X-TENDO WORKSHOP: TOWARDS THE NEXT GENERATION ENERGY PERFORMANCE CERTIFICATES

October 1, 13:30 – 16:00 CEST, online

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 845958

WORKSHOP: TOWARDS THE NEXT GENERATION ENERGY PERFORMANCE CERTIFICATES

Thursday, 1 October 2020, 13:30 – 16:00 CEST, online

13:30 Welcome and introduction - **Lukas Kranzl (TU Wien/ EEG)**

13:35 EU support for buildings' energy performance assessment & certification – **Rebecca Kanellea (EASME)**

13:45 X-tendo and its new innovative features for next-generation EPCs – **Iná Maia (TU Wien/ EEG)**

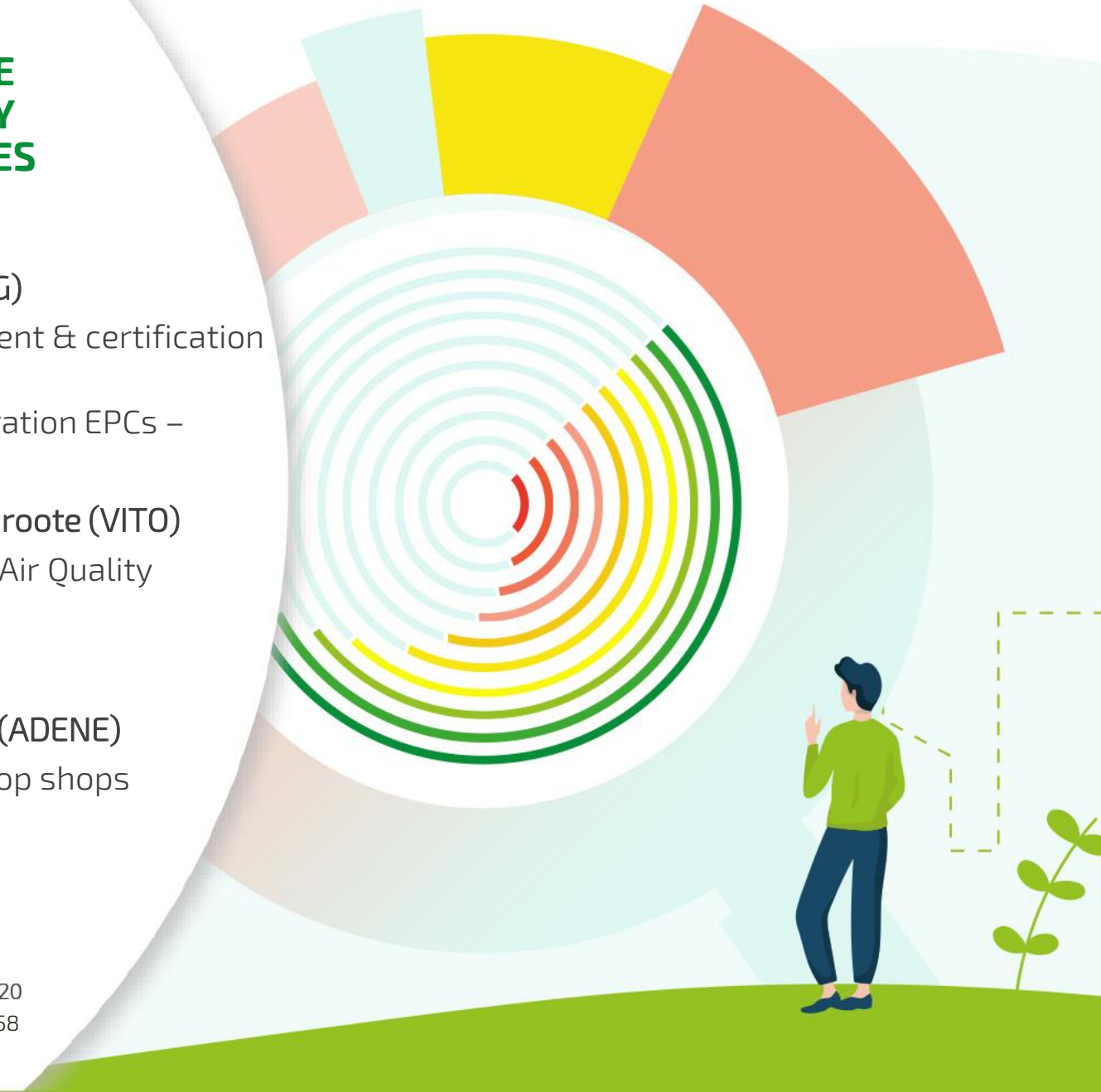
13:55 Session 1: Feeling at home in your home – **Maarten De Groote (VITO)**
Focus on: Smart Readiness Indicator, Comfort, Outdoor Air Quality
Q&A

14:45 *Coffee Break*

15:00 Session 2: Creating market opportunities – **Rui Fragoso (ADENE)**
Focus on: Logbook, Tailored Recommendations, One-stop shops
Q&A

15:50 Conclusions and next steps

16:00 *End*



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Some rules for the workshop

During the meeting:

- Please make sure your full name appears in the participants list
- Please make sure your microphone is muted

How to ask questions?

- Please use the chat function to ask questions during the sessions

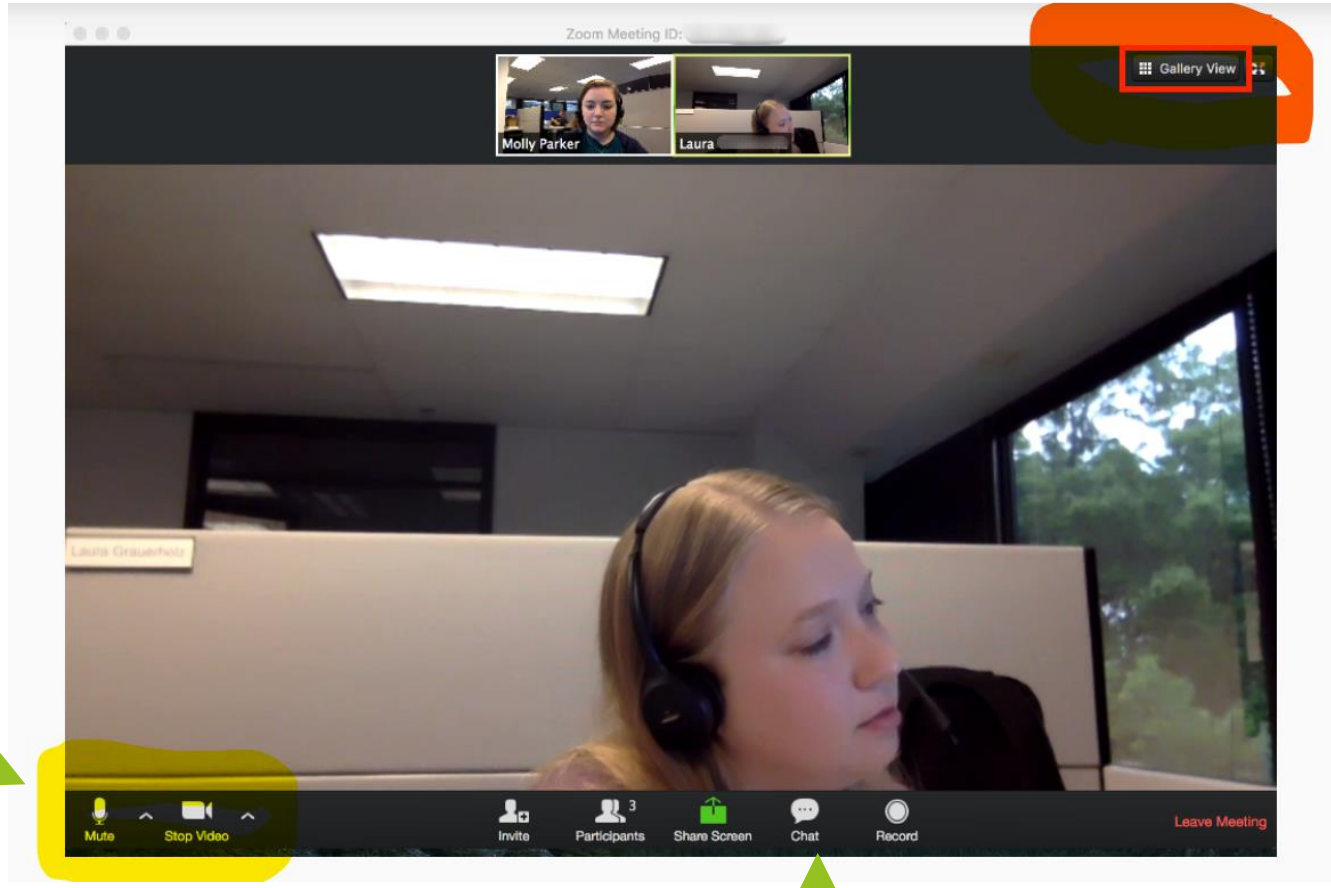
Technical support

- Please address all technical questions via the chat function to Roberta D'Angiolella, BPIE

X-tendo

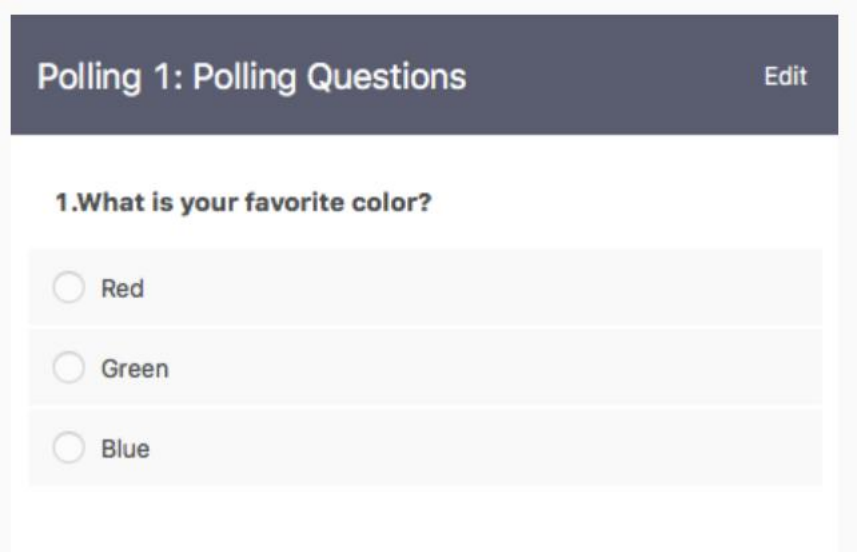
Technical rules for the workshop

- Switch to speaker view (highlighted in red)
- Mute microphone and switch off/ on camera (yellow highlights)



Technical information for the polls

- If you are connected through a browser, please make sure the pop-up function is enabled
- You will see a window with polls popping up at different times during the event
- You will have around 30 seconds to select one or multiple choices depending on the questions



X-tendo

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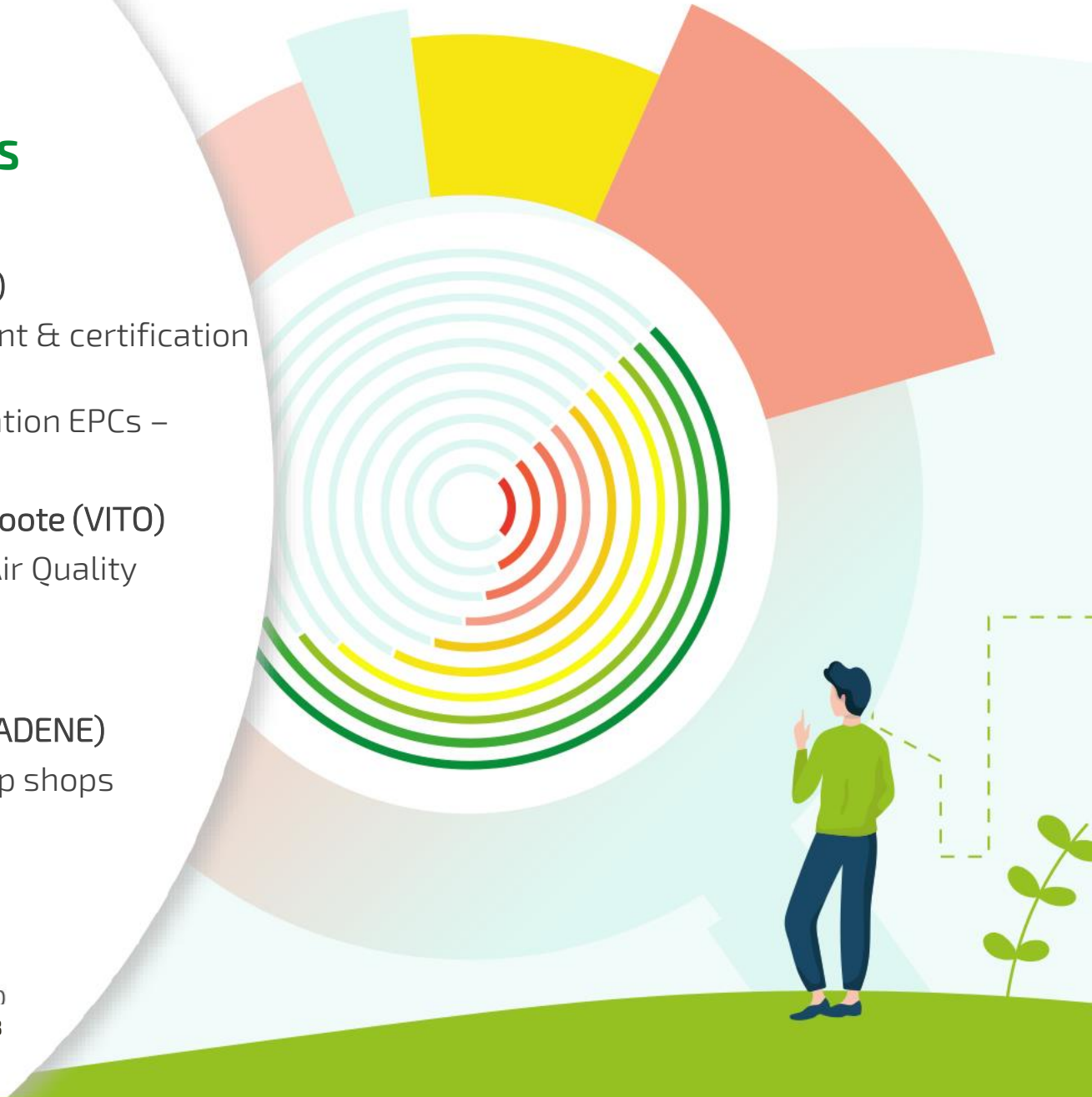

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EU Support for Buildings' Energy Performance Assessment and Certification

Rebecca Kanellea

Project Advisor

Unit B.1 Horizon 2020 Energy

EASME

European Commission

1 October 2020

FACTS

- 75% of the housing stock is energy inefficient, missing the benefits of increased renovation.
- Renovation rates are too low and renovation depth is too shallow.
- Need to accelerate and finance building renovation investments.
- Tapping the potential of smart building technologies.

