U-CERT

User-Centred Energy Performance
Assessment and Certification

Supported by U-CERT's Deliverable D3.2

Proposed set of user-centred and effective indicators integrated in a dynamic EPC

U-CERT

User-Centred Energy Performance Assessment and Certification

EPB Center roadshow

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Proposed set of

user-centred and effective indicators




integrated in a **dynamic EPC**

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What?

U-CERT proposes a set of **added value holistic indicators** contributing to the rebirth of next generation EPB Assessments.

Also, it designs a **new, dynamic, and user-centred EPC report**.

More information

Deliverable 3.2

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How?

Learning from the **ethnographic research** performed at each partner country.

- **Needs and expectations** of expert and non-expert users.

More informatio

Deliverable 2.3

Leveraging the **indicator mapping** performed at market level.

- Identification of paths towards **holistic indicators**.

More information

Deliverable 2.4

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Briefing findings

- Make energy more intuitive and influence behaviour of users.

Indicators covering **health**, **safety**, **convenience**, **well-being**, and **comfort** are valued by final users.

- Accommodate a wide scope of use.

Offer **several levels of complexity of user interface**.

Develop **a modular design** in combination with **digitalisation**.

Consider variable **building situation**.

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U-CERT's EPC structure

U-CERT's EPC is built to behave as a **repository of indicators** and **complementary data**.

Depending on the type of user, some or all the information is disclosed.

Expert user

Non-expert user

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Indicators

Analysis of the relevant **EPB Standards**:

- **EN ISO 52003-1**. Energy performance of buildings - Indicators, requirements, ratings and certificates.
- **EN ISO 52018-1**. Energy performance of buildings - Indicators for partial EPB requirements related to thermal energy balance and fabric features.

These documents are mostly restricted to **energy indicators**.

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Indicators

Analysis of the relevant **research initiatives**:

- **Smart Readiness Indicator** topical group proposal.
- **ALDREN project**.
- **CEN-CE project**.
- **Triple-A reno project**.

These projects have been analysed seeking to define complementary-to-energy **indicators**.

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Assessment type dependency

U-CERT considers the **assessment types** outlined in:

- **EN ISO 52001-1**. Energy performance of buildings. Overarching EPB assessment.

Thus, U-CERT's EPB Assessment could be referred to a **calculated** or **measured** evaluation of the performance of the building.

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Indicators

U-CERT Certification Scheme considers **four dimensions** of indicators:

- **Energy performance**.
- **Indoor Environmental Quality**.
- **Smart Readiness**.
- **Cost**.

Their inclusion in U-CERT's EPC report is sensitive to the assessment type:

Category	Indicators	Included in U-CERT's EPC	
		Calculated	Measured
Energy Performance	Overall EP indicators	X	X
	Partial EP indicators	X	-
Smart Readiness	SRI	X	-
IEQ	ALDREN Thermal score	X	-
Cost	Cost	-	X

