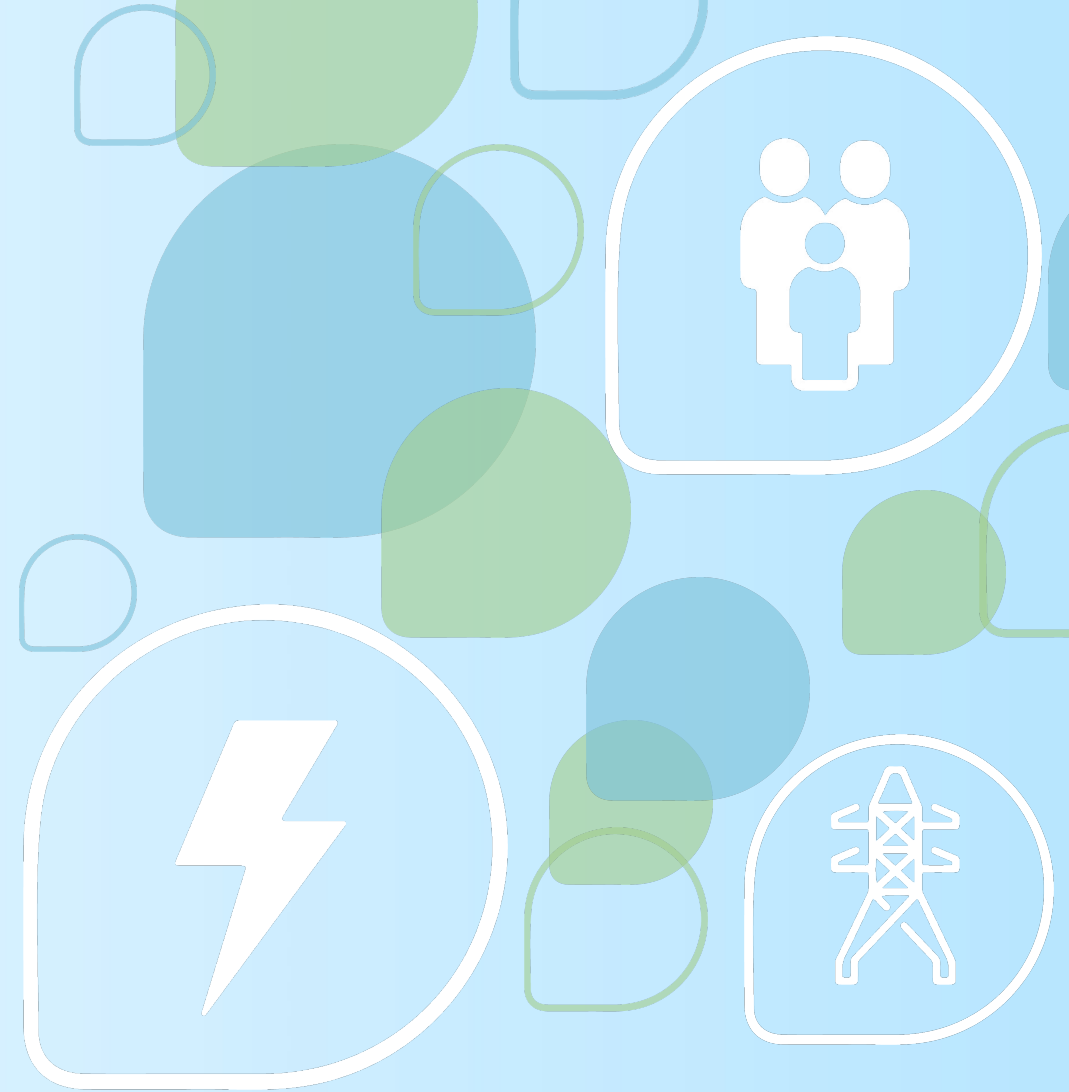


# Smart Readiness Indicator (SRI)

Training slide deck



# 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.



# Agenda

- Introduction to the SRI framework
- Overview of the SRI scoring methodology
- Must-know before undertaking an SRI assessment
- How to assess the smart readiness of a building
- Tips & tricks, frequently asked questions
- References