Highlight: Energy Performance of Buildings Directive
Main outcomes of the revision:

A STRENGTHENED DIRECTIVE

- Stronger long term renovation strategies for Member States, aiming at decarbonisation by 2050 and with a solid financial component.
- A Smart Readiness Indicator for buildings.
- Targeted support to e-mobility infrastructure deployment in buildings' car parks.
- Enhanced transparency of national building energy performance calculation methodologies.
- Reinforcement of building automation: additional requirements on room temperature level controls, building automation and controls and enhanced consideration of typical operating conditions.

Energy Performance Certificates

WHY ARE ENERGY PERFORMANCE CERTIFICATES IMPORTANT?

Energy Performance Certificates:

- Provide information for consumers on buildings they plan to purchase or rent
- Include an energy performance rating
- Include recommendations for cost-effective improvements

Impact of Energy Performance Certificates:

- The European Commission commissioned a study on the Impact of Energy Performance Certificates.
- Based on an analysis of residential markets in Europe, the study found that higher energy savings resulted in substantially higher sale or rental prices on average.

Energy Performance Certificates

Energy Performance Certificates – no new legislation at EU level

Aims and objectives are the same:

- Compare and assess
- Make recommendations

Policy context changes:

- EPBD
  - Greater role of smart systems (Smart Readiness Indicator and automation)
  - Greater focus on renovation
  - Use of standards

General context:

- More renovation – how to trigger and how to evaluate it
- More value on Energy Efficiency
- More visibility
- Policy monitoring

Energy Performance Certificates

- Final report on the technical support to the development of a Smart Readiness Indicator (SRI) for buildings is available on the European Commission's website

- (The SRI is NOT an EPC!)

Relevant initiatives and projects

Horizon 2020 topics on Next-generation of Energy Performance and Certification:

- LC-SC3-EE-5-**2018** (Coordination and Support Action)
- LC-SC3-EE-5-**2019** (Innovation Action)
- LC-SC3-B4E-4-**2020** (Coordination and Support Action)

European Commission

Relevant initiatives and projects

LC-SC3-EE-5-**2018** => **3 CSA projects**

- X-tendo (845958)
- QualDeEPC (847100)
- U-Cert (839937)

LC-SC3-EE-5-**2019** => **4 IA projects**

- D^2EPC (892984)
- E-DYCE (893945)
- ePANACEA (892421)
- EPC RECAST (893118)

LC-SC3-B4E-4-**2020** => **???**

European Commission

LC-SC3-EE-5-2018 – CSA

X-tendo (845958)

09/2019 – 08/2022

AT, BE, PT, EL, EE, RO, DK, PL, UK, IT (coordinator: TU WIEN)

- X-tendo toolbox, knowledge hub with 10 innovative EPC features:
  - new technical features used within EPC assessment processes, enabling inclusion of new indicators (Smart Readiness, Comfort, Outdoor Air Pollution, Real Energy Consumption, District Energy)
  - innovative approaches to handle and maximize value of EPC data (EPC Databases, Building Logbook, Tailored Recommendations, Financing Options, One-stop-shops)

Project website: https://x-tendo.eu/

X-tendo

European Commission

LC-SC3-EE-5-2018 – CSA

X-tendo (845958)

U-Cert (839937)

09/2019 – 08/2022

NL, BE, ES, IT, DK, EE, HU, SE, SI, RO, FR, BG (Coordinator: Huygen Installatie Adviseurs)

- New EPC scheme based on CEN standards
- Develop added value indicators for asset rating, operational rating and smart readiness
- Training and certification of the assessors

Project website: https://u-certproject.eu/

U-CERT
User-Centred Energy Performance Assessment and Certification

European Commission

U-Cert (839937)

U-CERT

User-Centred Energy Performance Assessment and Certification

European Commission

QualDeEPC (847100)

09/2019 – 08/2022

DE, EL, BG, LV, HU, BE, ES, SE (coordinator: WUPPERTAL INSTITUT)

- Improve practical implementation of EPCs as well as renovation recommendations. Develop a guidebook and tools for an enhanced and converging EPC assessment and certification scheme, Deep Renovation Network Platforms as one stop shops, roadmap for convergence of EPCs

Project website: https://qualdeepc.eu/

Qual DeEPC

European Commission

QualDeEPC (847100)

Wuppertal Institut

dena Deutsche Energie-Agentur

EPC

CIT Energy Management AB
A Chalmers Industriteknik company

FEDARENE

escan s.a.

ENERGIAKLUB
CLIMATE POLICY INSTITUTE
APPLIED COMMUNICATIONS

Ekodoma
Sustainable Energy Solutions

КАПЕ CRES

ЕНЕРГИЙНА АГЕНЦИЯ ПЛОВДИВ
ENERGY AGENCY OF PLOVDIV
save • agency

Qual DeEPC

European Commission

LC-SC3-EE-5-2019 – Innovation Action

D^2EPC (892984)

09/2020 - 08/2023

EL, LT, DE, ES, NL, AT, CY (Coordinator: Centre for Research and Technology Hellas)

- Clear focus on digitalization, large-scale data collection, development of digital twins and SRI indicators
- Calculation of a novel set of energy, environmental, financial and human comfort/wellbeing indicators
- Digital platform for issuing and updating EPCs, integrating GIS and user-centred recommendations, benchmarking/forecasting of buildings' performance and performance verification services
- Includes standardisation/certification bodies and a member of the CA EPBD as partners

LC-SC3-EE-5-2019 – Innovation Action

D^2EPC (892984)

09/2020 - 08/2023

EL, LT, DE, ES, NL, AT, CY (Coordinator: Centre for Research and Technology Hellas)

- 1 CERTH Greece
- 2 KTU Lithuania
- 3 GEOSYSTEMS HELLAS Greece
- 4 CLEOPA Germany
- 5 SEnerCon Germany
- 6 UNE Spain
- 7 DEMO CONSULTANTS BV Netherlands
- 8 SGS TECNOS SA Spain
- 9 HYPERTECH Greece
- 10 AUSTRIAN STANDARDS INTERNATIONAL Austria
- 11 FREDERICK RESEARCH CENTER Cyprus
- 12 AUSTRIAN ENERGY AGENCY Austria

EPC RECAST (893118)

09/2020 - 12/2023

FR, ES, DE, LU, IT, SK, BE, NL (Coordinator: CENTRE SCIENTIFIQUE ET TECHNIQUE DU BATIMENT)

- New generation of EPCs, focusing on existing residential buildings, combined with renovation roadmaps
- Specific attention is paid to end-users and building owners' involvement for the development of the cloud based platform, as well as to the needs of the EPC assessors
- Specific attention is paid to comfort levels and personalized instructions on renovation options and related costs

EPC RECAST (893118)

09/2020 - 12/2023

FR, ES, DE, LU, IT, SK, BE, NL (Coordinator: CENTRE SCIENTIFIQUE ET TECHNIQUE DU BATIMENT)

- 1 CSTB France
- 2 TECNALIA TECNALIA Spain
- 3 FRAUNHOFER Germany
- 4 LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY Luxembourg
- 5 POLITECNICO DI MILANO Italy
- 6 ELECTRICITE DE FRANCE France
- 7 ENGIE France
- 8 BIMEO rance
- 9 ENBEE Slovakia
- 10 R2M SOLUTION Italy
- 11 REHVA Netherlands

E-DYCE (893945)

09/2020 - 08/2023

DK, IT, EL, DE, CH (Coordinator: AALBORG UNIVERSITET)

- Develops a dynamic certification of buildings, following real time optimization of energy consumption and comfort, addressing also renovation roadmaps
- Combines smart technologies, with low-tech solutions and the free running potential of buildings for EPC labelling, which should allow to take into account historical buildings and buildings in the Mediterranean that rely on natural ventilation
- Strong focus on end-user behavioural change: tenants and building operators get feedback on building performance, and get recommendations to adapt their behaviour to increase the energy performance of their living spaces

E-DYCE (893945)

09/2020 - 08/2023

DK, IT, EL, DE, CH (Coordinator: AALBORG UNIVERSITET)

- 1 AALBORG UNIVERSITET Denmark
- 2 POLITECNICO DI TORINO Italy
- 3 CORE INNOVATION AND TECHNOLOGY OE Greece
- 4 EMTECH Germany
- 5 ESTIA SA Switzerland
- 6 ENEA Italy
- 7 GEP Greece
- 8 DEPARTEMENT DU TERRITOIRE Switzerland
- 9 COMUNE DI TORRE PELLICE Italy
- 10 NEOGRID TECHNOLOGIES Denmark

ePANACEA (892421)

06/2020 - 31/05/2023

ES, FI, AT, EL, BE, DE (Coordinator: FUNDACION CENER)

- "Smart Energy Performance Assessment Platform" (SEPAP) with 3 modules:
  - a smart and data driven energy performance tool using inverse modelling and operational data
  - a simplified monthly based calculation aligned to ISO52016
  - an advanced hourly simulation model aligned to ISO52017
- "Decision Matrix" to assist end-users to select the appropriate module(s) for their use
- 5 Regional Exploitation Boards covering EU27 + UK + NO

ePANACEA (892421)

06/2020 - 31/05/2023

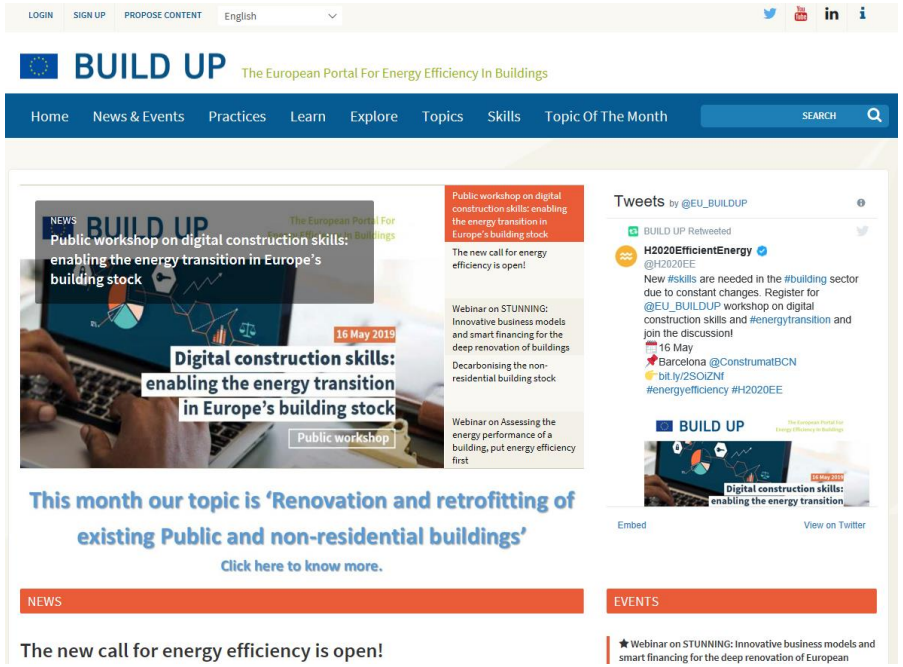
ES, FI, AT, EL, BE, DE (Coordinator: FUNDACION CENER)

- 1 FUNDACION CENER Spain
- 2 EFINOVATIC Spain
- 3 VTT Finland
- 4 TU WIEN Austria
- 5 CRES Greece
- 6 VITO Belgium
- 7 IZES Germany
- 8 IDAE Spain
- 9 EASt Austria
- 10 SYMPRAXIS TEAM Greece

European Portal for energy efficiency in buildings

https://www.buildup.eu/en

- Unique source of news and information
- EASME managed

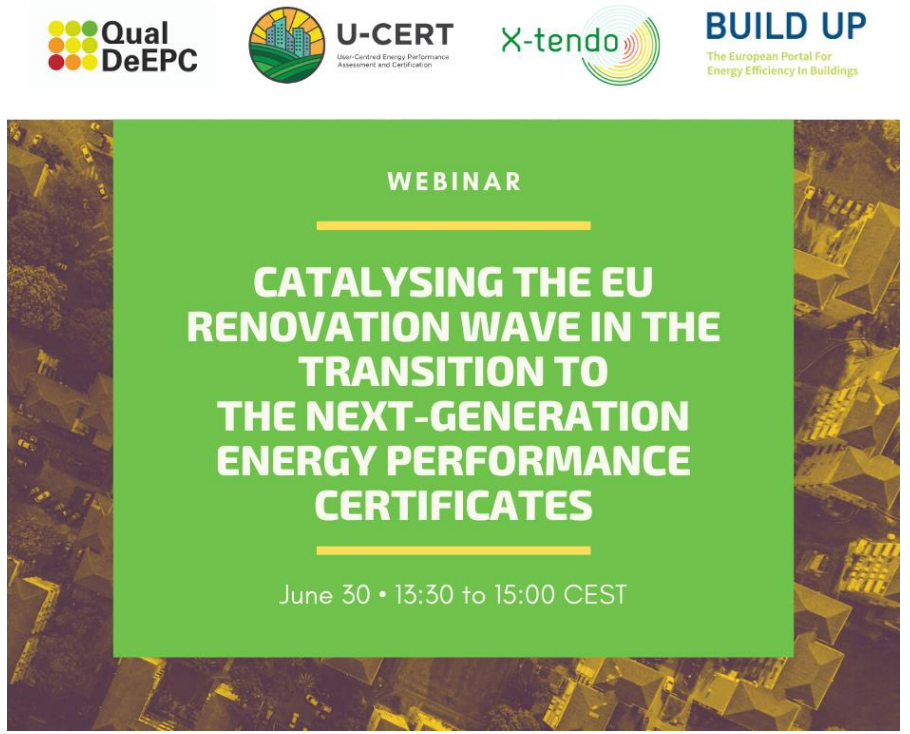


European Commission

European Portal for energy efficiency in buildings

- *June 2020: webinar with QualDeEPC, U-cert and X-tendo*

- *Link: http://www.buildup.eu/en/news/webinar-catalysing-eu-renovation-wave-transition-next-generation-energy-performance*



