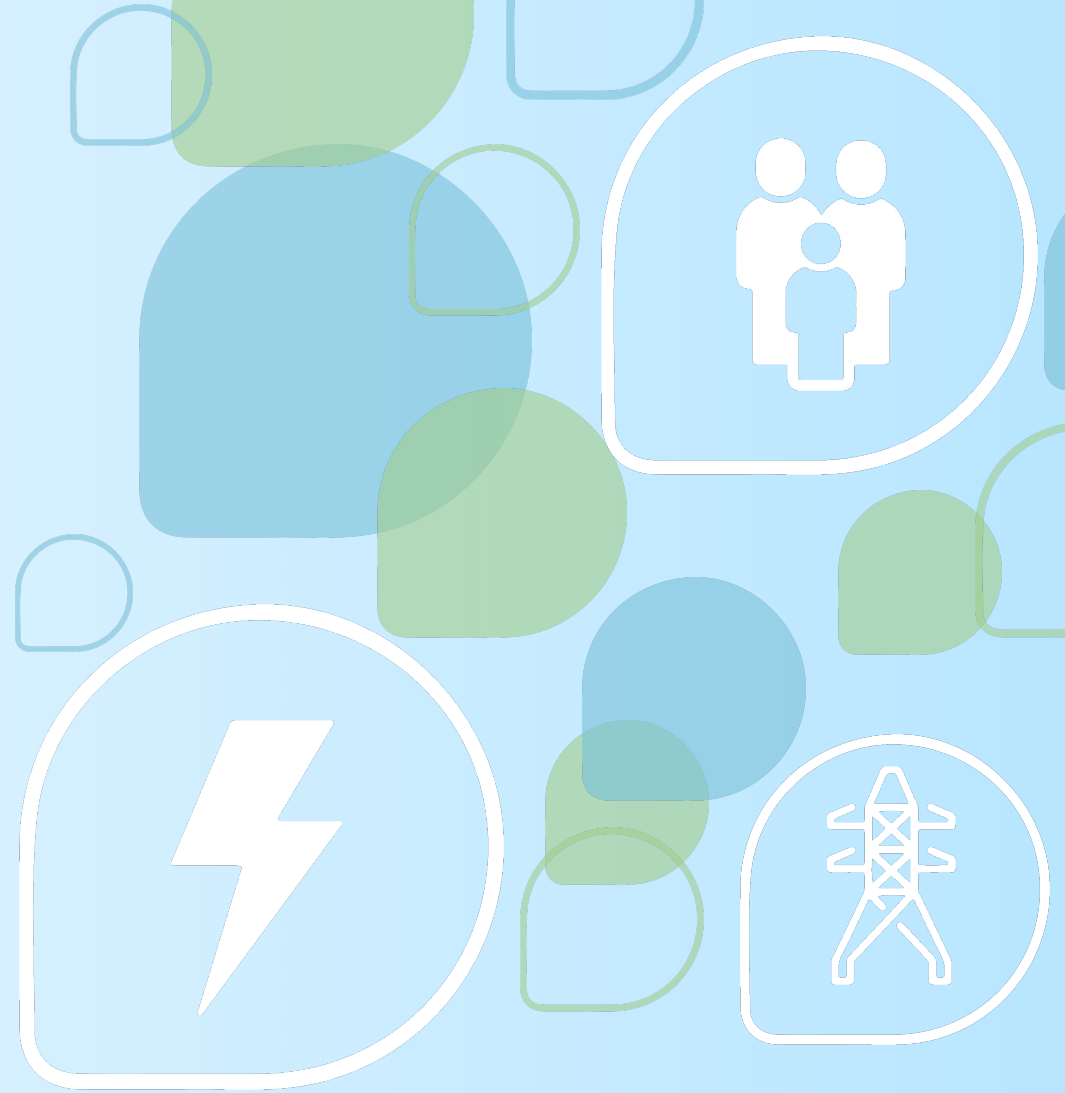


Thanks for your attention!

