SRI-ENACT

Co-creating Tools and Services
for Smart Readiness Indicator Uptake

MODULE 2 / Policy framework and national context for SRI

SRI in National Context (PART 2)

The LIFE21-CET-SMARTREADY-SRI-ENACT project has received funding from the European Union's LIFE Programme under grant agreement N°101077201

Content of Module 2

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PART 1 :	Overview of the building stock in Latvia
	The climate of Latvia and climatic zoning
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	Preliminary results of the initial assessments in Latvia
	Lessons learnt after initial assessments

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Tailoring of smart-ready services catalogue

A basic tool for the assessment of the smart readiness of buildings are two catalogues of pre-defined smart-ready services (27 or 54) applicable to the Building Technical Systems (BTS).

The use of the smart-ready service catalogues depends on the method A or B chosen by the SRI assessor, based on the complexity and existing functional performance of the BTS and other considerations such as the investment required, the quality level of the building management system, etc.

The first catalogue of a limited number of 27 smart services is intended for the simplified method A of the SRI assessment. The second catalogue with a full number of 54 smart services is intended for more complex buildings where method B has to be applied.

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At this stage of the SRI-ENACT project, the national partner team considers that the two catalogues of smart services could be applied as technical measures without specific limitations or modifications.

Based on the two catalogues of smart services and the current state of the building sector in terms of energy efficiency, the indicative potential for increasing the functional excellence of building technical systems for different building types is as follows:

Residential

- Single-family houses - low to high potential, especially for buildings in operation after 2013
- Multi-family buildings - low to medium potential depending on the type of heating, cooling and hot water systems.

Non-residential

- Office buildings - medium to high potential for buildings in operation after 2013, newly designed with energy class A/B, nZEB and certified according to international standards for sustainable construction
- Healthcare and social buildings - high potential for building technology systems - heating, lighting, hot water, appliances

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- Educational buildings (Universities and schools) - low to medium potential for technical systems heating, lighting, building envelope, electric vehicle charging
- Year-round hotels - medium to high potential for technical building systems heating, cooling, ventilation, lighting, hot water, appliances, building envelope, electric vehicle charging
- Sports buildings - low to high potential for technical building systems heating, lighting, hot water, ventilation, building envelope, electric vehicle charging
- Cultural buildings - low to medium potential for technical building systems heating, lighting, ventilation, building envelope, electric vehicle charging

Given the current rapid development and accelerated practical application of AI technologies, the functional levels of sophistication of smart services for buildings are likely to change towards higher levels in the near future and to be complemented by new smart services.

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Weighting service levels in SRI calculation

- The EC Technical report suggests three main methods for weighting service levels in the SRI calculation: fixed weights, equal weights, and energy balance weights.
- A fixed weight of 20% is assigned to the "monitoring and control" domain for all impact criteria. For the impact criteria "energy savings," "maintenance and fault prediction," and "energy flexibility and storage," a 5% weighting is allocated to the domains "electric vehicle charging" and "dynamic building envelope."
- Equal weights are assigned to the impact criteria "comfort," "convenience," "health and wellbeing," and "information to occupants," as it is considered that these weights are not dependent on the climate zone or building type.
- Energy balance weights are assigned to the impact criteria **"energy savings", "maintenance and fault prediction" and "energy flexibility and storage".** These values **depend on the climate zone or building** type and these values can be changed when using an alternative energy balance for example from EPCs.

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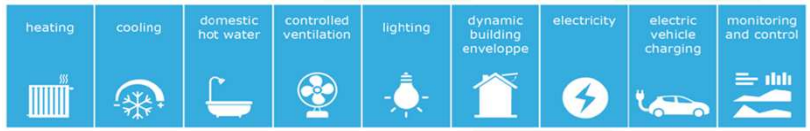
Weighting factors

