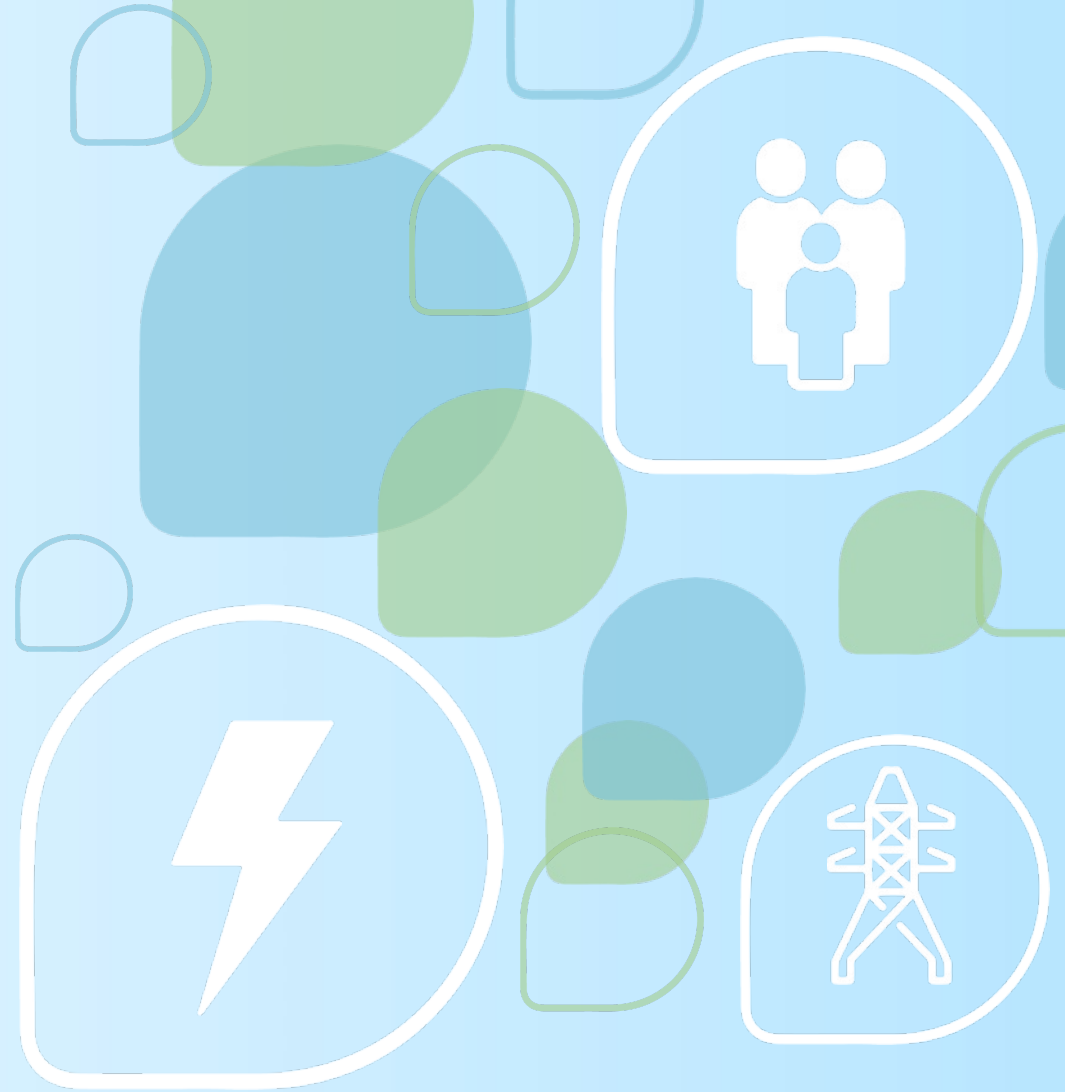


Smart Readiness Indicator (SRI)

SRI Platform
Working Group 1
Third meeting



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



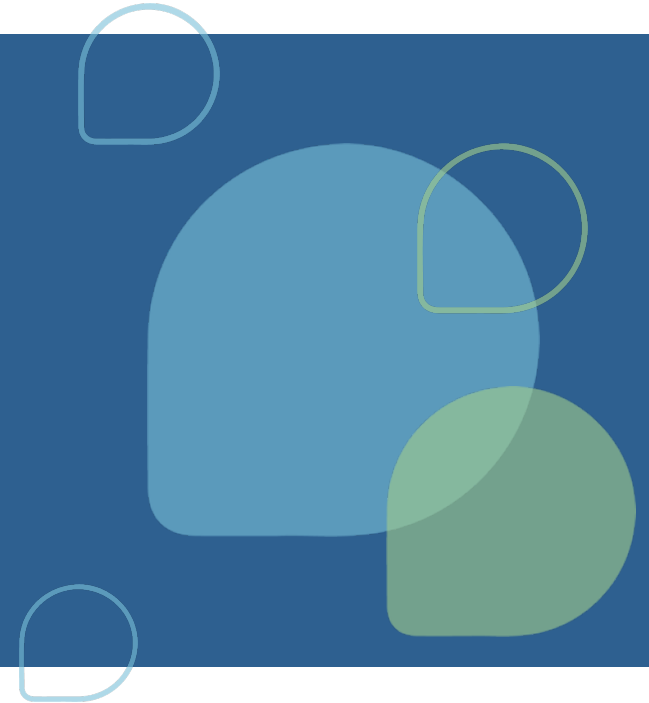
- This document has been prepared for the European Commission; however, it reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein



Agenda

9:30	Update from the European Commission	Brigitte Jacquemont, EC
9:35	Update about the EPBD Concerted Action	Xavier Loncour, EPBD CA
9:40	Details about the 4 LIFE projects selected Possible interactions with Member States	Pierre-Antoine Vernon, EC SRI support team
10:10	Status of online tools for assessing the SRI	SRI support team
10:20	Test phases update	Member States
10:40	Ongoing survey: Assessment of the needs of Member States	SRI support team
10:45	SRI methodology: user feedback and revision process	SRI support team Member States
11:10	Identification of exemplary buildings (ongoing)	SRI support team
11:20	Conclusions & next steps	All

Introductory words from the European Commission



Update about the EPBD Concerted Action



Details about the 4 LIFE projects
selected

Possible interactions with
Member States





LIFE Clean Energy Transition

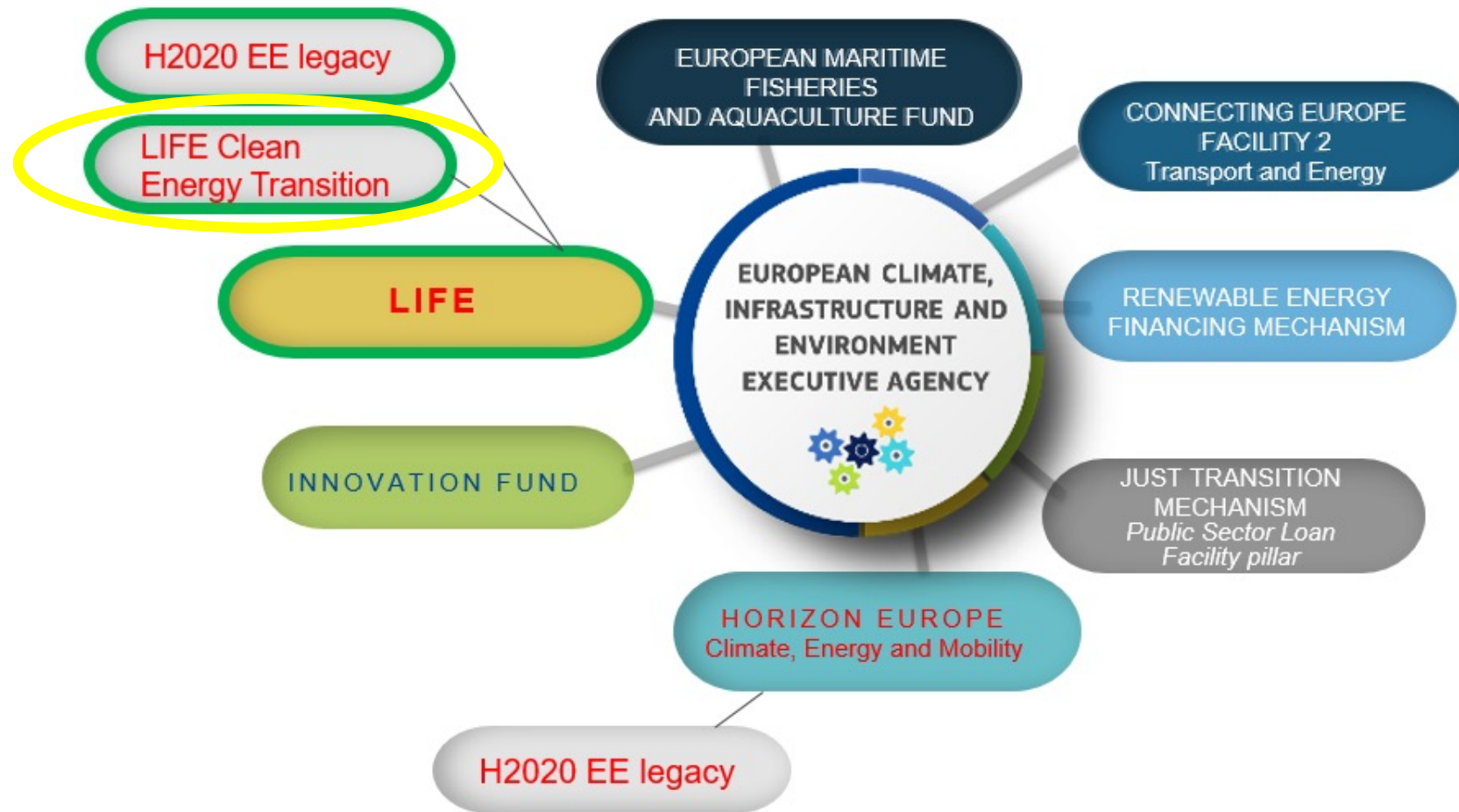
Presentation of the SRI projects

SRI Platform WG1 meeting #3 – 18 January 2023



CINEA – LIFE Climate & Energy Unit
Pierre-Antoine Vernon, Project Adviser

CINEA – the European Green Deal Agency



CINEA – the European Green Deal Agency



EU programmes' smart building and SRI action – big picture

Innovative technologies, methods & processes



Policy (technical) support, capacity building, market uptake

A supportive framework for the SRI in Europe



Horizon2020
European Union Funding
for Research & Innovation



European
Commission

EU programmes' SRI-relevant action – recent history



Horizon2020
European Union Funding
for Research & Innovation

EU funding to support smart /
digital buildings
Calls with explicit reference to
the SRI



Innovation for smart /
digital buildings



Energy performance
and smart readiness
of buildings

Project mapping: 64
projects granted
450 million € under
35 topics

LC-SC3-B4E-2020
Smart buildings
> 30 million €

HORIZON-CL5-D4
Smart buildings
> 40 million €

**LIFE-CET-2022-
BUILDPERFORM**
6 million €



LC-SC3-EE-4-2019
10 million €

**LIFE-2021-CET-
SMARTREADY**
6-8 million €

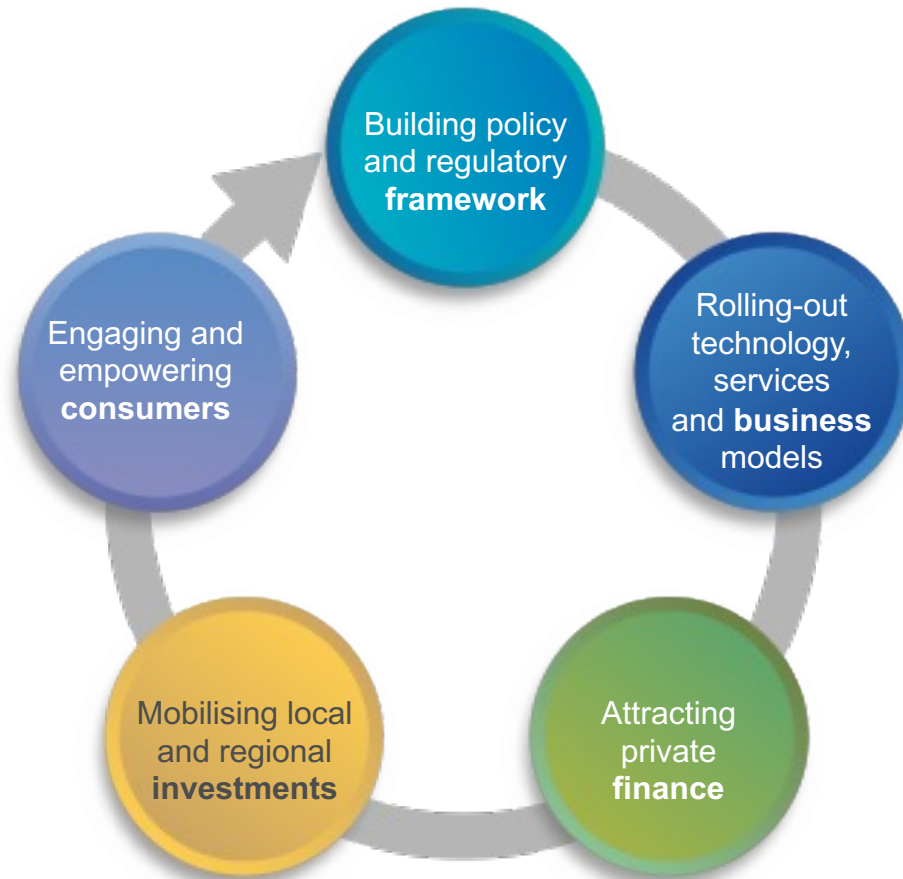
?



