
BUILD UP
The European portal for energy efficiency
and renewable energy in buildings
WEBINAR

Unlocking Operational Rating Schemes: the synergetic added value of SmartLivingEPC & CHRONICLE

14th September 2023 / 11.00H – 12.30H CET

BUILD UP

The European portal for energy efficiency and renewable energy in buildings

AGENDA

Presentation	Speaker
Challenges in Building Environment & Operational Rating Schemes	Sofia Bazzano, EU Project & Financial Officer at REHVA
From H2020 to LIFE-CET: The Buildings Topic(s) in transition	Ulrike Nuscheler, Senior Project Adviser LIFE Energy + LIFE Climate, CINEA
Keynote session - Measuring building performance as a steppingstone towards operational rating	• Speaker 1: Andrei Vladimir Liţiu, Executive Director at EPB Center • Speaker 2: Gusts Kossovics, Director Technical Communication at eu.bac
Presentation by SmartLivingEPC	Paris Fokaides, Senior Researcher, Frederick Research Center
Presentation by CHRONICLE	Angelina Katsifaraki, Project Manager at HYPERTECH SA
Q&A session	Moderated by BUILD UP
Thank you from BUILD UP	BUILD UP

REHVA

Challenges in Building Environment & Operational Rating Schemes

Sofia Bazzano

EU Project and Financial Officer

Challenges in the Building Environment

Challenges faced when implementing operational rating schemes in the building sector:

1. **Data Availability:** scarcity and inconsistency of building performance data
2. **Heterogeneous Building Stock**: diverse nature of buildings in terms of type, age, and energy systems.
3. **Interoperability:** difficulty in integrating disparate data sources and systems.
4. **Behavioral Factors:** occupant behavior can significantly influence building performance.
5. **Regulatory and Policy Barriers**: regulatory constraints can pose hurdles to effective rating schemes.

Overcoming Challenges with SmartLivingEPC & CHRONICLE

SmartLivingEPC & CHRONICLE projects share a common objective: to enhance the measured and operational performance of buildings through comprehensive operational rating schemes.

Smart living EPC

CHRONICLE

https://www.smartlivingepc.eu/en/

https://www.chronicle-project.eu/

SmartLivingEPC & CHRONICLE synergetic added value

- ✓ **Comprehensive Data:** SmartLivingEPC's real-time data integration capabilities, coupled with CHRONICLE's data integration features, create a comprehensive dataset. This addresses the challenge of data availability by ensuring that a wide range of building data is readily accessible.
- ✓ **Enhanced Data Quality:** CHRONICLE's data quality enhancement complements SmartLivingEPC's analytics. This means that the data used for operational rating schemes is not only abundant but also accurate, leading to more reliable assessments.
- ✓ **Customized Assessments:** SmartLivingEPC allows for the customization of rating criteria, tailoring the assessment process to the specific characteristics of different types of buildings. CHRONICLE's integrated data ensures that these customized criteria are supported by a wealth of information.
- ✓ **Real-Time Insights:** The combined solution provides real-time insights into building performance.

BUILDUP Webinar- Unlocking Operational Rating Schemes, 14 September

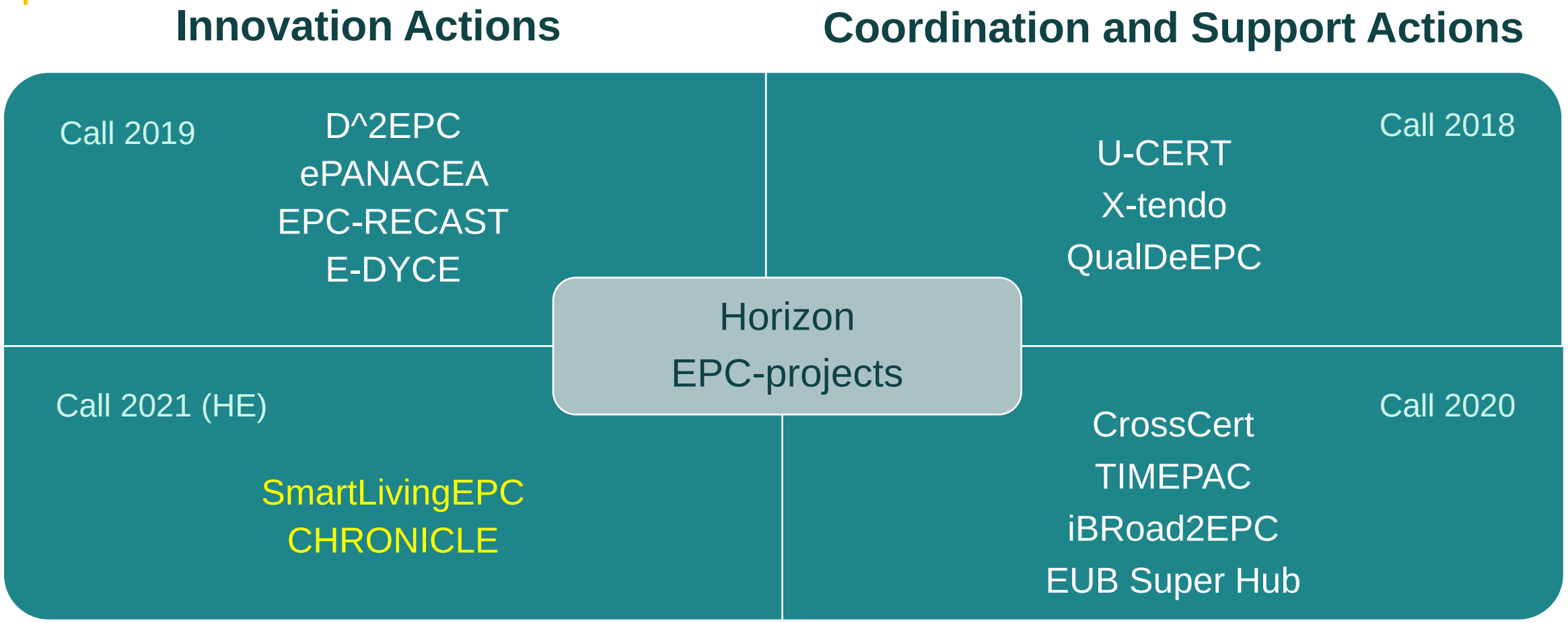
From H2020 to LIFE-CET: The Buildings Topic(s) in transition

Ulrike Nuscheler, Senior Project Adviser,

LIFE-Clean Energy Transition, CINEA

European Climate, Infrastructure and Environment Executive Agency

Landscape of Horizon EPC-projects

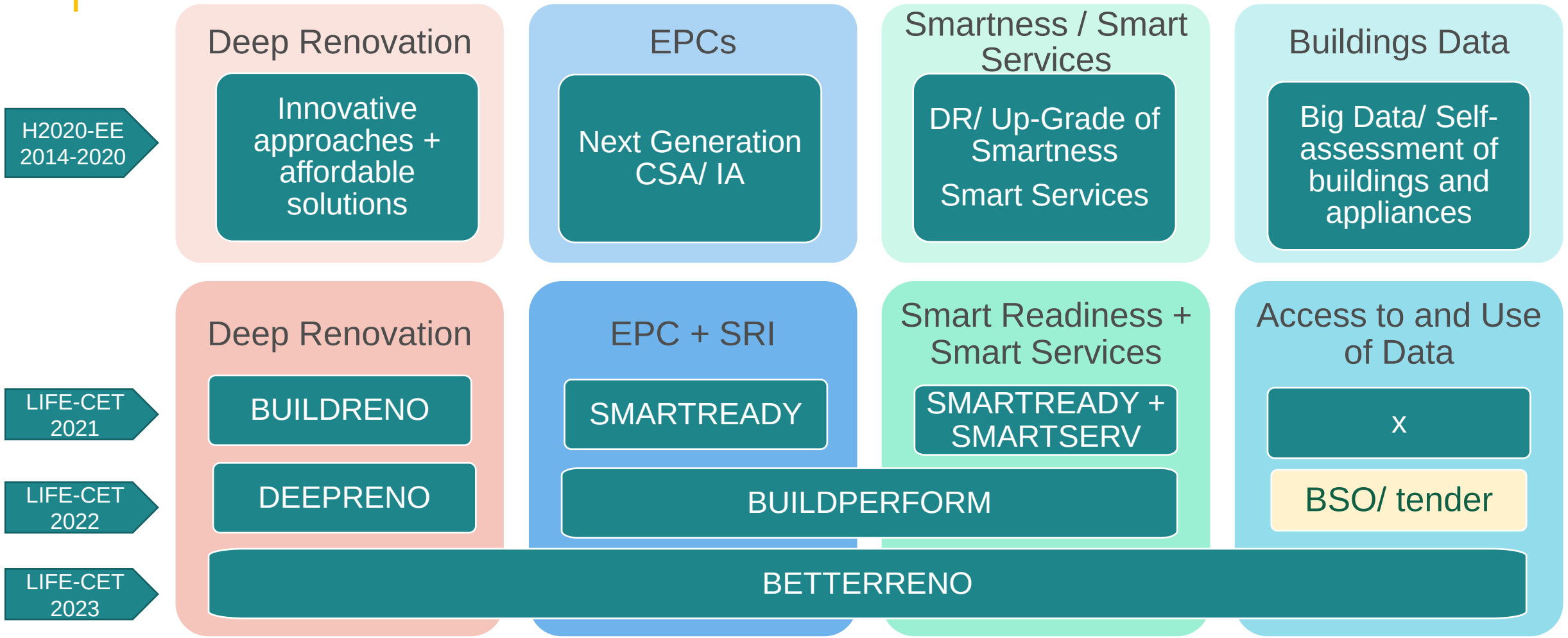


BuiltHub

European Commission

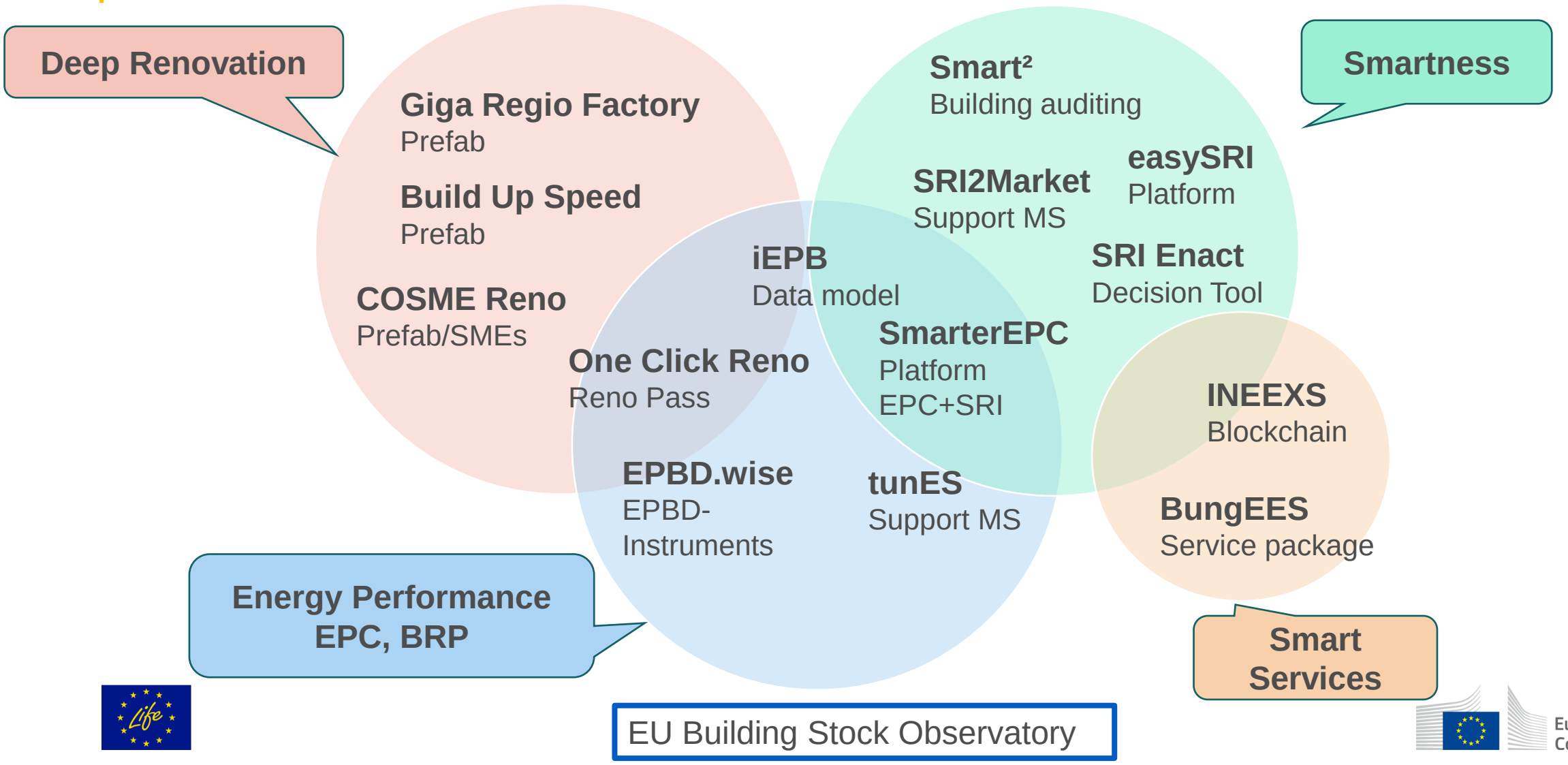
Buildings: Energy Performance, Smartness and Data