Building technical services weightings - subject to national adaptation

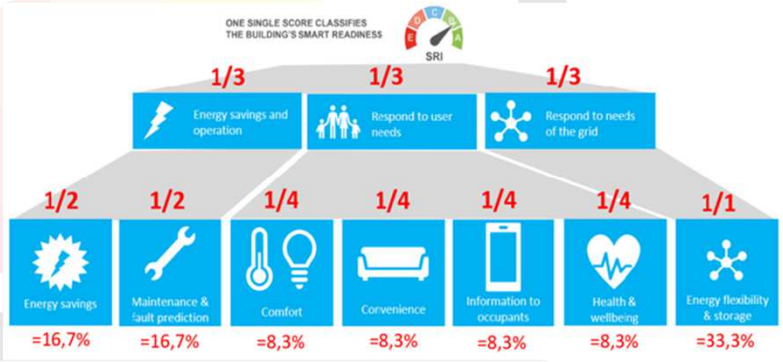
In line with Regulation 2020/2155 Annex V and Annex VII, Member States could set their own weighting coefficients for:

- Technical building systems/domains (subject to national adaptation)
- Seven Impact Criteria (adopted as common defaults)
- Three Key Functionalities (adopted as common defaults)

Building systems, subject to national adaptation



Key functionalities adopted as common default values



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The evaluation of national BTS weightings follows these general principles:

- Consider the impact of climate on building systems and energy consumption
- Take into account the differences between building types
- Adhere to national regulations on energy performance of buildings
- Preferably use the database of EP-certified buildings and the energy balance of buildings
- Follow Regulation 2020/2155, the SRI application guides and smart services' catalogues
- Consider the long-term EU policy on sustainability in the building sector

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Collection of data about buildings, national classification of buildings

The building data required for the SRI auditing procedure could be found in the following information sources:

- Energy Performance Certificate (EPC) for existing or new buildings
- Energy efficiency report for new buildings and/or the corresponding EPC issued at the design or commissioning stage
- Database of the governmental body in charge of sustainable energy/building development
- Local building database, if available
- Data collected by SRI auditor on site

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The weighting coefficients of the 9 building systems or domains depend on several factors. From a practical engineering point of view, the most important factors affecting the building energy balance are the building location/climate zone, the building type and size.

Climate, building type and size directly impact 6 out of 9 building systems: heating, ventilation, domestic hot water, cooling, lighting and dynamic building envelope.

Domains such as electricity, electric vehicle charging, monitoring and control are not directly affected by these three essential factors, unless there are building technical systems installed that produce or receive renewable energy locally.

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Processing building data to determine BTS weightings

The approach to determining BTS weightings depends on the availability and nature of building data, subject to SRI assessment. Two possible options are considered.

Option A: BTS REFERENCE WEIGHTING FACTORS BY BUILDING TYPE AND CLIMATE ZONE

This approach, despite some imprecision compared to the specific data of the assessed building, has the following advantages:

- Convenience for SRI auditors and EPB policy-makers
- Allows easier SRI assessment of non-certified buildings (applicable to all building types)
- Shorter time to collect data from the building
- Allows building managers and occupants to compare the energy performance of their building and provides better awareness of proposed measures for SRI improvement.

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Option B: BTS REFERENCE WEIGHTING FACTORS BASED ON ENERGY PERFORMANCE CERTIFICATE DATA

- In Latvia, the Energy Performance Certificate (EPC) of an existing or new/designed building, if available, includes "ready weightings" in % for six BTS, i.e. heating, ventilation, cooling, hot water, lighting and other/electricity. These data are available for public buildings. Except the energy consumption for lighting is not indicated in the case of residential buildings

- An example of such "ready weightings" is given below as data taken from the EP certificate of a real non-residential building:

Heating = 38%; Ventilation=28%; Cooling=0%; Hot water=23%; Lighting=4%; Other=7% RE=0%

- The values given represent the annual energy demand for the different needs of the building. This allows the data from the EP certificate to be entered into the SRI assessment tool and also allows the SRI assessor to enter individual weightings for each building with an issued EPC.

- Option B provides more realistic data entry, but requires manual intervention by the assessor, unless this process is automated in the future when integrated with the national EPC scheme.