Contact: support@smartreadinessindicator.eu

Web: <https://energy.ec.europa.eu/smart-readiness-indicator>

#SmartReadinessIndicator



Annex: the SRI in the EU Regulations





Additional slides on the Implementing & Delegated regulations (EU 2020/2156)

Implementing regulation (EU 2020/2156) and annexes

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2020.431.01.0009.01.ENG&toc=OJ:L:2020:431:TOC

https://energy.ec.europa.eu/system/files/2020-10/smart_readiness_buildings_implementing_act_annex_c2020_6929_0.pdf

Delegated regulation (EU 2020/2156) and annexes

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R2155>

https://energy.ec.europa.eu/document/download/e6b4c362-fddc-43cf-93d2-05244479c60d_en?filename=smart_readiness_buildings_delegated_act_annex_c2020_6930.pdf



Implementing regulation (EU 2020/2156)

The **implementing regulation EU 2020/2156** for the SRI sets out the technical modalities for the effective implementation of an optional common Union scheme for rating the smart readiness of buildings established in Delegated Regulation (EU) 2020/2155

Article 3: Accreditation and qualification of smart readiness indicator experts

1. Where Member States decide to implement the smart readiness indicator scheme, they may decide that experts accredited or qualified for issuing energy performance certificates, or for carrying out inspection of heating, air-conditioning, combined heating or air-conditioning and ventilation systems under Directive 2010/31/EU, or for performing energy audits under Directive 2012/27/EU, are also competent for issuing smart readiness indicator certificates
2. Member States shall make available to the public information on the qualifications of experts in charge of the smart readiness assessment
3. Where relevant, Member States may make available to the public either regularly updated lists of qualified or accredited experts or regularly updated lists of accredited companies that offer the services of such experts. Member States may use for this purpose the same means as for experts for energy performance certification and inspections under Article 17 of Directive 2010/31/EU



Implementing regulation (EU 2020/2156)

Article 4: Issue of the smart readiness indicator certificate and terms and conditions of its use

1. Any economic operator may request from the experts referred to in Article 3 a smart readiness indicator assessment and certificate for the building or building unit in question
2. The expert shall verify the reliability of the information collected for the assessment of the smart readiness of the building or building unit and for the issue of the smart readiness indicator certificate
3. Where relevant, the expert may, when assessing the smart readiness of a building or building unit, take into account other regional or national indicators, and related assessment methods
4. A smart readiness indicator certificate shall only be issued on the basis of an assessment performed by a qualified or accredited expert
5. The smart readiness indicator certificate shall include the elements listed in Annex IX to Delegated Regulation (EU) 2020/2155
6. The validity of the smart readiness indicator certificate shall not exceed 10 years. However, where there is a significant change in a building or building unit that would have had an impact on the initial assessment of smart readiness, a new certificate shall be recommended



Implementing regulation (EU 2020/2156)

Article 5: Coupling with energy performance certification and inspection schemes

1. Member States that decide to implement the smart readiness indicator scheme may couple the issuing of the smart readiness indicator certificate with their energy performance certification scheme or with their scheme for the inspection of heating, air-conditioning and combined heating or air-conditioning and ventilation systems under Directive 2010/31/EU, or with their scheme for energy audits under Directive 2012/27/EU
2. Member States may decide that coupling with those schemes shall be mandatory, in which case a smart readiness indicator certificate shall be issued whenever an energy performance certificate has to be issued or whenever an inspection or audit has to be performed, or that it shall be voluntary, in which case a smart readiness indicator certificate shall be issued only at the request of the economic operator
3. Where Member States choose to couple the smart readiness indicator scheme with their energy performance certification or inspection or energy audit scheme, they may rely on the independent control system already in place for that scheme



Implementing regulation (EU 2020/2156)

Article 6: Monitoring and promotion of the smart readiness indicator scheme

1. Where Member States decide to implement the smart readiness indicator scheme, experts that operate in the respective Member State's or Member States' territory shall report data on the smart readiness indicator certificates they issue to the national or, where applicable, the regional authorities of the respective Member States, in accordance with the Annex to this Regulation
2. Member States that decide to implement the smart readiness indicator scheme shall report annually to the Commission the number of smart readiness indicator certificates issued on their territory and related statistics, as set out in the Annex to this Regulation
3. The Commission, based on consultation with Member States, experts and stakeholders, and based on the data provided by experts, shall monitor the market uptake of the smart readiness indicator scheme
4. Member States that decide to implement the smart readiness indicator scheme may establish additional measures to support the uptake of the scheme. Such measures may be established and reported in the context of the long-term renovation strategies required under Article 2a of Directive 2010/31/EU