The sub-programme Clean Energy Transition



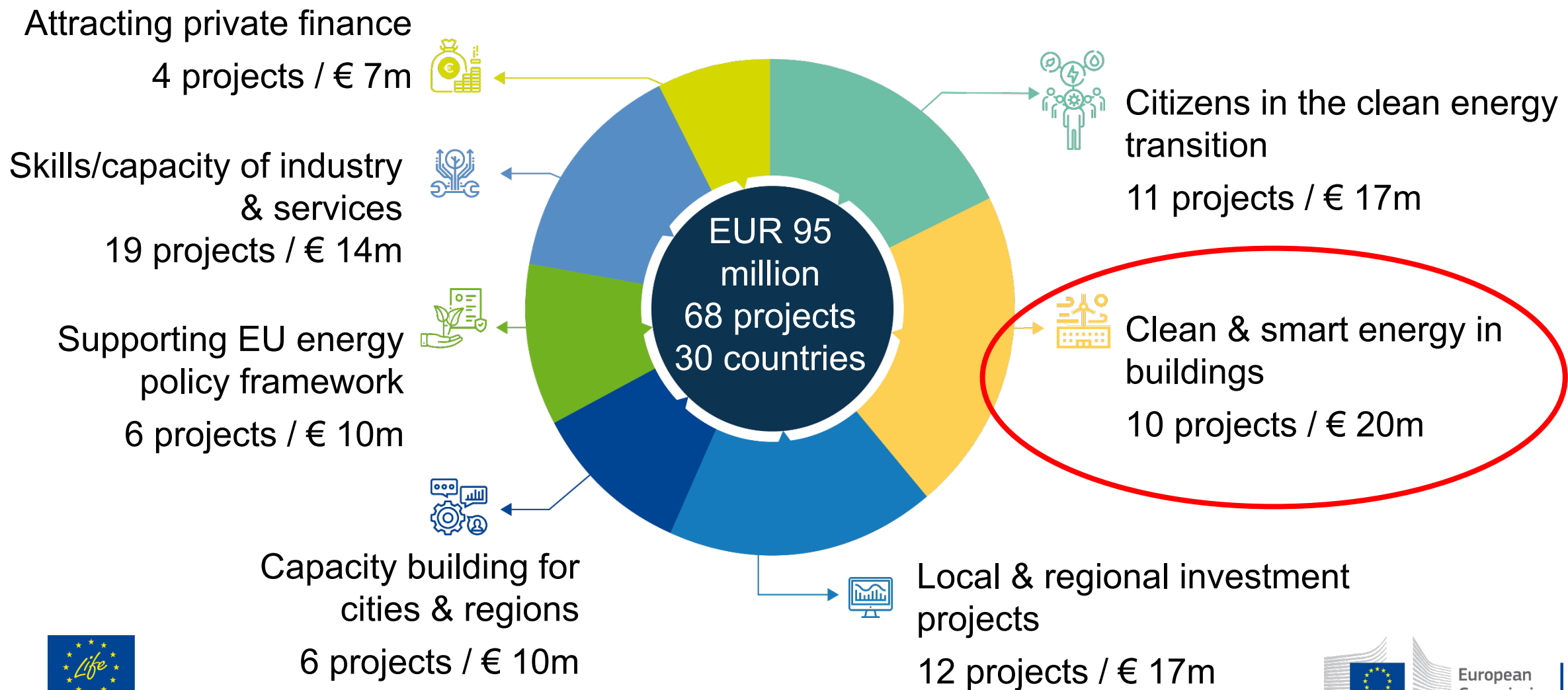
Clean Energy
Transition



- LIFE is 30 / LIFE CET created 2021
- Successor to Intelligent Energy Europe and Horizon 2020 Energy Efficiency
- Key objective: creating market & regulatory enabling conditions for the clean energy transition – focus on **non-technological** aspects
- 2021-2027 budget of almost €1 bn



Outcome of the LIFE CET 2021 call



Focus: LIFE CET 2021 'SMARTREADY' topic

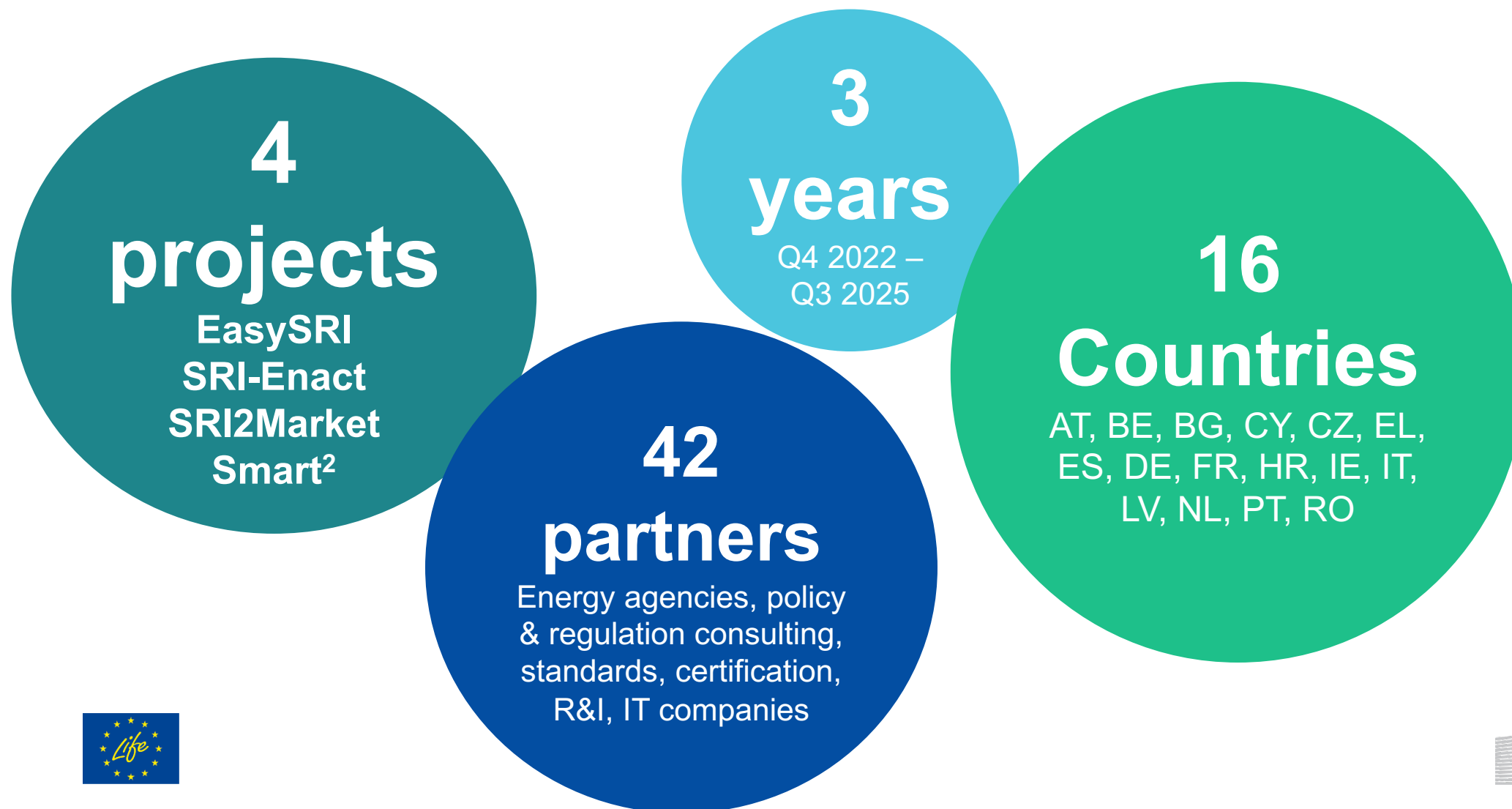
- Implementation of the Smart Readiness Indicator
- Market up-take of the Smart Readiness Indicator
- Rollout of ICT and smart-ready technologies
- Developing tools/packages for SRI upgrades
- Developing audit/certification tools, training

Facts & figures

- LIFE Clean Energy Transition
- SRI – 'Global improvement of smart readiness of European buildings'
- 8 million € EU funding
- 4 projects



LIFE SRI projects – facts & figures



Smart Square

- Focus: cloud-based open platform for assessing the intelligence of buildings including several novel ideas: using real-time data, investigating Artificial Intelligence for SRI calculation, on-line self assessment, etc.
- Result: a building auditing tool tailored to specific categories of buildings professionals and supported with appropriate trainings and a 'SRI helpdesk'. The tool integrates SRI auditing with other energy performance auditing (EPC, energy audits, building logbooks)
- The tool targets Europe as a whole. On-site pilot audits in CY, EL, IT

Budget: 1.9 Mio Euros



Smart Square

Team: CY.R.I.C (coordinator), R2M, REHVA, Arcadis, EnEffect, Romanian standardisation agency ASRO, Brainbox AI (Canada)



SRI-Enact - Co-creating Tools and Services for Smart Readiness Indicator Uptake

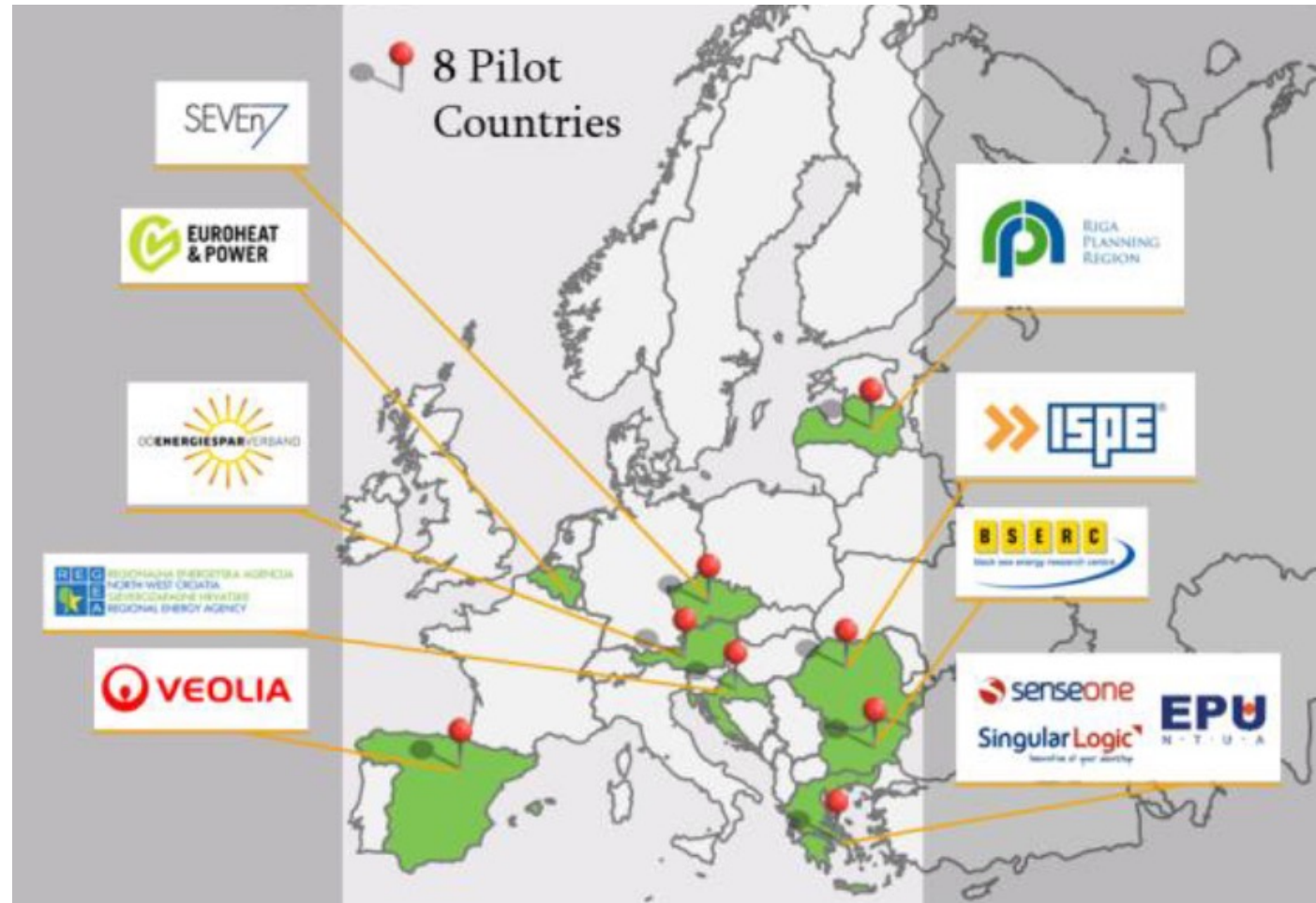
- Development of a toolkit enabling SRI-assessment and decision support to allow for better informed decision making on smartness upgrades
- Evaluated in 1200 buildings in 8 EU countries (AT, BG, HR, CZ, EL, LV, RO, ES)
- Accompanied by training activities for SRI-auditors