# Introduction to the SRI framework



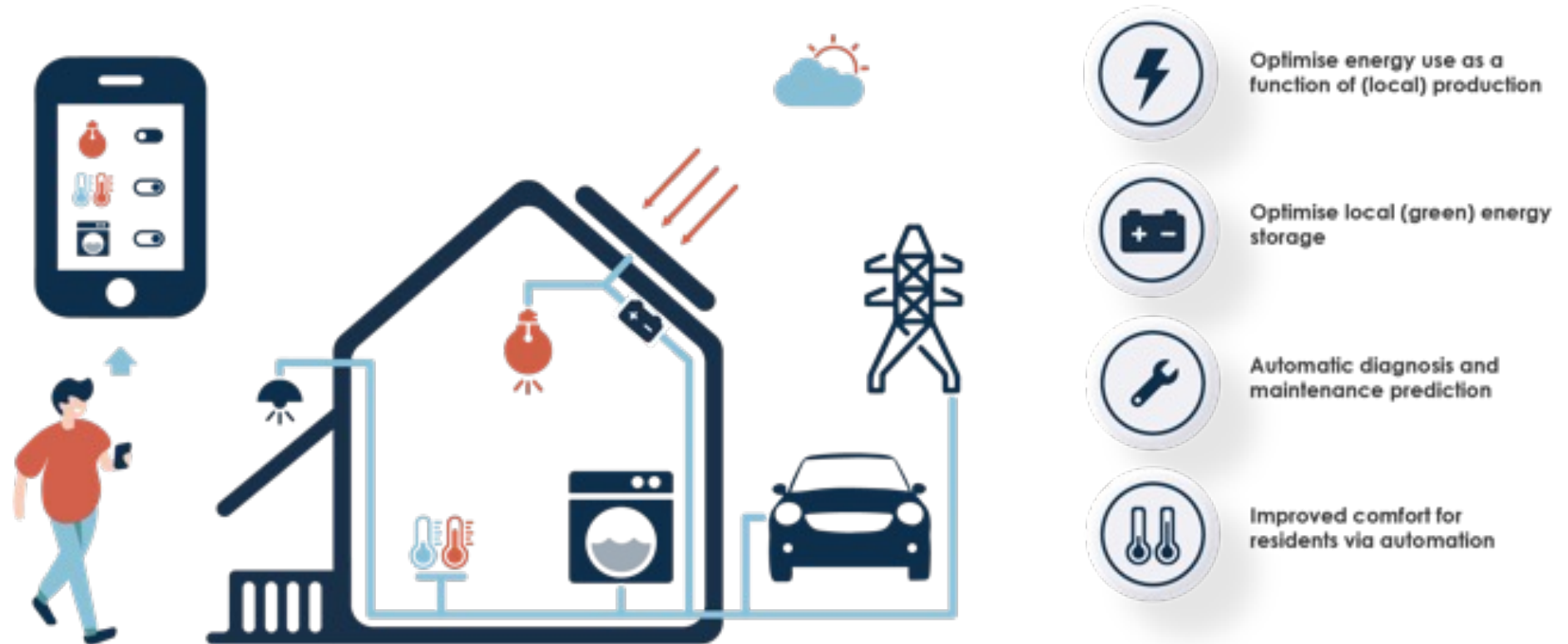


# Introduction to the SRI framework

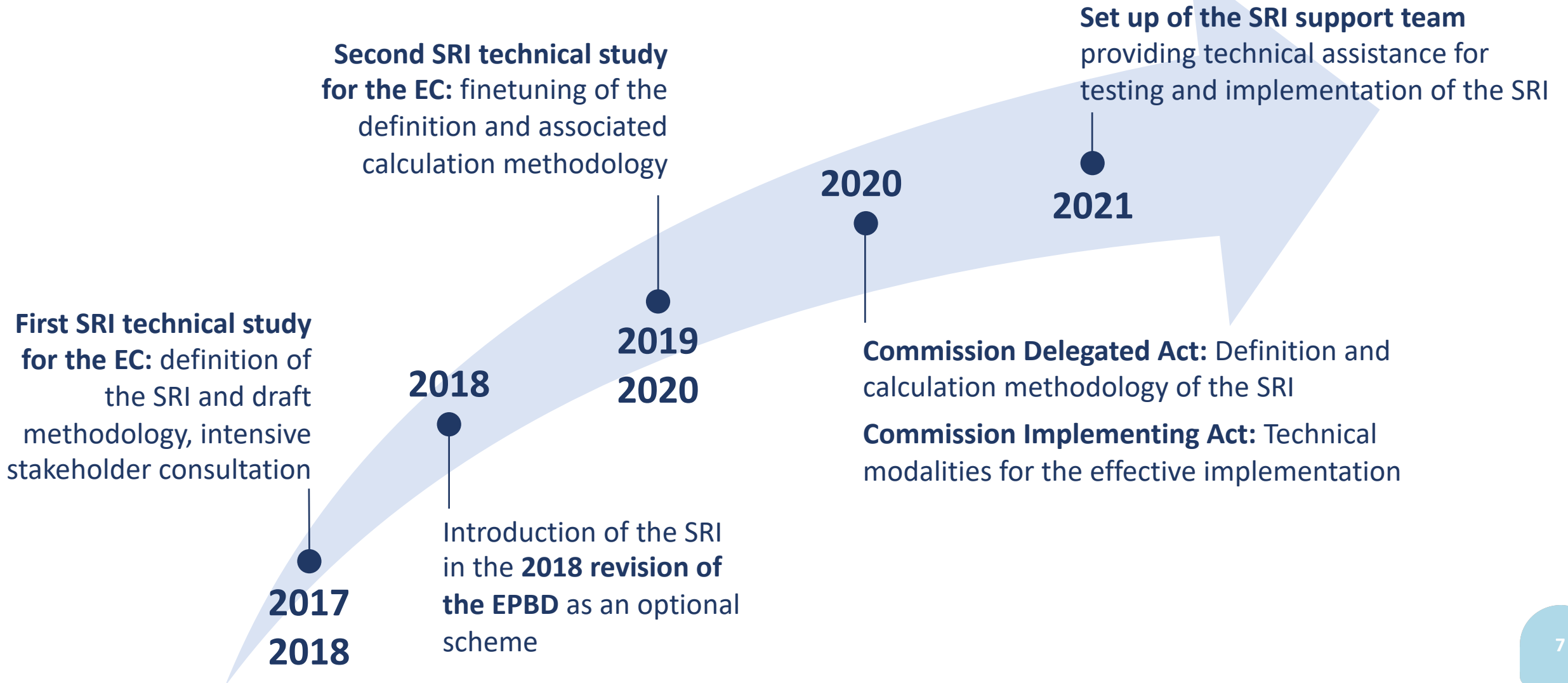
- With the [European Green Deal](#) and the [Renovation Wave](#), the European Union promotes the renovation of buildings, to help people cut their energy bills and energy use
- The [2018 revision of the European Energy Performance of Buildings Directive \(EPBD\)](#) heavily emphasised the potential 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 implement the SRI (with possibly a preliminary test phase)