European Commission

Thank you

European Commission

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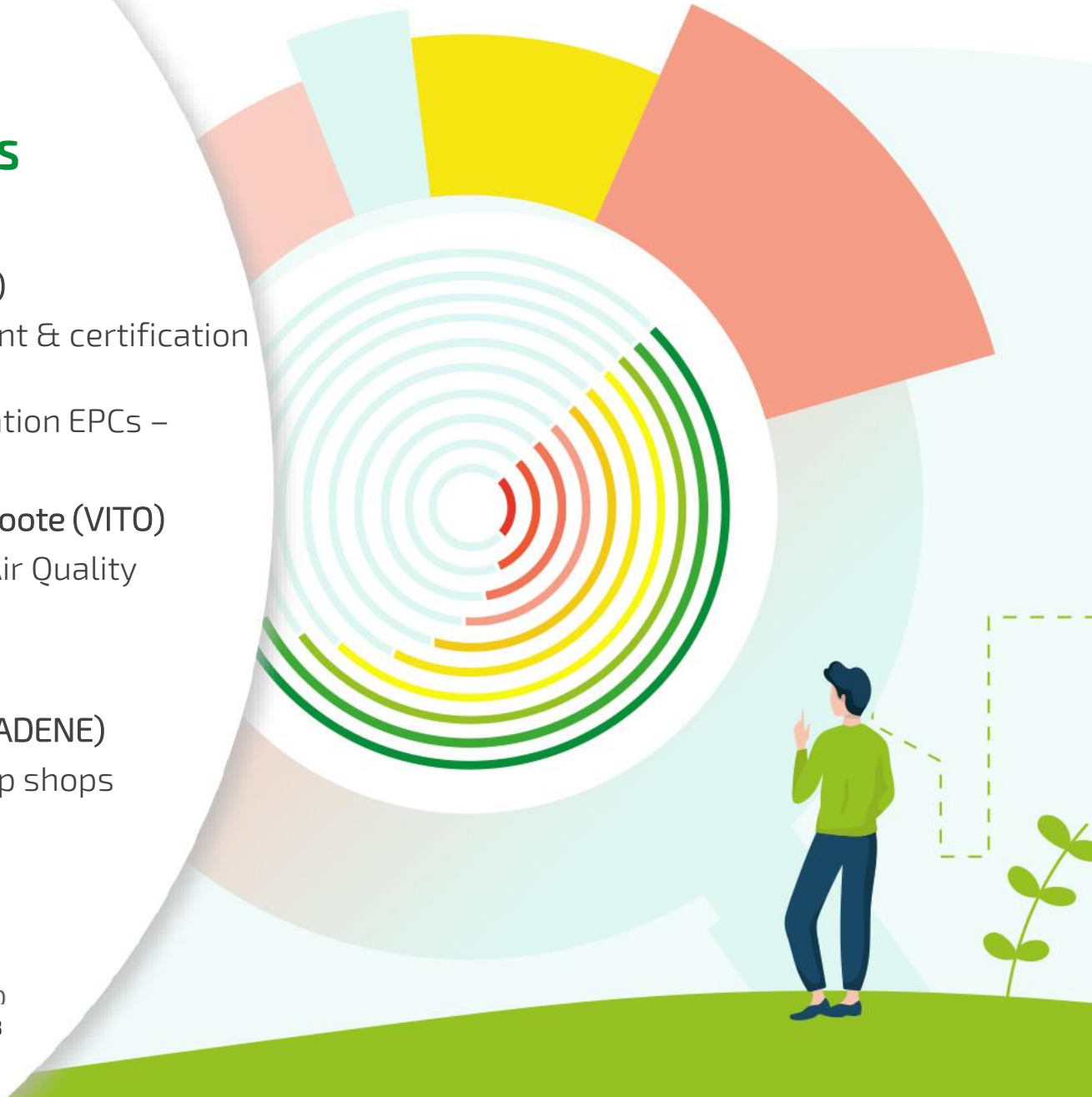

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eXtending the energy performance assessment and certifiation schemes via a mOdular approach

Iná Maia, Lukas Kranzl – TU Wien

01.10.2020

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X-tendo:objectives

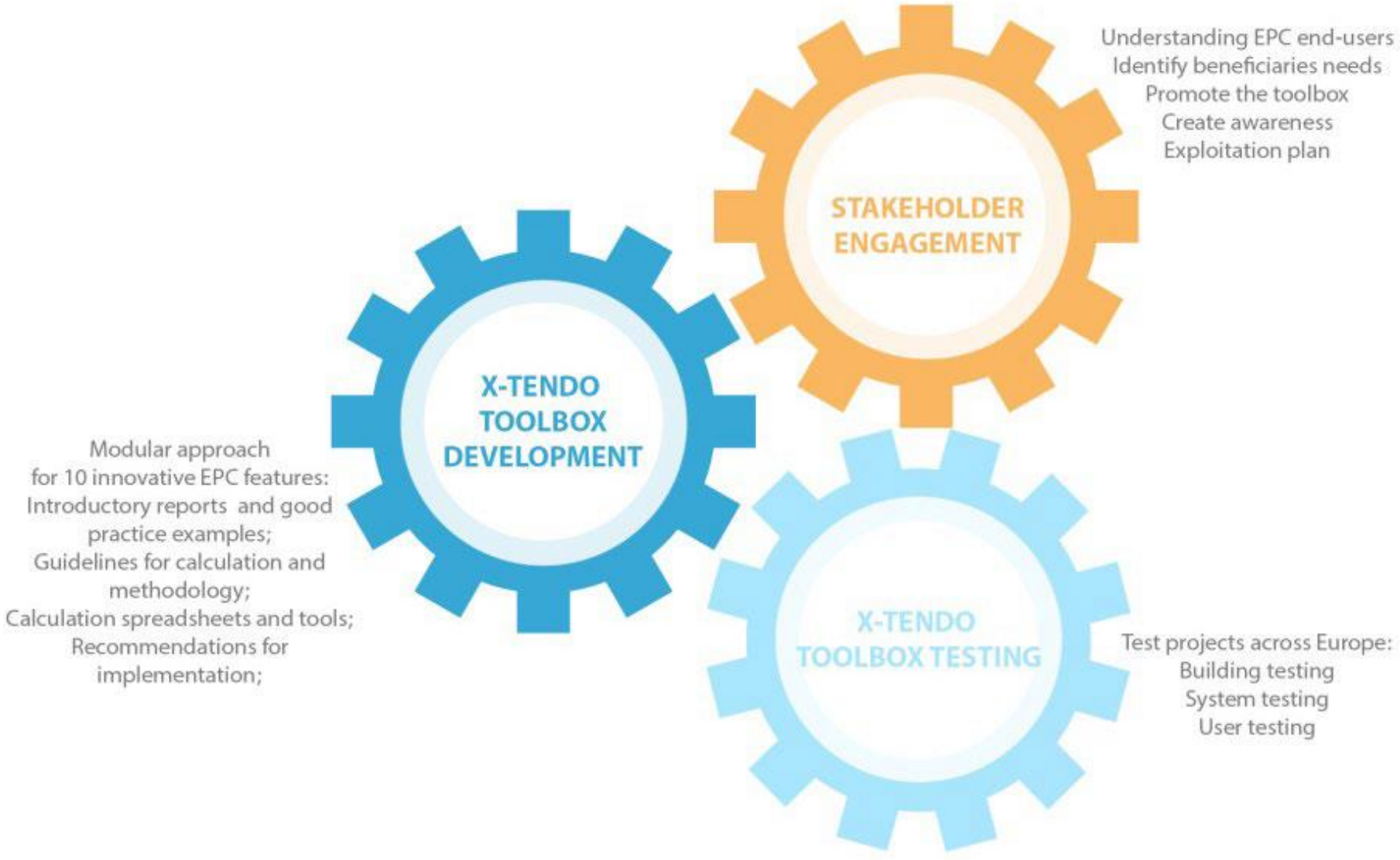
X-tendo‘s main goal:

„**Support public authorities** to properly implement, well manage and organise next EPC generations”

1) **Demonstrate and encourage** the roll out of next-generation EPC
2) **Improve** reliability, usability and convergence of practices and tools related to next generation EPCs

X-tendo

X-tendo: pillars



X-tendo: features

- 2 categories:
  - innovative indicators
  - innovative data handling
- 10 features
- 4 cross cutting criteria

X-tendo

X-tendo: innovative indicators

Economic feasbility

User friendliness

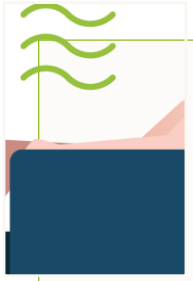
Quality and realibility

Compliance with international standards

F1:Smart readiness indicator

Lead: VITO

>> potential pathways to integrate SRI in the EPCs



F2:Comfort

Lead: BPIE

>> checklist for systems and materials; indoor measurements

F3:Air Pollution

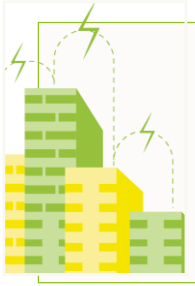
Lead: NAPE

>> **two indexes to assess outdoor air quality**

F4:Real energy consumption

Lead: VITO

>> explain difference between real and predicted energy consumption



F5:District energy

Lead: e-think

>> energy and emission factors

What to do with the EPC data?

X-tendo

X-tendo: innovative data handling

Economic feasbility

User friendliness

Quality and realibility

Compliance with international standards

F6: EPC Databases

Lead: TUW

>> Quality assurance and compliance of EPC databases

F7:Logbook

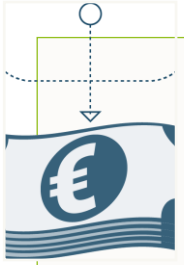
Lead: BPIE

>> EPC data linked to logbook

F8: Tailored recommendations

Lead: TUW

>> Automically provision of enhanced recommendations



F9:Financing options

Lead: ADENE

>> Link and communicate available financing schemes

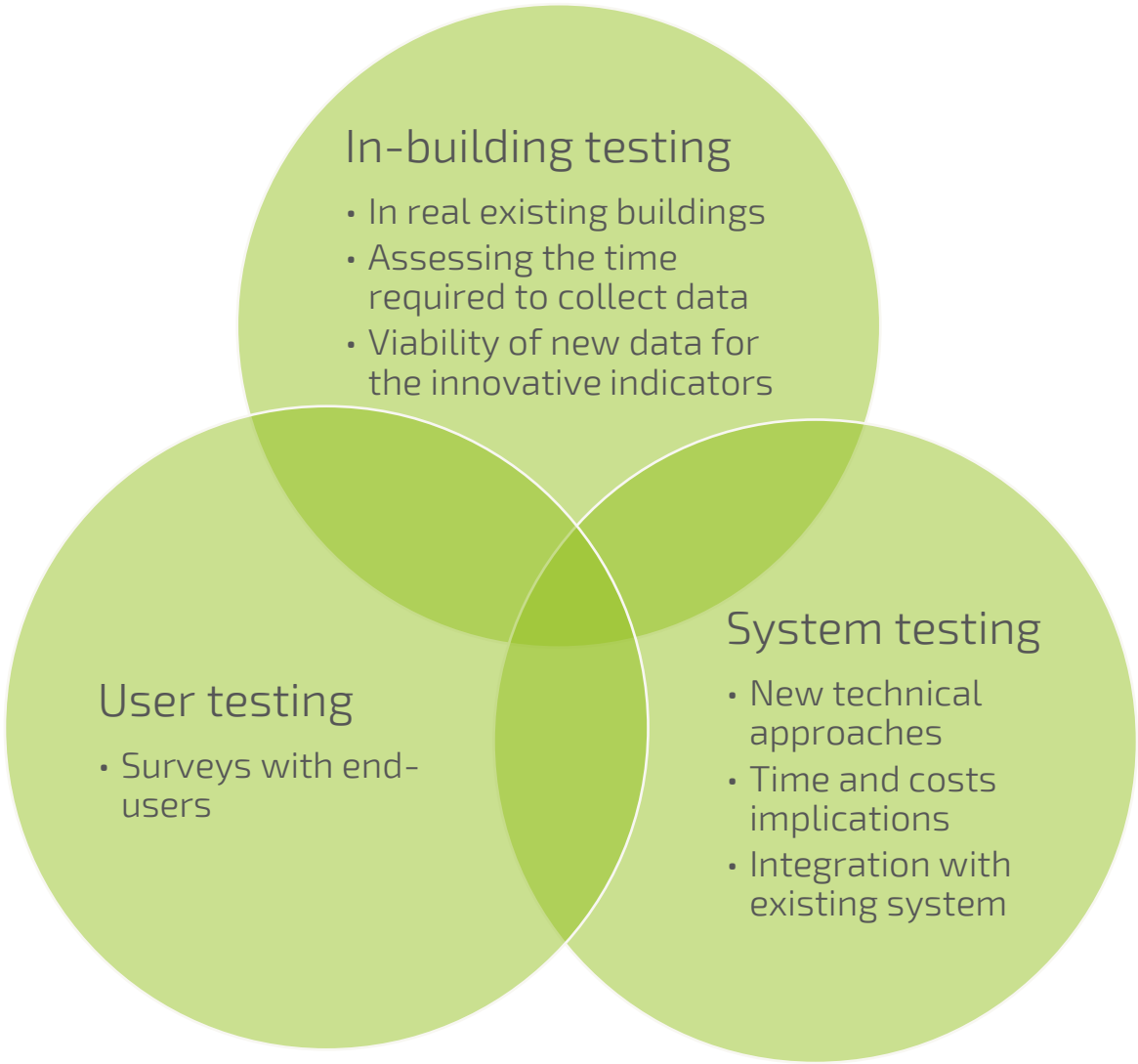
One-stop-shop

Lead: ADENE

>> EPC data linked to one-stop-shops

X-tendo

X-tendo: testing



X-tendo – main outcome: Toolbox

Methodology approaches

Calculation procedures: algorithm; spreadsheets; beta version

Guidelines and recommentaions

INNOVATIVE EPC INDICATOR

Smart Readiness

Smart technologies in buildings have the potential to contribute to increasing the energy efficiency of the building stock, to enhance the flexibility in smart energy grids, and to improve the comfort of building occupants. In order to increase the visibility and uptake of smart technologies in the European building stock, the introduction of a Smart Readiness Indicator (SRI) for buildings is included as optional in the current recast of the Energy Performance of Buildings Directive (EPBD). This indicator would allow to assess the level of smartness of a given building in a reliable and meaningful way for building owners, tenants and users.

A technical study, led by VITO and concluded in August 2018 investigates the scope, definition and calculation of the SRI, and performs a more detailed assessment of its potential impacts. X-tendo will evaluate potential pathways to integrate the SRI assessment as an integrated part of the EPC.