- From Horizon 2020 to LIFE-CET



European Commission

LIFE-CET Project Landscape



LIFE-CET buildings projects kicking off in autumn 2023

new

- ✓ **EPBD.wise** - supporting public authorities in 6 focus countries (TBD) in the **design, implementation** and evaluation of **ZEB, NBRP, MEPS, BRPs, EPCs**; engaging with CA-EPBD + Renovate Europe Campaign.
- ✓ **tunES** - supporting Member States in **implementing and initiating legislative** (and other) action to exploit the potential of **EPC + SRI** through consistent, ambitious + user-friendly design targeting AT, HR, GR, HU, IT, PL, SI.
- ✓ **Smarter EPC** - delivering a **platform for open access to EPC and SRI tools** developed under (H2020, LIFE CET) past and ongoing projects + supporting the integrated assessment of energy performance and smart readiness.
- ✓ **iEPB** - improving the **synchrony between EPB assessments** – i.e. EPCs, SRI + energy renovation recommendations by developing **common data model** for EPB Assessments; focus will be on ES, NL and AU.
- ✓ **OneClickReno** – **developing + integrating** automatically generated, customizable and easy to understand **BRPs** through simple ("one-click") web tools for 4 + 1 markets (IE, ES, NL, IT + GR).
- ✓ **COSME Reno** - **implementing industrialised renovation solutions**, focus on SMEs, using prefab elements and by deploying tools, services and training for SMEs.

European Commission

LIFE sub-programme Clean Energy Transition

Key EU programme for clean energy transition

focusing on **policy implementation & market up-take** of technologies and products

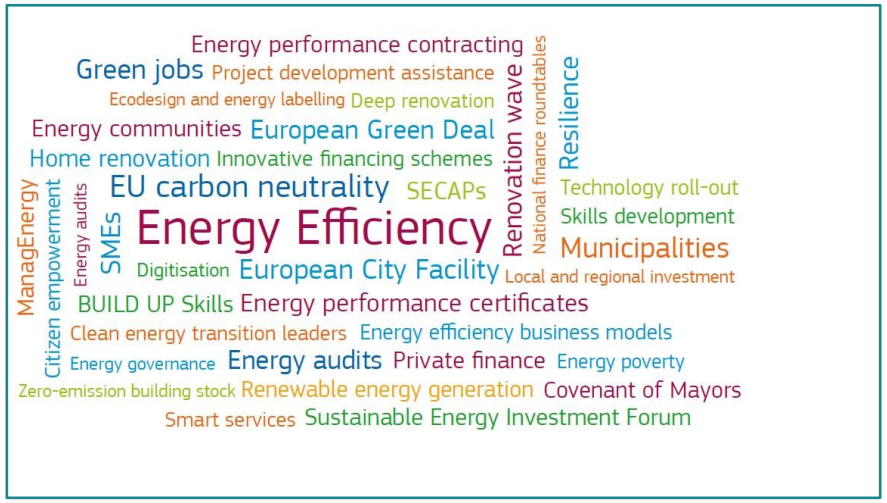
➡ Creating favourable regulatory and market conditions; mobilising investments; building capacity; empowering consumers

- Builds on **Horizon 2020 Energy Efficiency** (2014-2020)
- 2021-2027 budget of almost €1 bn

Clean Energy Transition

European Commission

LIFE-CET Call 2023



- Deadline 16 November 2023
- Ca. EUR 100m available for grants
- 95% co-funding rate (no infrastructure cost, mostly labour)
- Policy and market needs-driven funding topics, technologies as enablers
- Most topics: Minimum of 3 (eligible) entities from 3 different eligible countries
- Application through Funding & Tender opportunities portal

European Commission

Energy Performance of Buildings - Creating the conditions to make renovation faster, deeper, smarter, service- and data-driven (LIFE-2023-CET-BETTERRENO)

- Increase attractiveness of building performance upgrades
- Facilitate **large-scale deep renovation** (scope A): business models, link supply and demand, renovation passports, better coordination, replicable models
- Streamline the **regulatory and administrative framework** (scope B): adapted legal frameworks and support schemes, improved governance
- Better **building energy data and services** (Scope C): improved availability, quality and accuracy of data for financial services, EPCs, building valuation, easier inspections, valorisation of co-benefits

95% co-funding

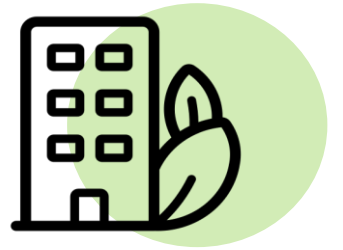
Total budget EUR 11 million

Proposals up to EUR 2 million.

Min. 3 applicants, 3 countries

European Commission

LIFE CET 2023 call
More funding opportunities for the buildings sector



- **LIFE-2023-CET-POLICY/ Scope C:** Support for the implementation of the Energy Performance of Buildings Directive
- LIFE-2023-CET-BUILDSKILLS: **Upskilling and reskilling** interventions enabling a decarbonised building stock and energy system integration
- LIFE-2023-CET-OSS: Integrated **services** for building renovation and clean energy transition in businesses
- LIFE-2023-CET-PDA: Project Development Assistance for sustainable energy **investments**

Check CINEA's website for more info:
https://cinea.ec.europa.eu/programmes/life/clean-energy-transition_en

European Commission

Keep in touch with us

30 years of bringing green ideas to LIFE

https://cinea.ec.europa.eu/life_en

LIFE Programme

@LIFEprogramme
@CleanEnergy_EU

LIFE Programme

LIFE Programme

@LIFEprogramme

LIFE Newsletter
Clean Energy Newsletter

European Commission

Thank you

European Commission

U-CERT

User-Centred Energy Performance
Assessment and Certification

Unlocking Operational Rating Schemes: the synergetic added value of SmartLivingEPC & CHRONICLE

Keynote: measuring building performance as a steppingstone towards operational rating

webinar powered by REHVA and hosted by the Build Up Portal,
11h00-12h30 CEST, 14 September 2023

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Andrei Vladimir LIȚIU

Executive Director

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EPB CENTER
Consultancy Services on the Energy Performance of Buildings

U-CERT
User-Centred Energy Performance Assessment and Certification

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Next Generation Energy Performance Certificates cluster

2019

Qual DeEPC

U-CERT
User-Centred Energy Performance Assessment and Certification

X-tendo

2020

D2EPC

E-DYCE

ePANACEA
Smart European Energy Performance Assessment & Certification

EPC RECAST
ENERGY PERFORMANCE CERTIFICATE RECAST

2021

crossCert
Next-generation of Energy Performance Assessment and Certification

EUB SuperHub

iBRoad2EPC

TIMEPAC
The new EPC for Europe

2022

Smart living EPC

CHRONICLE

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Next Generation Energy Performance Certificates cluster

NextGenEPCs

Enhancing the evolution of Energy Performance Certificates

Follow our hashtag **#NextGenEPCs**

Join us on our mission to make the EPCs evolution a reality

crosscert.eu d2epc.eu edyce.eu epanacea.eu epc-recast.eu eubsuperhub.eu ibroad2epc.eu

timepac.eu qualdeepc.eu x-tendo.eu u-certproject.eu cordis.europa.eu smartlivingepc.eu/en

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horizonresultsbooster.eu

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Next Generation Energy Performance Certificates cluster

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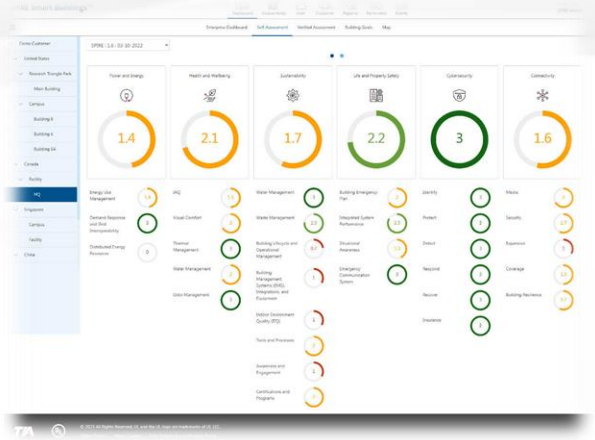
Evolution of Performance Assessment in EPBD & the related CEN/ISO set of EPB standards

- Asset Rating - Theoretical Approach
- Measured Performance - Real-world Conditions
- Operational Rating - Comprehensive Analysis



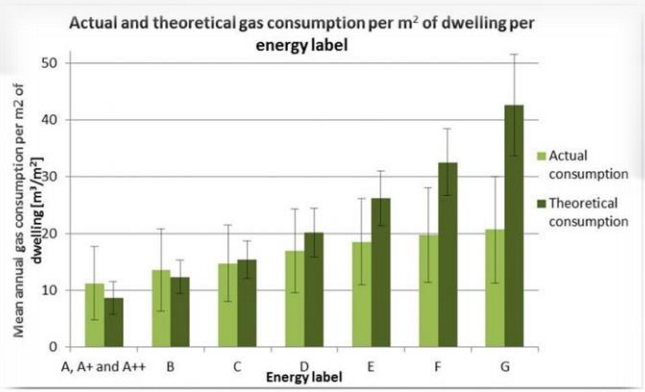


Figure 7: Actual and theoretical gas consumption per m2 of floor area per label (source Majcen and Itard, 2012)

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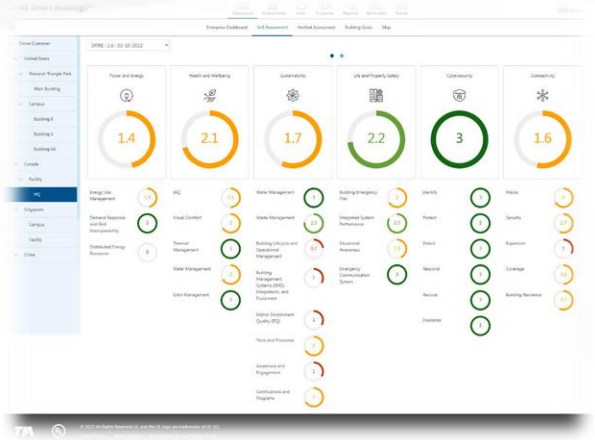
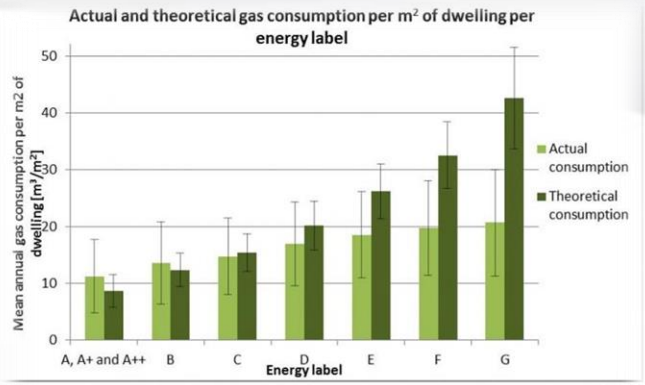
Making the Invisible Visible

- “To measure is to know.”
- “If you cannot measure it, you cannot improve it.”
- “When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind.”