# Introduction to the SRI framework

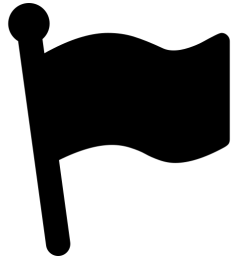
Smart technologies will be an essential enabler to **decarbonise the building sector**, while offering **healthier, more efficient**, and **comfortable** living environments



# History of the SRI



# Launch of official SRI testing phases



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

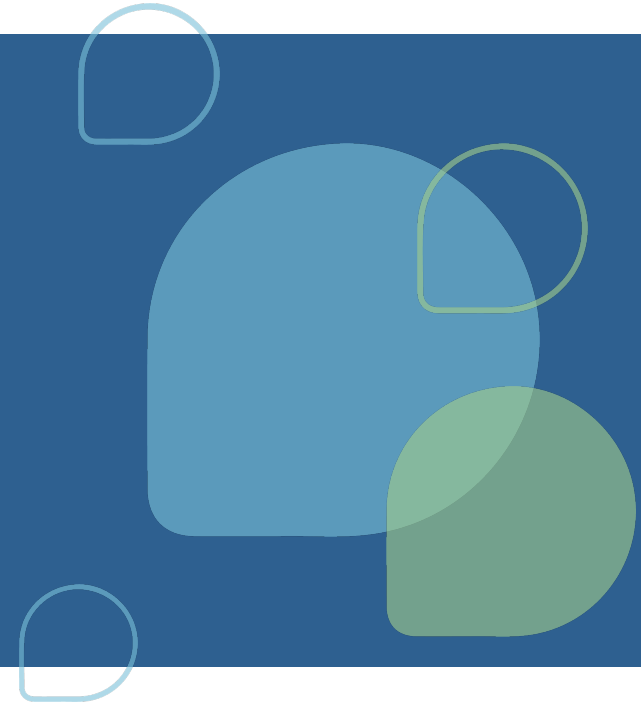
Only where a government decides to do so, formal SRI assessments can be conducted.



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.

# Overview of the scoring methodology



# 3 key functionalities

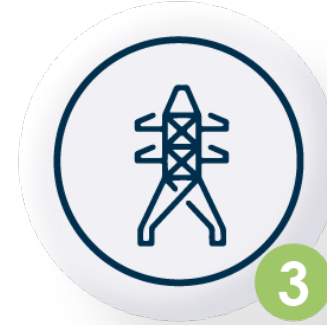
- The SRI assesses buildings (or building units), based on their capacity to satisfy three key functionalities:



Optimise energy  
efficiency and overall  
in-use performance



Adapt their operation  
to the needs of the  
occupant



Adapt to signals  
from the grid  
(energy flexibility)

# 7 impact criteria

- The three key smart-readiness functionalities can be further detailed into seven impact criteria:



Optimise energy efficiency and overall in-use performance



Adapt their operation to the needs of the occupant



Adapt to signals from the grid (energy flexibility)



Energy efficiency



Maintenance and fault prediction



Comfort



Convenience



Health, well-being and accessibility



Information to occupants



Energy flexibility and storage

# 9 technical domains

- The methodology for calculating the SRI is based on the **assessment of smart-ready services** that the building has or could use ("service catalogue"). These services are grouped into **nine technical domains**:



Heating



Cooling



Domestic hot  
water



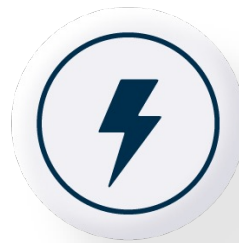
Ventilation



Lighting



Dynamic building  
enveloppe



Electricity



















Electric vehicle  
charging



Monitoring and  
control

















# 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...




















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

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

# Required and optional features

**Core of the SRI methodology  
(required)**

- 3 key functionalities
- 7 impact criteria
- 9 technical domains

*Service catalogue*

*Weighting factors*

*Inclusiveness,*

*connectivity, interoperability, cybersecurity, data protection*

**Potential contextual adaptations**

→ *Guidance will be provided by the EC*

# Must-know before undertaking an SRI assessment





# 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)

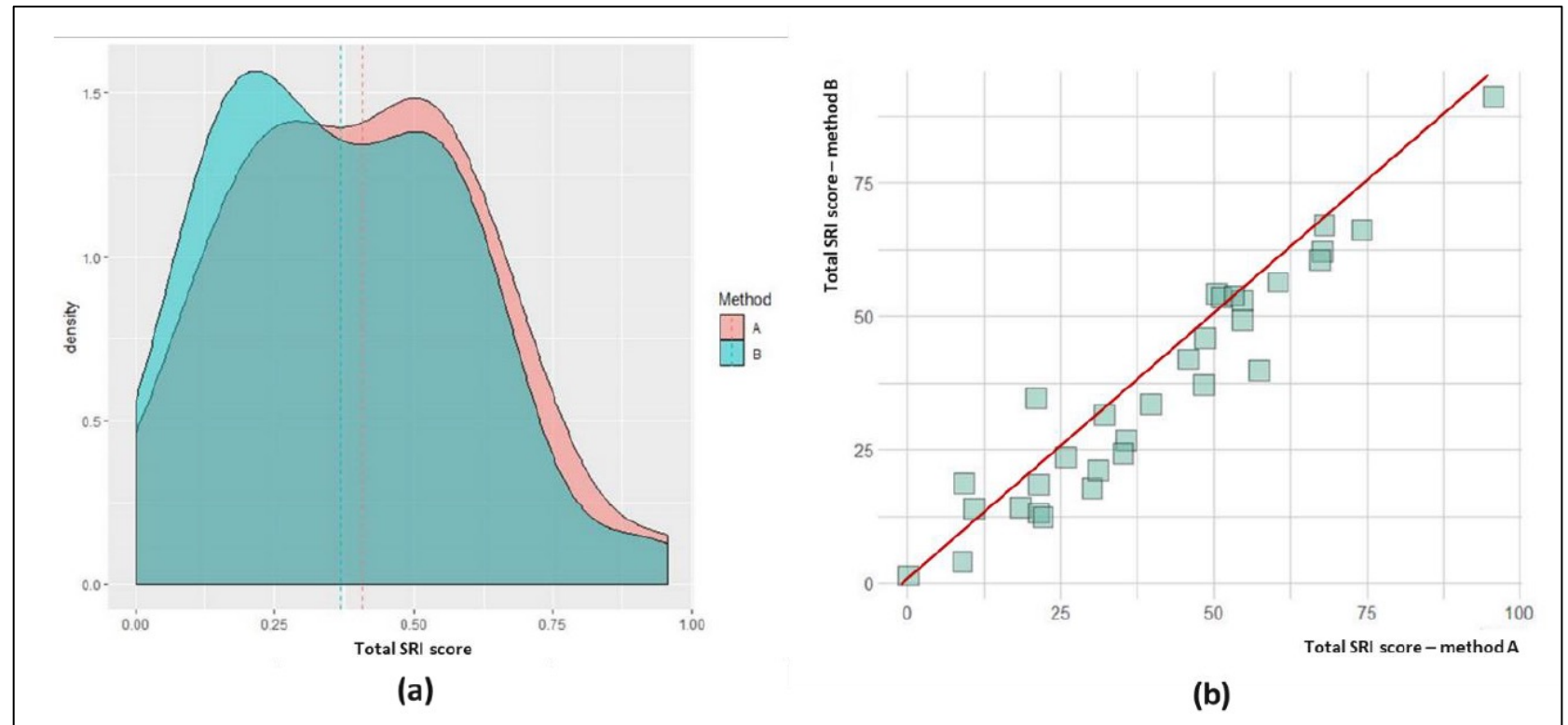
- Full, detailed service catalogue
- Typically for **new buildings** and **non-residential buildings** (higher complexity)
- On-site inspection / walk-through needed
- Assessment time < 1 day
- Necessary involvement of an expert, with support from a facility manager