SHARE

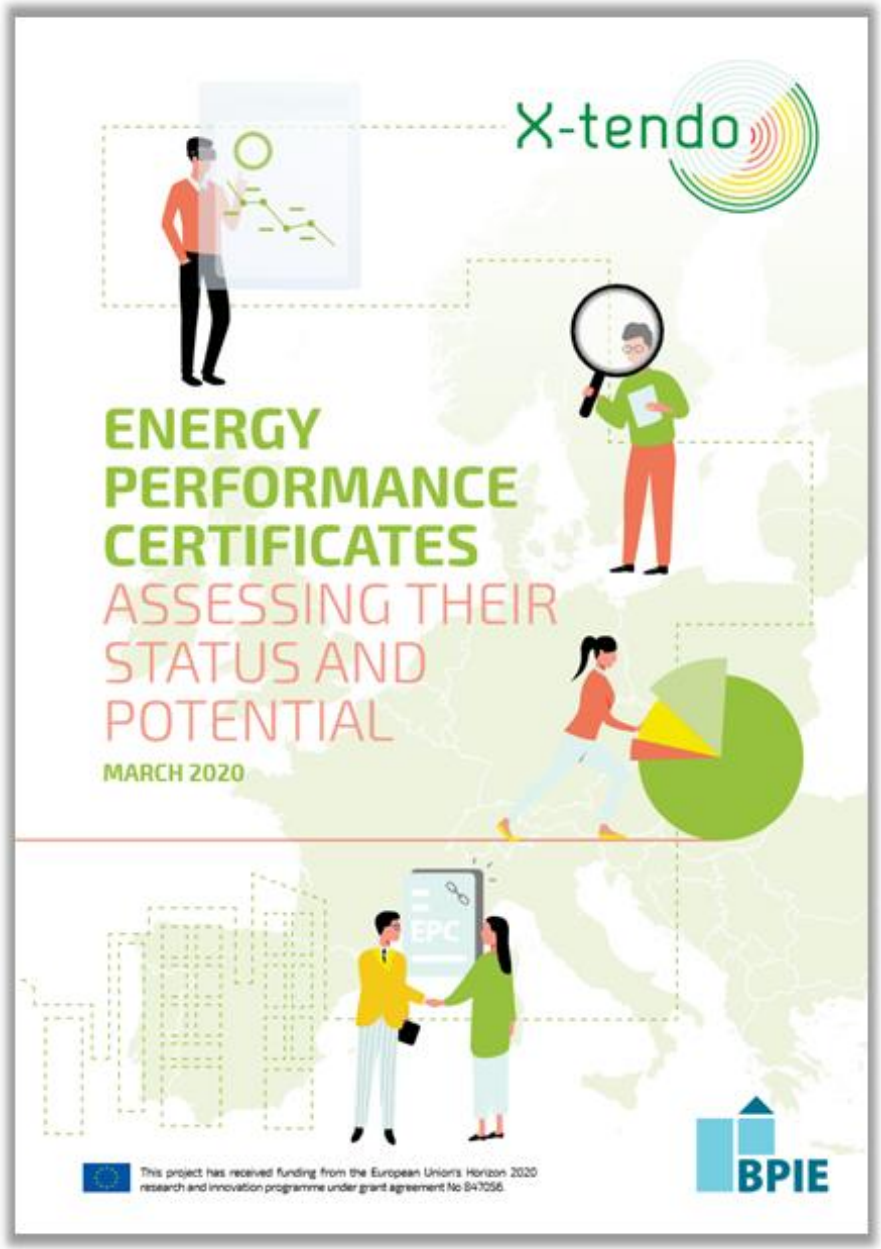
Methodological approaches

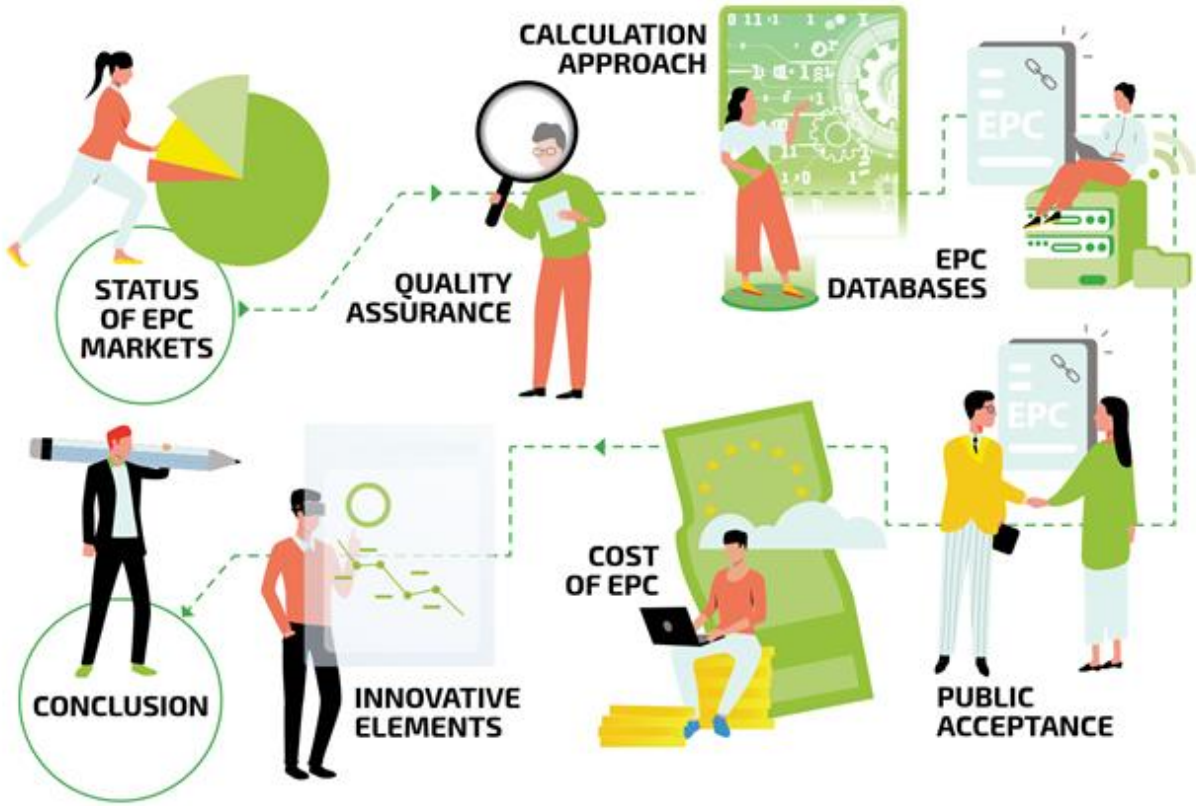
Calculation procedures

Recommendations for Implementation

Under construction

X-tendo





https://x-tendo.eu/toolbox/background-material/

X-tendo

X-tendo: team

- 13 partners
- 10 countries
- 9 implementing partners
  - Austria
  - Denmark
  - Estonia
  - Greece
  - Italy
  - Poland
  - Portugal
  - Romania
  - United Kingdom (Scotland)

X-tendo

X-tendo: team

TU WIEN TECHNISCHE UNIVERSITÄT WIEN Vienna | Austria

vito

think ENERGY RESEARCH

BPIE

Tartu Regiooni Energiaagentuur
Tartu Regional Energy Agency

КАПЕ CRES | ΚΕΝΤΡΟ ΑΝΑΝΕΩΣΙΜΩΝ ΠΗΓΩΝ ΚΑΙ ΕΞΟΙΚΟΝΟΜΗΣΗΣ ΕΝΕΡΓΕΙΑΣ

ENEA
Italian National Agency for New Technologies, Energy and Sustainable Economic Development

Danish Energy Agency

AAECR
Asociația Auditorilor Energetici pentru Clădiri din România

ENERGIEAGENTUR Steiermark

ADENE

NAPE NATIONAL ENERGY CONSERVATION AGENCY

energy® saving trust

X-tendo

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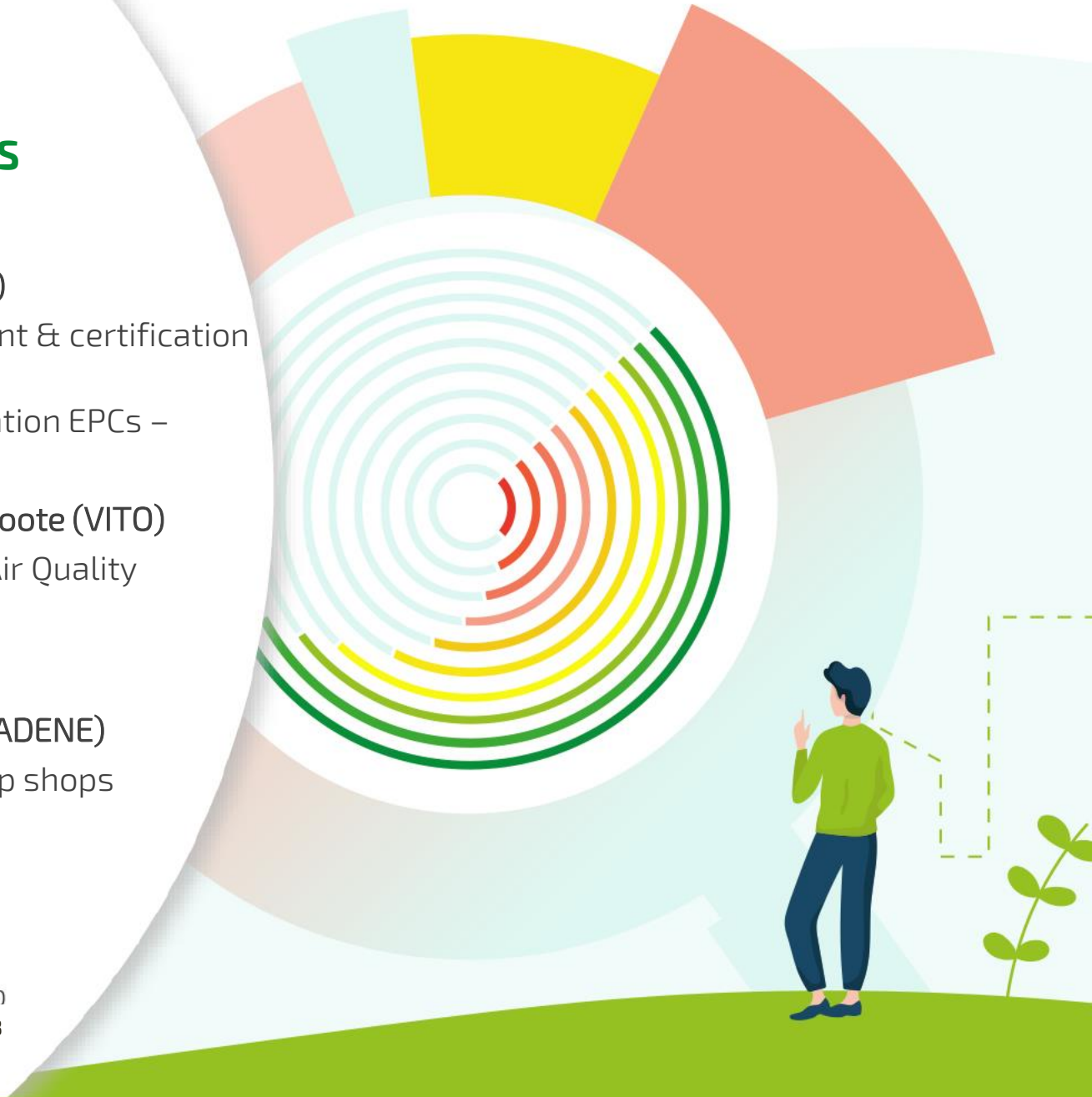

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X-tendo

Feeling at home in your home

X-tendo workshop: towards the next generation energy performance certificates

Maarten De Groote, Vito / EnergyVille (BE)

Sheikh Zuhaib, Buildings Performance Institute Europe (BE)

Jerzy Kwiatkowski, NAPE (PL)

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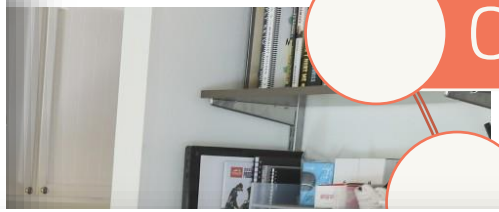
Your home is no longer your home…

UK housing demand soars since end of Covid lockdown

Roomier rural houses are selling quickest, says Zoopla, with buyers prioritising space

▲ Large houses in the countryside are selling the quickest, Zoopla reports. Photograph: Colin Underhill/Alamy

Demand for houses has soared since the lockdown ended, according to a report from Zoopla, with three- and four-bedroom houses with space to work from home particularly popular.



Office

DE GROTE MARKT

Coronarot? Niet op de Belgische vastgoedmarkt

Nico Tanghe
Vrijdag 25 september 2020 om 3.25 uur

Que casas se procuram em Portugal em tempos de Covid-19?

Principais redes imobiliárias analisam os comportamentos desde o rebentar da pandemia e ao longo destes últimos meses, perspetivando o futuro do setor.

Raivis Razgals on Unsplash

X-tendo

Links between wellbeing & pollution

European Environment Agency
Healthy environment, healthy lives: how the environment influences health and well-being

Table 2.1 Summary of indicative links between non-communicable diseases and related environmental risk factors

Disease	Environmental risk factors					
	Ambient air pollution	Noise	Chemicals	Climate change	Indoor fuel combustion	Radiation
Cancers	▲		▲		▲	▲
Neuropsychiatric disorders		▲	▲	▲		
Cataracts					▲	▲
Hearing loss		▲				
Cardiovascular disease	▲	▲	▲	▲	▲	
Chronic obstructive pulmonary disease	▲				▲	
Asthma	▲				▲	
Chronic kidney disease			▲			
Skin diseases			▲			
Congenital anomalies	▲		▲			▲

Population attributable fractions ▲ < 5 % ▲ 5–25 %

Clean surfaces and ventilate rooms to limit covid-19 spread at home, say experts

- People spend up to 90 % of their time indoors
- Air quality inside homes, offices, schools, nurseries, healthcare facilities, etc. is an important health determinant
- Indoor air quality is affected by pollutants brought into buildings from outside, as well as pollutants originating indoors
- In 2016, around 15.000 persons deceased in the EU because of indoor air pollution

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Increased value of a proper indoor environment

- Smart Readiness
  - Significant energy savings
  - Improve comfort and occupant satisfaction
  - Enabling buildings to play a key role in smart energy systems
- Comfort
  - Thermal comfort
  - Indoor air quality
  - Visual comfort
  - Acoustic comfort
- Air pollution
  - Local Air Pollution Contributor Index
  - Indoor Air Purity Index

X-tendo

Your opinion matters

- 1. Did the Covid-19 crisis increase your awareness on the indoor environment of your home?
  - Yes, on ventilating the rooms (2 answers)
  - Yes, on avoiding noise (2 answers)
  - Yes, but on none of the above (1 answer)
  - No (1 answer)
  - Yes, on the quality of (day)light
  - Yes, on comfortable indoor air temperatures
  - Yes, on biophilic aspects (bringing nature inside)
- 2. Do you have an air quality monitoring system at your home? (one answer)
  - No, and I don't consider buying it (21 answers)
  - No, but I am considering buying it (7 answers)
  - Yes (5 answers)

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Smart Readiness Indicator

Maarten De Groote, Vito / EnergyVille (BE)

Smart and digital technologies in the building sector enable

- Cost–effective energy efficiency savings
- Tangible benefits for users in terms of comfort, health and well-being
- Better integration of renewables to the energy grid

EXAMPLE APPLICATIONS:

- optimised energy use as a function of (local) production
- optimised local (green) energy storage
- automatic diagnosis and maintenance prediction
- improved comfort for residents via automation

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Smart Readiness Indicator in the EPBD

The **Energy Performance of Buildings Directive** (EU 2018/844) requires the development of **an optional Common Union scheme for rating the smart readiness of buildings: the "Smart Readiness Indicator" (SRI)**