Duration: 30 months; **Budget:** 2 Mio Euros

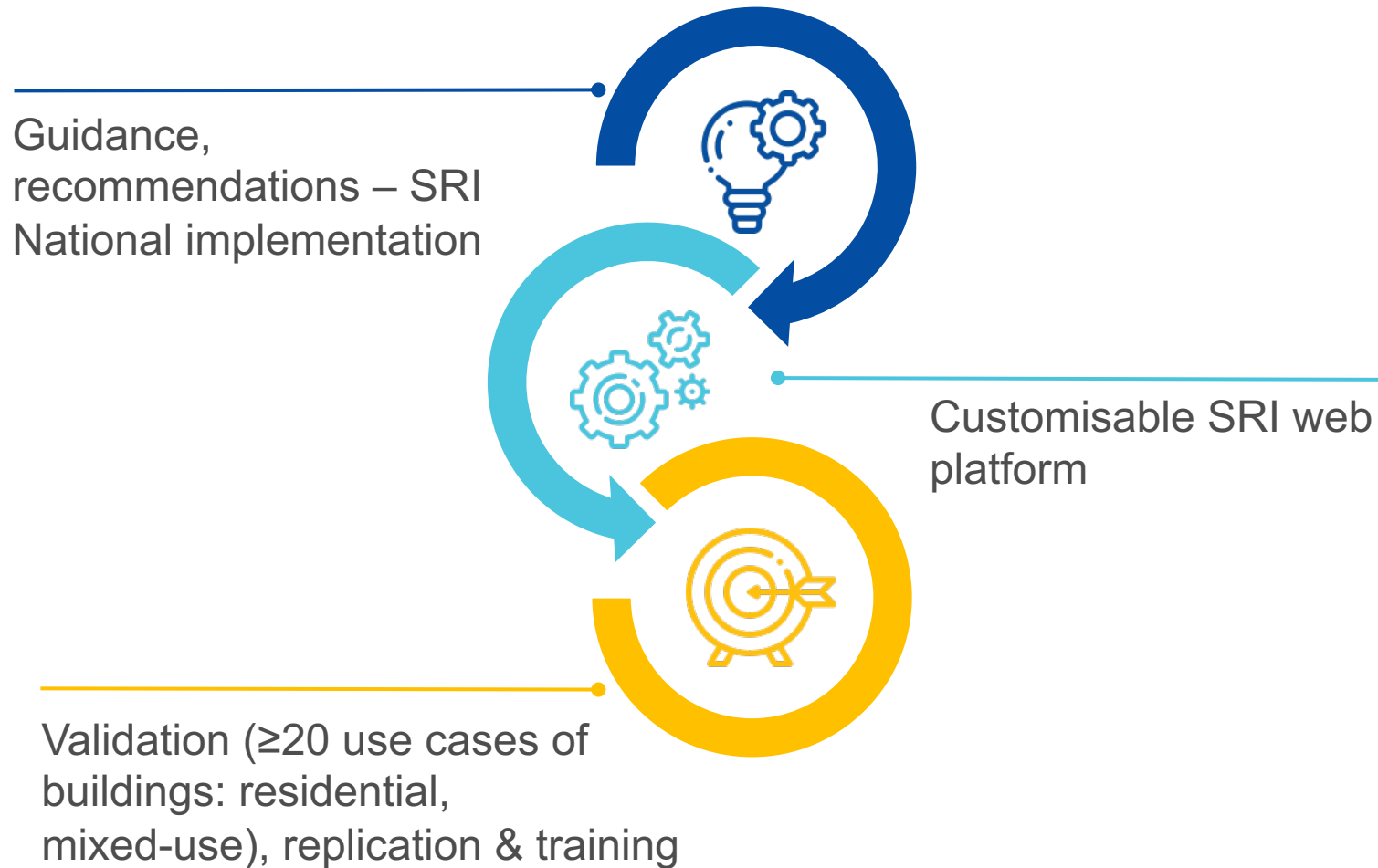


SRI-Enact - Co-creating Tools and Services for Smart Readiness Indicator Uptake

Team: 10 + 1 partners
from 9 countries,
gathering experts in
software and energy
auditing, energy
agencies, utilities and
district heating
association (EHP)



EasySRI – Improving and demonstrating the potential of the SRI



- 36 months
- Start date: Nov. 2022
- EUR 2 million EU funding



EasySRI – Improving and demonstrating the potential of the SRI



CERTH

CENTRE FOR RESEARCH & TECHNOLOGY HELLAS



CENTRE FOR RESEARCH & TECHNOLOGY - HELLAS

Information Technologies Institute

ENERGY@WORK



SERA



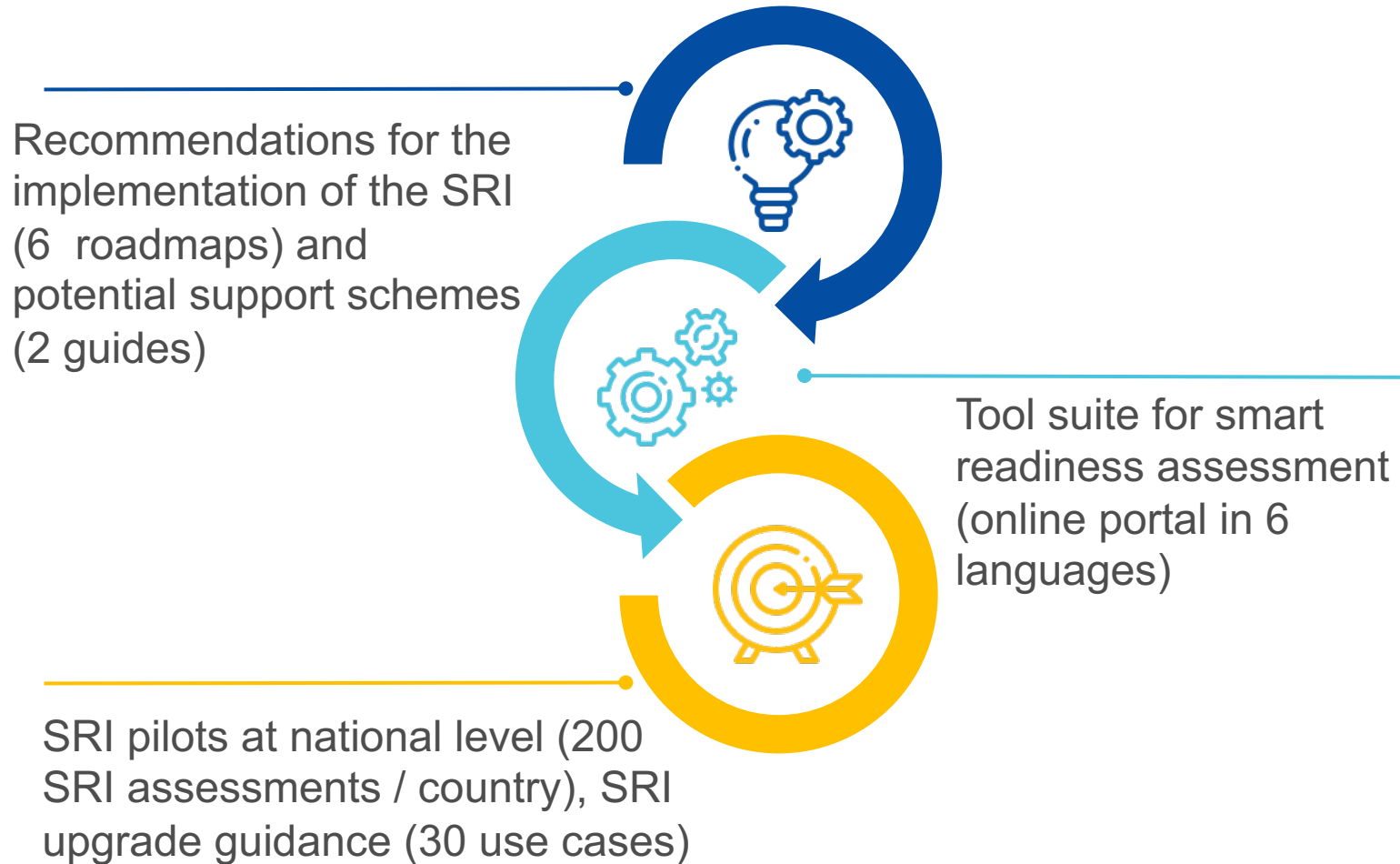
Waide Strategic Efficiency



**ΚΑΠΕ
CRES**



SRI2MARKET – Paving the way for the adoption of the SRI into national regulation and market



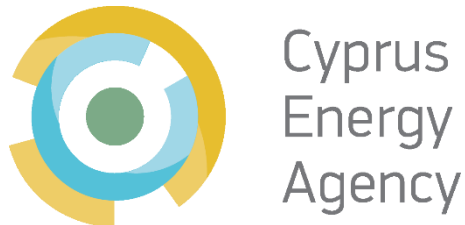
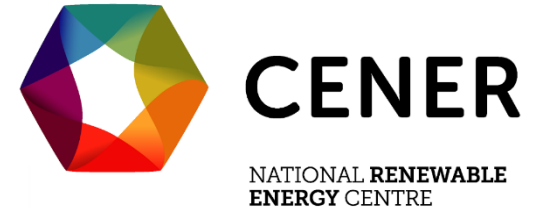
- 36 months
- Start date: Nov. 2022
- EUR 1.9 million EU funding

SRI2MARKET



SRI2MARKET – Paving the way for the adoption of the SRI into national regulation and market

12 partners (Policy & regulation consulting, energy agencies, R&I, energy certification) – AT, BE, CY, EL, ES, FR, HR, NL. PT



LIFE SRI projects – main activities

SRI policy support

- Policy dialogue
- Recommendations, guidance

SRI calculation framework

- Assessment / evaluation on real buildings
- Feedback and recommendations

Capacity building / market uptake

- Helpdesks & training
- Demonstration & testing

Digital tools

- Web interface
- Cloud-based platform
- SRI scores calculation

Smart capabilities

- AI-based generation of recommendations
- Self-assessment of smart readiness (real data)



SmartBuilt4EU – EU Smart Building Innovation Platform

- Started in October 2020, tackling all challenges to the smart buildings innovation community
- Achievements:
 - Database of members of the Smart Building Innovation Community
 - Factsheets on smartness upgrades for a set of representative buildings
 - Co-benefits of smart buildings deserving more investigation and promotion
 - Working Groups on major issues, resulting in White Papers
 - Future Research and Innovation priorities



Linking new LIFE projects and SRI implementation

- Q4 2022 – Kick-off meetings
- 16 November 2022 – 1st projects clustering workshop for the LIFE Smart Readiness Indicator (SRI) projects
- 23 November 2022 – 2nd SRI Platform plenary meeting
- 19 December 2022 – 2nd LIFE SRI projects clustering workshop
- 18-19 January 2023 – SRI Platform WG1 / SRI training for LIFE SRI Projects
- 16 February 2023 – 3rd LIFE SRI projects clustering workshop
- 22-23 March 2023 – 3rd SRI Platform plenary meeting / SmartBuilt4EU final conference