- 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



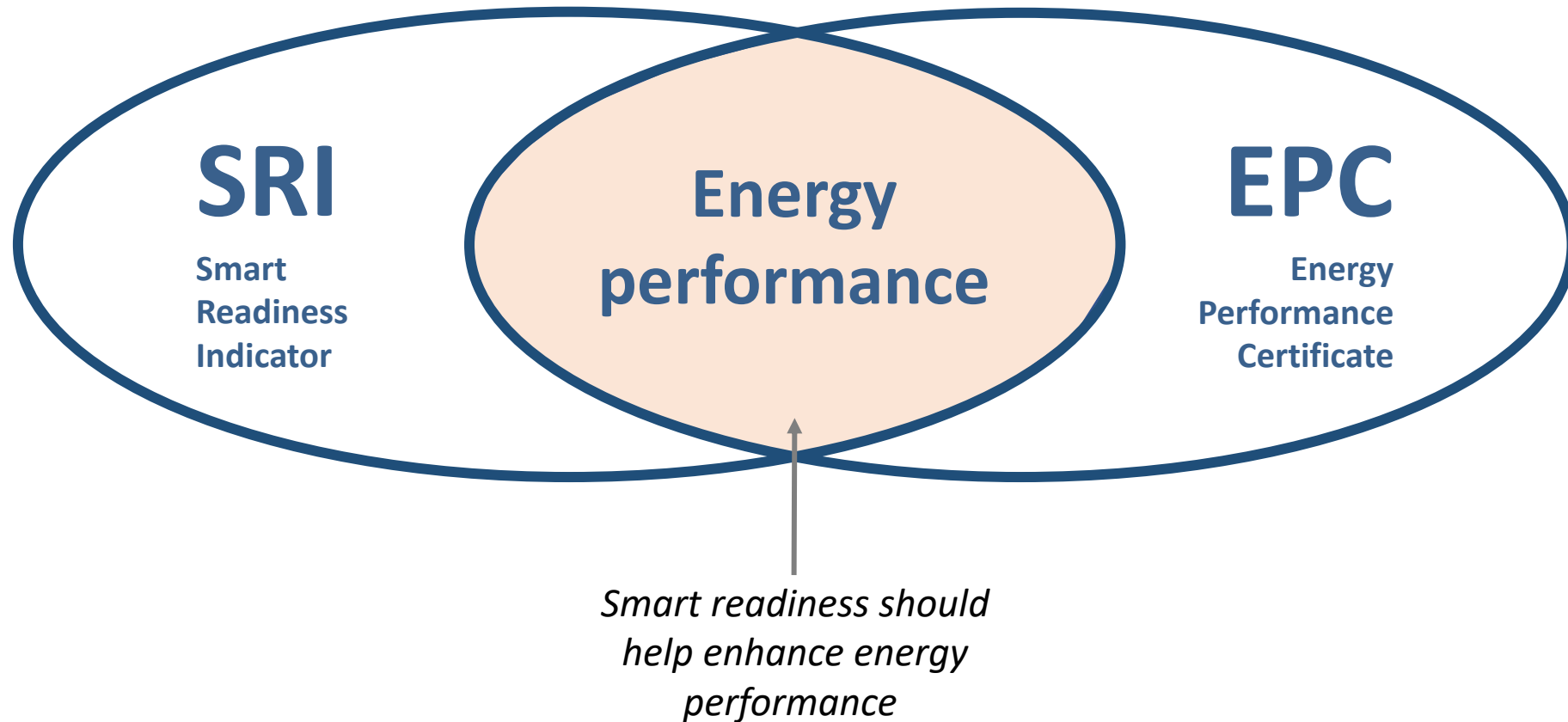
*Comparison of methods A and B, applied to the same buildings during the public beta test*



# 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.

# 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

# 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

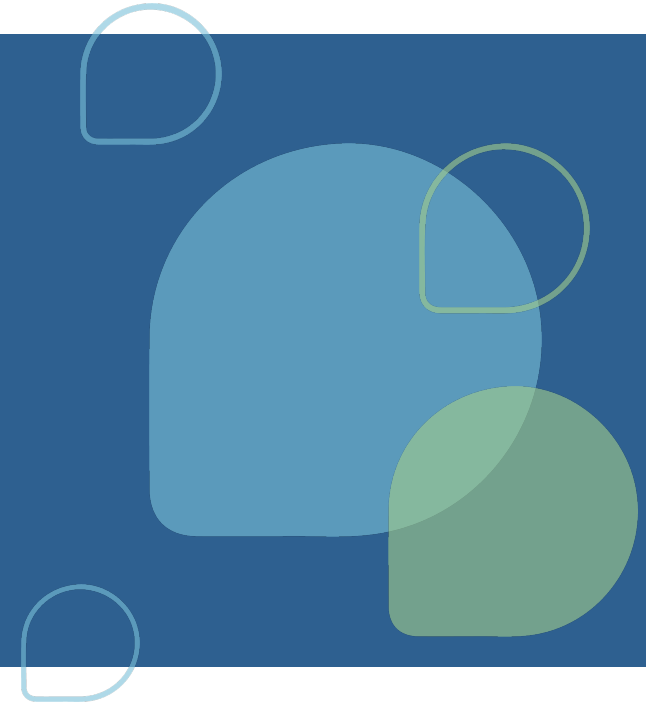
### of the SRI framework



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.

The SRI support team is working on possible design options for the SRI certificates. For this purpose, in-depth consultations of potential end users are being carried out, in collaboration with Member States.

# How to assess the smart readiness of a building



# 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)**



# The SRI calculation sheet

## Multiple tabs:



- General information & glossary
- Important instruction:

**Input fields:** use these yellow input fields to provide the requested information (see below)

All other fields: all other fields are filled automatically and cannot be edited

# The SRI calculation sheet

## Multiple tabs:



- Language choice
- Assessor information
- Building information
  - Includes the location (country) to which a predefined climate zone is automatically assigned. *Further information on climate zones on slide 42.*
- Important choices to be made for the assessment
  - Choice between method A and B
  - Choice between default or user-defined weighting factors. *Further information on user-defined weighting factors on slide 30.*
  - Triage process depending on the presence of each of the nine technical domains in the building. *Further information on triage process on slides 38-40.*

# The SRI calculation sheet

## Multiple tabs:



- Pages with technical information for the calculations.  
No user input needed.