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Asset Rating - Theoretical Approach

- An asset rating is based on the inherent performance characteristics of a building (its envelope and technical systems) and assumes a standard set of operating conditions, occupant behaviour and climatic conditions
- 👍 Provides a consistent benchmark, irrespective of actual usage or climatic conditions
- 👎 Might not reflect actual energy use if operated differently from standard conditions

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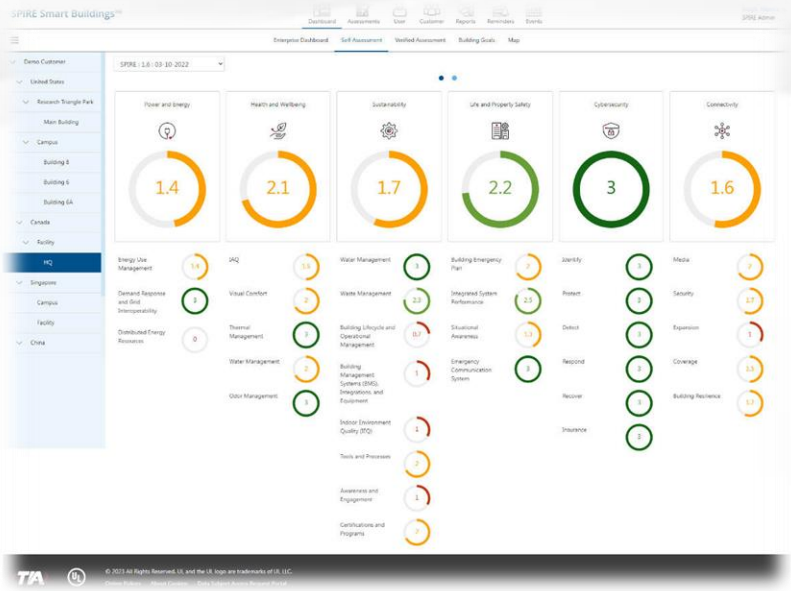
Measured Performance - Real-world Conditions

- Focuses on the actual performance of the building, often collected through meter readings or sensors
- 👍 Gives an accurate picture of a building's current performance
- 👎 Can be influenced by many variables, including occupant behaviour, maintenance, and climatic variations



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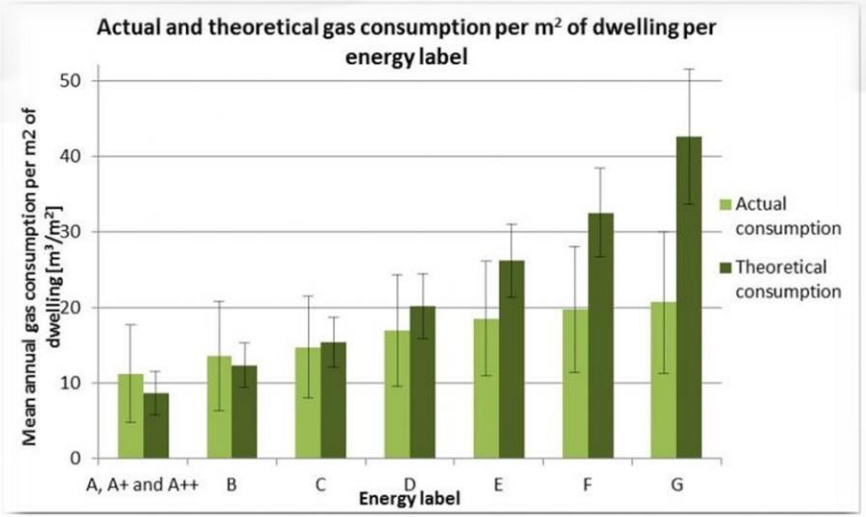
Operational Rating - Comprehensive Analysis

- Takes into account the actual performance and normalizes it based on factors like occupancy, operating hours, and climatic conditions
- 👍 Provides a more accurate picture of how efficiently a building is operated
- 👎 Requires more complex data collection and analysis



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Operational Rating – Why? (time frames)

- **Short-Term Predictions** (hours/days): Model-Based Controls/Flexibility
  - Peak Shaving: By predicting demand peaks for the upcoming hours or day, buildings can pre-cool or pre-heat to reduce HVAC loads during peak hours, or temporarily switch to stored energy.
  - Effective Use of Renewables: If solar or wind production is predicted to be high in the next few hours, the system might store excess energy, reduce dependence on the grid, or even sell back excess energy to the grid.
- **Mid-Term Predictions** (weeks): Fault Detection/Diagnosis
  - Monitoring systems can use accumulated data over weeks to detect patterns that suggest faults or inefficiencies in equipment. For example, if an air handling unit is drawing more power than usual for the same (heating/cooling/ventilation) load, it might be a sign of a failing component.

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Operational Rating – Why? (time frames)

- **Long-Term Predictions** (months): Predictive Maintenance
  - Instead of relying on scheduled maintenance, systems can predict when a component will likely fail or require service. This prediction, often based on patterns detected over months, can save costs by addressing issues before they become critical. For instance, if a heat pump shows gradual reduction in efficiency, it might be predicted to require maintenance in the next two months.
- **Very Long-Term Predictions** (years): Effect of Renovation Measures
  - By analysing building performance over multiple years, one can make accurate predictions about the potential benefits of major renovations or upgrades. For example, if a building envelope is showing increasing heat loss over several years, a renovation to improve insulation might be predicted to have substantial energy-saving effects over the next decade.

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Operational Rating – Why? (stakeholders)

- **Long-Term Predictions** (Years): Effect of Renovation Measures
  - **Building owners**
    - Optimal selection of renovation measures
    - Long-term cost savings, improved well-being and increased property value
  - **Policy makers**
    - Effective allocation of resources
    - Efficient distribution of costs/subsidies, manpower, and materials for maximum impact
  - **Performance Guarantee/Service Providers**
    - Offer dependable guarantees and services
    - Essential tools for rapid scaling and broader implementation

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Operational Rating – In Member States

Table 6. EPB Assessment type. U-CERT case studies' EPCs..

Case study ID[a]	Country	EPB Assessment for issuing an EPC	
		Valid assessment type[5]	Used in case study
9	Bulgaria	Calculated[a]	Calculated
11a	Denmark	Calculated and measured	Calculated
11b			Calculated
3	Estonia	Calculated and measured	Calculated
10a	France	Calculated and measured[b]	Measured
10b			Calculated
4a	Hungary	Calculated	Calculated
4b		Calculated	Calculated
8	Italy	Calculated	Calculated
1	The Netherlands	Calculated	Calculated
7	Romania	Calculated	Calculated
6a	Slovenia	Calculated and measured	Calculated
6b			Calculated
5a	Spain	Calculated	Calculated
5b		Calculated	Calculated
5c		Calculated	Calculated
2a	Sweden	Calculated and measured[c]	Measured
2b			Measured

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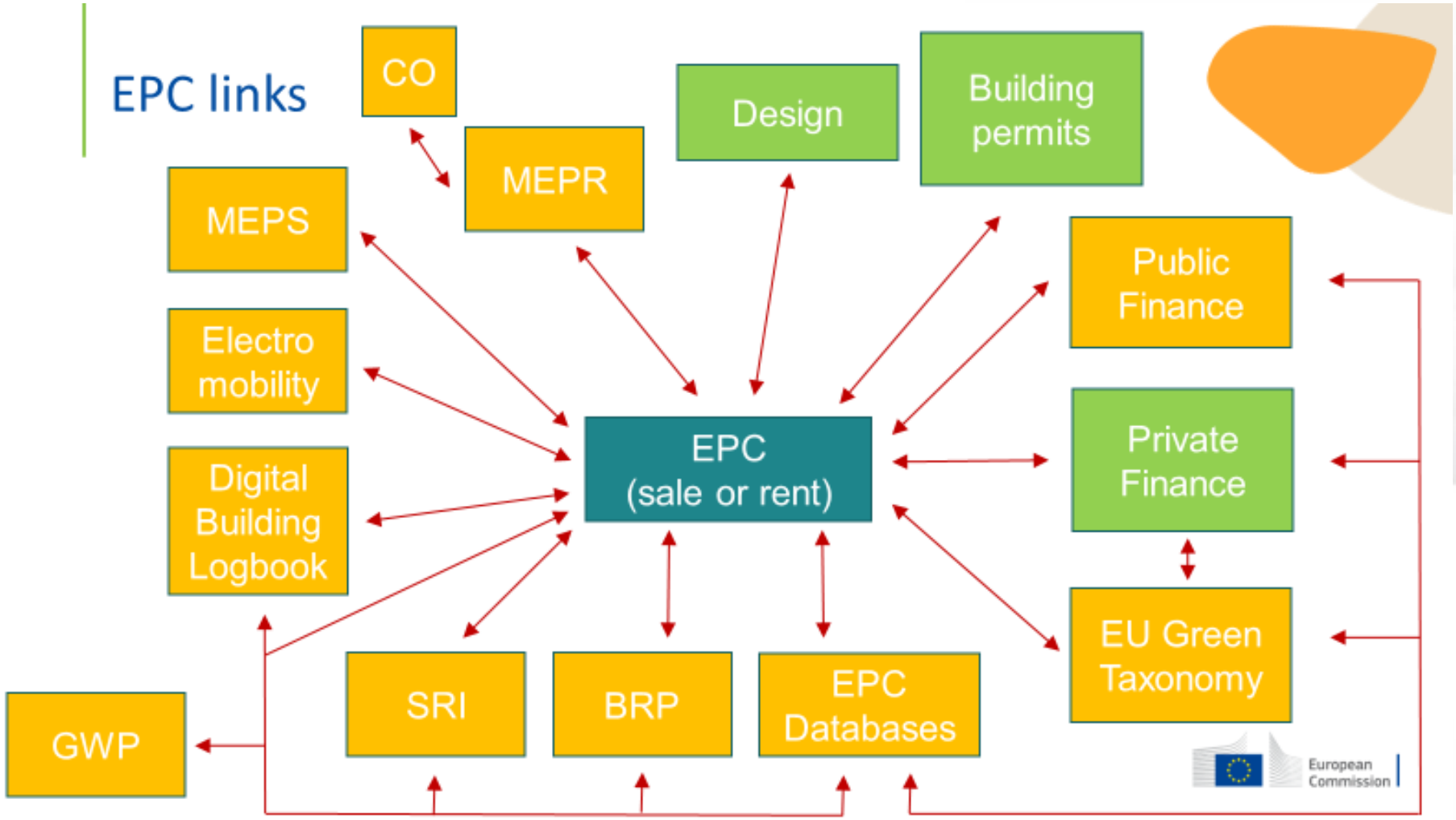
Energy Performance Certificates are linchpin



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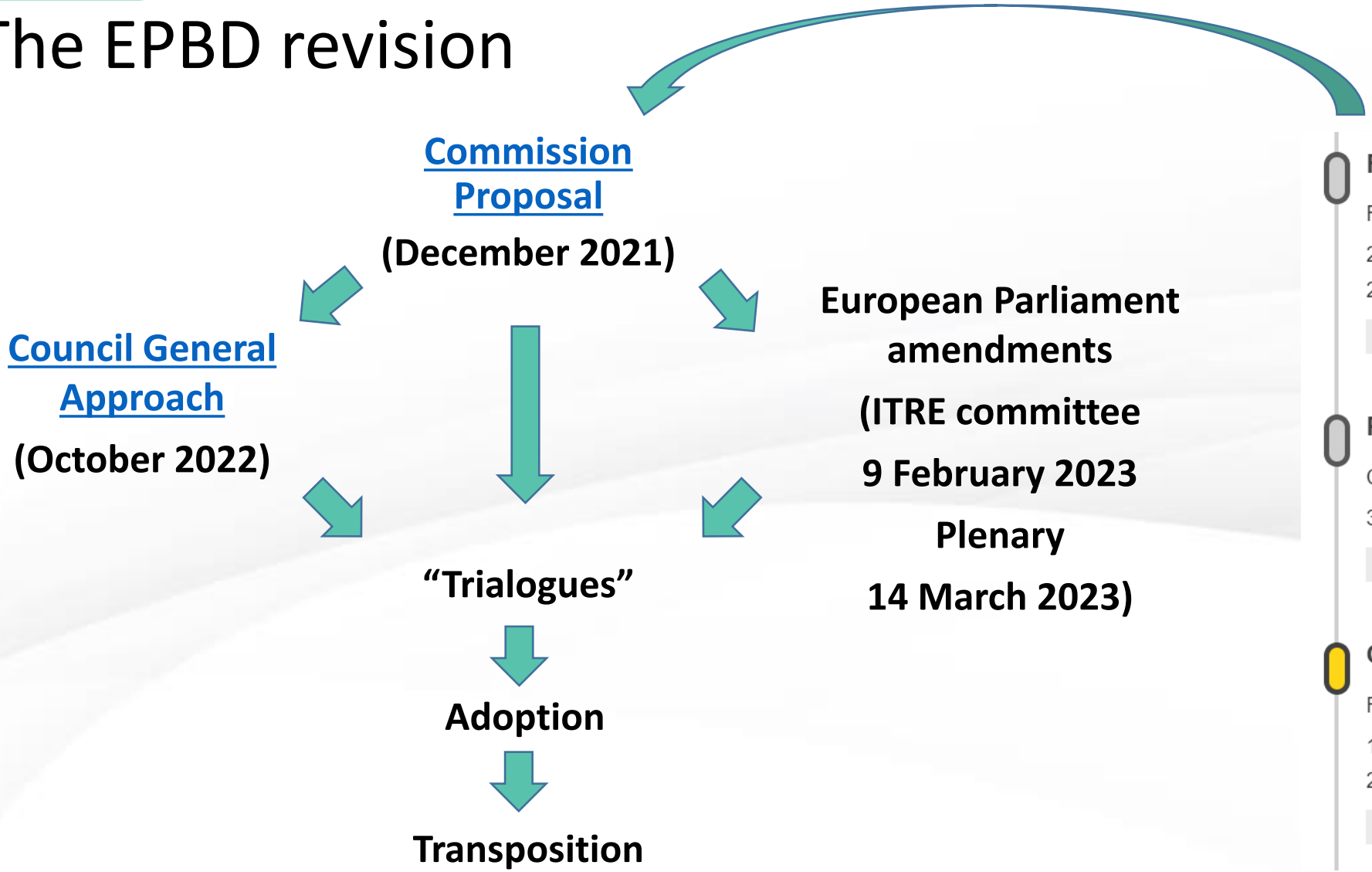
The EPBD revision