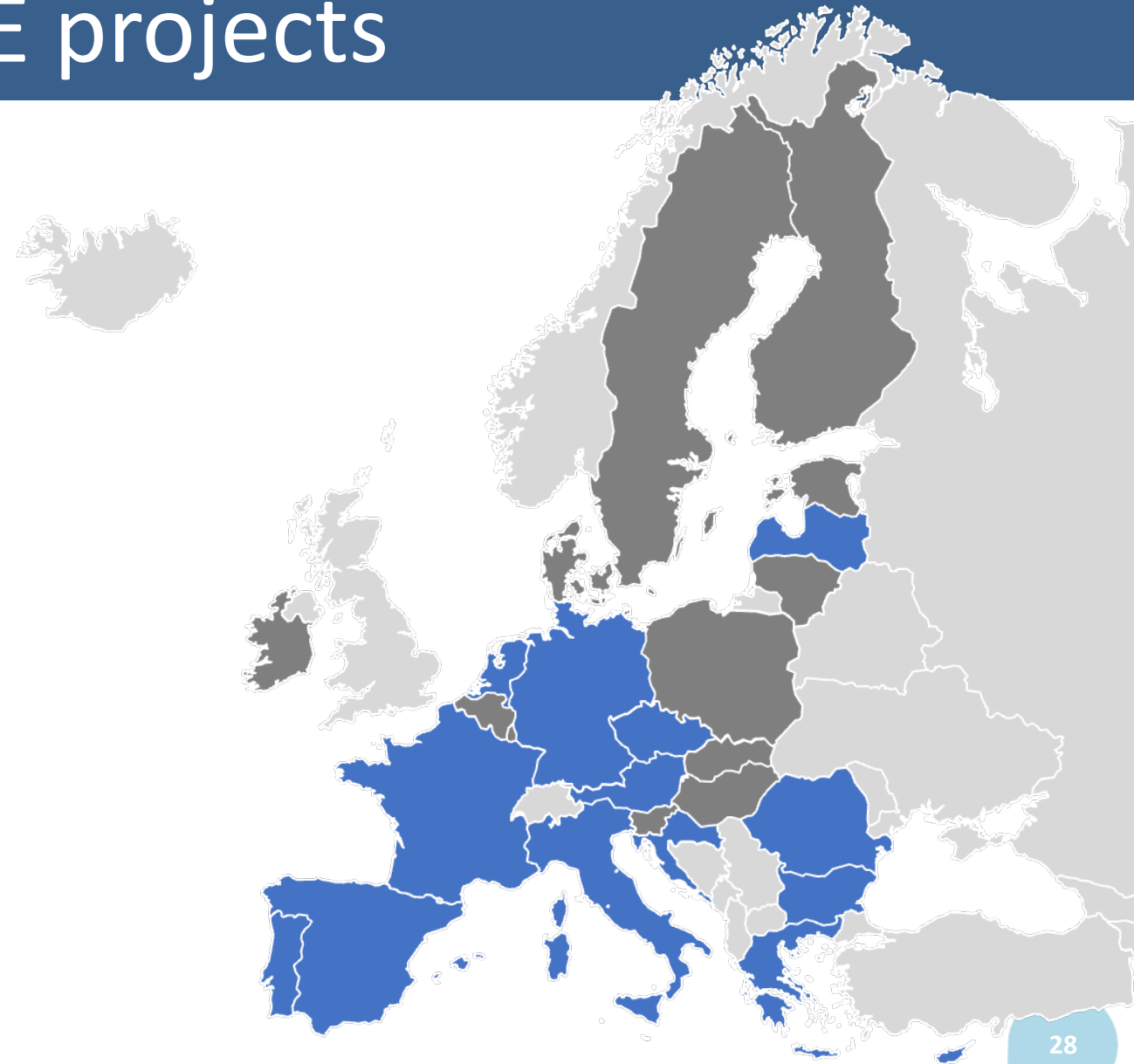
LIFE CET and SRI policy implementation

- Four areas of action / working groups:
 - SRI uptake in targeted countries and liaison with Authorities (lead: SRI2MARKET)
 - Design and development of SRI tools (lead: EasySRI)
 - Improvement of the smart-ready service catalogue (lead: Smart²)
 - Common communication and dissemination actions (lead: SRI-Enact)



Geographical coverage of the 4 LIFE projects

EU countries	Number of projects
Austria	2
Bulgaria	2
Croatia	2
Cyprus	3
Czech Republic	1
France	1
Germany	1
Greece	4
Italy	2
Latvia	1
Netherlands	1
Portugal	1
Romania	2
Spain	3



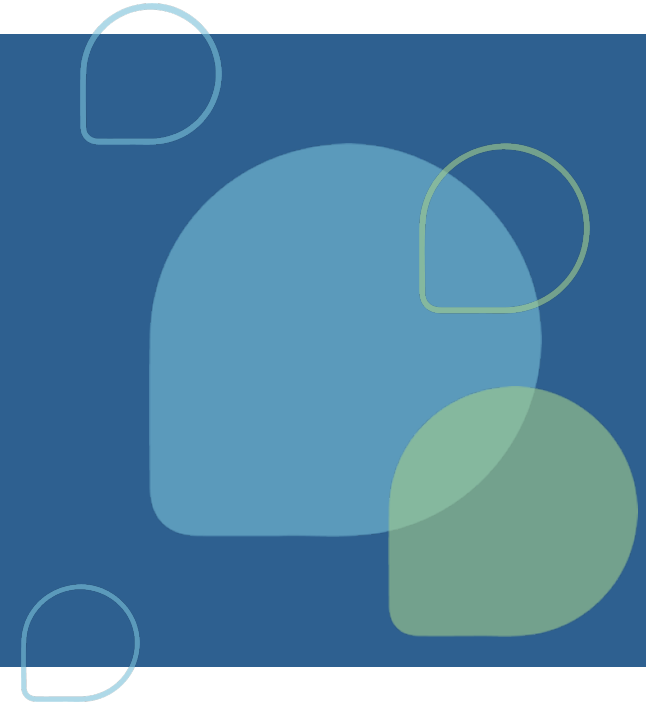
Projects and project partners in charge of reaching out to Member States

EU countries	Number of projects	SRI2MARKET	easySRI	SmartSquare	SRI-ENACT	Coordinating project
Austria	2	AEE INTEC, BOKU	SERA, AUSTRIAN STANDARDS		*	SRI2MARKET
Bulgaria	2			EnEffect	BSERC	SRI-ENACT
Croatia	2	EIHP			REGEA	SRI2MARKET
Cyprus	3	CEA	FREDU	CyRIC, Euphyia		SmartSquare
Czech Republic	1				SEVEEn	SRI-ENACT
France	1	R2M				SRI2MARKET
Germany	1			Cleopa		SmartSquare
Greece	4	UPRC, HEBES	CERTH	IsZEB	SLG, NTUA	SRI-ENACT
Italy	2		CETMA, E@W	ARCADIS, R2M		easySRI
Latvia	1				RPR	SRI-ENACT
Netherlands	1		DEMO			easySRI
Portugal	1	ADENE				SRI2MARKET
Romania	2			ASRO	ISPE	SmartSquare
Spain	3	CENER	SGS		VEOLIA	SRI2MARKET

Lead
Support

* To be confirmed

Status of online tools for assessing the SRI


















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, TIMEPAC, 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.

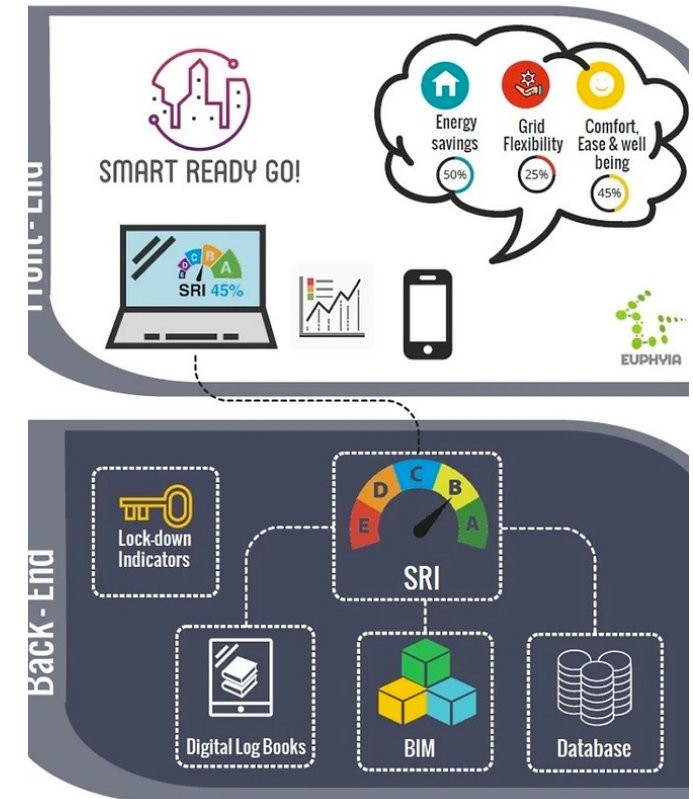
● **Targeted users:** Assessors, building owners, facility managers, building occupants, public authorities

● **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 D²EPC 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

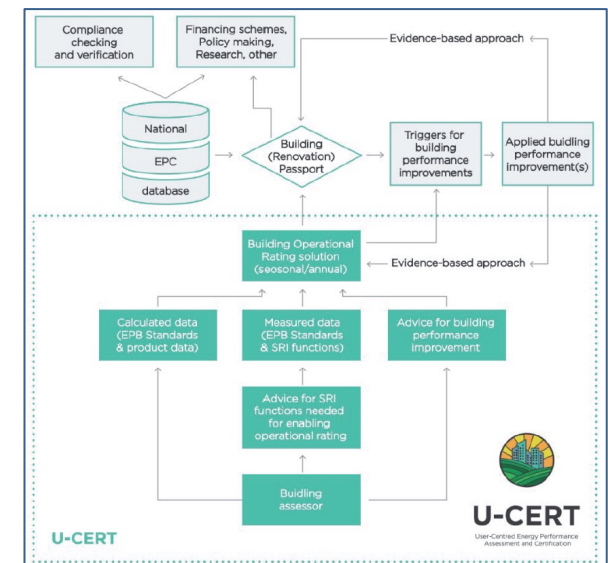
Contact information

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

Test phases update



Ongoing survey: Assessment of the needs of Member States





Ongoing survey: Assessment of the needs of Member States

- A set of **interviews** (survey) is being conducted to help inform the Commission Services on the **needs of the MS** with regards to the SRI
- Some of you have been contacted with regards to this request to undertake an informal interview – many thanks to those who have accepted and a **gentle reminder** to others to please respond to the request – also if you have not been approached but would like to be please let the support team know
- The interview findings are **anonymous** and will be **merged** so there is no attribution – the intent is to receive **individual views** rather than formal ones
- **Experts and professionals** who are not MS reps are also being interviewed for their perspectives on this topic



Assessment of the needs of Member States: indicative topics

- An accompanying memo is circulated to help stimulate thoughts that raises topics regarding
 - Communication
 - Certification
 - Webtools
 - Assessment methodology
 - Legal framework
- But the suggestions can cover any topic as the interviewee sees fit



Assessment of the needs of Member States: next steps

- The interviews should be complete before the end of January
- They will be followed up by an online survey to the broader public
- The findings will then be compiled and written into a report under the service contract
- A summary of findings can be shared with WG1 for the next meeting



Assessment of the needs of Member States: specific survey for calculation tools

- Supplementing the ongoing interviews, a more precise [online survey](#) is going to be distributed to Member States to help the European Commission understand MS' opinions and needs with regards to the development of SRI calculation tools
 - *What an SRI calculation tool should be used for ?*
 - *Who do you foresee will be the main users of the tool ?*
 - *Should the tool be accessible online or offline ?*
 - *Which stakeholders are more legitimate to lead the implementation and distribution of SRI calculation tools ?*
 - *Any additional comments or thoughts in relation to future SRI calculation tools*