# The SRI calculation sheet

## Multiple tabs:



- Catalogue of smart-ready services and corresponding functionality levels. *Further information on functionality levels on slides 31-34.*

- The catalogue is either
  - Full if method B has been chosen: 54 pre-defined services
  - Simplified if method A has been chosen: 27 pre-defined services
- The services can also be user-defined:
  - Each pre-defined service can be enabled or disabled manually
  - Additional services can be defined by the user for each technical domain

# The SRI calculation sheet

## Multiple tabs:



- This tab is where the assessment is performed by the assessor. For each service available, the assessor evaluates the functionality level enabled by the building. *Further information on functionality levels on slides 31-34.*
- This is the main page to be used by the assessor, who is also invited to provide the estimated assessment time (minutes) and optional comments.

# The SRI calculation sheet

## Multiple tabs:



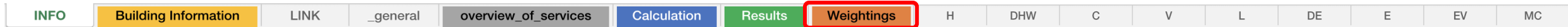
### ● In this tab the result of the assessment is displayed:

- Total SRI score and SRI class
- Aggregate scores for each of the three key functionalities
- Aggregate scores for each of the seven impact criteria
- Aggregate scores for each of the nine technical domains
- Detailed scores per impact criterion and technical domain

- The way results are presented in this tab does not necessarily reflect the final presentation/format of the SRI certificate, which is still the subject of research and consultation.

# The SRI calculation sheet

## Multiple tabs:



- In this tab, the user can modify the default weights assigned to each pair Technical domain - Impact criterion.
  - Default weighting factors are set according to the relative importance of each domain in the energy balance of the building wherever deemed relevant (and equal or fixed weighting factors elsewhere). In addition:
    - **Default weighting factors are different for residential and non-residential buildings** (reflecting for instance the differences in relative importance of domains such as domestic hot water)
    - **Default weighting factors are different for each climate zone** (reflecting for instance the differences in relative importance of heating). *Further information on climate zones on slide 42.*
- Detailed explanations about default weighting factors are provided in the practical guide accompanying the calculation sheet

# The SRI calculation sheet

## Multiple tabs:



- These tabs correspond to each of the nine technical domains. A score (between 0 and 3) is attributed to each smart-ready service, according to the functionality level evaluated by the assessor.
- These tabs do not need to be modified if the regular service catalogue is used
- If additional services are defined, corresponding functionality levels and scores must be set for each impact criterion

# Some examples of functionality levels

*From non-smart...*

*... to maximum smartness*

| Code   | Smart ready service   | Functionality level 0 (default)      | Functionality level 1   | Functionality level 2   | Functionality level 3  | Functionality level 4  |
|--------|---|--------------------------------------|---|---|--|--|
| H-1a   | Heat emission control                                       | No automatic control                 | Central automatic control (e.g. Central thermostat)   | Individual room control (e.g. thermostatic valves, or electronic controller)  | Individual room control with communication between controllers and to BACS                           | Individual room control with communication and occupancy detection   |
| DHW -3 | Report information regarding domestic hot water performance | None                                 | Indication of actual values (e.g. temperatures, submetering energy usage)   | Actual values and historical data   | Performance evaluation including forecasting and/or benchmarking                                     | Performance evaluation including forecasting and/or benchmarking; also including predictive management and fault detection |
| C-2a   | Generator control for cooling                               | On/Off-control of cooling production | Multi-stage control of cooling production capacity depending on the load or demand (e.g. on/off of several compressors) | Variable control of cooling production capacity depending on the load or demand (e.g. hot gas bypass, inverter frequency control) | Variable control of cooling production capacity depending on the load AND external signals from grid |  |

# Some examples of functionality levels

*From non-smart...*

*... to maximum smartness*

| Code | Smart ready service                       | Functionality level 0 (default)         | Functionality level 1  | Functionality level 2   | Functionality level 3   | Functionality level 4  |
|------|---|---|--|---|---|--|
| V-1a | Supply air flow control at the room level | No ventilation system or manual control | Clock control  | Occupancy detection control                                     | Central Demand Control based on air quality sensors (CO2, VOC, humidity, ...) | Local Demand Control based on air quality sensors (CO2, VOC,...) with local flow from/to the zone regulated by dampers |
| L-1a | Occupancy control for indoor lighting     | Manual on/off switch                    | Manual on/off switch + additional sweeping extinction signal | Automatic detection (auto on / dimmed or auto off)              | Automatic detection (manual on / dimmed or auto off)                          |  |
| DE-1 | Window solar shading control              | No sun shading or only manual operation | Motorized operation with manual control                      | Motorized operation with automatic control based on sensor data | Combined light/blind/HVAC control   | Predictive blind control (e.g. based on weather forecast)  |