Implementing regulation (EU 2020/2156)

Article 7: Self-assessment

1. The Commission shall make available by 1 April 2021 on its website a framework that allows building owners, users and other interested stakeholders to evaluate the smart readiness of a building or building unit. Member States may adapt or supplement this framework for use in their national context
2. Where the smart readiness of a building or building unit is evaluated by building owners, users or other stakeholders without the intervention of an expert, this may not lead to the issue of a smart readiness indicator certificate



Implementing regulation (EU 2020/2156)

Annex: Monitoring of the implementation of the smart readiness indicator scheme

See details at:

https://energy.ec.europa.eu/system/files/2020-10/smart_readiness_buildings_implementing_act_annex_c2020_6929_0.pdf



Implementing regulation (EU 2020/2156)

Article 8: Testing of the smart readiness indicator scheme

1. Member States may undertake a non-committal test phase of the smart readiness indicator scheme at national level
2. National test phases may begin as from the entry into force of this Regulation
3. Member States that undertake a national test phase shall submit a report on the related feedback to the Commission up to 6 months after the conclusion of the test phase
4. All arrangements of the national test phases shall be defined by Member States. They include but are not limited to the duration, phasing, types of building and geographical zones targeted, aspects of the smart readiness indicator framework that are tested, arrangements for collecting feedback, the criteria for the choice of experts carrying out the smart readiness indicator assessments, the decision on whether an independent control system is established as part of the test phase, the decision on whether certificates are issued and made available to economic operators during the test phase, and designation of a third party to manage the test phase, where relevant



Implementing regulation (EU 2020/2156)

Article 8: Testing of the smart readiness indicator scheme

5. At the end of the national test phases, Member States shall assess the outcomes and decide whether they will implement the smart readiness indicator scheme
6. Member States that plan to undertake a national test phase shall notify the Commission ahead of launching the test phase, also indicating applicable arrangements
7. The Commission shall support Member States that undertake a test phase of the smart readiness indicator at national level by supplying the framework referred to in Article 6 of this Regulation and by supporting exchanges of information and good practices
8. The Commission, in consultation with Member States, shall monitor the test phases of the smart readiness indicator scheme
9. Member States that choose to conduct the test phase may include in their report to the Commission an analysis or evaluation of the data collected by their national experts. Such national analyses or evaluations shall be taken into consideration by the Commission for the purpose of further developing the smart readiness indicator and related methodology



Delegated regulation EU 2020/2155

The **Delegated regulation EU 2020/2155** establishes an optional common Union scheme for rating the smart readiness of buildings that is to say the definition of the smart readiness indicator and a common methodology by which it is to be calculated. The methodology consists of calculating smart readiness scores of buildings or building units and deriving smart readiness rating of buildings or building units

Article 3: Smart readiness indicator

1. The smart readiness indicator shall allow for rating and communicating the smart readiness of buildings and building units to economic operators and other stakeholders, in particular planners and building operators
2. The smart readiness indicator shall allow for the assessment of the capabilities of a building or building unit to adapt its operation to the needs of the occupant and of the grid and to improve its energy efficiency and overall in-use performance. The smart readiness indicator shall cover features for increased energy savings, benchmarking and flexibility, and enhanced functionalities and capabilities provided by more interconnected and intelligent devices
3. The smart readiness indicator shall include the smart readiness rating of a building or building unit and a set of smart readiness scores that reflect the smart readiness of buildings, building units and systems along predefined key functionalities, impact criteria and technical domains
4. The smart readiness indicator shall include, where possible, additional information on inclusiveness and connectivity of the building, on interoperability and cybersecurity of systems, and on data protection



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Article 4: Methodology for calculating the smart readiness indicator

1. The methodology for calculating the smart readiness indicator shall be based on the assessment of smart-ready services present or planned at design stage in a building or building unit, and of smart-ready services that are considered relevant for that building or building unit
2. The calculation of the smart readiness scores shall be based on a common Union methodological framework set out in Annexes I to VI
3. The standard calculation methodology set out in Annexes I to VI may be adapted in accordance with Annex VII, in particular by making a link to energy performance calculations in the scope of energy performance certification
4. The methodology for calculating the smart readiness indicator shall be used in accordance with the conditions set out in this Regulation, in particular regarding the qualification of experts