Roadmap

Feedback period

22 February 2021 - 22 March 2021

FEEDBACK: CLOSED

Public consultation

Consultation period

30 March 2021 - 22 June 2021

FEEDBACK: CLOSED

Commission adoption

Feedback period

15 December 2021 - 01 April 2022

FEEDBACK: CLOSED

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U-CERT
User-Centred Energy Performance Assessment and Certification

Measuring building performance as a steppingstone towards operational rating

Thursday 14 September

Gusts Kossovics, eu.bac Director Technical Communication

OUR MEMBERS

eu.bac european building automation controls association

"A world where energy efficiency and sustainability in every building is achieved through the optimal application of home and building controls, automation systems and services."

MEASURING BUILDING PERFORMANCE

Building performance = effectiveness of a building in terms of its:

- energy efficiency,
- indoor environmental quality and comfort,
- overall sustainability.

Operational rating = system for assessing and rating the performance

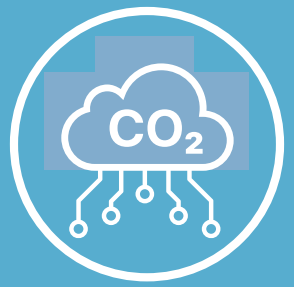
Parameters to measure:

- Energy consumption
- Water consumption
- Indoor air quality
- Occupant comfort
- Building systems performance

eu.bac european building automation controls association

BENEFITS OF MONITORING & CONTROL

REDUCE ENERGY AND CO2 CONSUMPTION



IMPROVE HEALTH AND COMFORT

REDUCE COSTS

TACKLE ENERGY POVERTY

BACS FOR OPERATIONAL RATING

- Provide accurate and timely data on building performance
- Identify opportunities for improvement
- Track progress over time
- Automate building systems

SUGGESTED NEW REQUIREMENTS FOR ENHANCING MEASURING

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EXTENDING BUILDING AUTOMATION AND CONTROL SYSTEM (BACS) REQUIREMENT SCOPE

MANDATORY SMART READINESS INDICATOR

INDOOR ENVIRONMENTAL QUALITY (IEQ) MONITORING AND CONTROL

BACS REQUIREMENTS AND BENEFITS

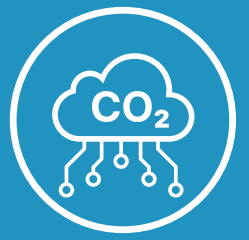
- Non-Residential buildings with effective rated output over 290 kW by 31/12/2024 and over 70kW by 31/12/2029
- Larger multifamily residential with effective rated output over 70 kW from 31/12/2024

a) continuously monitoring, logging, analysing and allowing for adjusting energy usage;

b) benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement;

c) allowing communication with connected technical building systems and other appliances inside the building and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers.

14% primary energy savings



Savings exceed investment by a factor of 9

BACS average payback 3 years

SMART READINESS INDICATOR (SRI) Art 13

Mandatory for large non-residential buildings >290 kW from 1/01/2025; >70kW from 1/01/2030

- Evaluates smartness and raises awareness of the value behind smart buildings
- Promotes more flexibility and enables buildings for demand response
- Smart functions crucial to achieving NZEB and ZEB building efficiency
- Smart-ready services provide Indoor Environmental Quality (IEQ) monitoring and reporting
- Practical sense to mandate the scheme to all buildings falling in the scope of the mandatory Building Automation and Control System (BACS) requirements

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IEQ REQUIREMENTS AND BENEFITS

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WHAT REQUIREMENT?

The installation of measuring and control devices for the monitoring and regulation of indoor environmental quality parameters in existing buildings, at relevant unit level, where technically and economically feasible.

WHICH BUILDINGS?

a) zero emission buildings;
b) new buildings;
c) existing buildings undergoing a major renovation;
d) medium and large non-residential buildings >70kW;
e) all public buildings and buildings that serve a specific function, such as schools and hospitals

26% Increase in cognitive function in office workers

9-20% reduction in asthma and allergy symptoms among students

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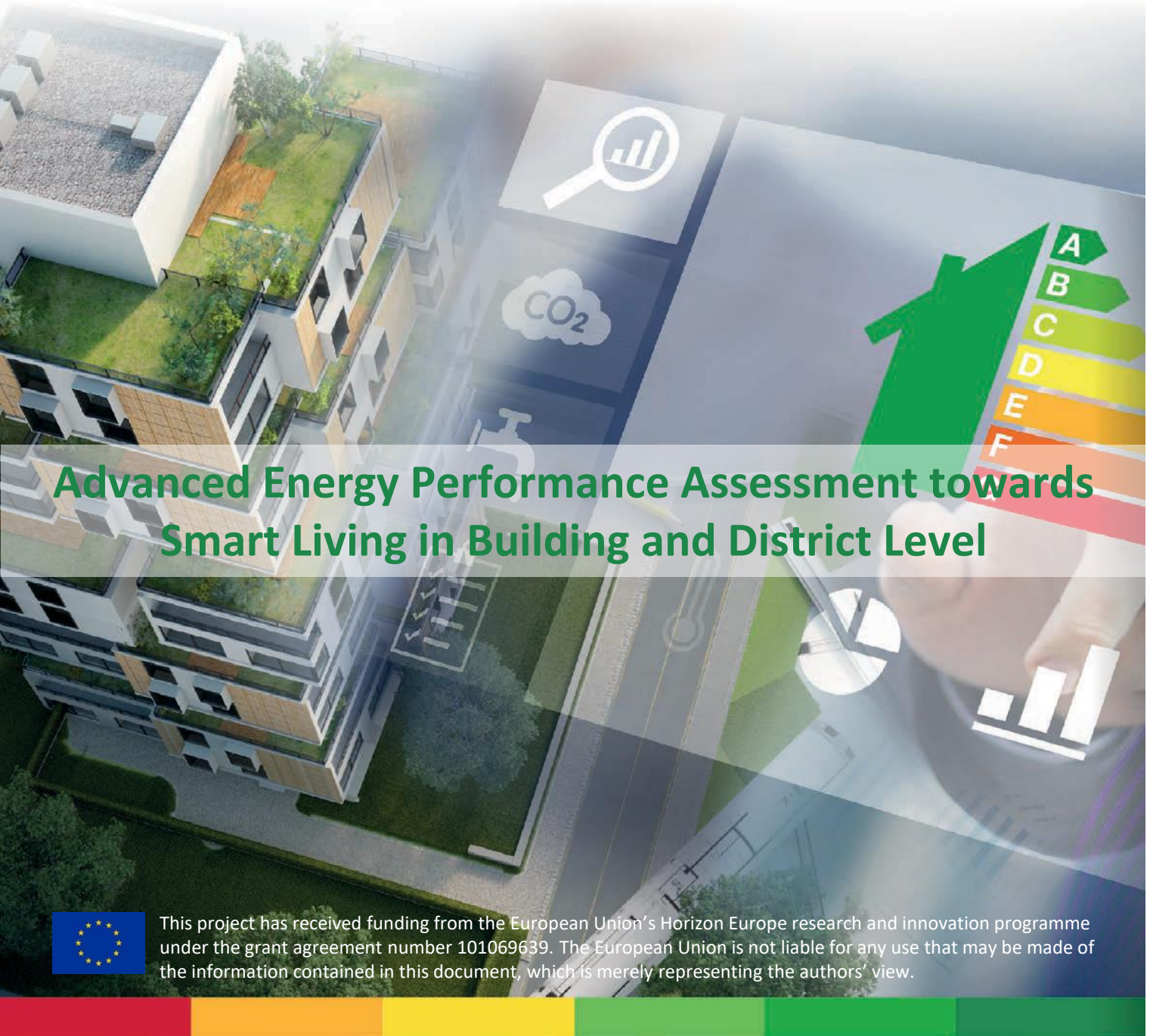

Advanced Energy Performance Assessment towards Smart Living in Building and District Level

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Project Short Overview – Enhancing buildings operational rating

Paris A. Fokaides, FRC

Unlocking Operational Rating Schemes: the synergetic added value of SmartLivingEPC & CHRONICLE

14 September 2023, Virtual

Smart living EPC

Outline

SmartLivingEPC Project Identity

- The Consortium
- The Problem & the Need
- SmartLivingEPC Project Vision & Objectives
- SmartLivingEPC Overall Concept
- SmartLivingEPC Case Studies
- SmartLivingEPC Impact
- SmartLivingEPC Work Plan

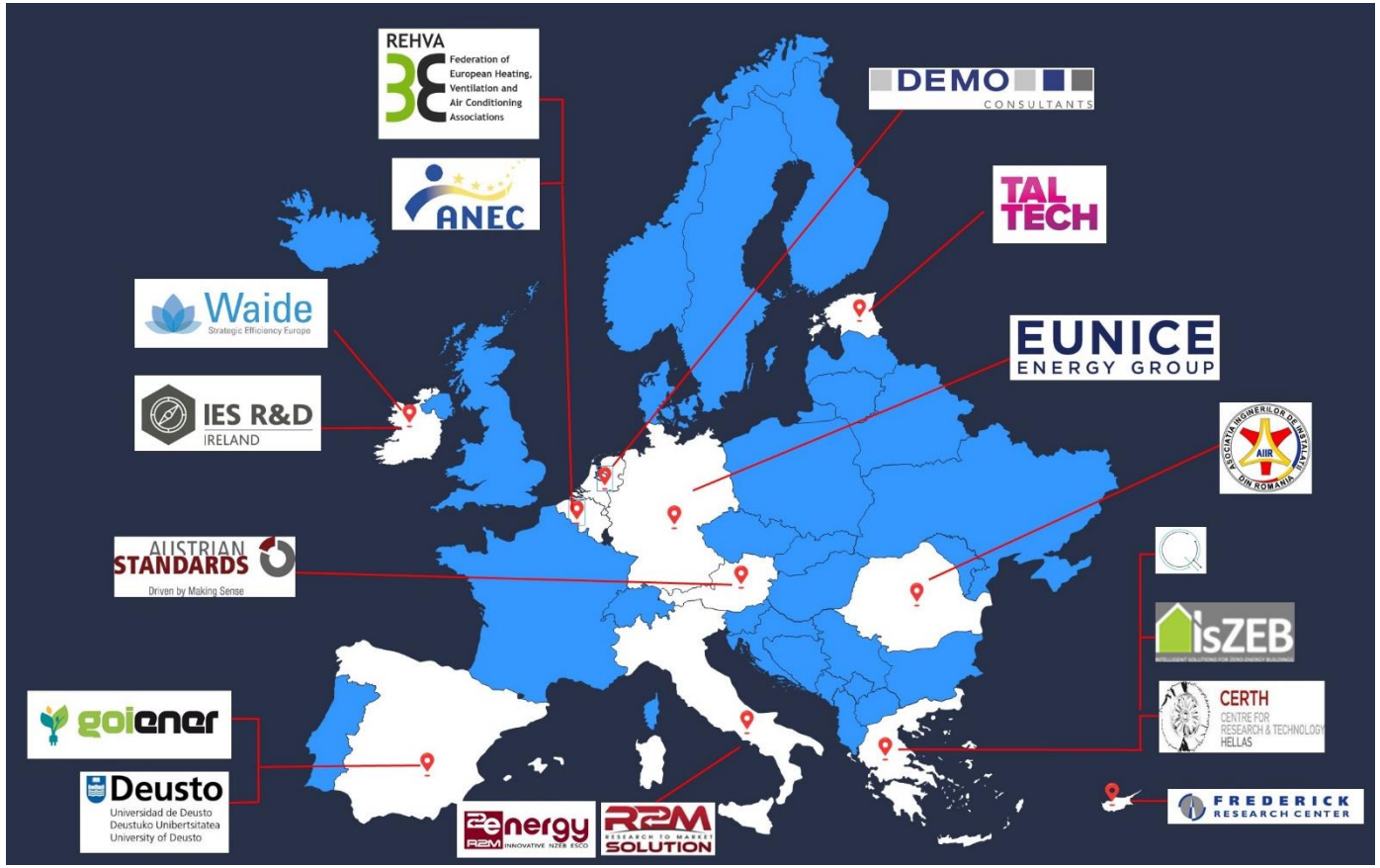
Enhancing buildings operational rating

Project Identity Card

Grant Number	**101069639**
H2020 Call	HORIZON-CL5-2021-D4-01-01
Type of action:	Advanced Energy Performance Assessment & Certification HORIZON Innovation Actions
Duration	36 months
Starting date	**1 July 2022**
Budget	**€ 4,745,065.00**
EU contribution	**€ 4,100,533.00**
Countries	Greece, Cyprus, Germany, Belgium, Romania, Ireland, Spain, Italy, Estonia, Netherlands, Austria