# Some examples of functionality levels

*From non-smart...*

*... to maximum smartness*

| Code  | Smart ready service  | Functionality level 0 (default)   | Functionality level 1   | Functionality level 2                              | Functionality level 3  | Functionality level 4  |
|-------|--|---|---|--|--|--|
| E-2   | Reporting information regarding local electricity generation | None  | Current generation data available   | Actual values and historical data                  | Performance evaluation including forecasting and/or benchmarking | Performance evaluation including forecasting and/or benchmarking; also including predictive management and fault detection |
| EV-15 | EV Charging Capacity   | Not present   | Ducting (or simple power plug) available  | 0-9% of parking spaces has recharging points       | 10-50% of parking spaces has recharging point                    | >50% of parking spaces has recharging point  |
| MC-25 | Smart Grid Integration                                       | None - No harmonization between grid and TBS; building is operated independently from the grid load | Demand side management possible for (some) individual TBS, but not coordinated over various domains | Coordinated demand side management of multiple TBS |  |  |



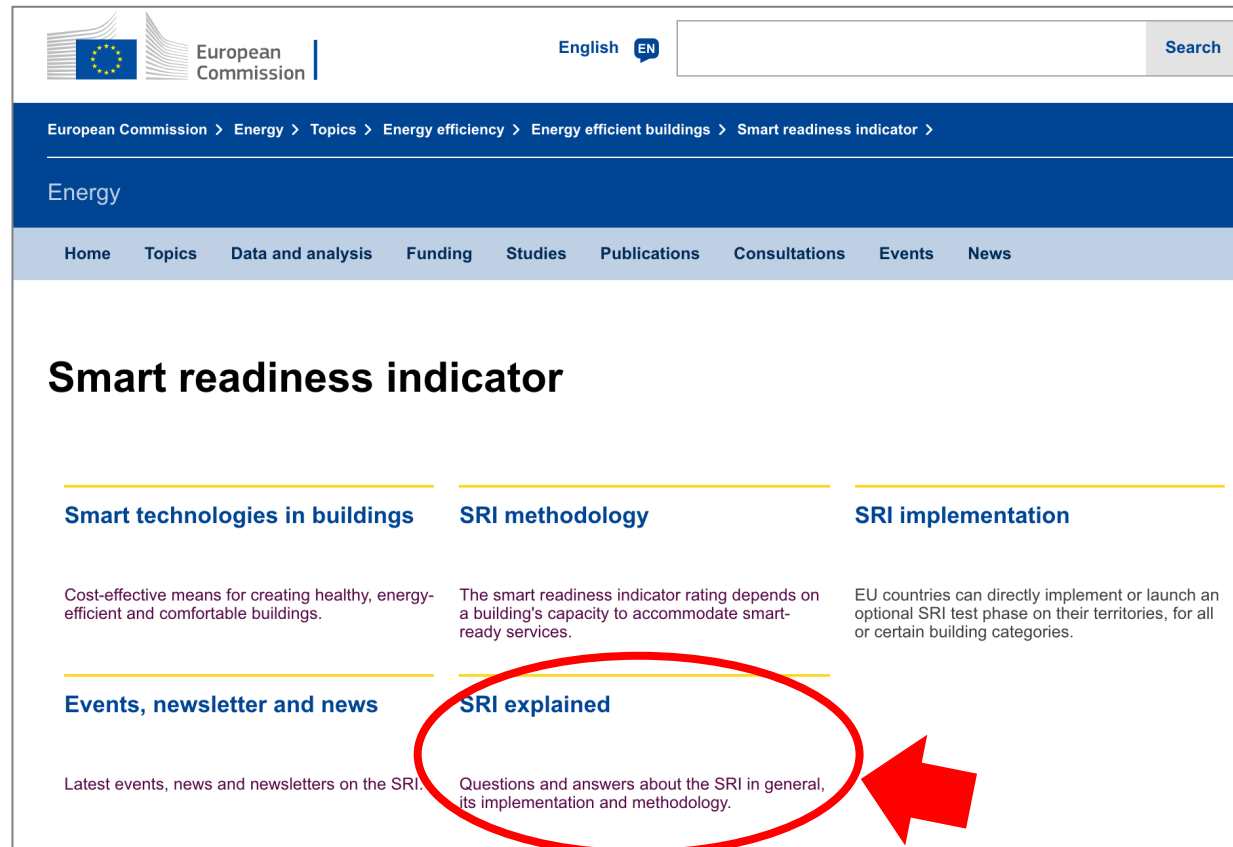
# Tips and tricks

## 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>




- It is regularly updated, always check it first
- New questions can be sent to the SRI support team at [support@smartreadinessindicator.eu](mailto:support@smartreadinessindicator.eu)

# 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  | K   |   |   |  | L  |  |
|------|--|--|---|---|---|--|--|--|
|      |  |  | Service applicable in your building? - to be assessed by the assessor: 1 - applicable; 0 - not applicable | Main functionality level as inspected by SRI assessor | 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  |  |