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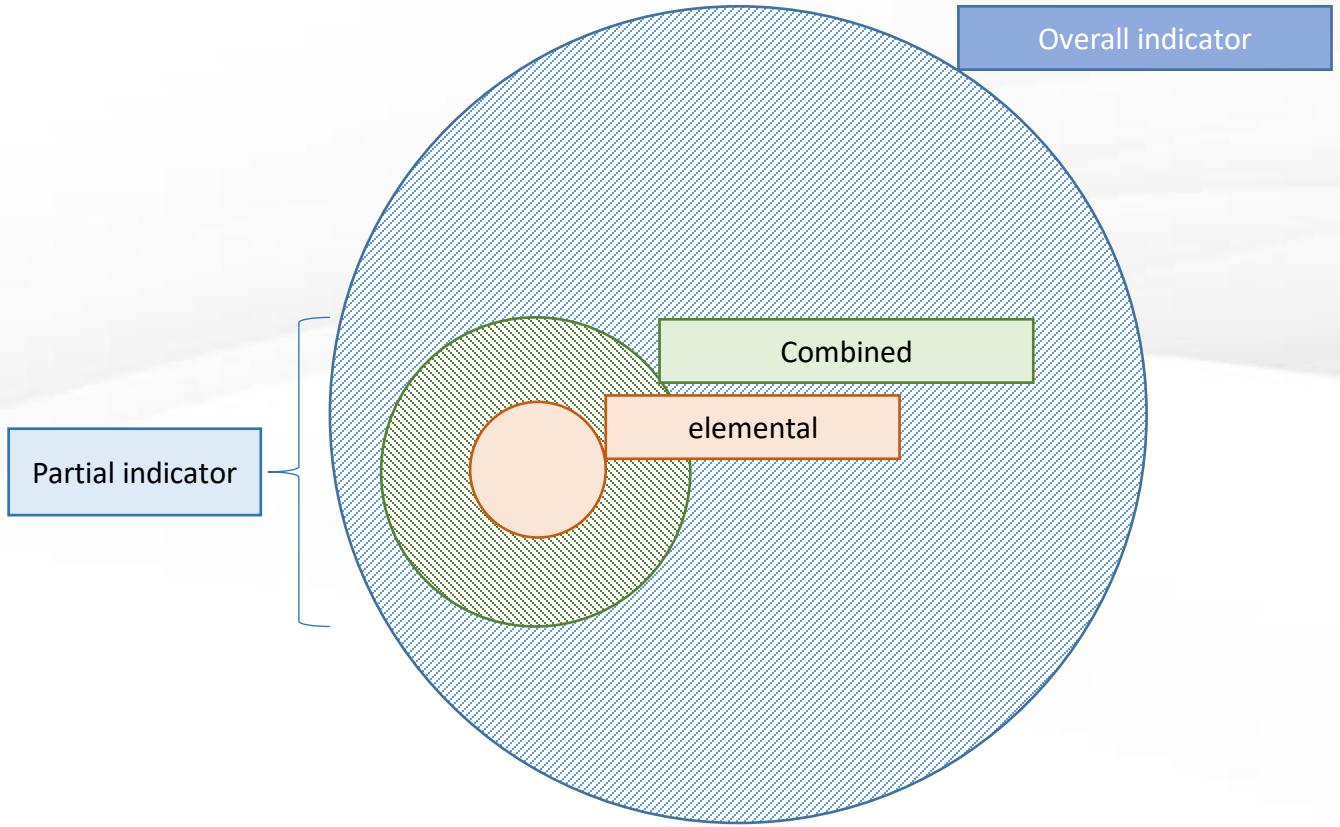
Indicators

The **energy indicators** were divided into **overall** and **partial**.



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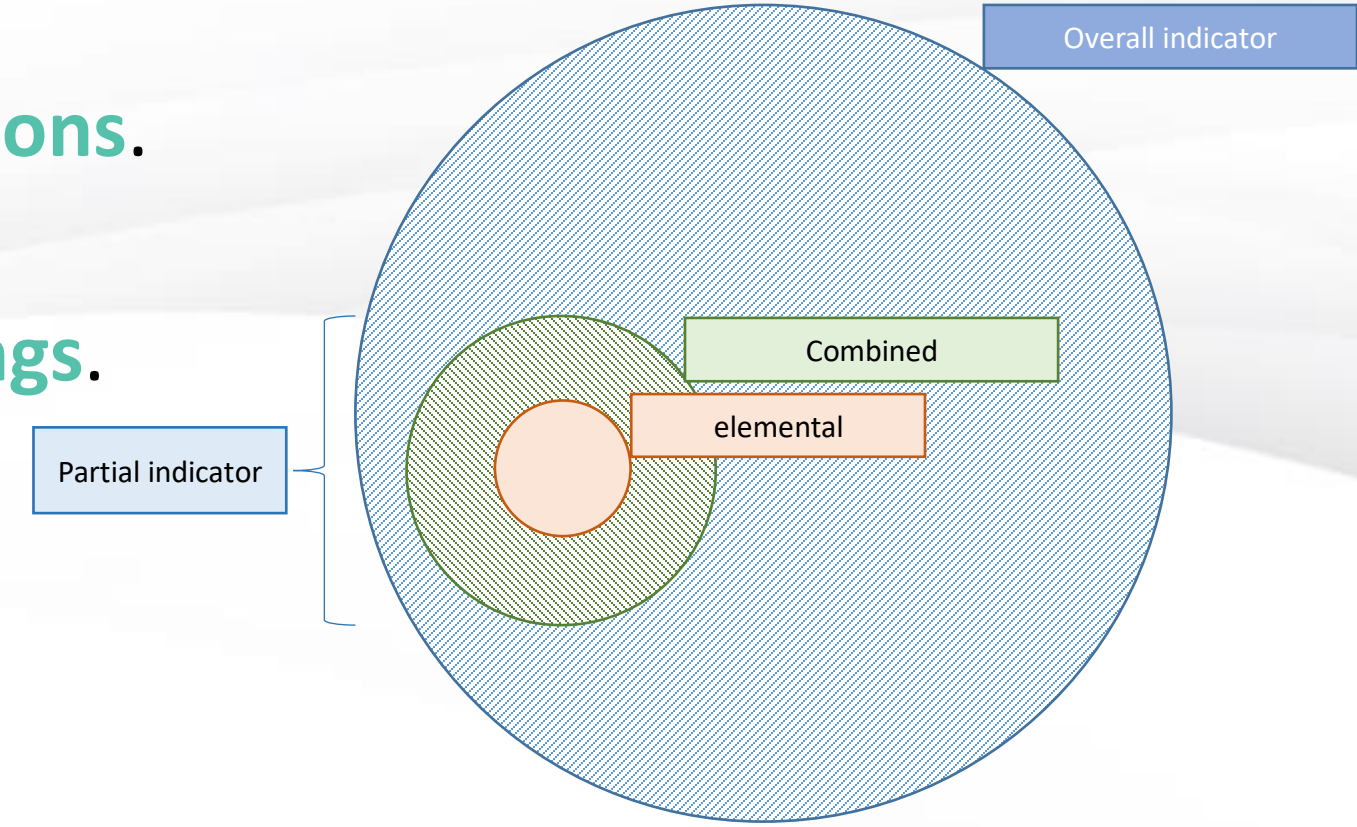
Indicators