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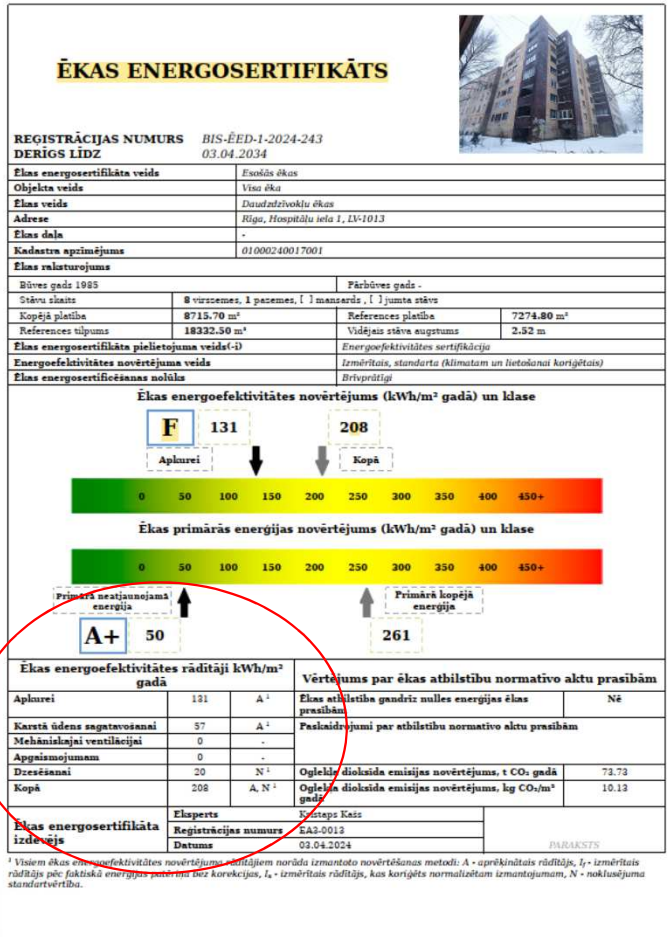
Example of EPC

- heating;
- ventilation;
- cooling;
- hot water;
- Lighting;
- other/electricity;
- These data are available for public buildings. Except the energy consumption for lighting is not indicated in the case of residential buildings



ĒKAS ENERGOSERTIFIKĀTS

REĢISTRĀCIJAS NUMURS *BIS-ĒED-1-2024-243*
DERĪGS LĪDZ *03.04.2034*

Ēkas energosertifikāta veids	*Esošās ēkas*
Objekta veids	*Visa ēka*
Ēkas veids	*Daudzdzīvokļu ēkas*
Adrese	*Rīga, Hospitālu iela 1, LV-1013*
Ēkas daļa	-
Kadastra apzīmējums	*01000240017001*
Ēkas raksturojums	

Būves gads 1985		Pārbūves gads -	
Stāvu skaits	8 virszemes, 1 pazemes, [ ] mansards , [ ] jumta stāvs		
Kopējā platība	8715.70 m²	References platība	7274.80 m²
References tilpums	18332.50 m³	Vidējais stāva augstums	2.52 m
Ēkas energosertifikāta pielietojuma veids(-i)		*Energoefektivitātes sertifikācija*	
Energoefektivitātes novērtējuma veids		*Izmērītais, standarta (klimatam un lietošanai koriģētais)*	
Ēkas energosertificēšanas nolūks		*Brīvprātīgi*	

Ēkas energoefektivitātes novērtējums (kWh/m² gadā) un klase

F 131 Apkurei — 208 Kopā

0 50 100 150 200 250 300 350 400 450+

Ēkas primārās enerģijas novērtējums (kWh/m² gadā) un klase

0 50 100 150 200 250 300 350 400 450+

Primārā neatjaunojamā enerģija A+ 50 — Primārā kopējā enerģija 261

Ēkas energoefektivitātes rādītāji kWh/m² gadā			**Vērtējums par ēkas atbilstību normatīvo aktu prasībām**	
Apkurei	131	A [1]	**Ēkas atbilstība gandrīz nulles enerģijas ēkas prasībām**	**Nē**
Karstā ūdens sagatavošanai	57	A [1]	**Paskaidrojumi par atbilstību normatīvo aktu prasībām**	
Mehāniskajai ventilācijai	0	-		
Apgaismojumam	0	-		
Dzesēšanai	20	N [1]	**Oglekļa dioksīda emisijas novērtējums, t CO_2 gadā**	73.73
Kopā	208	A, N [1]	**Oglekļa dioksīda emisijas novērtējums, kg CO_2/m² gadā**	10.13

Ēkas energosertifikāta izdevējs	**Eksperts**	Kristaps Kalējs
	Reģistrācijas numurs	EA2-0012
	Datums	03.04.2024

PARAKSTS

[1] *Visiem ēkas energoefektivitātes novērtējuma rādītājiem norāda izmantoto novērtēšanas metodi: A - aprēķinātais rādītājs, I_f - izmērītais rādītājs pēc faktiskā enerģijas patēriņa bez korekcijas, I_k - izmērītais rādītājs, kas koriģēts normalizētam izmantojumam, N - noklusējuma standartvērtība.*

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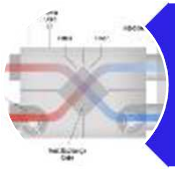
Example on NZEB definition in Latvia

Building energy consumption for heating ≤ 40 and 45 kWh/m2 per year.