SRI methodology: user feedback and revision process



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>

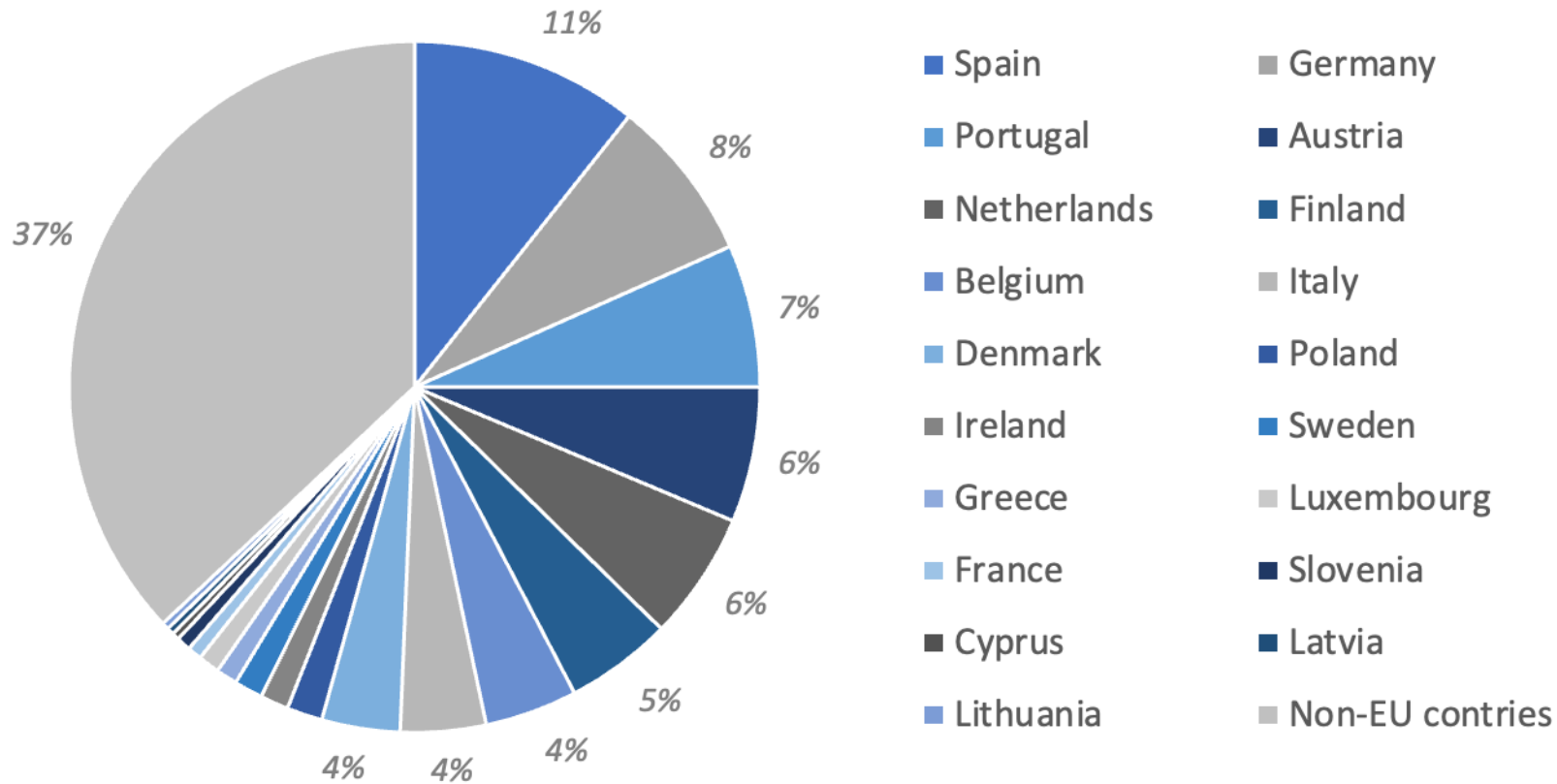


Answers received so far

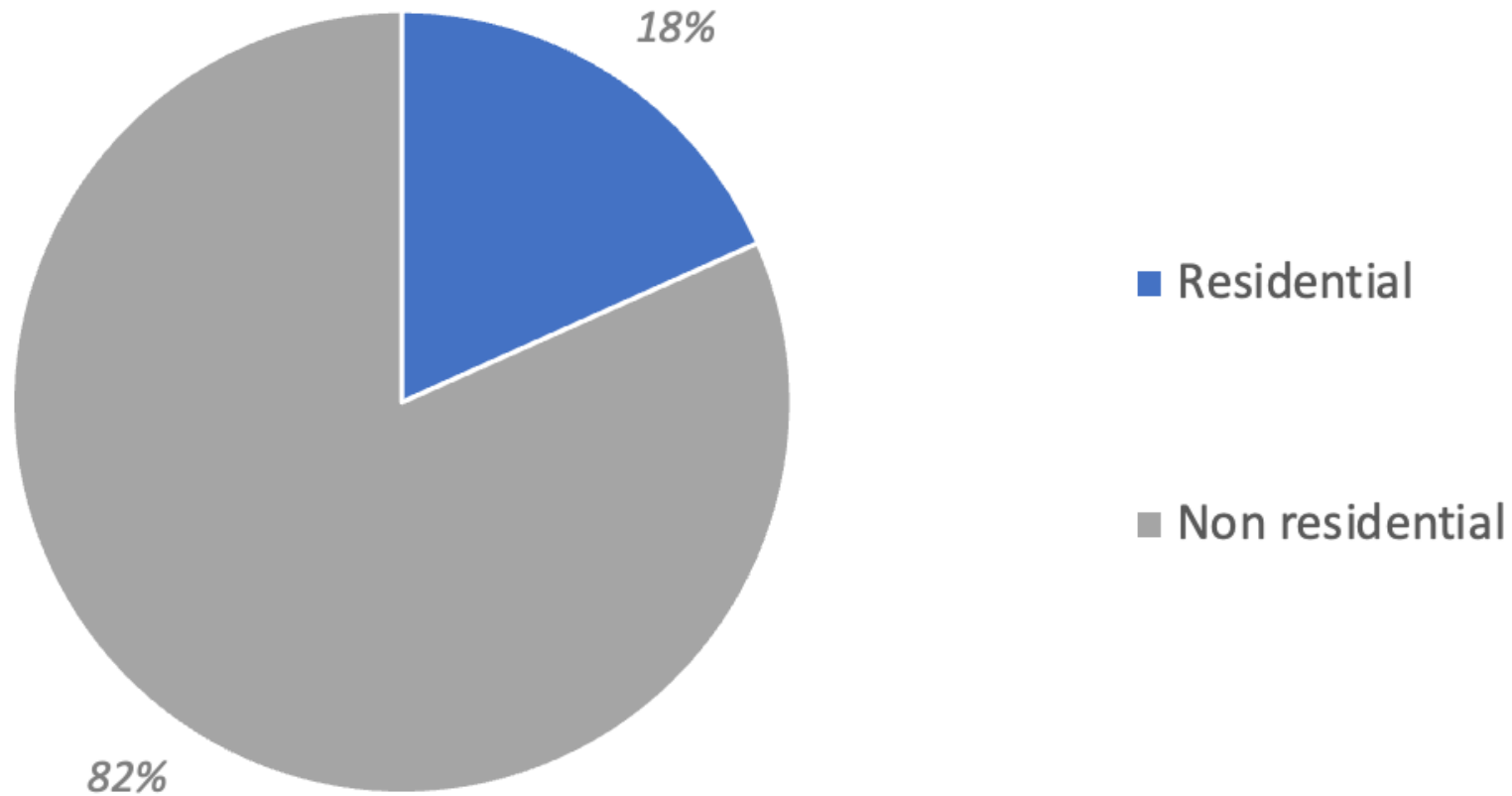
- Number of answers to the questionnaire: **46**
- Corresponding number of SRI assessments conducted: **282**
- Corresponding number of SRI assessors trained: **51**