The **requirements** on **energy indicators** should be defined in an incremental manner.

- **Shallow-medium renovations**.
- **Majorly renovated buildings**.
- **New buildings**.
- Existing buildings.



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Indicators - Energy

Overall EP indicators

- **Overall non-renewable primary energy use** [kWh/m²]
- Overall total primary energy use [kWh/m²]
- Summer thermal comfort [K·h]
- Winter thermal comfort [K·h]
- Domestic Hot Water thermal comfort [K·h]

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Indicators - Energy

Overall EP indicators

- Overall non-renewable primary energy use [kWh/m^2]
- Overall renewable primary energy production [kWh/m^2]
- Overall renewable primary energy use [kWh/m^2]
- Overall equivalent CO_2 emissions [kg/m^2]
- Renewable electricity generation by onsite systems [kWh/m^2]
  - of which used
  - of which exported to non-EPB uses
  - of which exported to the grid

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Indicators - Energy

Overall EP indicators

Energy needs per <u>service</u>:

- Heating [kWh/m²]
- Cooling [kWh/m²]
- Domestic Hot Water (DHW) [kWh/m²]
- Humidification and Dehumidification [kWh/m²]
- Mechanical ventilation [kWh/m²]
- Lighting, in terms of Daylight Autonomy [%]

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Indicators - Energy

Overall EP indicators

Energy use per system service and energy vector:

- Heating [kWh/m^2]
- Cooling [kWh/m^2]
- Domestic Hot Water (DHW) [kWh/m^2]
- Humidification and Dehumidification [kWh/m^2]
- Mechanical ventilation [kWh/m^2]
- Lighting [kWh/m^2]

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Indicators - Energy

Partial EP indicators

Envelope

Per opaque construction:

• Thermal transmittance	[W/(m²·K)]

Per layered material:

• Name	[Text]
• Thickness	[cm]
• Conductivity	[W/(m·K)]
• Density	[J/(kg·K)]
• Colour, only for the outer layer	[Text]

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Indicators - Energy

Partial EP indicators

Envelope

Per window/skylight:

- Thermal transmittance [W/(m²·K)]
  - Glass
  - Frame
- Solar factor [-]
- Opening control type [Text]
- Solar shading
  - Presence [Text]
  - Technology [Text]
  - Control [Text]
- Solar shading potential, according to ISO 18292 [%]
- Air permeability class, according to EN 12207 [Text]

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Indicators - Energy

Partial EP indicators

Envelope

Thermal bridges per <u>type of junction</u>:

- Linear thermal transmittance [W/K]
- Length [m]

Air leakage:

- Air change rate at 50 Pa [1/h]

This indicator should be measured by means of a Blower Door test according to EN 13829 whenever possible, and its value should be included in the calculations.