- *The Smart Readiness Indicator intends to*
  - ***raise awareness*** *about the benefits of smart technologies and ICT in buildings;*
  - ***motivate consumers*** *to accelerate investments in smart building technologies; and*
  - ***support the uptake of technology innovation*** *in the building sector.*

https://smartreadinessindicator.eu/

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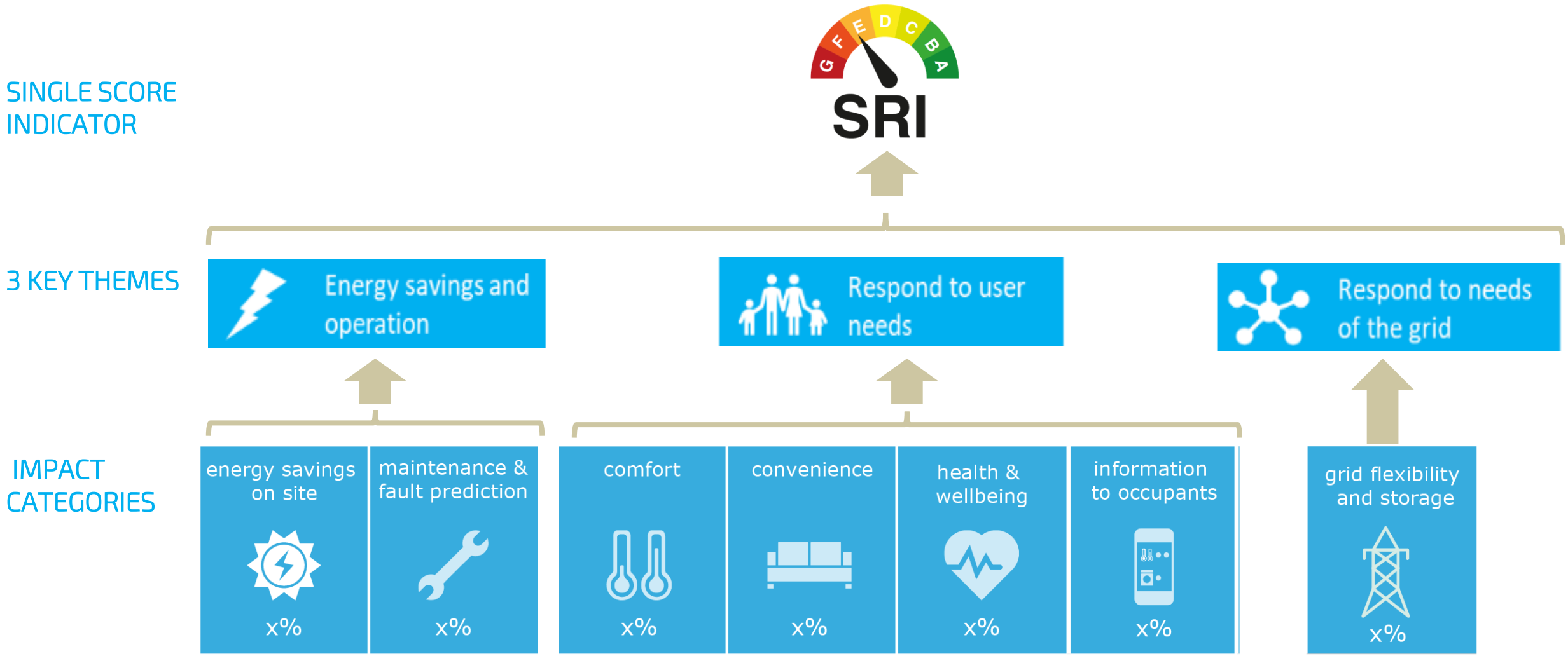
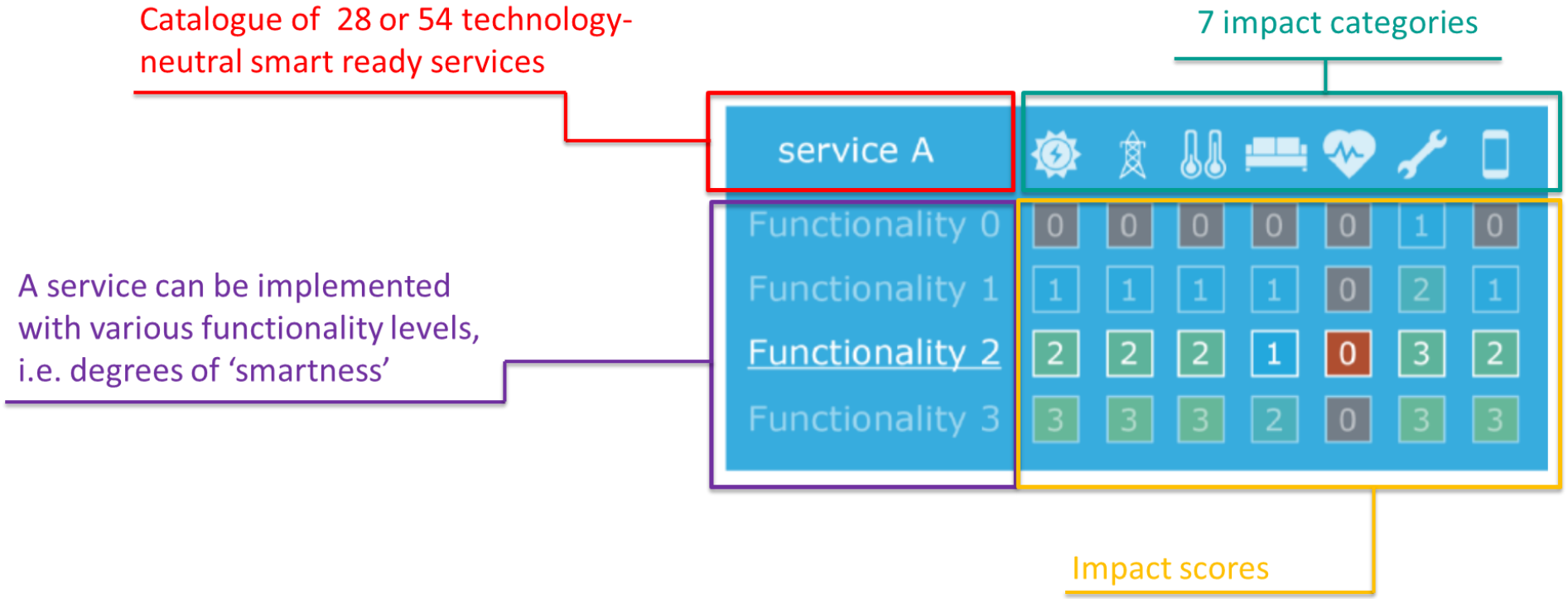
Aggregating impact scores



The buildings' response to the need of the occupant

- The ability to adapt its operation mode in response to the needs of **the occupant** paying due attention to the availability of user-friendliness, maintaining healthy indoor climate conditions and ability to report on energy use, e.g.:
  - Use of CO_2 sensors to decide when to increase ventilation
  - Dashboards displaying current and historical energy consumption



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Comfort feature

Sheikh Zuhaib

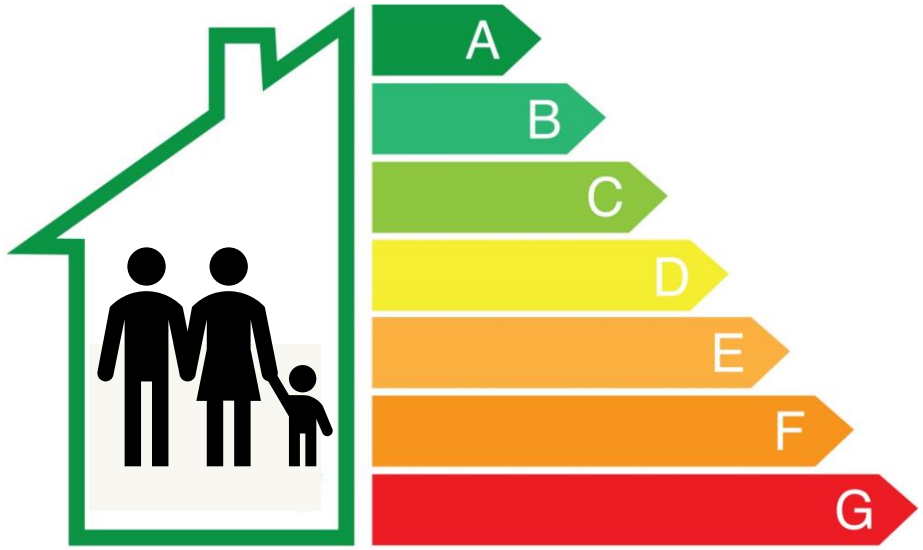
1st October 2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 845958

Why comfortable indoor comfort is important?

60-90%

of time people spend in indoor environments (homes, offices, schools etc.)[1]



Benefits for renovation

- Health and well-being
- Space satisfaction
- Economic (e.g. marketing advantage)
- Psychological
- Productivity

[1]Health & Consumer Protection Directorate- General, "Promoting actions for healthy indoor air (IAIAQ)", 2011

Where do we get inspiration from?

BREEAM®

U.S. GREEN BUILDING COUNCIL LEED USGBC

INTERNATIONAL WELL BUILDING INSTITUTE™

CASBEE®

DGNB

HOME • PERFORMANCE • INDEX © HPI

THE HOME PERFORMANCE INDEX (HPI)©
Know that your house is a home.

LIVING BUILDING CHALLENGE

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What are the main objectives?

- ✓Enrich the EPCs with key indicators of building performance other than energy efficiency
- ✓Increase awareness and willingness for improvement of comfort
- ✓Promotion of health and well being in built-environment
- ✓Extension of multiple benefits to the customers for new and existing buildings

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What are the challenges in developing comfort feature for future EPCs?

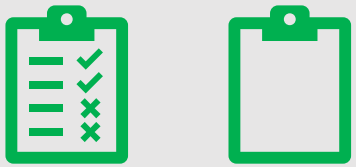
BUILDING TYPOLOGY

SCALE or INDEX

MEASUREMENTS

INDIVIDUAL SCORE/ RATING

BASELINE PERFORMANCE



SURVEYS

INDUSTRY READINESS

BUILDING or ZONE

AFFORDABLE/ EXPENSIVE

ndo

How do we develop it?

-> Use of checklists (observations/measurements)

-> Questionnaire survey to building occupants

-> On-site monitoring depending on the requirement of individual criteria

Flexible and adaptable assessment approach based on building typologies (domestic and non-domestic buildings)

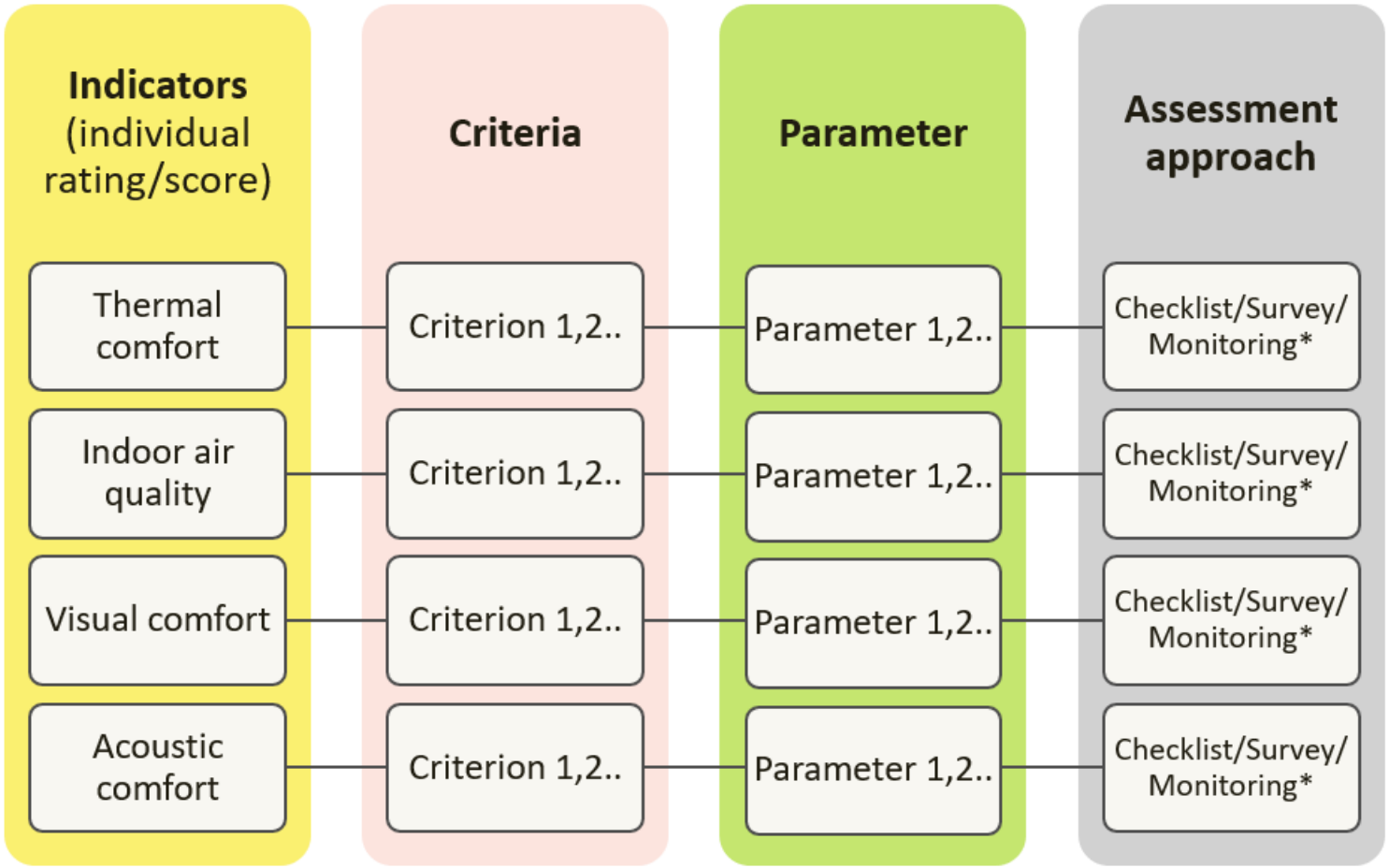
Based on four main indicators:

- Thermal comfort
- Indoor air quality
- Visual comfort
- Acoustic comfort

Individual scores for all indicators

Affordability and time-effective assessment

Scoring process



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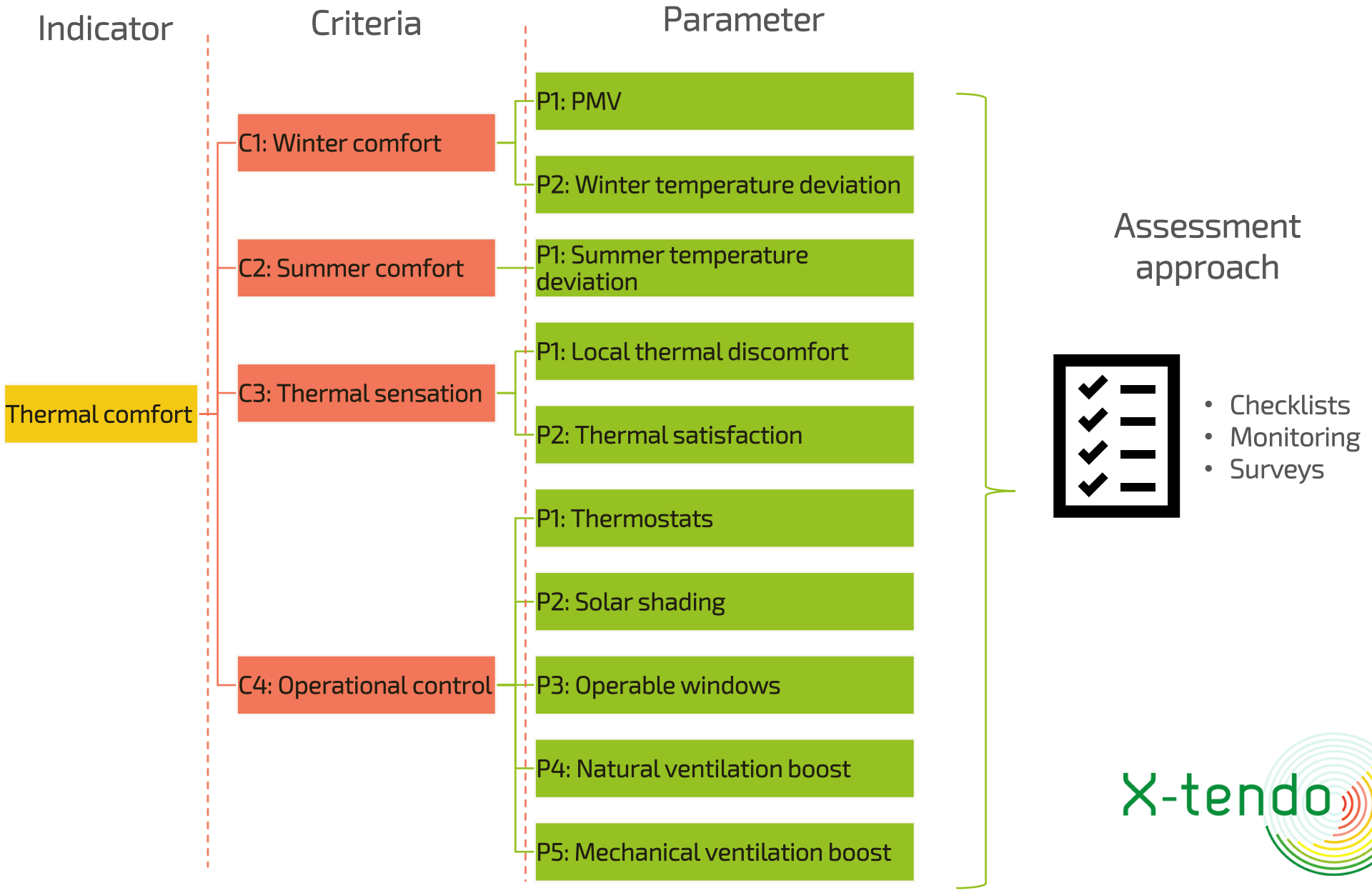
Approach example (Thermal comfort)



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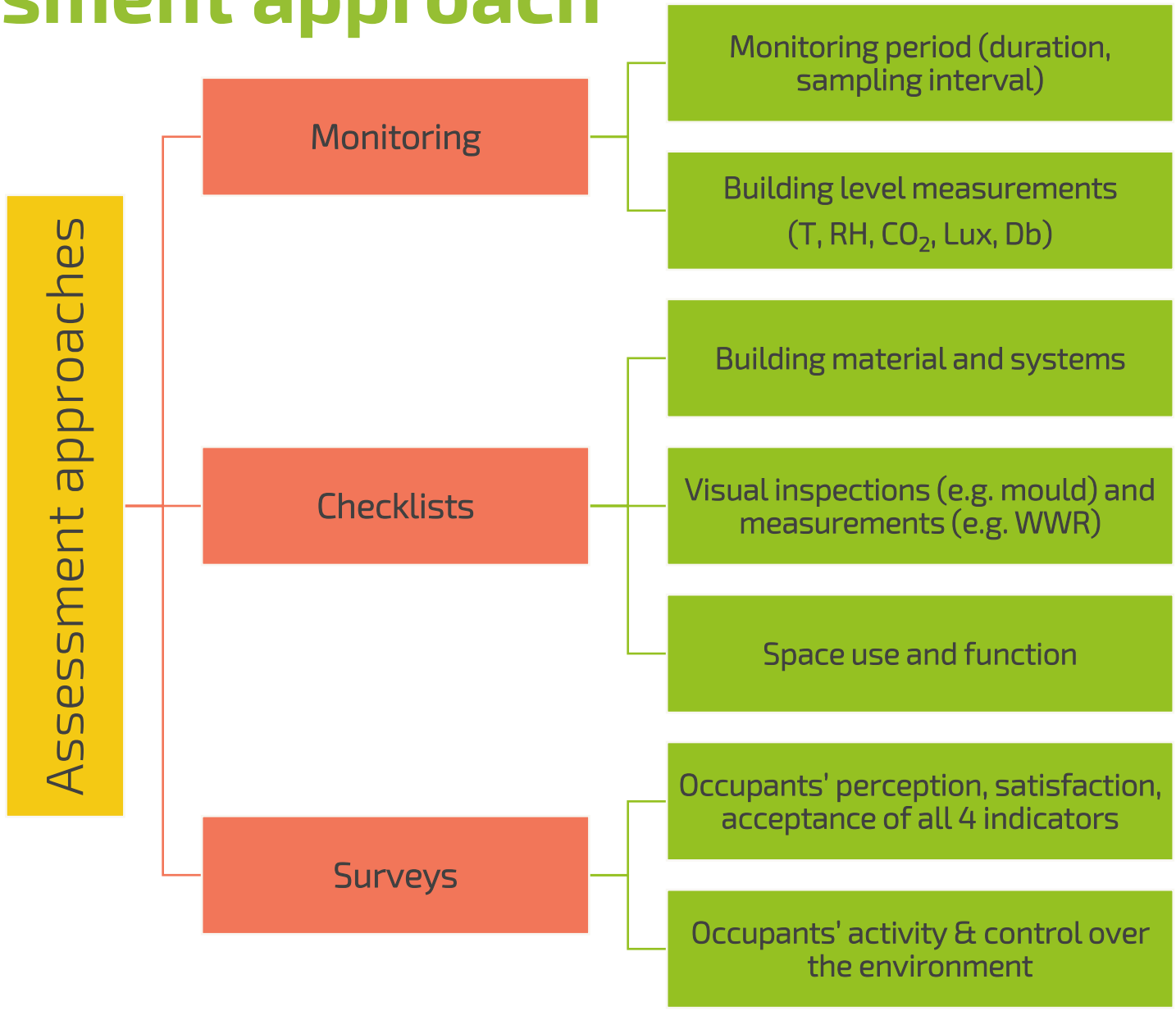
Assessment approach



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Display of rating per indicator

Label for comfort feature	Score (maximum achievable fraction)
Very bad	0% < score ≤ 30%
Bad	30% < score ≤ 40%
Acceptable	40% < score ≤ 60%
Good	60% < score ≤ 80%
Excellent	80% < score ≤ 100%

Indicator	0%----------100%	Label
Thermal comfort	90%	Excellent
Indoor air quality	80%	Good
Acoustic comfort	25%	Very bad
Visual comfort	50%	Acceptable

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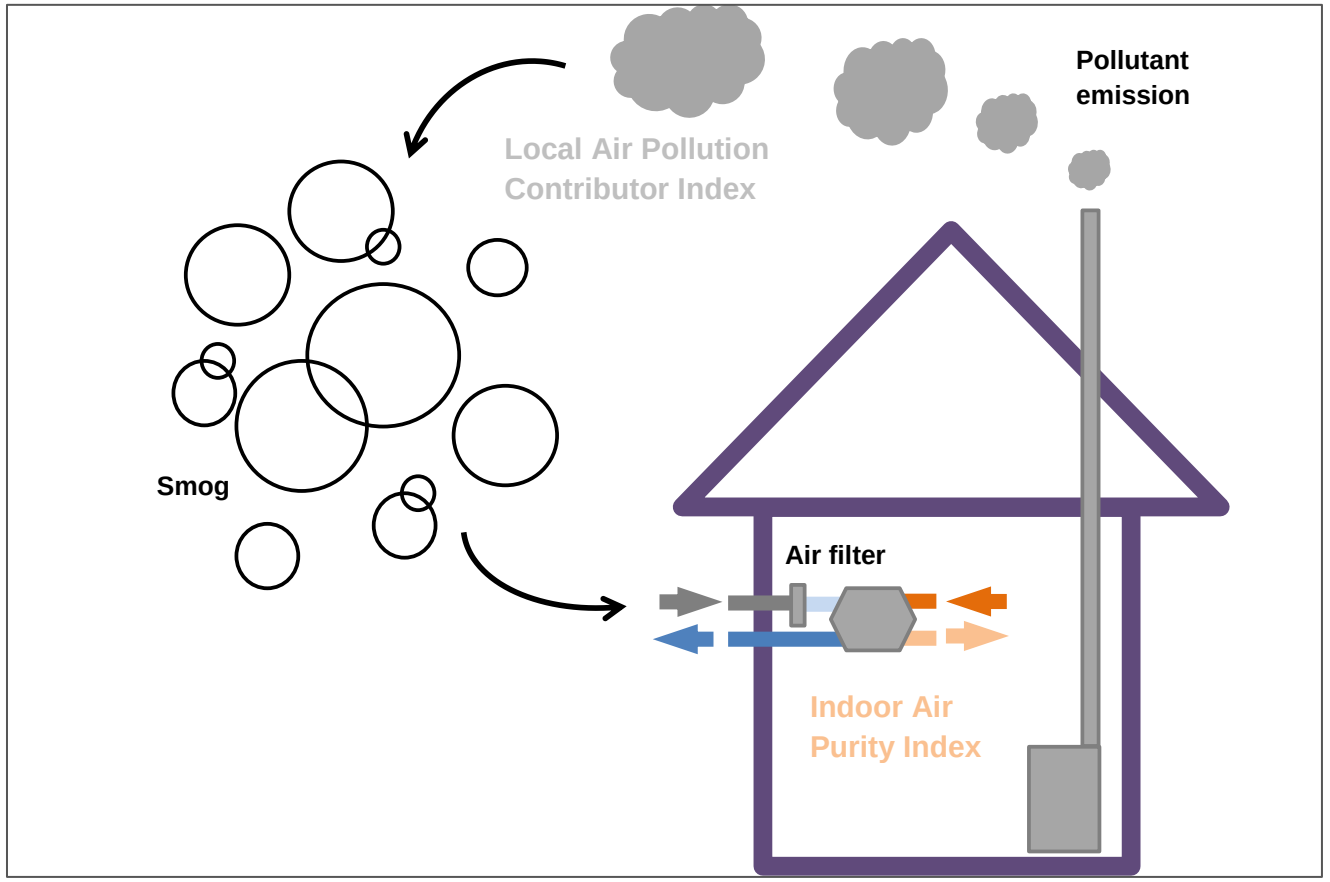
Outdoor Air Pollution

Jerzy Kwiatkowski, NAPE
(PL)

Outdoor Air Pollution

Indoor Air Purity Index *can persuade to invest in mechanical ventilation with air filtration*

The Local Air Pollution Contributor Index can enforce building owners or users to undertake actions of building modernization or energy source exchange



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Indoor Air Purity Index - Input data

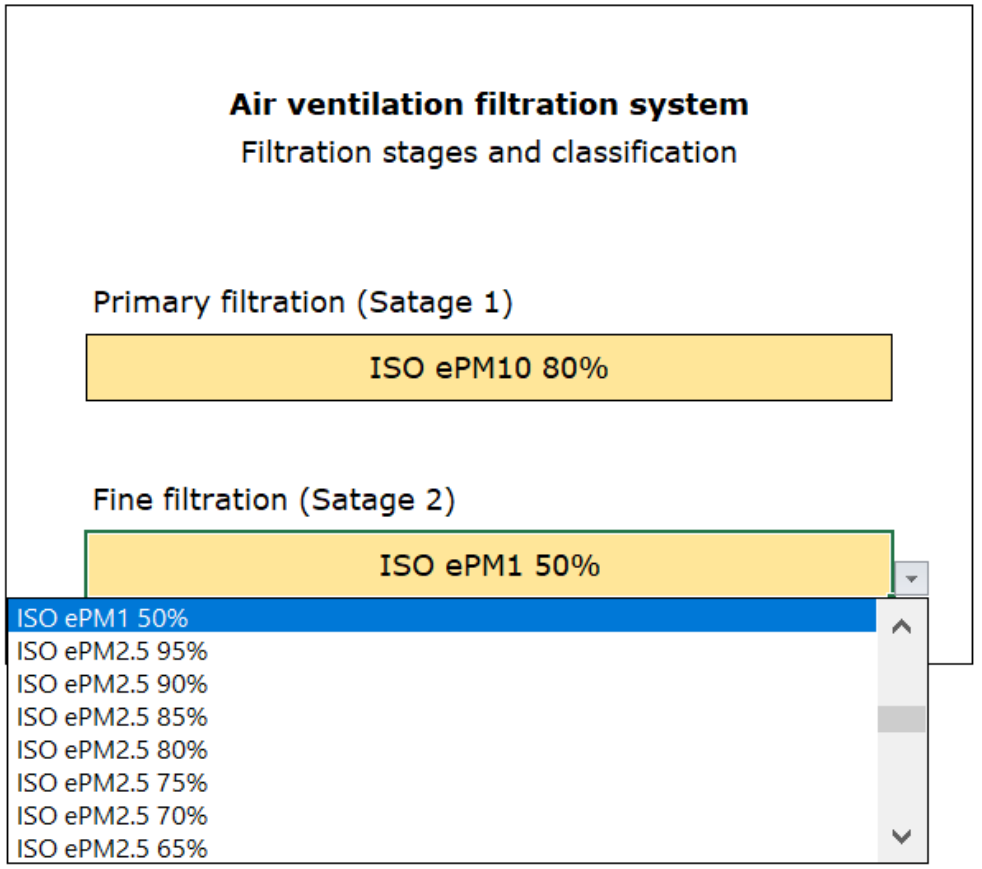
The annual mean concentration of PM_{10} and $PM_{2.5}$ for assessed building localization

$PM_{10,mean,out}$	36	$\mu g/m^3$
$PM_{2.5,mean,out}$	24	$\mu g/m^3$

Index level for assessed building localization

Moderate

Based on the annual mean pollutant concentrations



Filter class according to ISO 16890; EN779:2012; Eurovent 4/23 (2018):

Indoor Air Purity Index – Final Result

Indoor Air Purity Index

Fair

Based on the annual mean concentration of PM10 and PM2.5 in supply air

Worksheet 2

The annual mean concentration of PM_{10} and $PM_{2.5}$ in supply air for assessed building localization (estimation)