Number of assessments reported per country

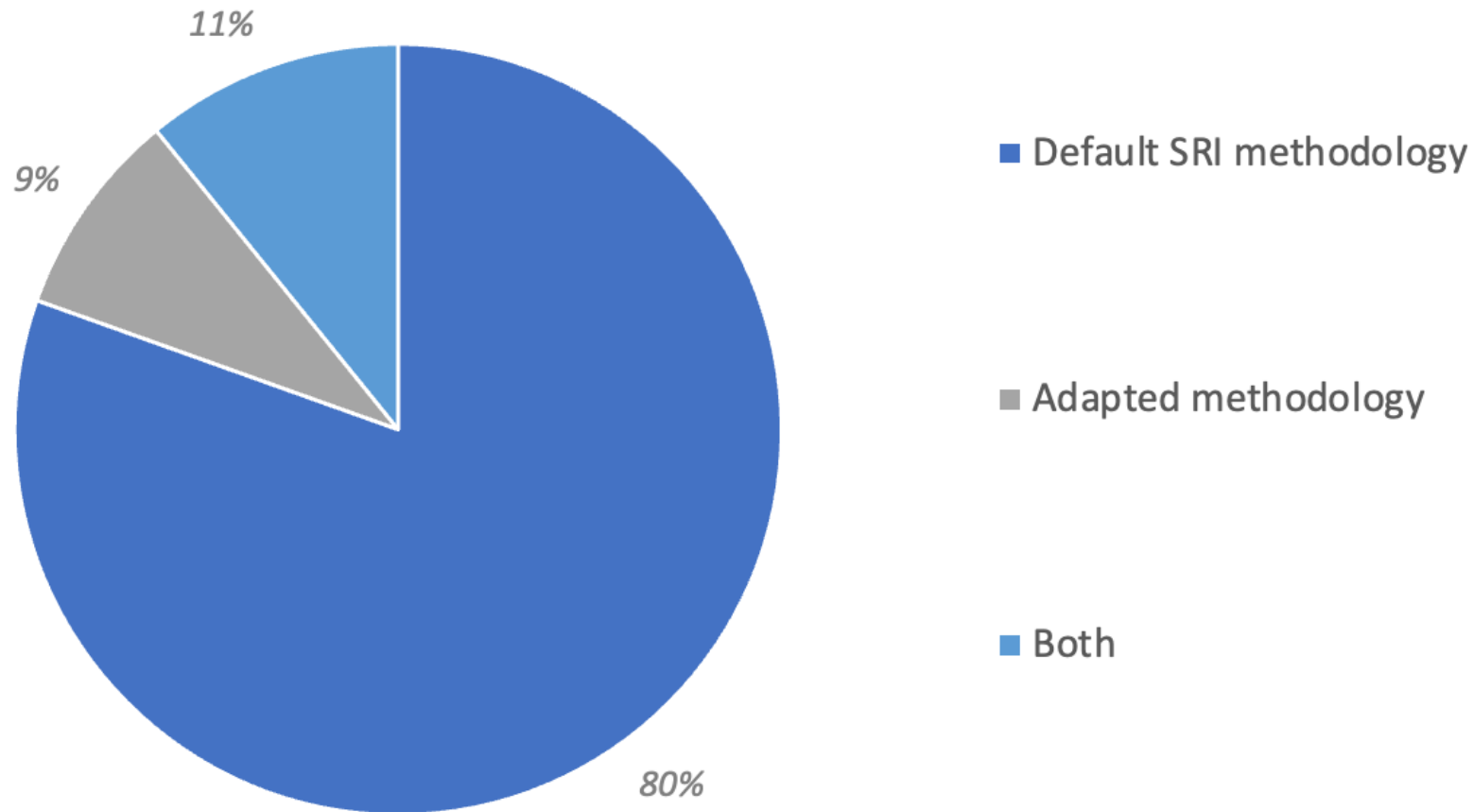
Most from
UCL, UK



Number of assessments reported per building type

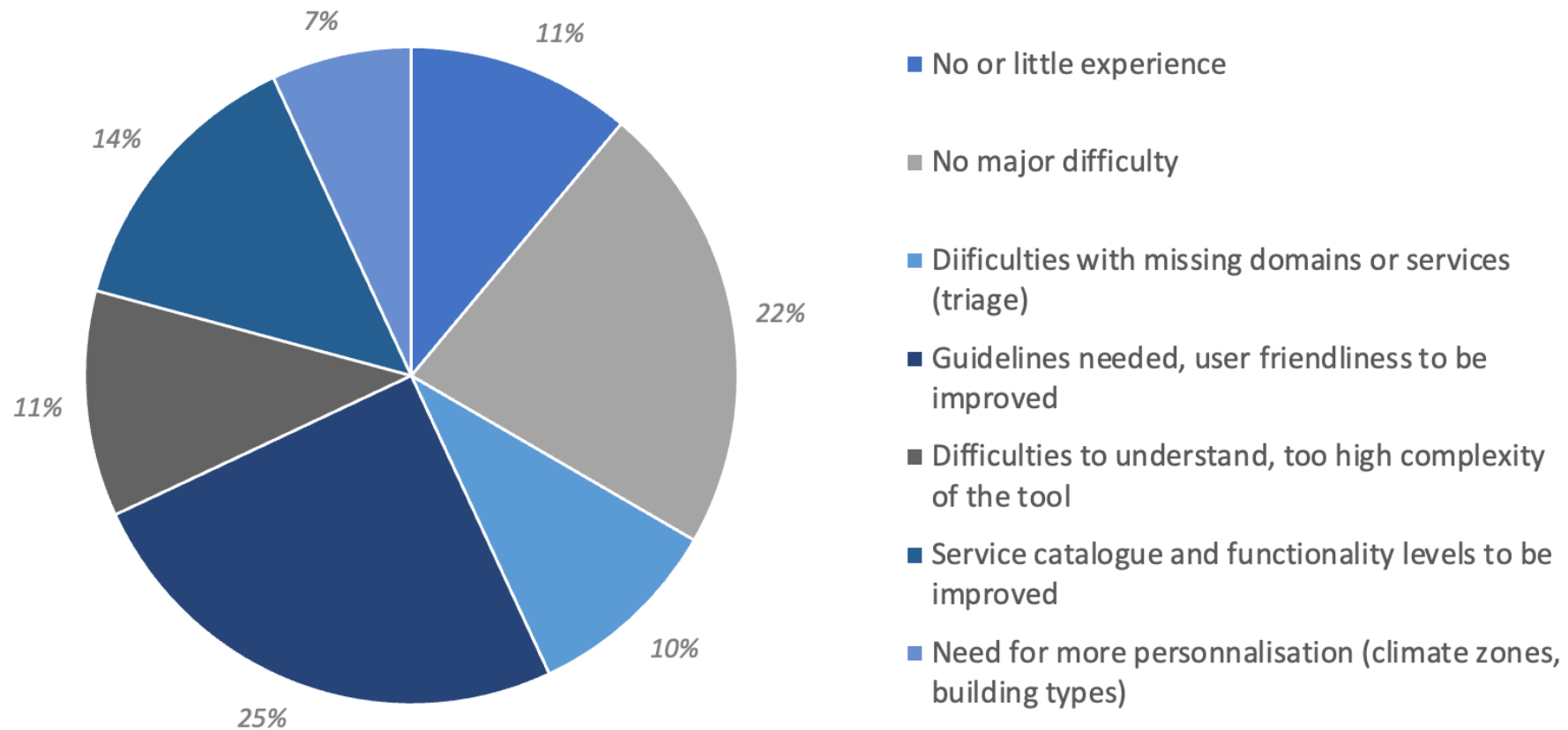


Generic vs. adapted configuration of the SRI methodology



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)"

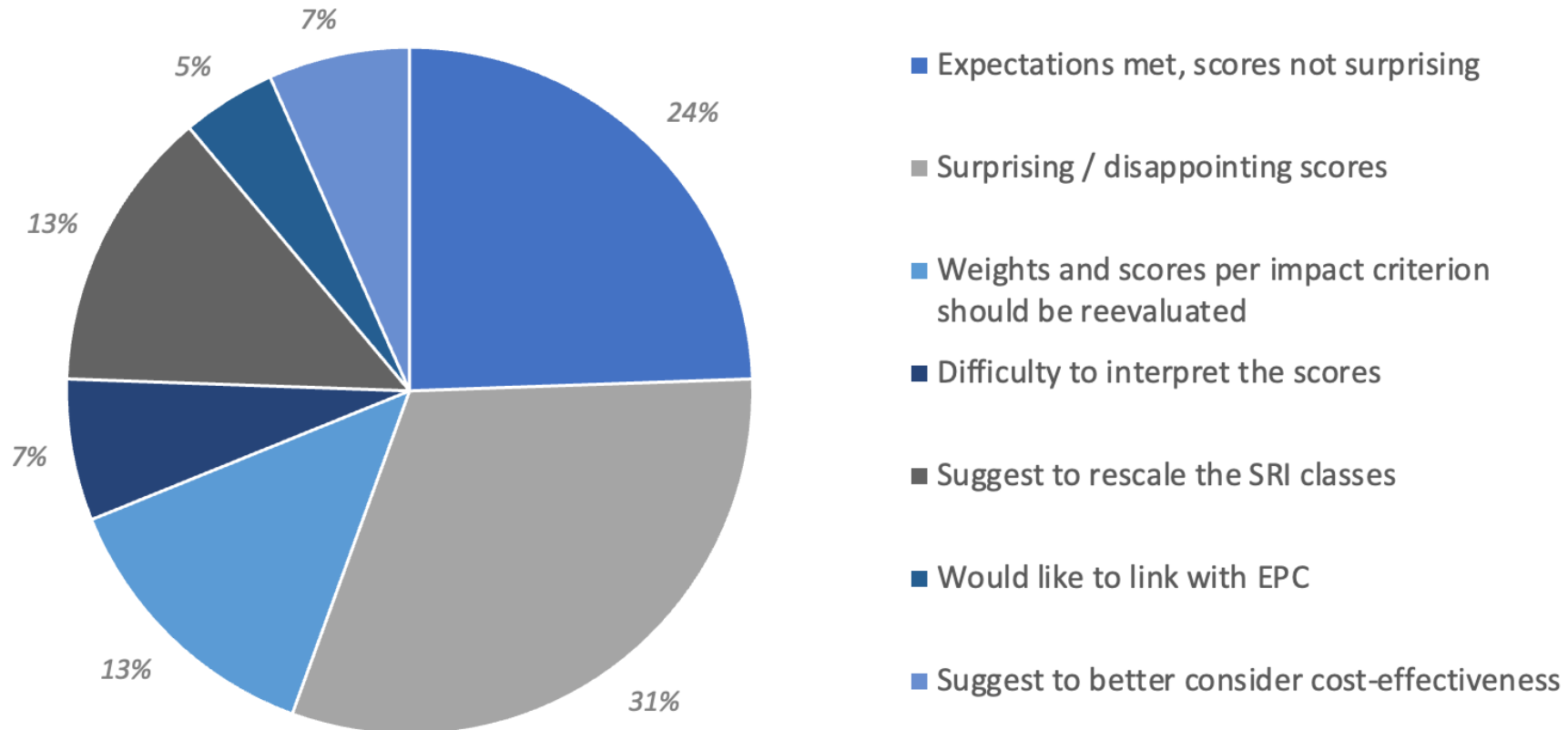
"Define an optimized catalogue of services for each specific type of buildings (i.e. schools, hospitals, offices, ...)"

"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%

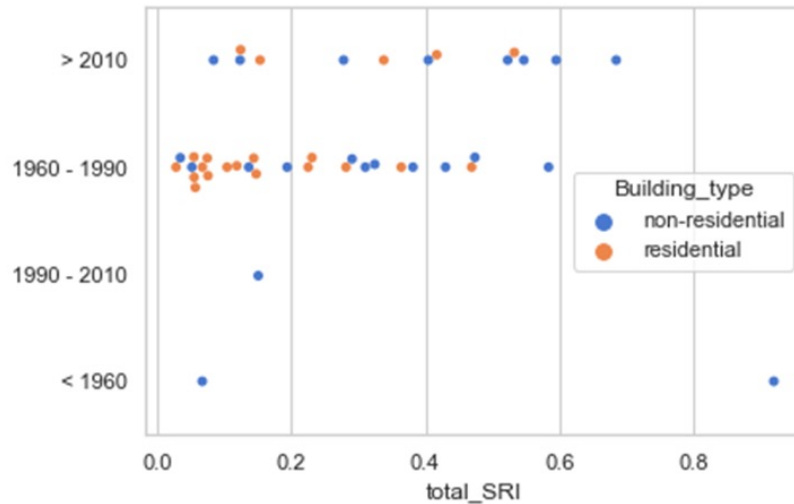
➤ [Majority of total SRI scores ≤ 60%](#)

- 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

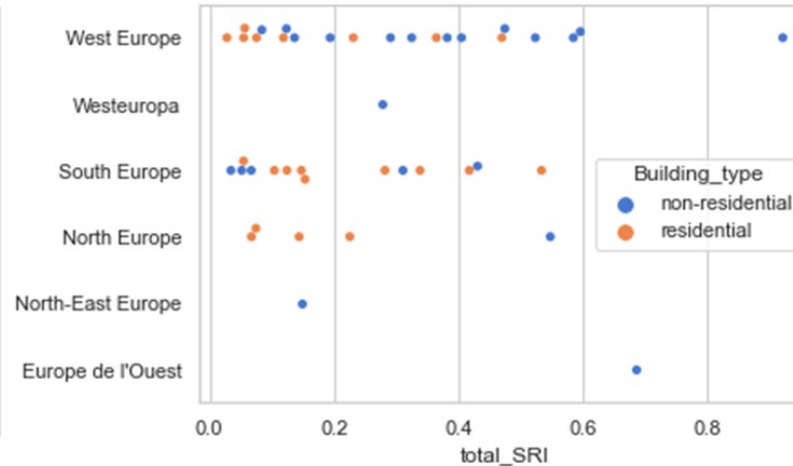
Analysis of SRI assessment spreadsheets received so far