Building's primary non-renewable energy consumption for heating, hot water supply, mechanical ventilation, cooling, and lighting (applicable to non-residential buildings) is less than or equal to 95 kWh/m2 per year.



The building has installed engineering systems and energy-consuming devices that comply with at least Class A

A certain microclimate is provided in the rooms (Requirements for room temperature, air exchange, overheating in summer, ...)

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Weight factors

- Another possibility is to adjust weight factors using an alternative energy balance. In this case for each of these 6 domains, the correction factor α_{domain} can be calculated by dividing the primary energy use of the given domain by the sum of the six primary energy usages.

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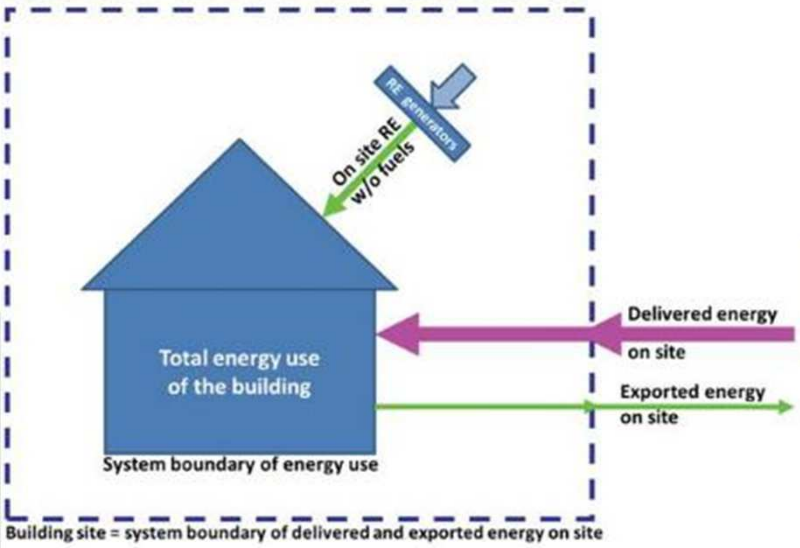
Primary energy factors

For existing buildings:

- Primary Uses:
  - Heating: 64.5% of household energy consumption.
  - Hot Water Preparation: 19.2%.
  - Lighting and Electrical Appliances: 8.7% (excluding major systems like heating, cooling, or cooking).
- Specific Energy Needs:
  - Lighting: Covered 100% by electricity.
  - Cooking: 15% energy need met by electricity.
  - Heating and Water Heating: Dominantly powered by renewables and biofuels (49.1%) and district heating (39.1%).



- **Electricity: 2.5**
- **Oil: 1.1**
- **Solid fossil fuel: 1.1**
- **Natural gas: 1.1**
- **RES: 1.2**

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Overview of Latvian Residential Energy Consumption (2021)

Primary Energy Sources:
Renewable Energy: 38.47% of final consumption
District Heating: 34.59% of final consumption
Electricity: 12.84% of final consumption
Natural Gas: 9.59% of final consumption
Oil: 4.41% of final consumption
Solid Fossil Fuels: 0.1% of final consumption

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Primary Uses of Household Energy

- Heating: 64.5% of energy consumed
- Hot Water Preparation: 19.2% of energy consumed
- Lighting and Electrical Appliances: 8.7% of energy consumed (excludes main heating, cooling, or cooking systems)
- Cooking: 15% of the energy for cooking covered by electricity

Sources for Heating and Hot Water:

- Renewables and Biofuels: 49.1% for space and water heating
- District Heating: 39.1% for space and water heating

Note: No detailed data available for energy consumption for space cooling.