The Consortium

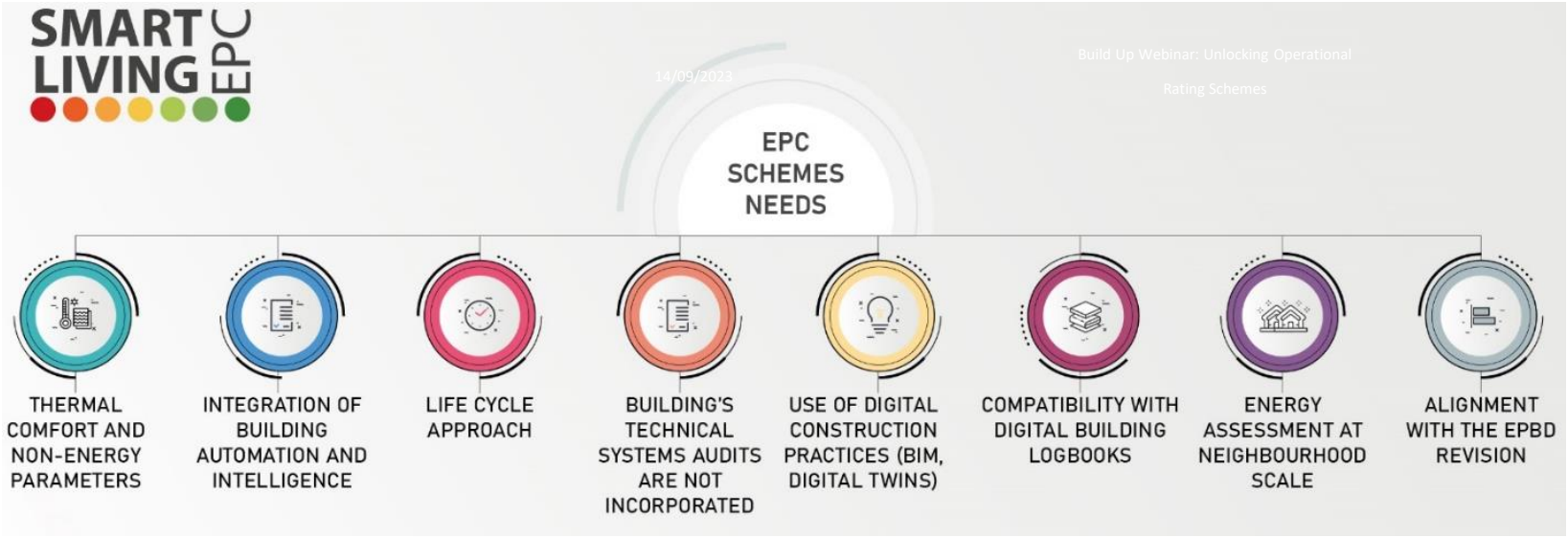
- 15 Partners and 2 affiliated entities from 12 Countries



- 8 multinational industry (IESRD, R2M, R2I, IsZEB, DEMO, QUE, WSEE, EUNICE)
- 3 research centers and academia (CERTH, FRC, UDEUSTO)
- 2 non-profit organizations (AIIR, REHVA)
- 1 Standardization body (ASI) & 1 one association (ANEC)
- 1 non-profit SME (GOI)
- 1 university (TalTech)

The problem and the need

- The sustainable built environment should go beyond improving the energy efficiency of buildings and include:
  - a qualitative and human dimension for the well-being of its users and examine
  - new ways of analysing & assessing the building stock throughout its life cycle.
- Energy efficiency research in buildings should contain:
  - the impact of the neighbourhood design on the energy performance of buildings
  - the neighbourhood as a whole.



SmartLivingEPC Vision

- SmartLivingEPC aims to:

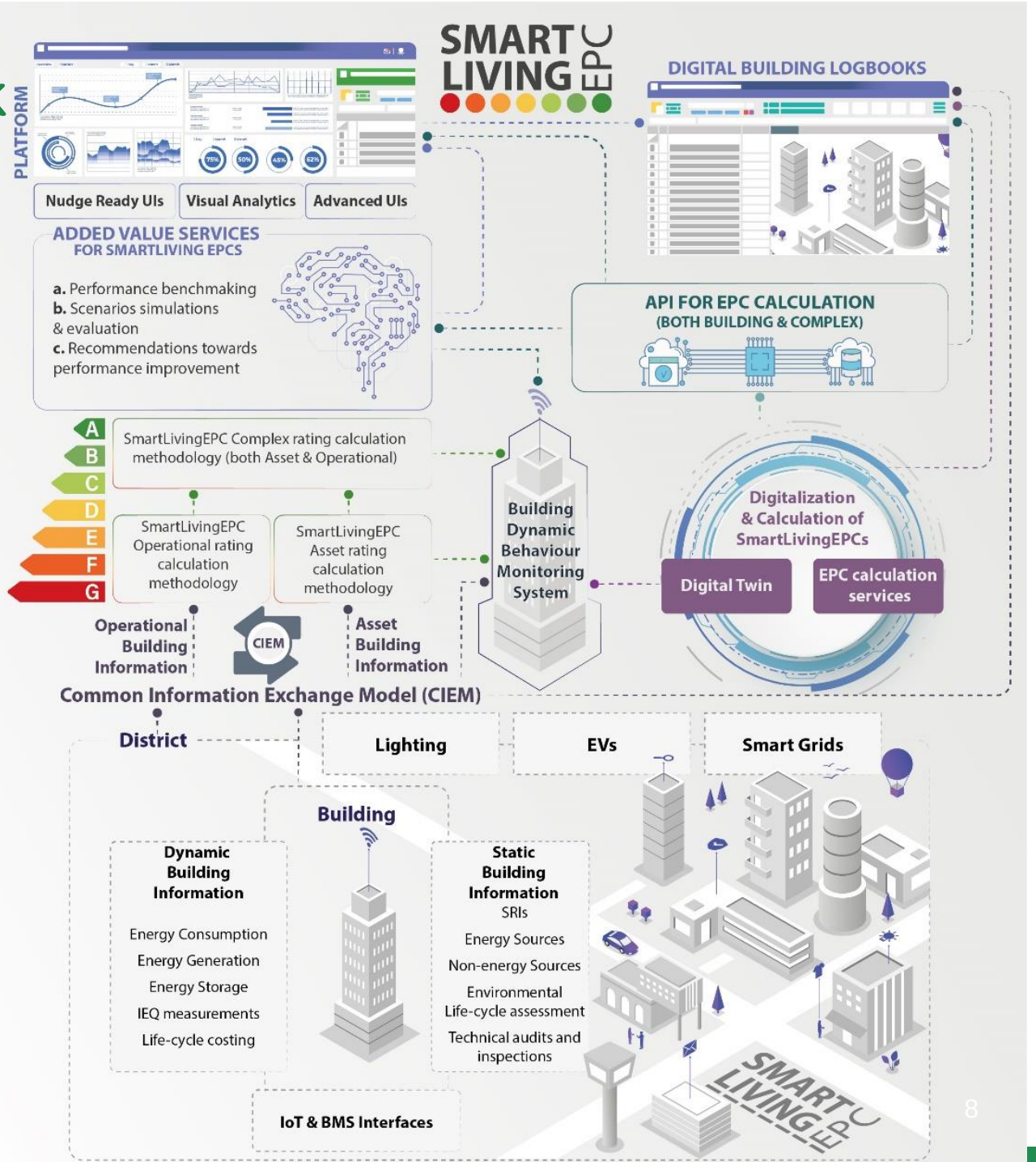
1. integrate the main parameters that constitute Industry 4.0 into a Smart Energy Performance Certificate and :
   - deliver certificates issued with the use of digitized tools
   - retrieve the necessary assessment information from BIM literacy.
2. provide information in relation to the operational behavior of the building based on a weighted approach of :
   - life cycle performance aspects,
   - building smartness assessment
   - information on the actual performance of the technical systems of buildings
3. cover aspects related to water consumption, as well as noise pollution and acoustics
4. being fully compatible with digital logbooks & building renovation pa
5. provide energy certification at the neighborhood scale
6. develop two parallel schemes:
   - one at the building level (Building EPC)
   - and one at the level of building complex (Complex EPC)

SmartLivingEPC Objective

- The development of a more reliable, cost-effective and highly replicable energy performance calculation method, utilizing data and information from the overall building's life cycle
- The integration of building automation and control systems intelligence into the EPC calculation procedure through the SRI scheme
- The establishment of a scheme that allows for synergies with building sustainability relevant instruments and relevant parts of Level(s)
- The development of a methodology for operational EPCs towards incorporating technical systems audits and adapting the certificate ratings to the actual energy consumption of the building
- The design and development of a certification process based on digital construction practices and Industry 4.0 building services
- The development of an EPC, compatible with digital building logbooks
- The development of a new rating scheme for neighborhood scale, b individual building units and on additional building complex paramete
- The development of AI services supporting the building performa consequence the next generation EPCs

Concept & Overall Framework

- Enhanced Calculation Methodology
  - Novel Asset Rating based on EN ISO 52000 standards series, considering SRI, Level(s) and technical building systems
  - Operational Rating , considering IEQ monitoring, energy generation/storage and life cycle costing
  - Rating scheme for neighbourhood scale
- Compatibility with BIM Literacy (SmartLiving Building Digital Twin) and DBLs
- Digital Platform and Services
  - Building dynamic behavior monitoring
  - SmartLivingEPC software calculation
  - Added value AI tools
  - Performance benchmarking and evaluation
  - Visualization Platform & nudge ready UIs



SmartLivingEPC Outcomes

Expected Outcome 1

- **Improved construction quality and service life compliance**

Expected Outcome 2

- **Improved accuracy of energy performance assessment, reduced gap between assessment and actual performance**

Expected Outcome 3

- **Improved and automated monitoring of energy performance of buildings with a direct link to the energy efficiency performance**

Expected Outcome 4

- **Improved user-friendliness of Energy Performance Certificates and post-occupancy performance data**

Expected Outcome 5

- **Increased uptake of design standards and practices based on actual performance**

Expected Outcome 6

- **More reliable understanding of energy and environmental performance in the early stage of the building life cycle based on consistent assessment practices across the buildings sector and across Member States and Associated Countries**

SmartLivingEPC Impact

Expected Impact 1

- **More energy efficient building stocks supported by an accurate understanding of buildings performance in Europe and of related evolution**

Expected Impact 2

- **Building stocks that effectively combine energy efficiency, renewable energy sources and digital and smart technologies to support the transformation of the energy system towards climate neutrality**

Expected Impact 3

- **Higher buildings' performance with lower environmental impacts through increased rates of holistic renovations**

Expected Impact 4

- **Higher quality, more affordable built environment preserving climate, environment and cultural heritage and ensuring better living conditions**