$PM_{10,mean,sup}$	21,6	µg/m³
$PM_{2.5,mean,sup}$	16,5	µg/m³

Indoor Air Purity Index

Supply Air Categories

European Air Quality Index

IAQI level	Limit values of: [µg/m³]	
	$PM_{10,mean,sup}$	$PM_{2.5,mean,sup}$
Excellent	5	2,5
Very good	10	5
Better than good	15	7,5
Good	20	10
Fair	40	20
Moderate	50	25
Poor	100	50
Very poor	150	75
Extremely poor	>150	>75

Local Air Pollution Contributor Index - Input data (1)

DE_{AB}

Delivered energy to assessed building [kWh/(m²·year)]

$DE_{AB,S1}$ – Energy source 1
$DE_{AB,S2}$ – Energy source 2
$DE_{AB,S3}$ – Energy source 3
$DE_{AB,O}$ – Other

Onsite heat production by fuel combustion

	Delivered energy kWh/(m²·year)	Fuel and technology name
Source 1	*35,0*	*EMEP - Gaseous fuels - Conventional boilers (to 50 kW)*
Source 2	*0,0*	

EMEP - Gaseous fuels - Conventional boilers (to 50 kW)
EMEP - Gas oil - Conventional stoves (to 50 kW)
EMEP - Gas oil - Conventional boilers (to 50 kW)
EMEP - Coal - Advanced stoves (<50 kW)
EMEP - Coal - Standard boilers (from 50 kW to 1 MW)
EMEP - Coal - Standard boilers (from 1 MW to 50 MW)
EMEP - Coal - Boilers (to 1 MW) - manual feed technology
EMEP - Coal - Boilers (to 1 MW) - automatic feed technology

Onsite power generation or

	Delivered energy kWh/(m²·year)	Fuel and technology name
Source 3	*0,0*	*EMEP - Gaseous fuels - Gas turbines (from 50 kW to 50 MW)*

Energy from onsite renewable energy sources or external sources

	Delivered energy kWh/(m²·year)	Description
Other	*25,0*	Heat, cold and electricity from external networks and local RES

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Local Air Pollution Contributor Index - Input data (2)

Type of building

DE_{RB}
Delivered energy to reference building [kWh/(m²·year)]

Type of building (drop-down list)				
No.	**Prefix**	**Type of building**	**Type of building (drop-down list)**	**Delivered energy (reference value) kWh/(m²·year)**
1	PL	Single-family residential buildings	PL - Single-family residential buildings	65
2	PL	Multi-family residential buildings	PL - Multi-family residential buildings	60
3	PL	Collective residence buildings	PL - Collective residence buildings	70
4	PL	Public buildings, healthcare	PL - Public buildings, healthcare	175
5	PL	Public building, other	PL - Public building, other	40
6	PL	Outbuilding, storage and production building	PL - Outbuilding, storage and production building	60
7			-	
8			-	
9				

Type of building

PL - Single-family residential buildings

PL - Single-family residential buildings
PL - Multi-family residential buildings
PL - Collective residence buildings
PL - Public buildings, healthcare
PL - Public building, other
PL - Outbuilding, storage and production building
-
-

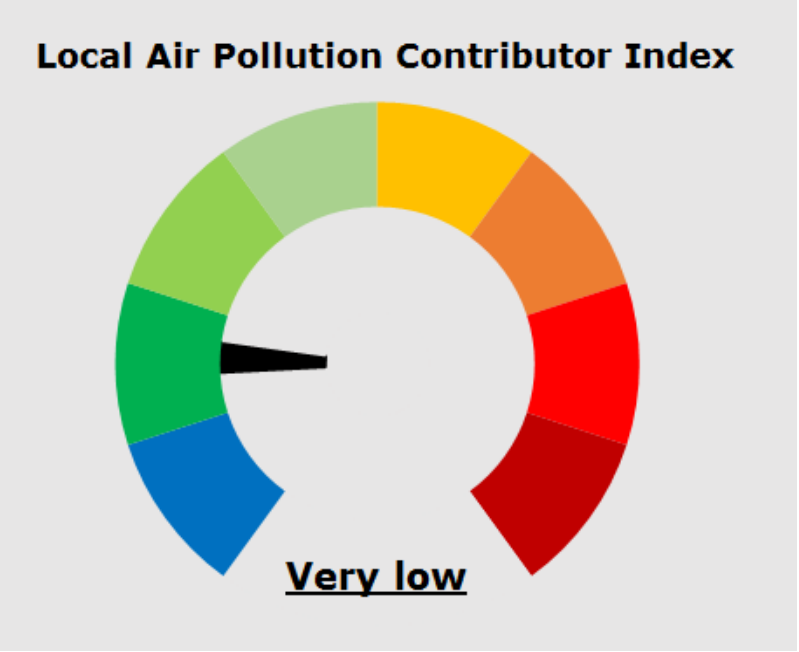
Reference building

Onsite heat production by fuel combustion

	Participation	Fuel and technology name
Source 1	*100%*	*EMEP - Gaseous fuels - Conventional boilers (to 50 kW)*
Source 2	*0%*	

EMEP - Gaseous fuels - Conventional boilers (to 50 kW)
EMEP - Gas oil - Conventional stoves (to 50 kW)
EMEP - Gas oil - Conventional boilers (to 50 kW)
EMEP - Coal - Advanced stoves (<50 kW)
EMEP - Coal - Standard boilers (from 50 kW to 1 MW)
EMEP - Coal - Standard boilers (from 1 MW to 50 MW)
EMEP - Coal - Boilers (to 1 MW) - manual feed technology
EMEP - Coal - Boilers (to 1 MW) - automatic feed technology

Final result



Rate	Limit values of the REI		
Zero		REI =	0
Very low	0	< REI ≤	0,71
Low (reference value	0,71	< REI ≤	1
Moderate	1	< REI ≤	1,41
Sufficient	1,41	< REI ≤	2
High	2	< REI ≤	2,83
Very high	2,83	< REI ≤	4
Dangerouse	4	< REI	

The relative emission indicator

$$REI = \max\{REI_{PM10}, REI_{PM2.5}, REI_{NOx}, REI_{SOx}, REI_{CO}\}$$

$$REI = 0{,}58$$

RATE:

Very low

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Time for your input...

Your opinion matters (II)

- 3. Having a smart home will mostly…
  - Help me to save energy. (14 answers)
  - Improve my comfort. (8 answers)
  - Enable me to pay lower energy prices. (4 answers)
  - Relief me from housekeeping. (3 answers)
  - Support the energy system in avoiding black outs. (2 answers)
  - Increase the value of my property. (2 answers)
- 4. What information on Comfort would you value more on Energy Performance Certificates (EPC) for residential buildings?
  - Thermal comfort. (16 answers)
  - Indoor Air Quality. (14 answers)
  - Noise comfort. (3 answers)
  - Lighting comfort. (1 answer)
- 5. Do you consider buying an outdoor air quality monitoring system?
  - No, it should be covered by public authorities or research organisations (24 answers)
  - Yes, air pollution is important to me and I would like to share data with others. (4 answers)
  - No, air pollution is not of my concern (3 answers)
  - Yes, air pollution is important to me but I will not share data with others. (2 answers)

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Any questions?

Next steps

- Mapping and selection of suitable approaches to assess features – available
- Draft assessment methods of 5 indicators – November 2020
- Test phase theoretical buildings - 2021
- Test phase real buildings across Europe – 2021
- Updated and validated algorithms and calculation tools for assessment of next-generation EPC features

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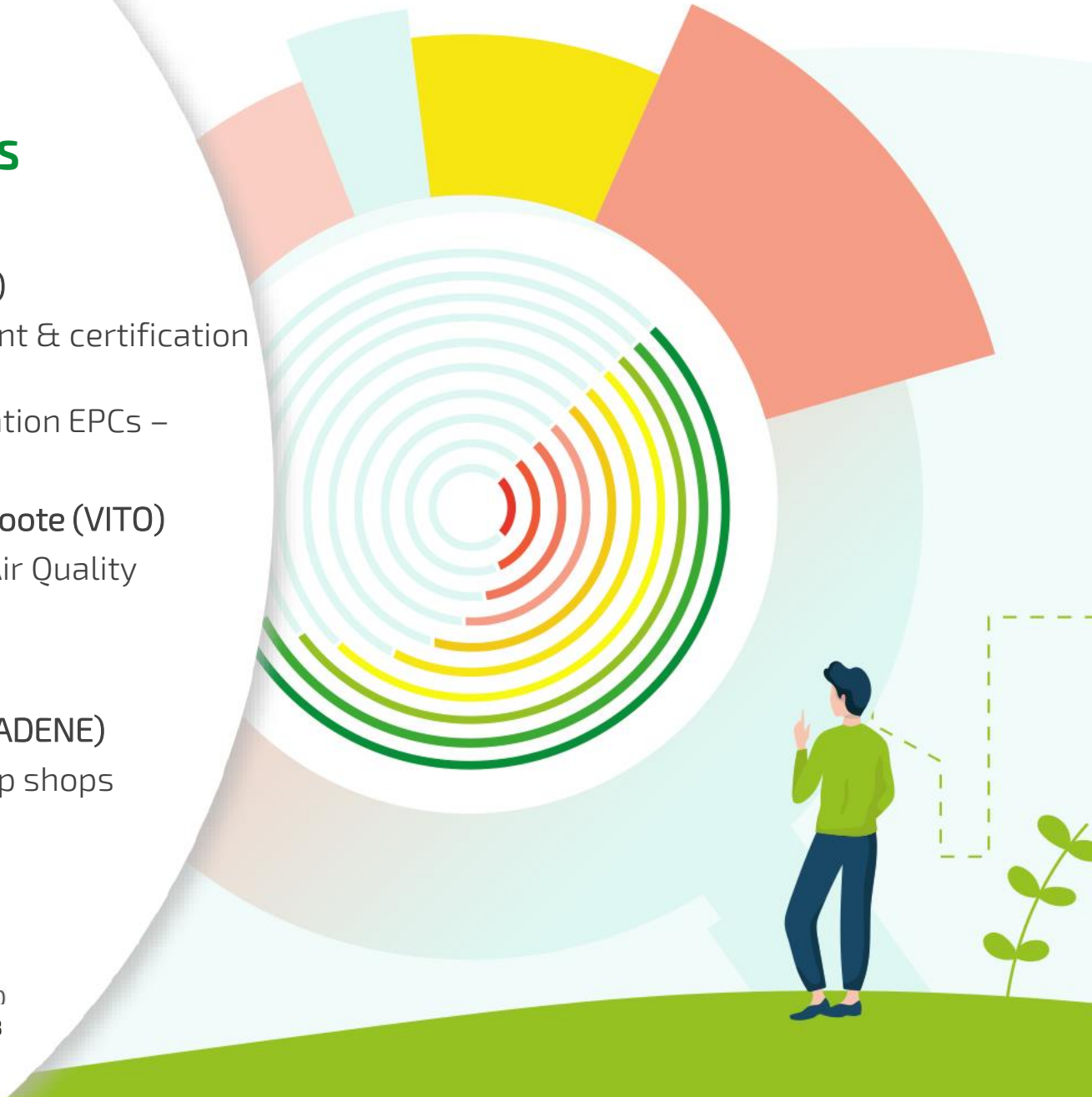
www.x-tendo.eu
#Xtendoproject

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 845958

WORKSHOP: TOWARDS THE NEXT GENERATION ENERGY PERFORMANCE CERTIFICATES

Thursday, 1 October 2020, 13:30 – 16:00 CEST, online

13:30	Welcome and introduction - **Lukas Kranzl (TU Wien/ EEG)**
13:35	EU support for buildings' energy performance assessment & certification **Rebecca Kanellea (EASME)**
13:45	X-tendo and its new innovative features for next-generation EPCs – **Iná Maia (TU Wien/ EEG)**
13:55	Session 1: Feeling at home in your home – **Maarten De Groote (VITO)** Focus on: Smart Readiness Indicator, Comfort, Outdoor Air Quality Q&A
14:45	*Coffee Break*
15:00	Session 2: Creating market opportunities – **Rui Fragoso (ADENE)** Focus on: Logbook, Tailored Recommendations, One-stop shops Q&A
15:50	Conclusions and next steps
16:00	*End*



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Creating market opportunities

X-tendo workshop: towards the next generation energy performance certificates

Rui Fragoso, ADENE (PT)

Zsolt Toth, BPIE (BE)

Iná Maia, TU WIEN (AT)

Neuza Rosa, ADENE (PT)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 845958

- Introduction

- **Feature 1: Buildings Logbook**
- Poll n. 1*

- **Feature 2: Tailored recommendations**
- Poll n. 2*

- **Feature 3: One-Stop-Shops**
- Poll n. 3*

- Questions & Answers
- Closing

Please share your questions in the chat for the answer at the end

* Interactive part with real-time surveys

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Where do we stand?

*"recommendations for the **cost-optimal or cost-effective** improvement of the energy performance" ..." it shall contain information on the **steps to be taken to implement the recommendations"***

"80% of industrial data is still collected and never used"

*"results shall be **documented** and **passed on to the building owner**, so that they remain available"*

*"A real data economy, on the other hand, would be a **powerful engine for innovation and new jobs**"*

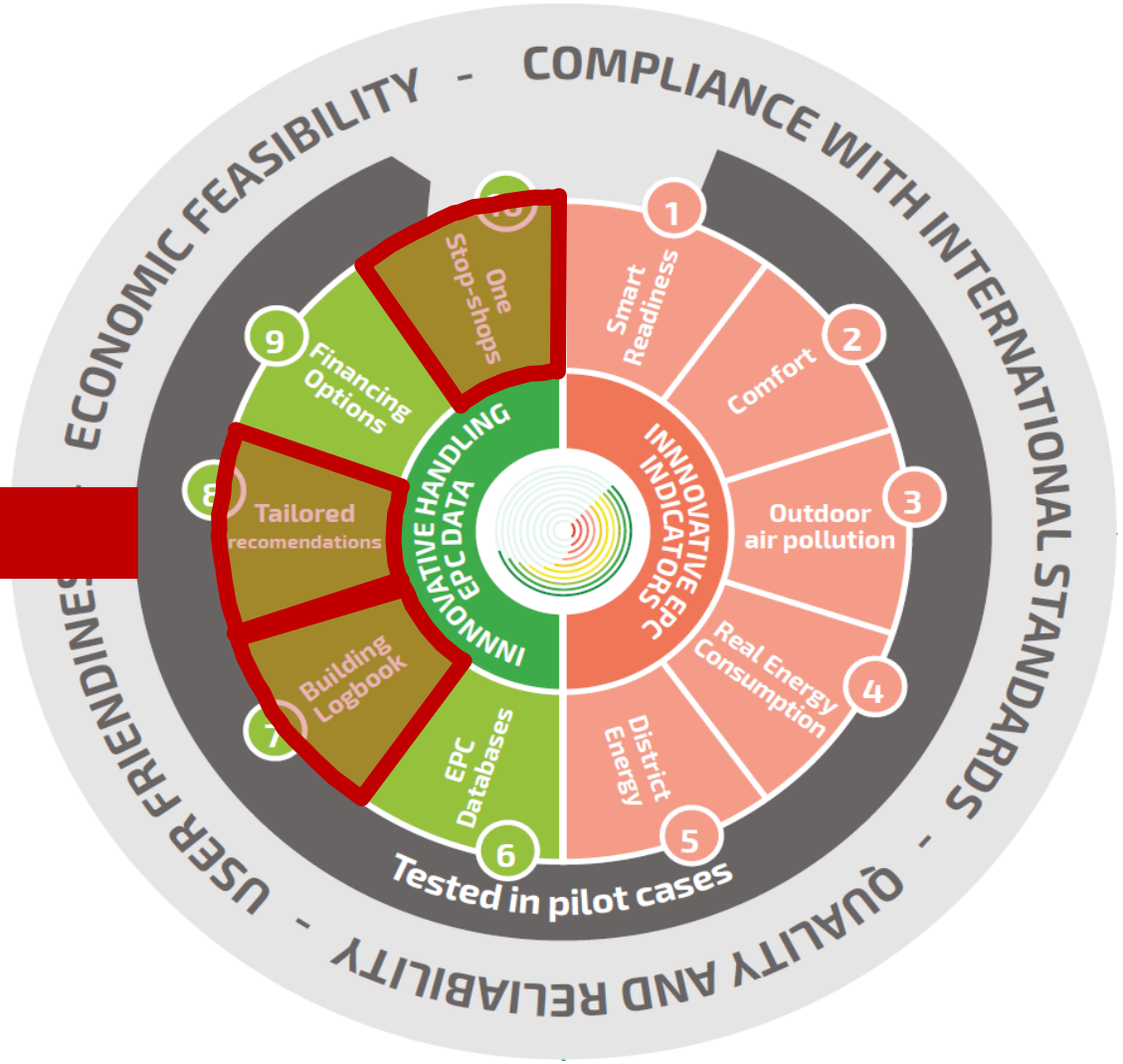
*Member States shall provide the information through **accessible and transparent advisory tools** such as renovation advice and **one-stop-shops***