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a_d relative importance of a given "technical domain"

$$a_d = \frac{Q_d}{Q_{total}} \qquad Q_{total} = Q_{Heating} + Q_{Domestic\ Hot\ Water} + Q_{Cooling} + Q_{Ventilation} + Q_{Lighting} + Q_{Renewables}$$

where:

Q_d is the primary energy use for the domain under examination,

$Q_{Heating}$ is the primary energy use for space heating,

$Q_{Domestic\ Hot\ Water}$ is the primary energy use for domestic hot water,

$Q_{Cooling}$ is the primary energy use for space cooling,

$Q_{Ventilation}$ is the primary energy use for ventilation,

$Q_{Lighting}$ is the primary energy use for lighting,

$Q_{Renewables}$ is the renewable energy produced on site.

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a_d relative importance of a given "technical domain"

Relative importance for residential buildings	a_d
Heating	0.38
DHW	0.21
Cooling	0
Ventilation	0.24
Lighting	0.17
Electricity (RES generation)	0

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Conclusions

- SRI assessments could be integrated into inspections of heating and air conditioning **systems with capacities exceeding 70 kW.** Linking SRI assessments with building energy audits and regular system inspections provides a comprehensive building overview. And SRI certificate should be included as an annex to the current Energy Performance Certificate for buildings. Linkage to the **Building Automation and Control Systems (BACS) and Technical Building Systems (TBS) deployment, drawing from Articles 8, 14 and 15 of the EPBD**
  - Article 8 provisions the installation, upgrade, and replacement of TBS and measures to encourage the deployment of automatic temperature regulation and zoning
  - Articles 14 (heating inspections) and 15 (cooling inspections) require all non-residential buildings with equivalent rated capacity for heating/cooling > 290 kW to have BACS by 2025
- Considering the current state of the building sector, priority should be given to smart ready services for essential building technical systems such as heating, hot water, green electricity, monitoring and control.
- The national adaptation of the SRI methodology should consider the distinction between different type of buildings – public (schools, office buildings, ..) and residential
- For sustainable nationwide adoption of the SRI process in the building sector, it is recommended that a minimum SRI rate be established as a normative requirement for:
  - all new buildings
  - major renovations of public buildings.

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Future changes in legislation

- **Carbon Emission Standards**
  - Must not produce any onsite carbon emissions from fossil fuels.
- **Adaptive Energy Management**
  - Capable of responding to external signals to adapt energy usage, generation, or storage.
  - Adaptations should be economically and technically feasible.
- **Compliance with National Standards**
  - Energy demand must comply with at least cost-optimal levels from the latest national report.
- **Energy Use Thresholds**
  - Maximum primary energy use threshold must be at least 10% lower than the national standard for nearly zero-energy buildings.
- **Renewable Energy Sourcing**
  - Prioritize energy from renewable sources generated onsite or nearby.
  - Encourage the use of renewable energy community initiatives.
  - Support the inclusion of efficient district heating and cooling systems

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Conclusions

- The SRI certification process could be introduced in two steps: Firstly, could be integrated into national legislation along with an SRI test phase. Secondly, could be implemented as a mandatory procedure in the current EPC certification practice, supported by various funding schemes.
- When selecting professionals for SRI training and assessment, certified energy performance auditors/inspectors in the building sector are preferred as the most suitable.
- Both the simplified (A, 27 specified intelligent services) and detailed (B, 54 specified intelligent services) SRI assessment methods are suitable for national application, depending on the building type and BTS complexity.
- For the upcoming SRI assessment of national pilot buildings, we consider offices, hospitals, educational buildings, hotels and all new or renovated buildings with issued energy performance certificates to be more appropriate categories.
- Given the established national funding practices for energy efficiency and renewable energy projects in the building sector, a supportive financial scheme for the SRI implementation process could be a combination of accessible EU incentives, ALTUM, national budget support, specialised local and EU funds and public-private partnerships.

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Financial Incentives:

- Introduce financial incentives to encourage property owners to adopt SRI practices and invest in energy-efficient technologies.
- Include key SRI characteristics in public procurement documentation to ensure new public buildings meet high energy SRI standards.

Capacity-Building Initiatives:

- Focus on training and education for building owners, architects, engineers, and contractors to emphasize the importance of SRI and share best implementation practices.
- Essential for promoting SRI understanding and adoption, especially as the concept is relatively new in Latvia

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Co-creating Tools and Services for Smart Readiness Indicator Uptake

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