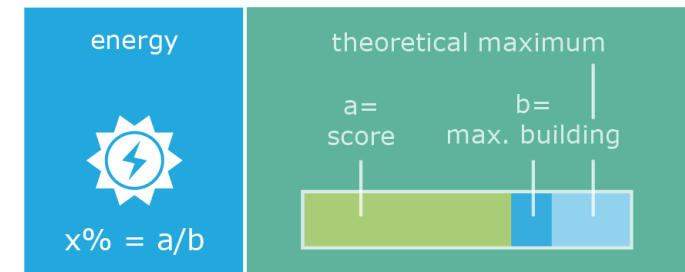
In this case, the functionality level is 3 for 60% of the net surface floor area, and is 0 for the remaining 40%

- For each service, no more than two functionality levels are accommodated by the calculation sheet

# 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)



# 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

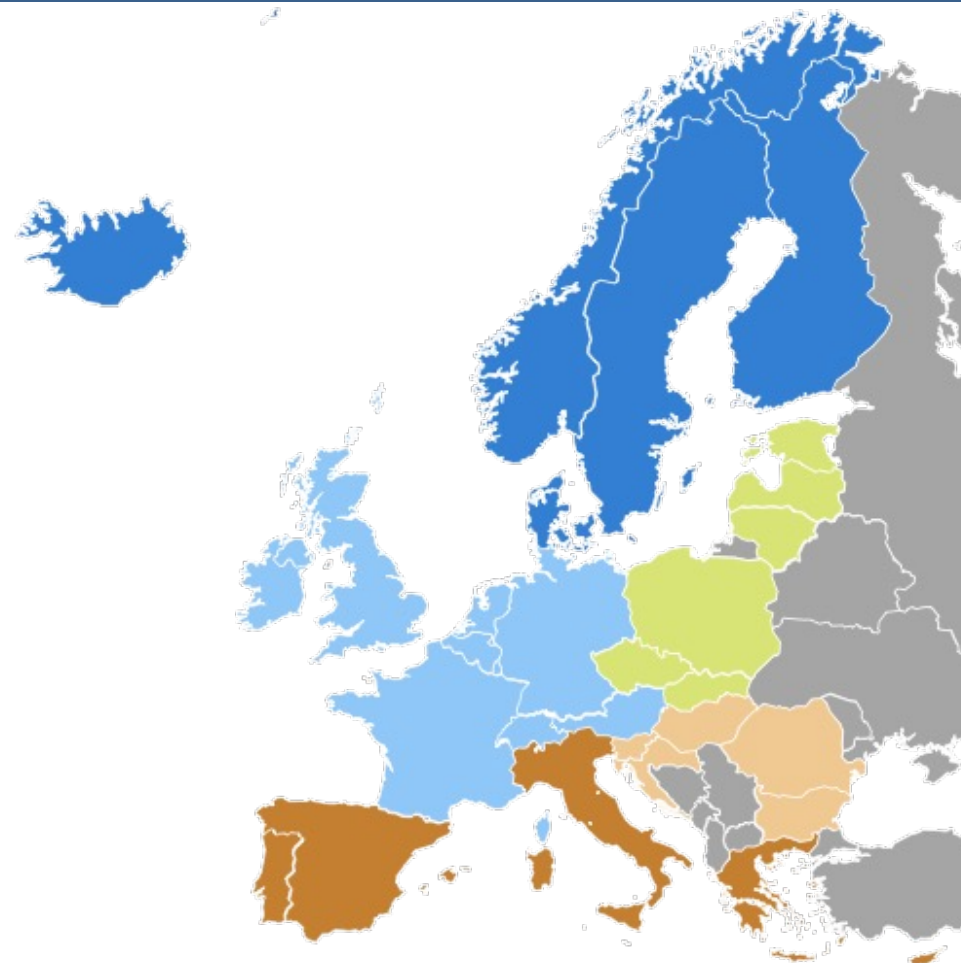
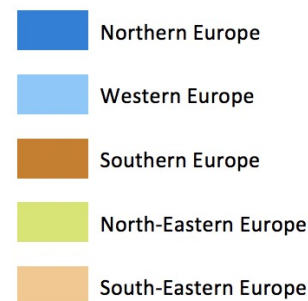
## **Examples:**

- 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 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



# References





# Legal texts

- [Energy Performance of Buildings Directive](#) (2010/31/EU)
- [Amending Energy Performance of Buildings Directive](#) (2018/844/EU)
- [Consolidated version of the Energy Performance of Buildings Directive](#)
- [Implementing regulation on optional scheme for rating smart readiness of buildings](#) C(2020) 6929 | [Annex](#)
- [Delegated regulation on optional scheme for rating smart readiness of buildings](#) C(2020) 6930 | [Annex](#)



# Material from a study carried out in 2019-2020, supporting the development of the SRI

- Final report on the technical support to the development of a smart readiness indicator for buildings
- Executive summary of the final report
- Annex C - simplified service catalogue (Excel sheet)
- Annex D - detailed service catalogue (Excel sheet)



# SRI web resources

- [SRI webpage](#)
- [SRI newsletter subscription page](#)
- Contact of the SRI support team (helpdesk):  
[support@smartreadinessindicator.eu](mailto:support@smartreadinessindicator.eu)

# Thanks for your attention!

Contact: [support@smartreadinessindicator.eu](mailto:support@smartreadinessindicator.eu)

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