Overall scores

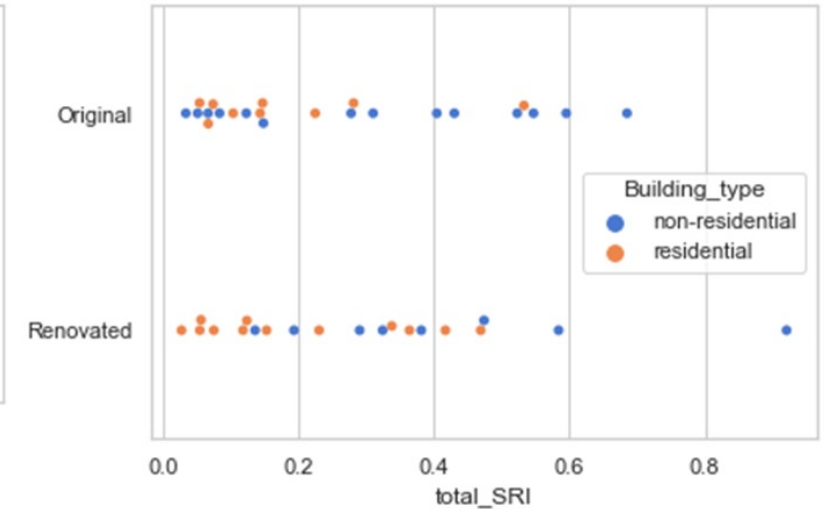
Construction years



Climatic zones

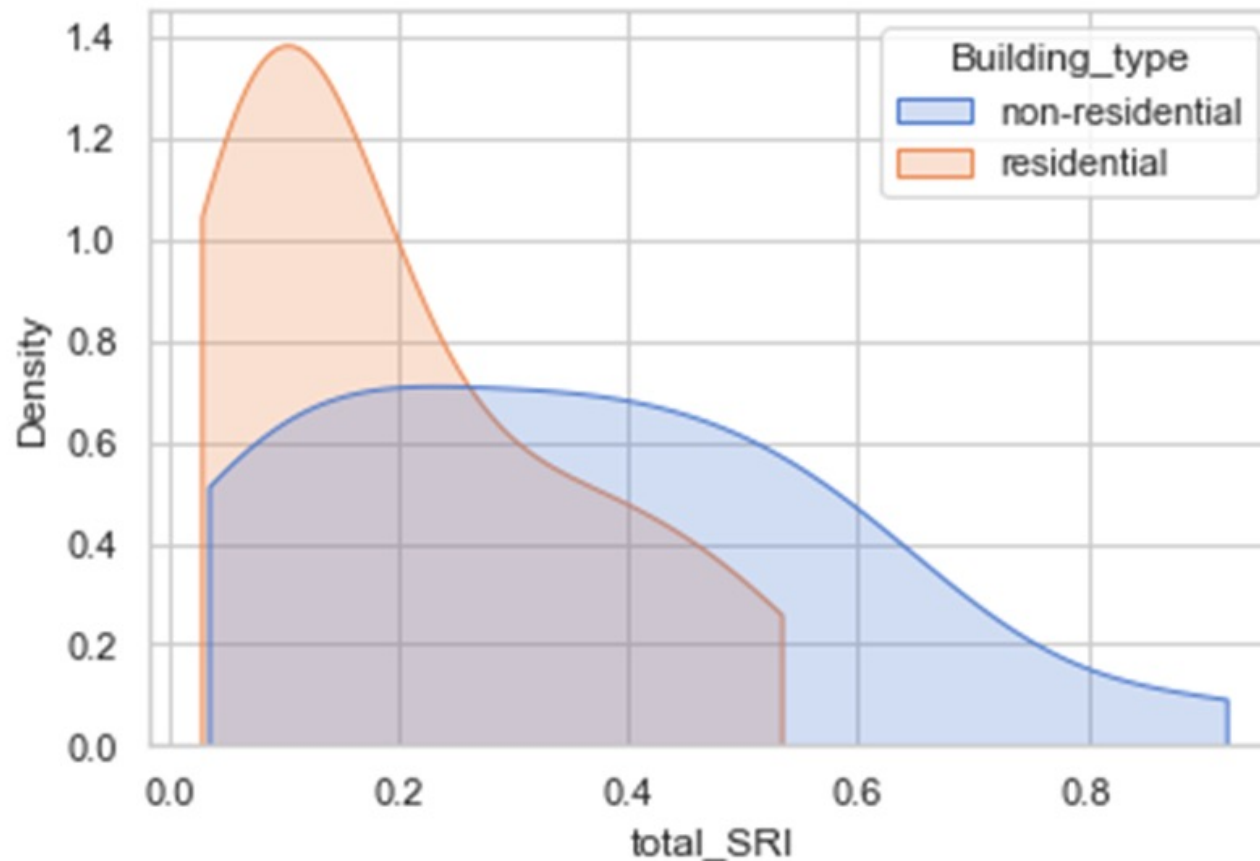


Original / Renovated



Analysis of SRI assessment spreadsheets received so far

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

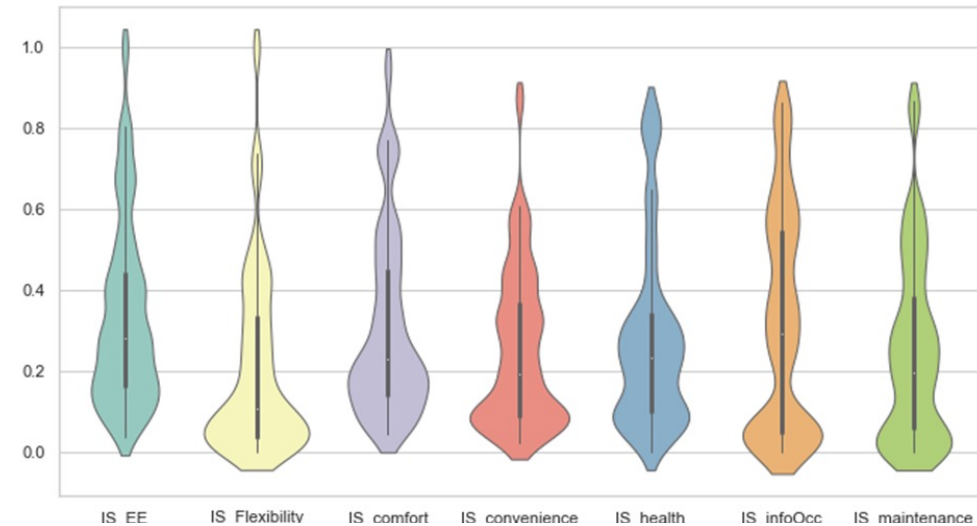


Analysis of SRI assessment spreadsheets received so far

Impact Scores

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

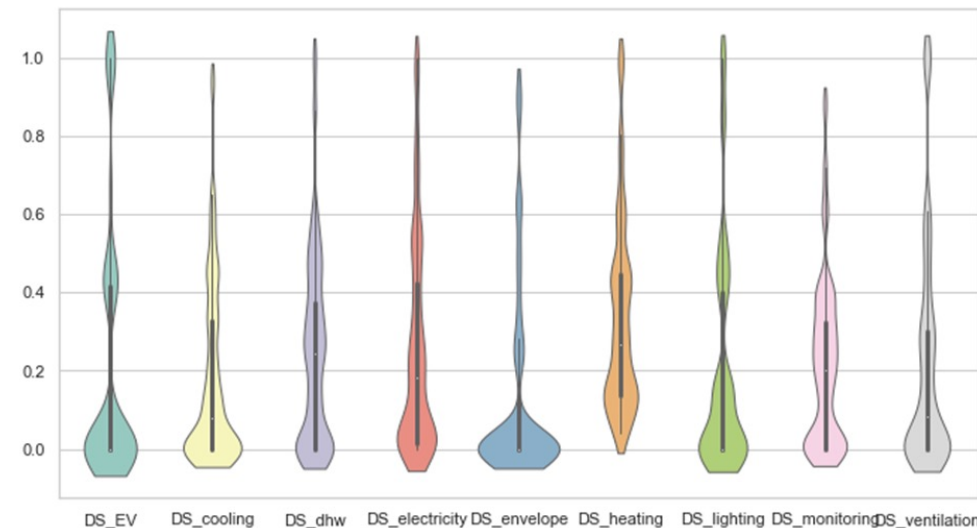
Average



Domain Scores

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

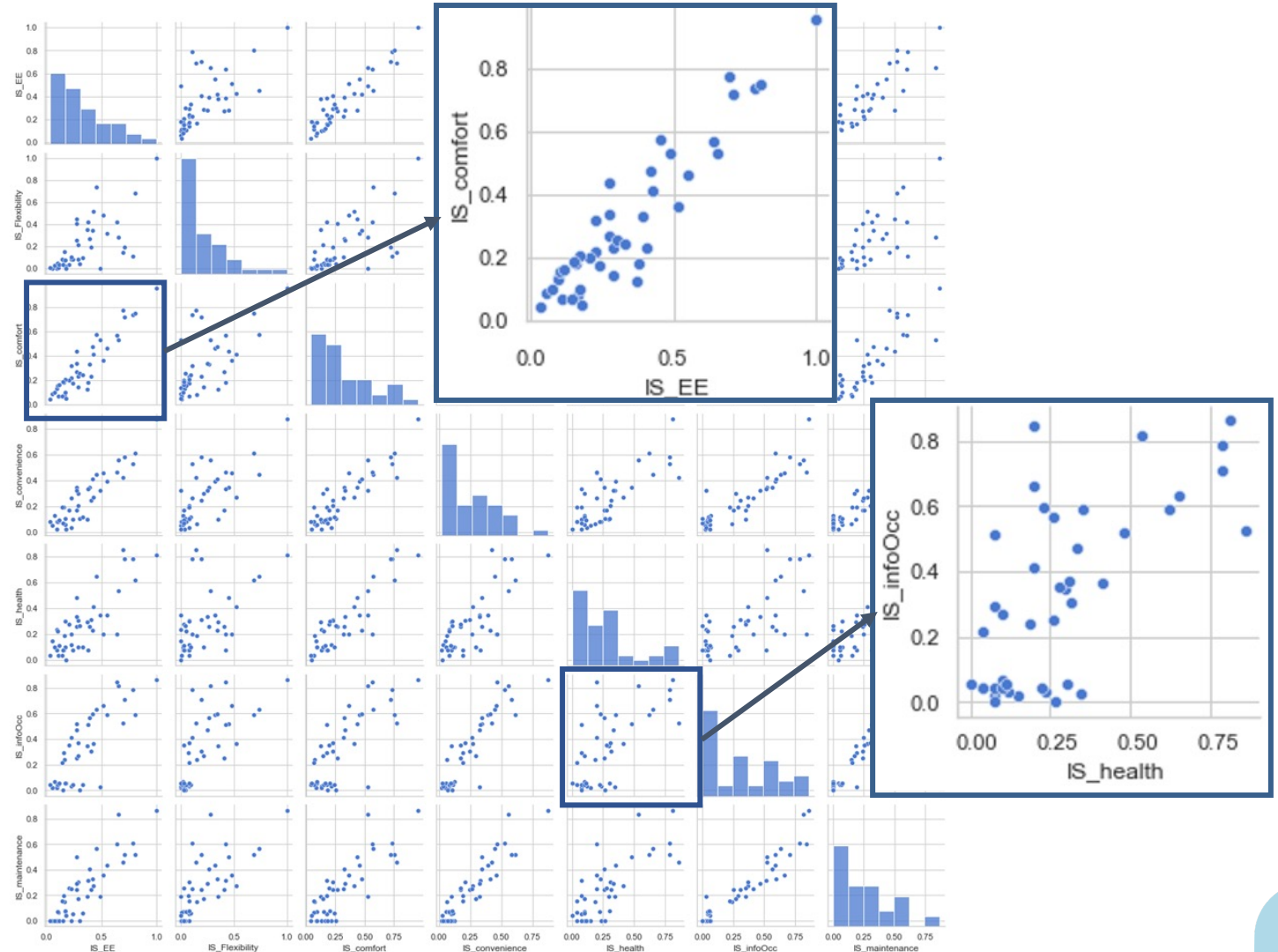
Average



Analysis of SRI assessment spreadsheets received so far

Impact Scores

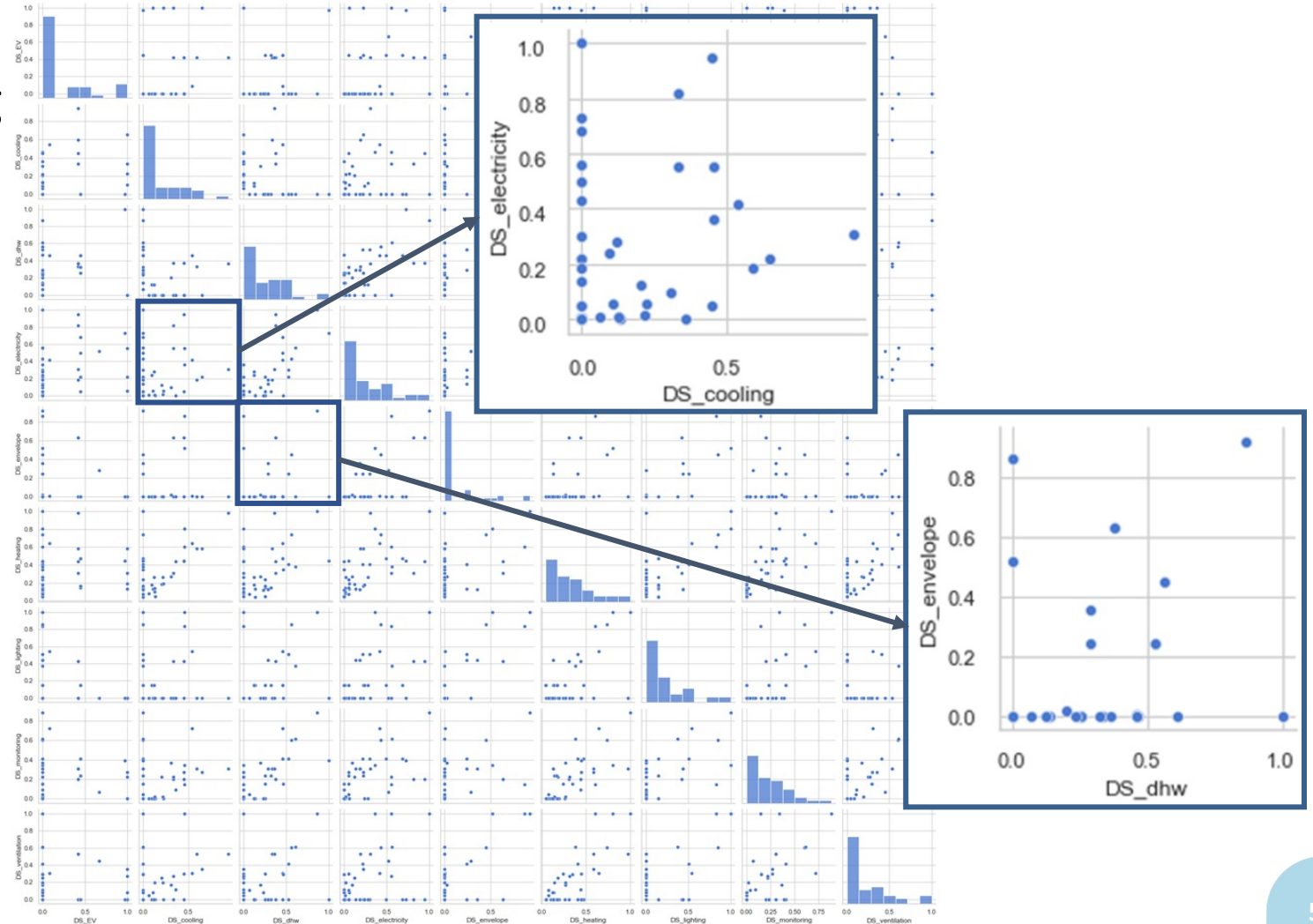
- Energy Efficiency
- Flexibility
- Comfort
- Convenience
- Health
- Info to Occupants
- Maintenance



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 from the survey

- 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
 - Assessment spreadsheets have **not** been **validated**



Evolution of the methodology: Interaction with WG2

- Working Group 2 '**Maintenance & potential extension of the SRI calculation methodology**' addresses
 - Process for updating the scoring, the weighting and the service catalogue
 - Streamlining a common EU approach and defining a process for keeping the SRI catalogues and scoring matrices up to date
- WG2's priority right now is to draft the revision process for the SRI calculation methodology
- Member States' inputs to this work is very welcomed:
 - Requests for deviations from the common standard methodology identified by Member States
 - Involvement of MS in the SRI methodology maintenance and extension?



Evolution of the methodology: Interaction with WG2

- Suggestions for topics to be addressed by WG2:
 - Low and non-differentiated scores for most buildings
 - How to issue recommendations for improving the smart-readiness of buildings
 - Distinction between the building's smartness based on installed equipment, and the possibilities for the building owner to opt for smartness from the "cloud" (apps, contracts with relevant suppliers)
 - ...