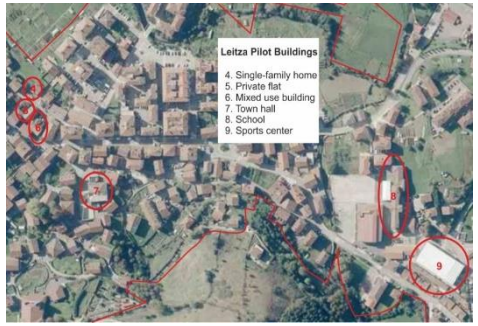
SmartLivingEPC Pilots

- Demo site 1:: nZEB Smart House DIH, Mixed-use, Thessaloniki Greece
- Demo site 2: Limassol Main Building, Frederick University, Cyprus
- Demo site 3: Joint Building complex, Pärnu, Esthonia
- Demo site 4: Single family house, Leitza, Spain
- Demo site 5: Private flat, Leitza, Spain
- Demo site 6: Mixed-use Building, Leitza, Spain
- Demo site 7: Town Hall, Leitza, Spain
- Demo site 8: School Building Facilities, Leitza, Spain
- Demo site 9: Sports Centre, Leitza, Spain

Demo site 1: nZEB Smart Home

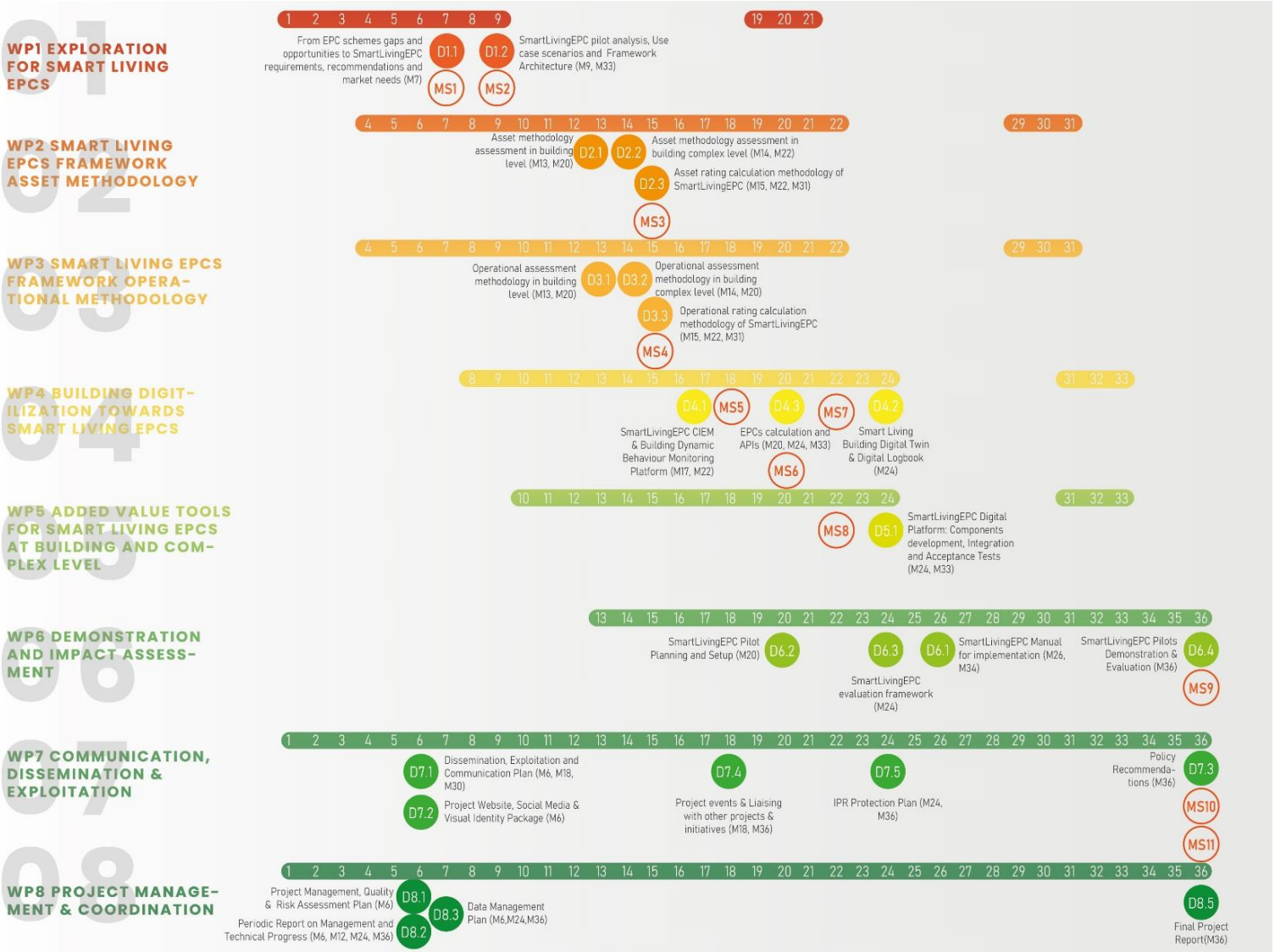
Demo site 2: Limassol, Cyprus

Demo site 3: Pärnu, Esthonia



Complex Building Assessment, Leitza, Spain

WPs Dependencies & Overall Methodology



SmartLivingEPC approach on Operational Rating

- Operational Rating Enhancements:
  - Operational rating scheme (WP3) expands beyond energy performance, addressing:
    - IEQ, including virus risk mitigations (Task 3.1).
    - Sustainability, focusing on life cycle costing (Task 3.3).
    - Integration of digital twin practices for real-time analysis (Task 3.2).
- Indoor Environmental Quality:
  - Assessment based on indoor comfort, European standards, and COVID-19 infection probability.
  - Utilizes IoT sensor data, particularly for non-residential spaces.
  - Aims to calculate infection risk using CO2 and occupancy data.
- Sustainability and Digital Twin Integration:
  - Novel operational scheme tracks building performance over time.
  - Quantifies deviations from design using life cycle costing principles.
  - Integrates smart sensors and digital twins for real-time energy assessment in a BIM environment.

SmartLivingEPC approach on Operational Rating

Integrated Operational Rating Methodology:

- Task 3.5 focuses on developing an integrated operational rating method.
- It goes beyond smart energy meter data, including wellbeing, indoor air quality, life cycle costing, and complex-scale certification.
- Goal is to capture building's operational nature, intelligence, and user well-being.

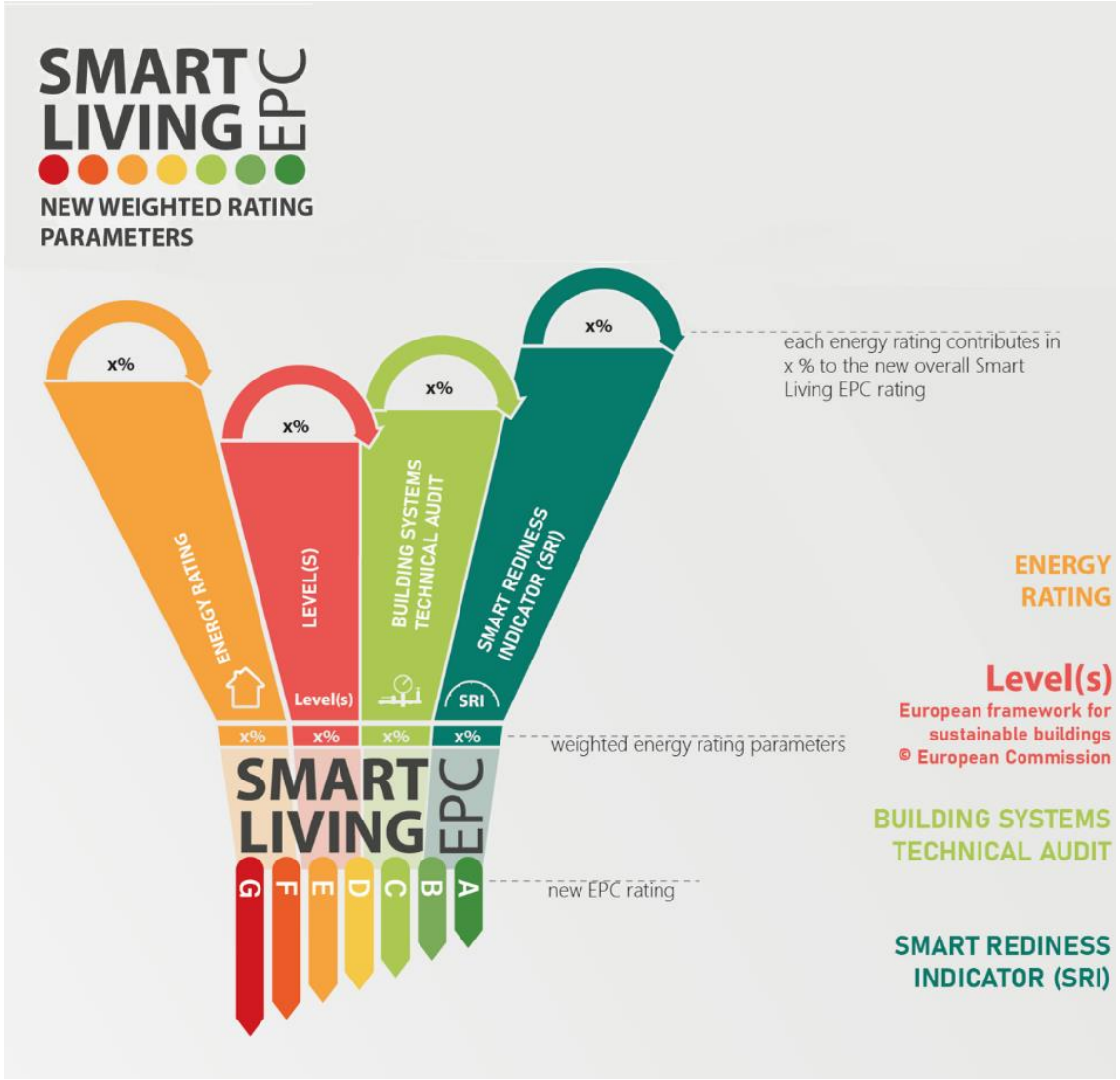
Digital Logbooks Integration:

- Digital logbooks (T4.4) will be used to incorporate building energy performance data into digital databases.

Comprehensive Building Classification:

- End result aims for an integrated building classification system.
- It considers various assessment schemes directly or indirectly related to building energy behavior, weighted accordingly as discussed across WP3 tasks.

SmartLivingEPC approach on Operational Rating



Suporting Standardization

Alignment with CEN/TC 371/WG5:

- T7.4 activities are aligning with CEN/TC 371/WG5, led by D2EPC, focusing on operational rating of energy performance in buildings.

New Standard Development:

- WG5 is currently working on a new standard for Energy Performance of Buildings, specifically addressing the requirements for assessing operational rating.

Workshop and Partnership:

- On September 28, 2023, UNE will host a workshop to transition standardization activities from D2EPC to SmartLivingEPC and CHRONICLE.
- Partners from SmartLivingEPC and CHRONICLE are invited to participate, with UNE expected to send official meeting invitations shortly.
- ANEC has initiated the process of registering as a partner organization for CEN/TC 371/WG5.

Advanced Energy Performance Assessment towards Smart Living in Building and District Level

This project has received funding from the European Union's Horizon Europe research and innovation programme under the grant agreement number 101069639. The European Union is not liable for any use that may be made of the information contained in this document, which is merely representing the authors' view.