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Article 5: Smart readiness rating

The smart readiness rating of a building or building unit shall be based on the smart readiness scores calculated for the building or building unit in accordance with Annex VIII



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Article 6: Optionality of the scheme

1. The smart readiness indicator scheme shall be an optional common Union scheme
2. Member States may decide if they implement the smart readiness indicator on their national territory, or parts thereof. They may also choose to implement the scheme only to certain categories of buildings
3. Member States that implement the smart readiness indicator scheme may choose to apply it on a voluntary or mandatory basis for buildings or building units located on their territory
4. Member States that decide to implement the smart readiness indicator scheme on their national territory, or parts thereof, shall notify the Commission prior to implementing the scheme
5. Member States may decide to modify, adapt, or terminate the implementation of the scheme at any time without providing any justification to that end. They shall notify the Commission of any such decision



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Article 7: Smart readiness indicator certificate

1. The smart readiness indicator of a building or building unit shall be communicated to economic operators and other interested parties in a certificate
2. The smart readiness indicator certificate shall include the information specified in Annex IX

Article 8: Smart readiness indicator experts

1. Member States that decide to implement the smart readiness indicator shall ensure that the assessment of the smart readiness of buildings or building units with a view to issuing a smart readiness certificate is carried out by experts that are qualified or accredited. The experts may operate as self-employed or be employed by public bodies or private enterprises
2. Member States that decide to implement the smart readiness indicator scheme shall lay down requirements on the qualification or accreditation of smart readiness indicator experts and ensure that those requirements include competence criteria, including in the ICT field. Member States that decide to implement the smart readiness indicator scheme on their national territory, or parts thereof, shall notify the Commission prior to implementing the scheme



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Article 9: Control system of the smart readiness indicator scheme

1. Member States that decide to implement the smart readiness indicator scheme shall establish an independent control system for smart readiness indicator certificates. Where relevant, those Member States may rely on the independent control systems that are already in place, such as those for energy performance certification schemes
2. The independent control system shall ensure the validity of the smart readiness indicator certificates issued on the Member State's territory



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Annex I: Calculation of the smart readiness indicator scheme

This is long – see the link



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Annex II: Smart readiness impact criteria

The smart readiness impact criteria considered in the calculation protocol set out in Annex I are the following:

- (a) energy efficiency,
- (b) maintenance and fault prediction,
- (c) comfort,
- (d) convenience,
- (e) health, well-being and accessibility,
- (f) information to occupants,
- (g) energy flexibility and storage.



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Annex III: Weighting of impact criteria in key functionalities

1. Each impact criterion set out in Annex II of this Regulation is considered for only one of the three key functionalities, as set out in points 2 to 4. For each key functionality, Member States shall define the respective weighting factors of relevant impact criteria.
2. For the 'energy performance and operation' key functionality, the relevant impact criteria are 'energy efficiency' and 'maintenance and fault prediction'.
3. For the 'response to user needs' key functionality, the relevant impact criteria are 'comfort', 'convenience', 'information to occupants' and 'health, well-being & accessibility'.
4. For the 'energy flexibility' key functionality, the relevant impact criterion is 'energy flexibility & storage'.



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Annex IV: Technical domains

The smart readiness technical domains considered in the calculation protocol set out in Annex I to this Regulation are the following:

- (a) heating,
- (b) cooling,
- (c) domestic hot water,
- (d) ventilation,
- (e) lighting,
- (f) dynamic building envelope,
- (g) electricity,
- (h) electric vehicle charging,
- (i) monitoring and control



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Annex V: Weighting of technical domains