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Indicators - Energy

Partial EP indicators

Technical Building Systems

For the services of **Heating**, **Cooling**, **DHW**, **Humidification & Dehumidification**, and **Mechanical Ventilation**.

Per technical building system per service or combination of services:

- Service or services linked to the system [Text]
- Rated general installation efficiency [%]

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Indicators - Energy

Partial EP indicators

Technical Building Systems

Generation:

• Technology	[Text]
• Energy carrier	[Text]
• Rated power input	[kW]
• Effective rated output	[kW]
• Rated efficiency	[%]
• Renewable contribution, if applicable	[%]
• Metering type	[Text]
• Control type	[Text]

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Indicators - Energy

Partial EP indicators

Technical Building Systems

Storage:

- Capacity [m^3]
- Control type [Text]

Distribution:

- Typology of circuit [Text]
- Pipe insulation [Text]
- Circulation device [Text]
- Control type [Text]

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Indicators - Energy

Partial EP indicators

Technical Building Systems

Emission:

- Technology [Text]
- Control type [Text]

Reporting of performance. [Text]

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Indicators - Energy

Partial EP indicators

Technical Building Systems

For the **lighting** service.

- Technology [Text]
- Overall rated power [W]
- Control type [Text]

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Indicators - Energy

Partial EP indicators

Renewable electricity production

Per **producing** technology:

• Technology	[Text]
• Installed peak power	[kWp]
• Rated efficiency	[%]
• Orientation	[°]
• Inclination	[°]
• Inverter type	[Text]
• Reporting of performance.	[Text]

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Indicators - Energy

Partial EP indicators

Renewable electricity production

Per **storage** technology:

- Technology [Text]
- Installed peak capacity [kWh]
- Control [Text]
- Reporting of performance. [Text]

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Indicators – Smart Readiness

- **Overall score**

- **Impact scores**:
  - Energy savings on site;
  - Flexibility for the grid and storage;
  - Comfort;
  - Convenience;
  - Convenience;
  - Wellbeing and health;
  - Maintenance and fault prediction;
  - Information to occupants;
  - Total.

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Indicators – Smart Readiness

- **Domain scores**:
  - Heating;
  - DHW;
  - Cooling;
  - Controlled ventilation;
  - Lighting;
  - Dynamic envelope;
  - Renewable generation & Storage;
  - EV charging;
  - Monitoring & control;
  - Total.

The **Smart Readiness Assessment** can be integrated in **EPB Assessments**.

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Indicators – Indoor Environmental Quality

- **Overall ALDREN thermal score**
- **Winter thermal score**
- **Summer thermal score**
- **Spring thermal score**
- **Fall thermal score**

Season	Occupied (h)	Score
Winter	[Value]	1.9
Summer	[Value]	2.8
Aut./Spring	[Value]	2.7
Total:	[Value]	2.5

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Indicators – Cost

- **Overall energy cost per energy carrier**

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U-CERT's EPC Report

Issue Date: [insert text here]
Building Reference: [insert text here]
Software used: [insert text here]

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User-Centred Energy Performance Assessment and Certification

EPB Assessor name: [insert text here]
EPC Reference: [insert text here]
[link to EPC database]

Calculated EPB Assessment

Professional's report

Building Information

Name: [insert text here]
Address: [insert text here]
Municipality: [insert text here]
Postal Code: [insert text here]
Region: [insert text here]
Country: [insert text here]
Cadastral Ref.: [insert text here]

Building Situation: [insert text here]
Year of Construction: [insert text here]
Previous Interventions: [insert text here]
Object Type: [insert text here]
Building Category: [insert text here]
Building Ref. Area: [insert text here]

Energy Performance

Thermal Score

Season	Occupied (h)	Score
Winter	[Value]	1.9
Summer	[Value]	2.8
Aut./Spring	[Value]	2.7
Total:	[Value]	2.5

Smart Readiness Indicator

Assessor Information

Name: [insert text here]
ID: [insert text here]
Company name: [insert text here]
Company ID: [insert text here]
Email: [insert text here]
Phone: [insert text here]

Address: [insert text here]
Municipality: [insert text here]
Postal Code: [insert text here]
Region: [insert text here]
Country: [insert text here]

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