Thank you for your attention!

https://www.smartlivingepc.eu/en/

https://www.linkedin.com/company/smartlivingepc/

https://twitter.com/SmartLivingEPC

https://www.youtube.com/channel/UC0SKa-20tiSabuwjtYDqRrQ

Smart living EPC

Joint BuildUp Webinar

“Unlocking Operational Rating Schemes": The synergetic added value of SmartLivingEPC & CHRONICLE

Dr. Angelina Katsifaraki

Hypertech Energy Labs (HSRT), Greece

14/09/2023

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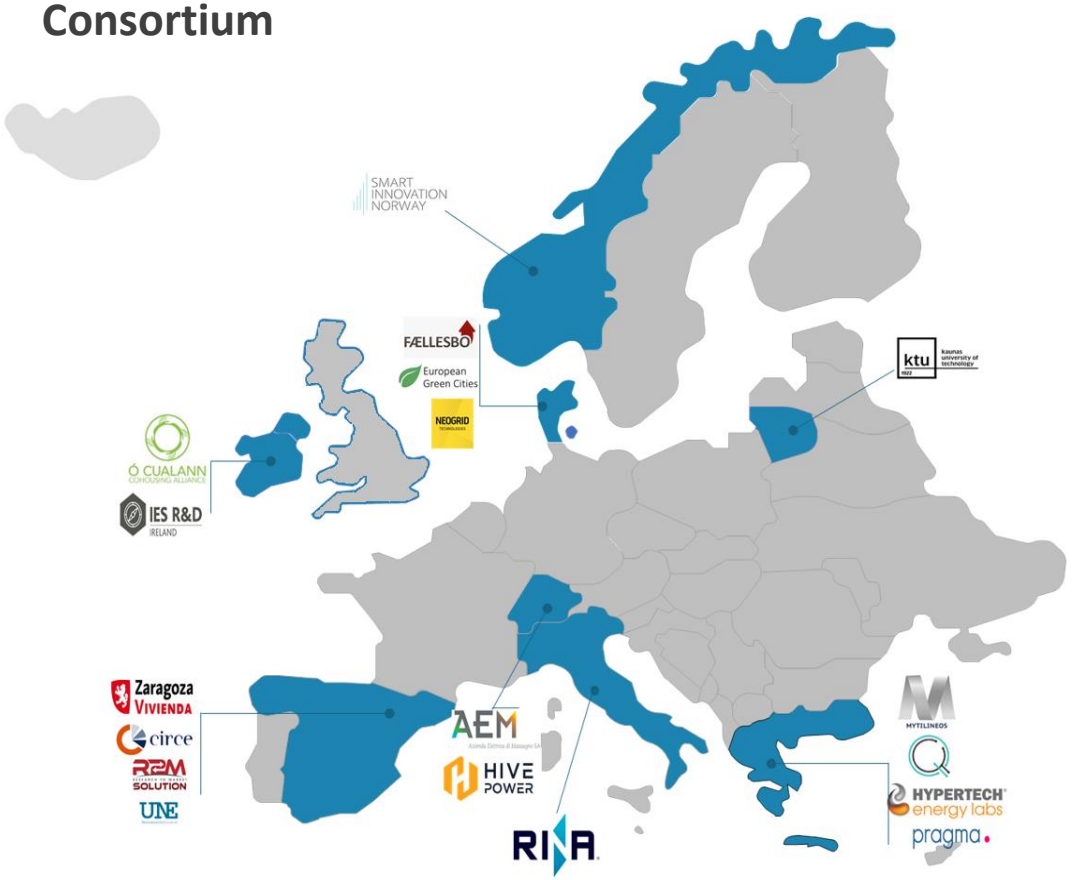
CHRONICLE in numbers

Consortium



18 Partners | **8 Countries** | **42 Months** | **4.95M €**

Demonstration Sites

5 Full Scale Pilots | **2 Pre-Validation Sites** | **~200 Dwellings** | **~24 Months**

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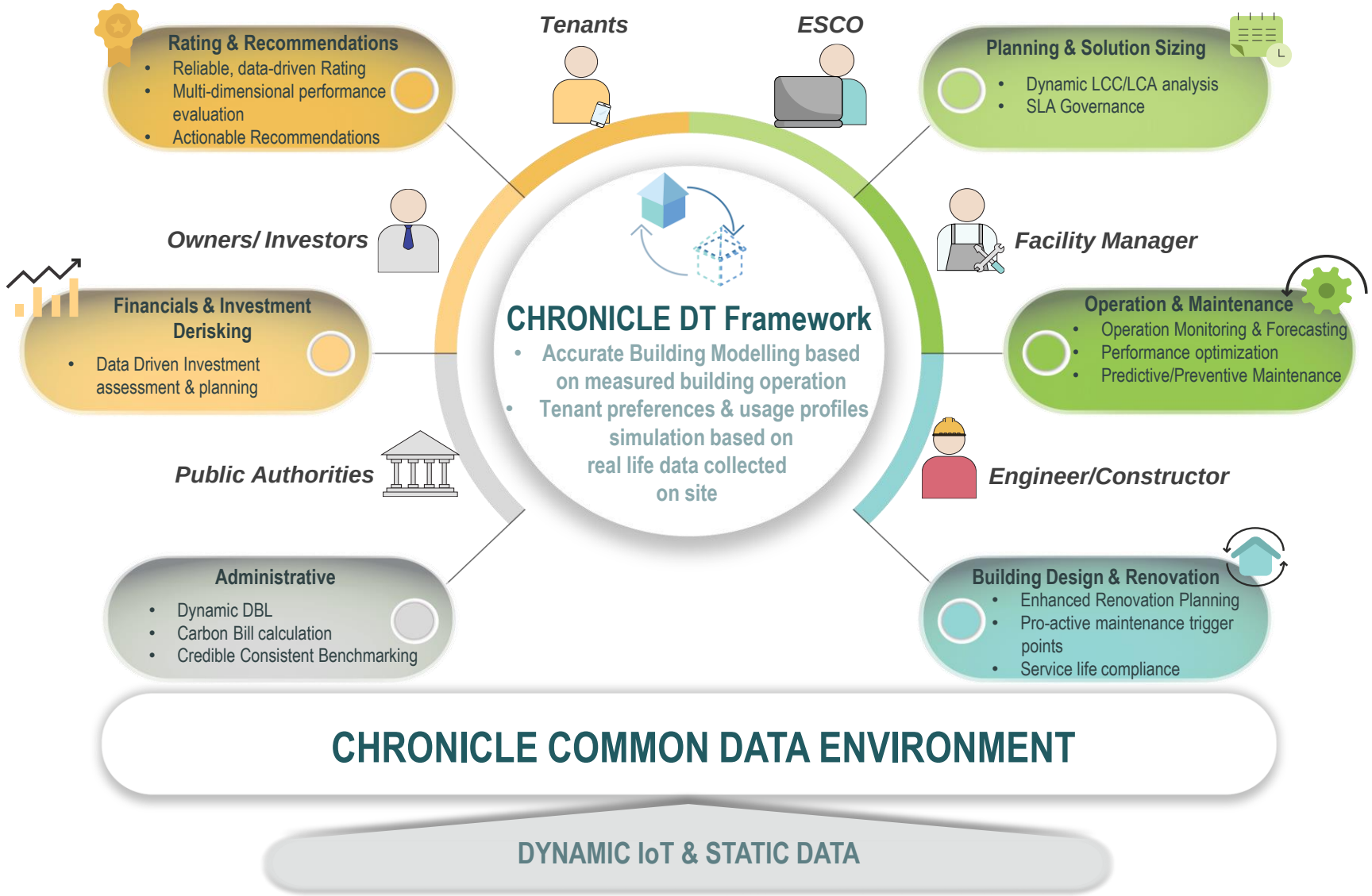
CHRONICLE in a nutshell



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Data Driven Digital Twinning

CHRONICLE

Virtual Replicas

ETL tools and Co-simulation

- BIM-to-BEP
- ML-to-obXML
- Physics-based co-sim

Performance Enhancement and Optimization Services

- Energy Savings
- Peak load Reduction
- Building-to-Grid Flex

Performance Monitoring and Assessment Services

- Dynamic EPC
- SRI Rating
- Comfort KPIs

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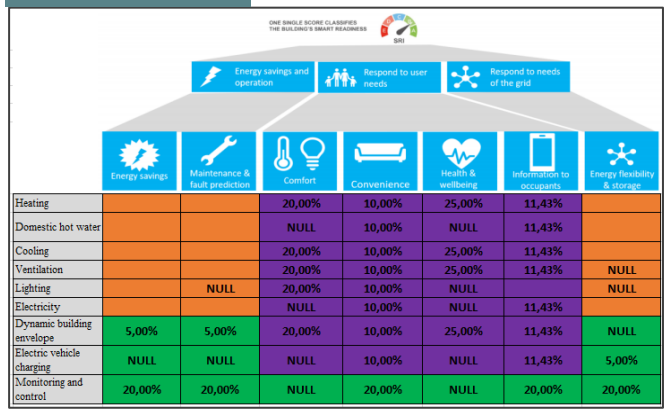
Dynamic Performance Rating

SRI methodology

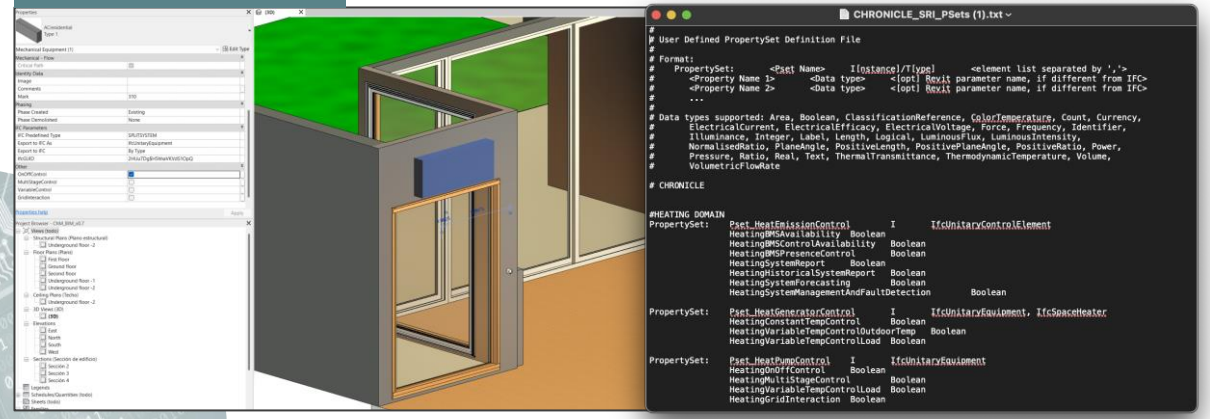


Heating			20,00%	10,00%	25,00%	11,43%	
Domestic hot water			NULL	10,00%	NULL	11,43%	
Cooling			20,00%	10,00%	25,00%	11,43%	
Ventilation			20,00%	10,00%	25,00%	11,43%	NULL
Lighting		NULL	20,00%	10,00%	NULL		NULL
Electricity			NULL	10,00%	NULL	11,43%	
Dynamic building envelope	5,00%	5,00%	20,00%	10,00%	25,00%	11,43%	NULL
Electric vehicle charging	NULL	NULL	NULL	10,00%	NULL	11,43%	5,00%
Monitoring and control	20,00%	20,00%	NULL	20,00%	NULL	20,00%	20,00%

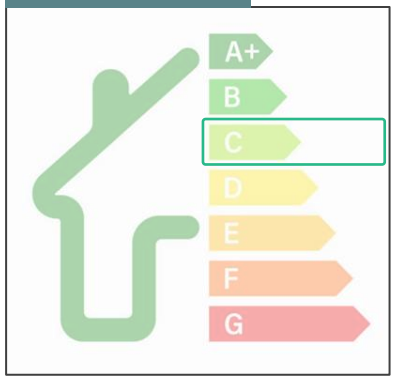
DD SRI weights re-adjustment

3-key functionalities	Energy savings and operation	Energy flexibility	Respond to user needs			Energy savings and operation	Respond to user needs
Impact criteria/Technical domain	Energy efficiency	Energy flexibility and storage	Comfort	Convenience	Health, well-being and accessibility	Maintenance and fault prediction	Information to occupants
Heating	$\left(\frac{Q_{heat}}{Q_{total}}+\frac{Q_{heat}^{nominal}}{Q_{total}^{nominal}}\right)/2$	$\left(\frac{Q_{heat}}{Q_{total}}+\frac{Q_{heat}^{nominal}}{Q_{total}^{nominal}}\right)/2$	0,33	0,20	0,33	$\left(\frac{Q_{heat}}{Q_{total}}+\frac{Q_{heat}^{nominal}}{Q_{total}^{nominal}}\right)/2$	0,20
Domestic hot water	$\left(\frac{Q_{DHW}}{Q_{total}}+\frac{Q_{DHW}^{nominal}}{Q_{total}^{nominal}}\right)/2$	$\left(\frac{Q_{DHW}}{Q_{total}}+\frac{Q_{DHW}^{nominal}}{Q_{total}^{nominal}}\right)/2$	0	0,20	0	$\left(\frac{Q_{DHW}}{Q_{total}}+\frac{Q_{DHW}^{nominal}}{Q_{total}^{nominal}}\right)/2$	0,20
Cooling	$\left(\frac{Q_{cool}}{Q_{total}}+\frac{Q_{cool}^{nominal}}{Q_{total}^{nominal}}\right)/2$	$\left(\frac{Q_{cool}}{Q_{total}}+\frac{Q_{cool}^{nominal}}{Q_{total}^{nominal}}\right)/2$	0,33	0,20	0,33	$\left(\frac{Q_{cool}}{Q_{total}}+\frac{Q_{cool}^{nominal}}{Q_{total}^{nominal}}\right)/2$	0,20
Ventilation	$\left(\frac{Q_{vent}}{Q_{total}}+\frac{Q_{vent}^{nominal}}{Q_{total}^{nominal}}\right)/2$	0	0,33	0,20	0,33	$\left(\frac{Q_{vent}}{Q_{total}}+\frac{Q_{vent}^{nominal}}{Q_{total}^{nominal}}\right)/2$	0,20
Lighting	0	0	0	0	0	0	0
Electricity	$\left(\frac{Q_{RES}}{Q_{total}}+\frac{Q_{RES}^{nominal}}{Q_{total}^{nominal}}\right)/2$	$\left(\frac{Q_{RES}}{Q_{total}}+\frac{Q_{RES}^{nominal}}{Q_{total}^{nominal}}\right)/2$	0	0,20	0	$\left(\frac{Q_{RES}}{Q_{total}}+\frac{Q_{RES}^{nominal}}{Q_{total}^{nominal}}\right)/2$	0,20
Dynamic building envelope	0	0	0	0	0	0	0
Electric vehicle charging	0	0	0	0	0	0	0
Monitoring and control	0	0	0	0	0	0	0