Identification of exemplary buildings & recommendations to improve the SRI scores (ongoing)



SRI : NON-RESIDENTIAL EXAMPLE

Evaluating the Smart Readiness Indicator - the Neobuild building

Sylvain Kubicki, LIST

19/01/2023

SRI : NEOBUILD BUILDING

01 Description

02 Applying 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)

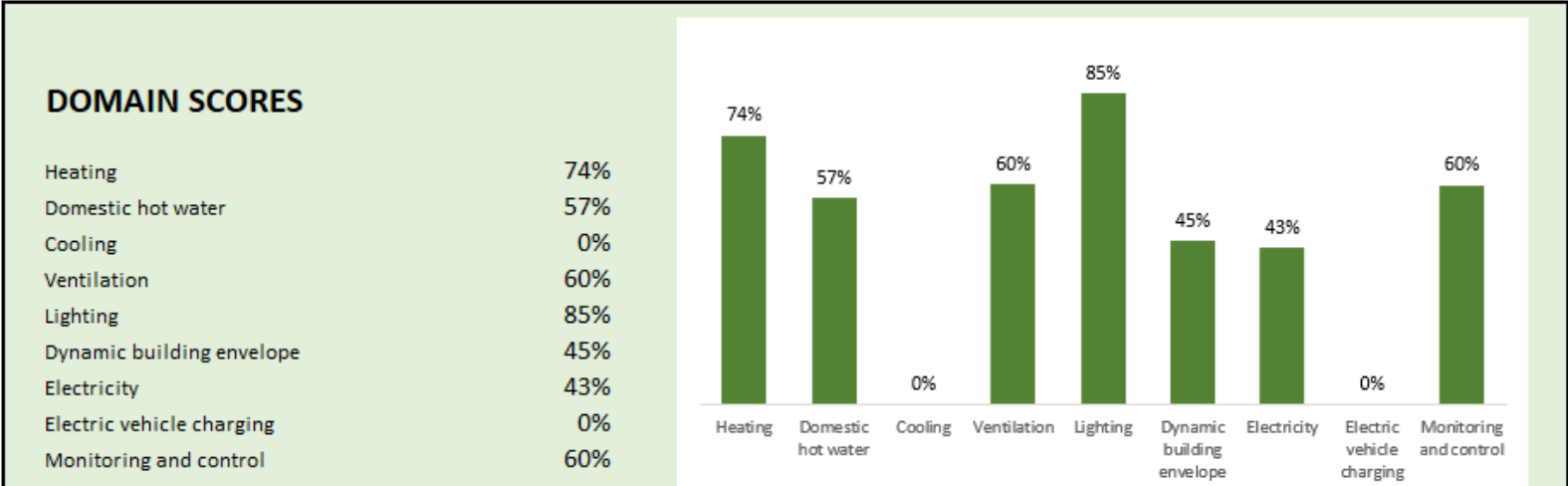
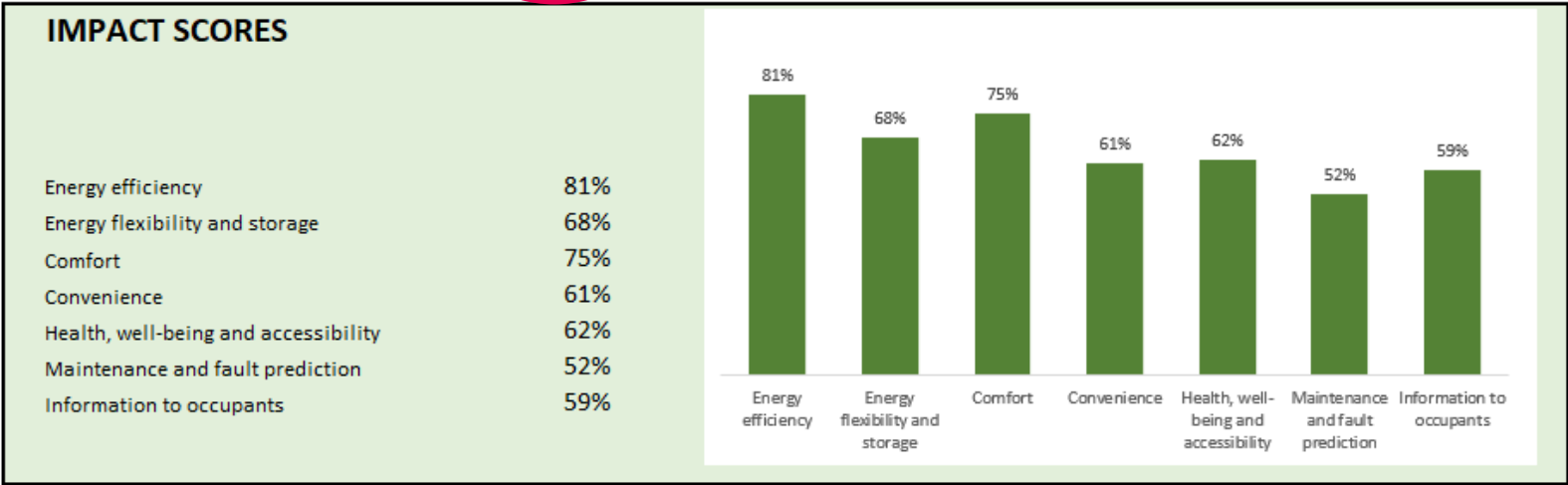
- Complete Catalogue of detailed services : 54 services to evaluate
- For complex buildings
- Site visit necessary
- Duration of evaluation < 1 day

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

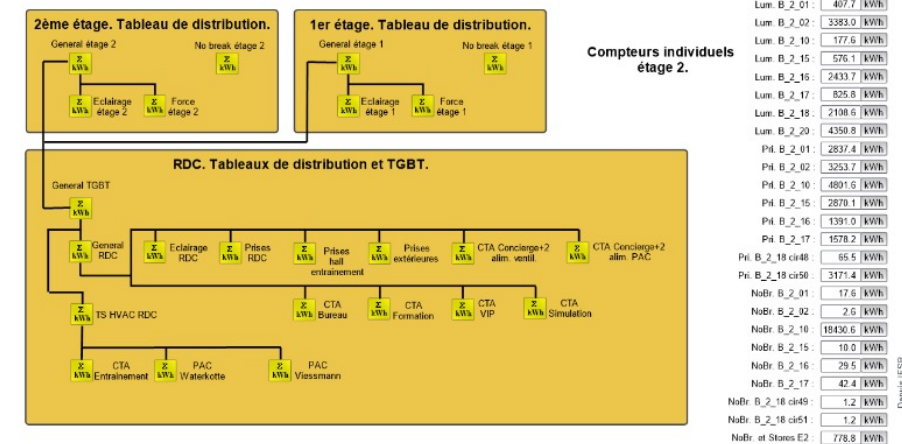
67 = Pluie+neige faible ; 68 = Pluie+neige modérée

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

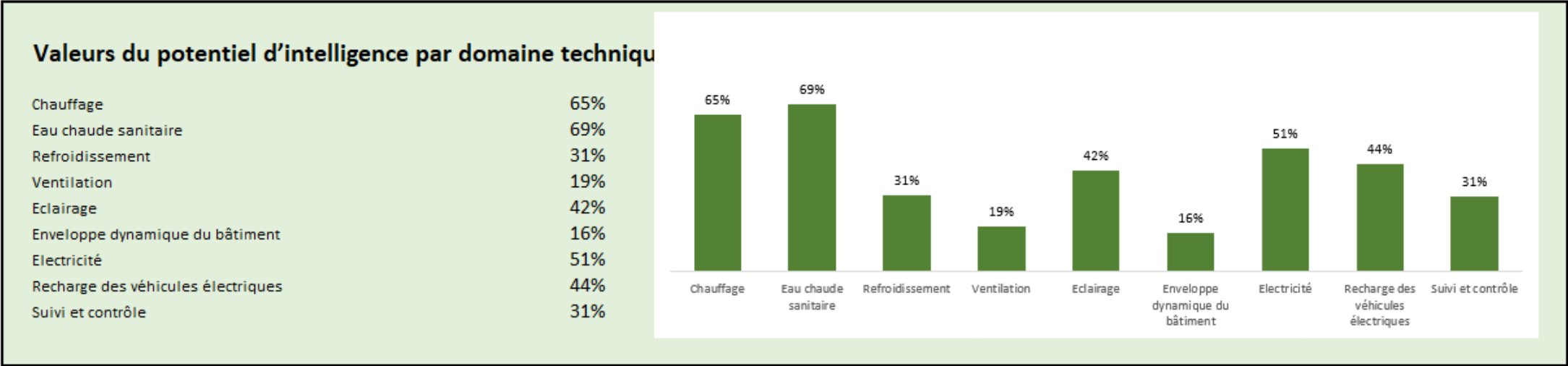
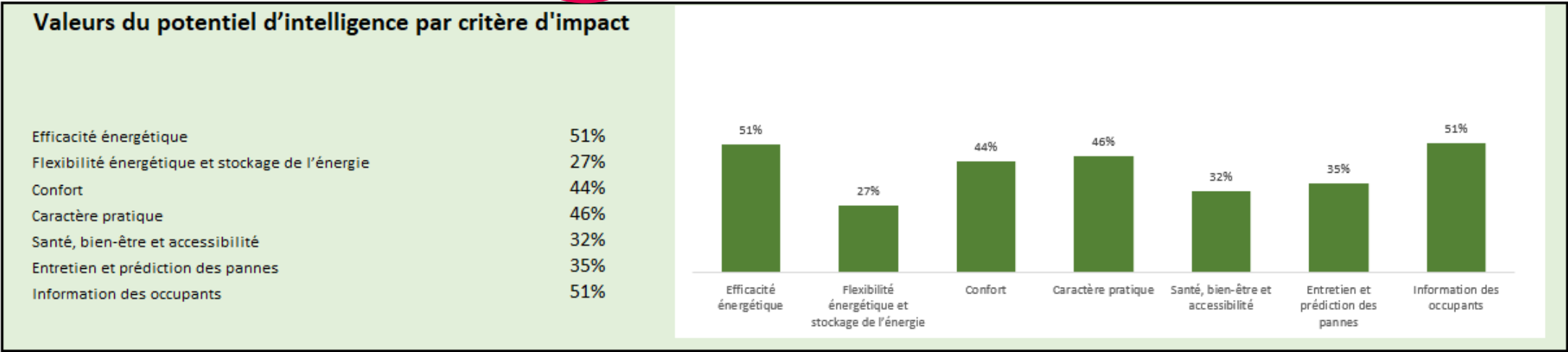
The evaluation process is the same for both methods. For each service, the evaluator is investigating the level of functionalities of the building.

SRI RESULT : RESIDENTIAL BUILDING

7 impact criteria

9 technical domains

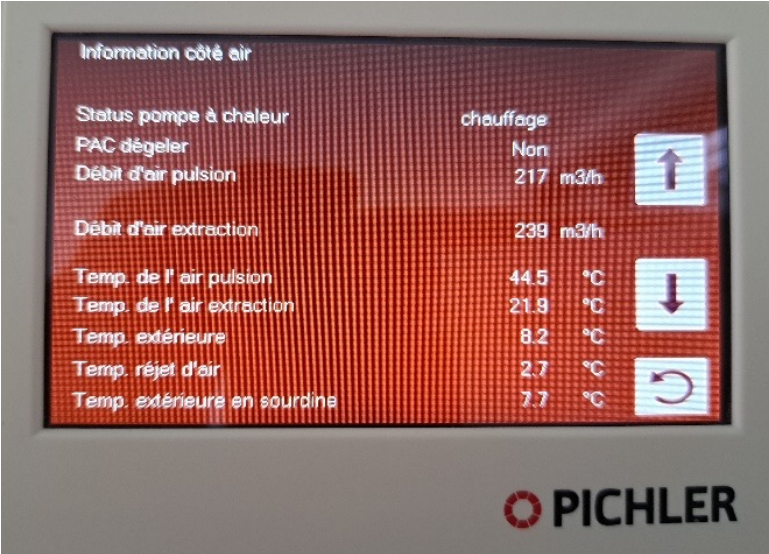
Valeur totale du potentiel d'intelligence	40%	Classe du potentiel d'intelligence	E
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FOCUS ON ONE CRITERION

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*

Conclusion & next steps





Next topics for discussion

- Next WG1 meeting proposed in April
- Candidate topics for discussion:
 - Test phases update
 - Revision of the SRI methodology / Interaction with WG2
 - Identification of exemplary buildings (continuation)
 - ...

Thanks for your attention!

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#SmartReadinessIndicator

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