1. Each technical domain is weighted for each of the impact criterion and the weighting factors characterise the influence of the technical domain on the impact criterion
2. Technical domains' weighting factors are expressed as a percentage, and for each impact criterion, the sum of the weighting factors of the technical domains equals to 100 %
3. The standard approach to allocate weighting factors to the technical domains is based on:
 - (a) The climatic zone's energy balance for the weighting factors of 'heating', 'cooling', 'domestic hot water', 'ventilation', 'lighting', and 'electricity' technical domains along the 'energy efficiency', 'maintenance and prediction' and 'energy flexibility and storage' impact criteria;
 - (b) for all other cases: weighting factors that are either fixed or equally distributed.
4. Member States define the climatic zones that are used, where relevant, in the determination of weighting factors. For this purpose, Member States may use, where available, relevant Union guidance
5. The weighting factors of technical domains may differ between residential and non-residential buildings for some impact criteria
6. Member States define the weighting factors and, for this purpose, are encouraged to use, where available, relevant Union guidance. They may also take into account possible impacts from climate change



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Annex VI: Smart ready service catalogue

1. For the purpose of calculating smart readiness scores in accordance with the methodology set out in Annex I, Member States make available at least one smart-ready catalogue to be used by experts as the basis for identifying and assessing smart-ready services
2. A smart-ready service catalogue includes the list of smart-ready services to be considered for calculating the smart readiness score, related functionality levels, and corresponding individual scores for the impact criteria
3. The definition and any subsequent update of smart-ready catalogues reflect the current state of the art of smart-ready technologies
4. Member States are encouraged to provide guidelines to experts on the most effective way to identify and assess smart-ready services using, where available, relevant Union guidance
5. Member States may decide to make available several smart-ready catalogues, for instance for different building types



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Annex VII: Possible adaptation of the standard calculation process

1. To avoid unfairly penalising a building or building unit, some smart-ready services may be omitted in the calculation of the smart readiness scores, in case those services are not relevant for that building or building unit
2. Member States define the conditions under which such adaptations are relevant and allowed
3. Weighting factors of those technical domains for which the (climatic) energy balance approach would be used under the standard calculation may be calculated on the basis of the consumptions as evaluated in the energy performance certificate of the building or building unit in question. Member States are encouraged to provide guidelines to experts on the most effective way to identify and assess smart-ready services using, where available, relevant Union guidance



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Annex IX: Smart readiness rating

1. The smart readiness rating is expressed on the basis of seven smart readiness classes, from highest smart readiness to lowest smart readiness
2. Each smart readiness class corresponds to a range of total smart readiness scores as follows: 90 – 100 %; 80 – 90 %; 65 – 80 %; 50 - 65 %; 35 – 50 %; 20 – 35 %; < 20 %



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Annex X: Content of the smart readiness indicator certificate

The information contained in the smart readiness indicator and conveyed to the end user includes the following:

- (a) unique ID of the certificate,
- (b) date of issue and date of expiry of the certificate,
- (c) an informational text clarifying the scope of the smart readiness indicator, in particular with regard to energy performance certificates,
- (d) 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),
- (e) where available, the energy performance class of the building or building unit as specified by a valid energy performance certificate,
- (f) smart readiness class of the building or building unit,
- (g) optionally, total smart readiness score of the building or building unit,
- (h) smart readiness scores along the three key functionalities highlighted in Annex I of this Regulation,



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Annex X: Content of the smart readiness indicator certificate

- (i) smart readiness score per impact criterion,
- (j) optionally, scores of each technical domain for each impact criterion,
- (k) where possible, available information on connectivity, in particular on the existence of high-speed-ready in-building physical infrastructure, such as the voluntary 'broadband ready' label,
- (l) where possible, available information on interoperability, cybersecurity of systems and data protection, including where relevant on conformity to commonly agreed standards, and information on related risks,
- (m) 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,
- (n) optionally, recommendations on how to improve the smart readiness of the building or building unit taking into account, where relevant, the heritage value,
- (o) optionally, 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.



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Annex IV: Technical domains

1. Each impact criterion set out in Annex II of this Regulation is considered for only one of the three key functionalities, as set out in points 2 to 4. For each key functionality, Member States shall define the respective weighting factors of relevant impact criteria.
2. For the 'energy performance and operation' key functionality, the relevant impact criteria are 'energy efficiency' and 'maintenance and fault prediction'.
3. For the 'response to user needs' key functionality, the relevant impact criteria are 'comfort', 'convenience', 'information to occupants' and 'health, well-being & accessibility'.
4. For the 'energy flexibility' key functionality, the relevant impact criterion is 'energy flexibility & storage'