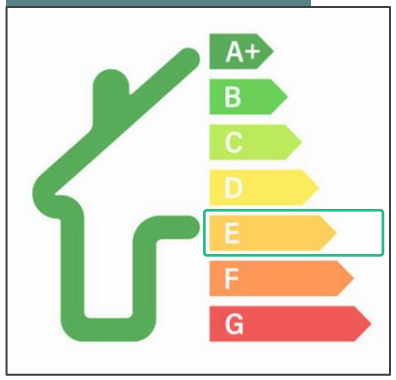
BIM-based SRI input collection



EPC Asset Rating



EPC Operational Rating



EPC Rating (DTs co-sim)

Performance Monitoring and Assessment Services

- Dynamic EPC
- SRI Rating
- Comfort KPIs

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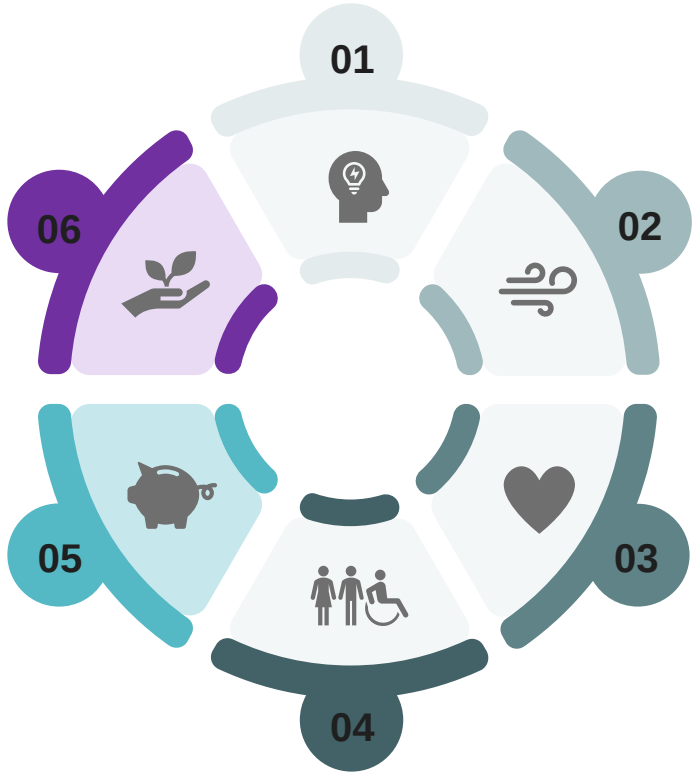
Rating beyond Energy

6. Sustainability KPIs

Data driven & evidence based indicators for sustainability throughout the building's life cycle

5. Financial KPIs

Data driven KPIs reflecting the financial aspects of the building performance & investement assessment



1. Comfort KPIs

Data driven indicators considering: thermal, visual, and acoustic comfort

2. IAQ KPIs

Data driven indicators based on EU standards for Indoor Air Quality

3. Well-being KPIs

Evidence-based indicators considering tenant well-being within a building

4. Social KPIs

Evidence-based & data driven indicators considering the social aspects of a building's performance

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Common Data Environment

IoT Ecosystem - Distributed Data Management

CDE

Layer-2

Authentication and authorisation

KEYCLOAK

Layer-1

Data ingestion

Data ingestion

Data ingestion

Message Broker

mosquitto

RabbitMQ

kafka

Layer - 3

Batch

Speed

BIM-viewer

unity

WebGL

BIM-to-mesh converter

Compliance checker

Completeness checker

Data repository

TIMESCALE

Layer-4

Restful APIs

Swagger

Supported by SMARTBEAR

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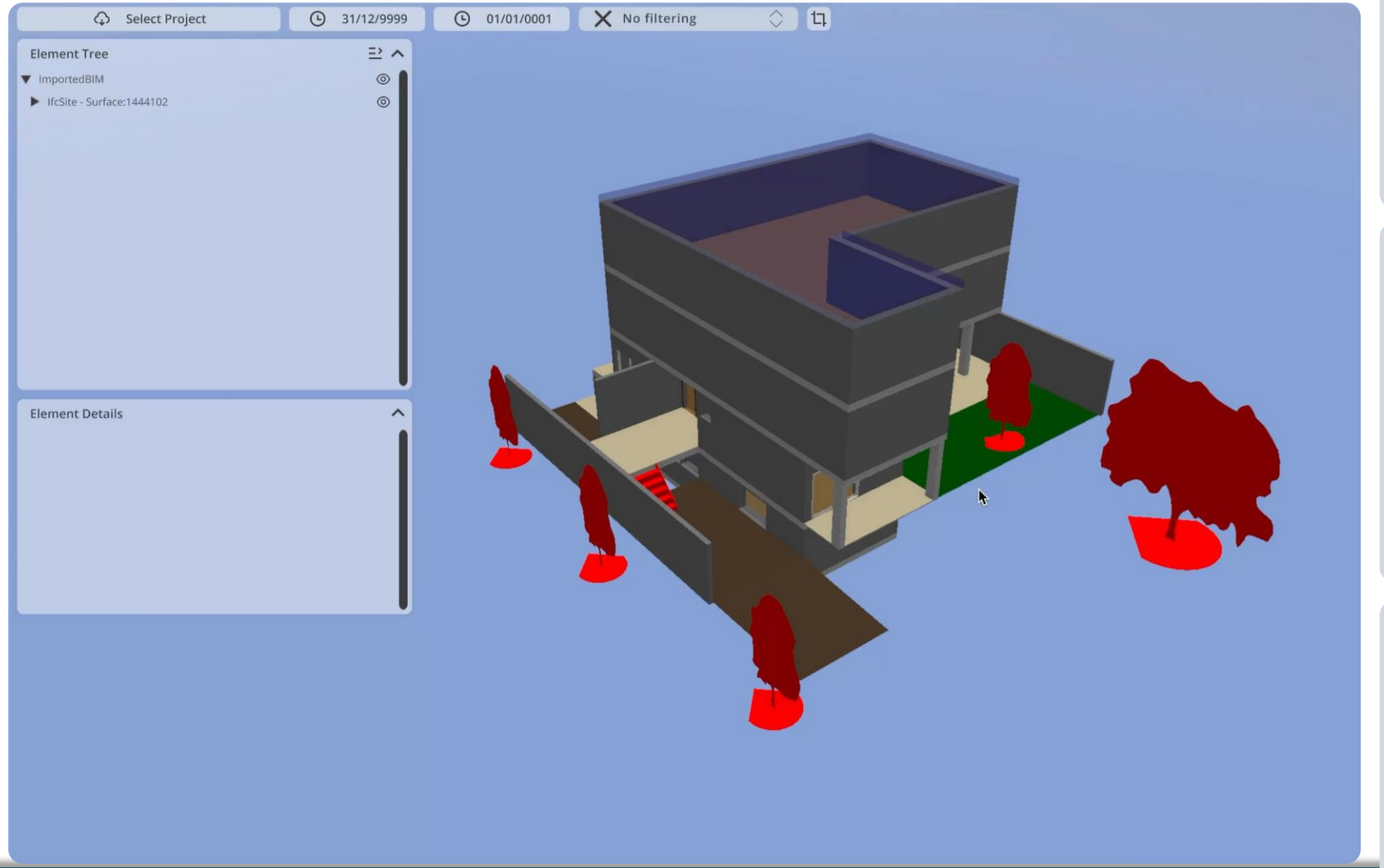
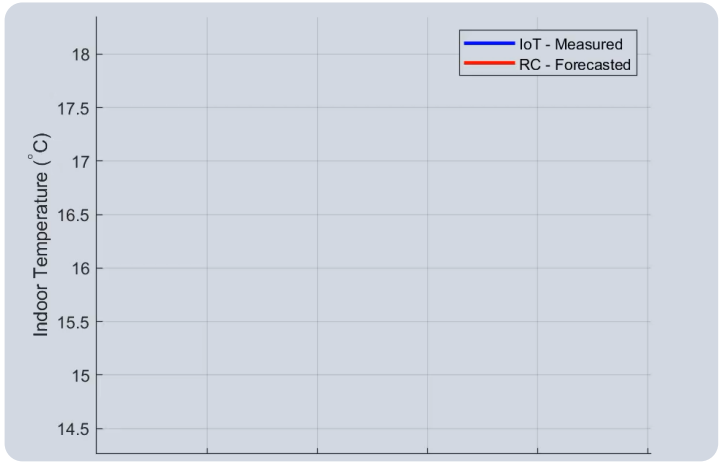
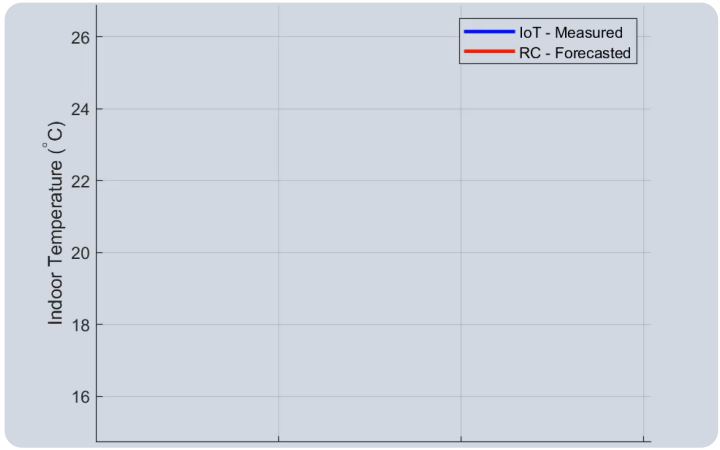
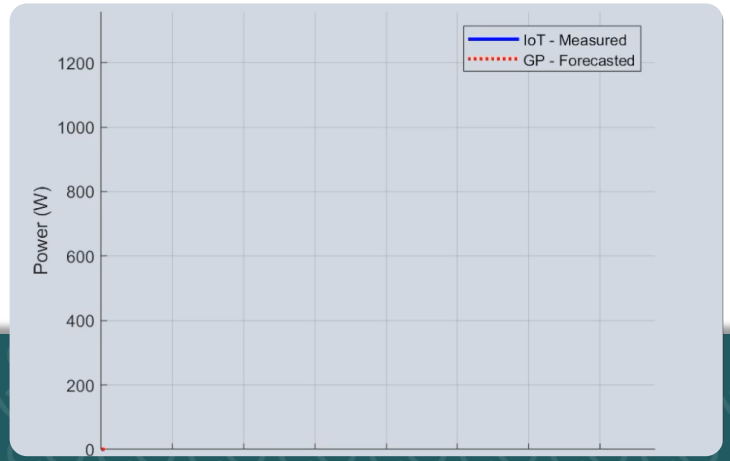
Intuitive Visualization









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CHRONICLE UCs

EPCs for People	• Data-driven & comprehensive operational rating • Multi-dimensional building performance evaluation • Timely, relevant & actionable feedback for building performance optimization
Operation monitoring, optimization, & maintenance	• Intuitive overview of building operations • Near real-time data analytics • Performance indicators throughout the building's life cycle • Pro-active and re-active maintenance notifications
Renovation scenarios for enhanced Building performance	• Building renovation planning for enhanced thermal comfort • Multi-factor optimization for efficient building renovations • Post renovation validation of as-designed energy performance on operational data
Digital Building Logbooks	• Trusted and transparent data repository • Blockchain enabled data sharing among relevant stakeholders • Digital record of specific milestones in the building's lifetime

Funded by the European Union

Thank you!

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Twitter: @CHRONICLEheu

Website: chronicle-project.eu

Q&A session

Thank you!


BUILD UP
The European portal for energy efficiency
and renewable energy in buildings