*"**new opportunities** for energy savings"*
*"provide consumers with **more accurate information**"*

*"To ensure that measures related to energy efficiency are applied in the best way in building renovation, they should be linked ... to the **level of certification or qualification of the installer...**"*

Accelerating buildings renovation

- **Building logbook**
  - Building data **repository**
  - **Information** about the buildings
- **Tailored recommendations**
  - **Detailed** information
  - **Specific** to each single context
- **One-Stop-Shop**
  - **Link** demand and supply
  - Call to **action**



Interaction between features

Building descriptions .
Building characteristics .
Technical bld. systems .
Appliances .
Building performance .
Energy consumption .
Energy production .
Automation & Control .
Financial data .

1
Building logbook

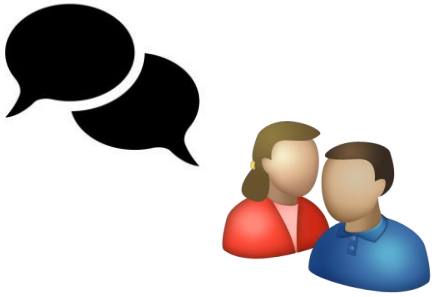
Tailored recommendations

2

3
One-Stop-Shop

. Powered by a logbook
. Link demand and supply
. Access to Experts
. Access to Companies
. Rating of Companies
. Access to financial instruments & incentives
. Single point to connect to Government services

Technical expertise .
Provide solutions .
Financial opportunities .



. Available budget
. Comfort requirements
. Living space changes
. Family planning

Building logbook

Zsolt Toth, BPIE (BE)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 845958

Feature 7: Building Logbooks

WHY:
Lack of information

FOR WHOM:
All actors across the life cycle

HOW:
Organised collection and management data

TESTING WHERE:
EE, **GR**, PT

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We usually keep records of the things we value…

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Definitions – what are we talking about?

Building Logbook?

???

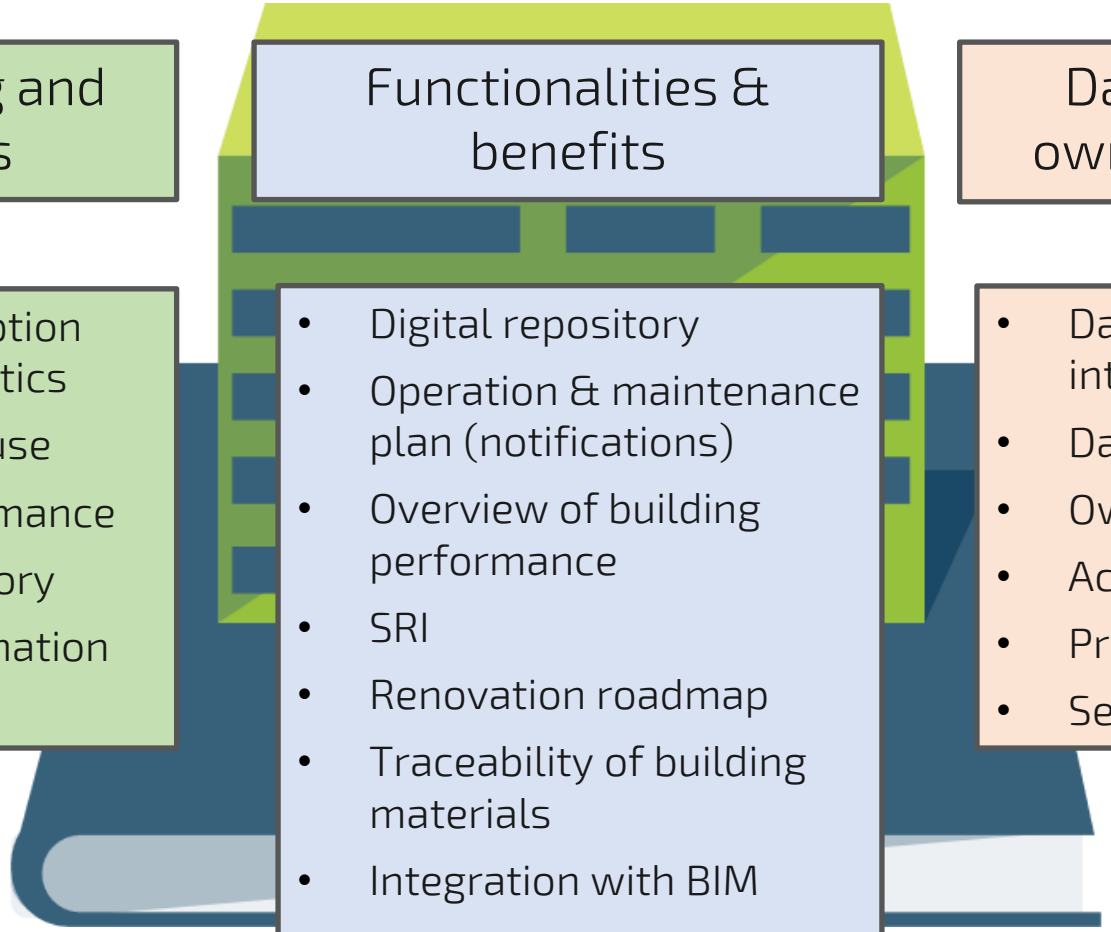
Renovation Passport?

Building Materials Passport?

Building Information Template?

BIM?

Core ingredients of the logbook



Data gathering and data points

- Building description and characteristics
- Operation and use
- Building performance
- Material inventory
- Financial information
- Etc.

Functionalities & benefits

- Digital repository
- Operation & maintenance plan (notifications)
- Overview of building performance
- SRI
- Renovation roadmap
- Traceability of building materials
- Integration with BIM
- Etc.

Data governance, ownership & access

- Data standards, interoperability
- Data storage
- Ownership
- Access
- Privacy
- Security

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Organisation of data

European level
Common standards and structure

Member State level

	LEVEL 1 (7 categories)	LEVEL 2 (216 data fields)	LEVEL 3	LEVEL 4
	Administrative information	13		
	General information	9		
	Building descriptions and characteristics	118		
	Building operation and use	37		
	Building performance	6		
	Building material inventory	11		
	Smart readiness	9		
	Finance	10		

Country dependent

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Circularity in construction and buildings through deconstruction, reuse and recycling of materials

Simplify and improve the certification processes

Higher residual value of buildings due to more accurate information

Reduces risk of purchasing a property - Enhanced transparency and trust for potential buyers

Demolish & recycle

Construction & acquisition

X-tendo Logbook

The X-tendo logbook gathers data, and enables its use, over the whole life cycle.

Better use of resources across the whole life of the building

Increase value of the building - Strengthen the correlation between the EPC rating and the property value

Traceability of materials and chemicals

Better informed decision-making (including energy and environment aspects, financing, investment, etc.)

Operation & maintenance

Synchronising maintenance cycles with renovation needs

Enable demand response and smart solutions

Better informed renovation decisions – linked with trigger points and aligned with long-term targets

Increased awareness of energy use and saving potential, health, accessibility, adaptability, flexibility and resilience

Aggregate demand and links to one-stop-shops

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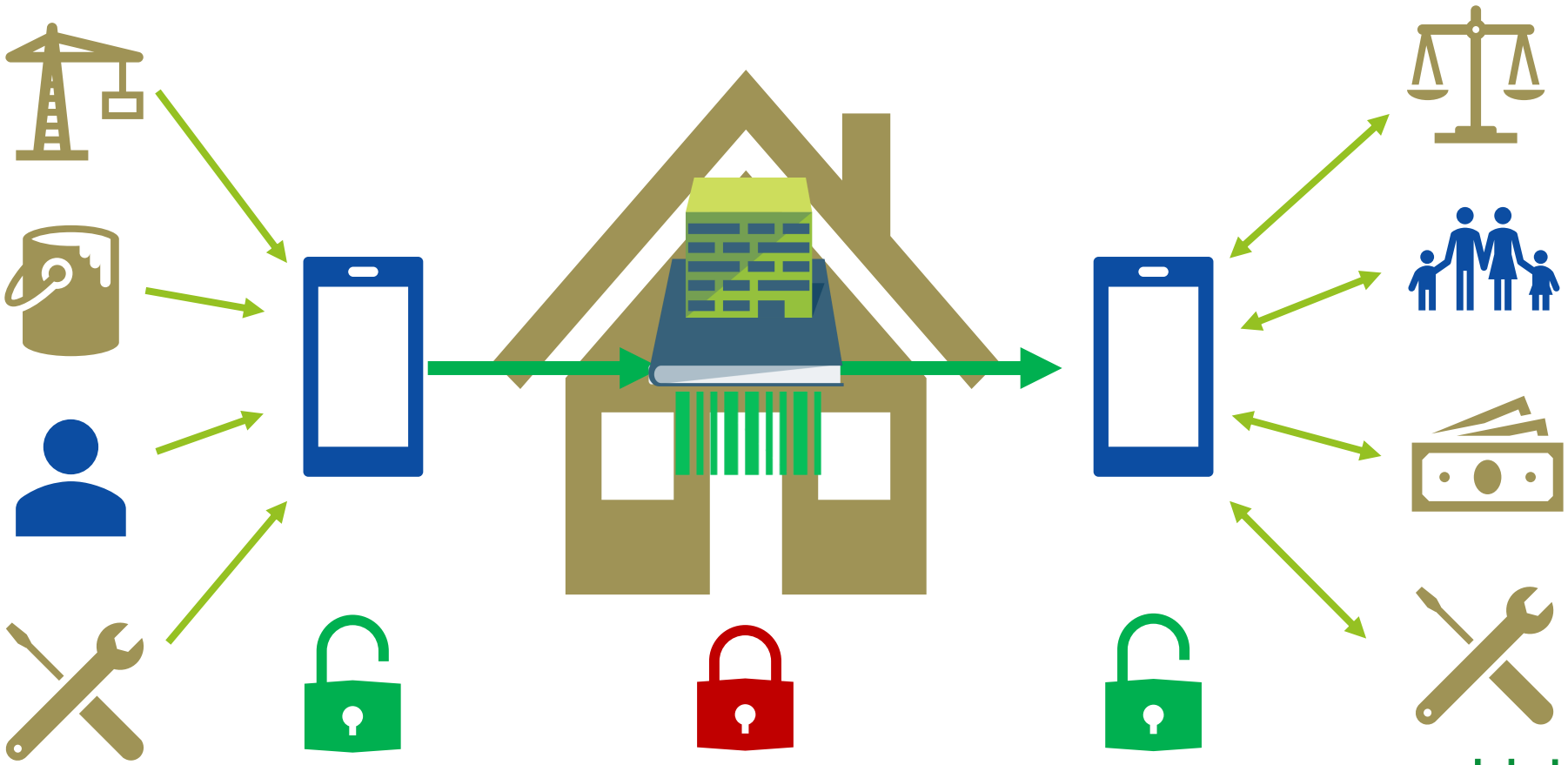
How can it work in practice?



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Success factors

- Building logbook development based on previous study, tests, and stakeholders experience
- Detailed information on what should be provided by the different stakeholders in the value chain
- Include regular updates
- Easy to use and user friendly
- Provide clear scope of the logbook
- Clear legal framework
- Include process for data validation
- Alignment with other national and international initiatives/industry standards

Market barriers

Cost implications

- Costs for implementation, update and validation

Privacy and data management

- No clear data ownership and data handling procedures, including data validation

Administrative burden

- No clear understanding of the use and added value of the building logbook

Static nature of the logbook

- Information often need to be manually updated; lack of dynamic updates

Access to information

- Information accessible only on site and/or to specific stakeholders

Fragmented regional approach

- Regions develop their own requirements for building logbooks

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Logbook Poll (I)

- 6. What are the TOP 3 most important functionalities of a logbook (final user perspective)?
  - Easy access to all relevant building-related information (18 answers)
  - Overview of building performance (energy & resource consumption, flexibility, health and safety, etc) (18 answers)
  - Links to financial incentives (12 answers)
  - Benchmarking, reporting and links to various certification and assessment schemes (10 answers)
  - Visualizing future energy/cost saving potentials and lifecycle costing (8 answers)
  - Value chain integration, aggregation of project and marketplace of services (3 answers)

Logbook Poll (II)

- 7. Who should have access to the logbook data?
  - Building owner, public authorities and 3rd parties (e.g. building professionals) (13 answers)
  - Building owner and public authorities (9 answers)
  - Only the building owner (6 answers)

- 8. What is the main driver for the logbook to become a living document?
  - Interoperability between various databases and automated data flows (10 answers)
  - Incentivising the building owners / built environment value chain to keep it updated (10 answers)
  - Compulsory update at regular intervals (7 answers)

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Tailored recommendations

Iná Maia, TU WIEN (AT)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 845958

Feature 8: Tailored recommendations

WHY:

lack of information is still a barrier

FOR WHOM:

building end-users

HOW:

workflow for automatical, enhanced recommendations

TESTING WHERE:

DK,PL,UK

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What can EPCs do in terms of recommendations?

- Standardised recommendations
  - Energy auditors choose recommendations from a standandised list, without taking into account either specific building user nor specific building related data

OR

- Technical recommendations, with more precise information than the first option (above)

OR

- Technical recommendations including cost estimations of the measures

OR

- Recommendations including user behaviour aspects

→ Currently not provided in any implementing country

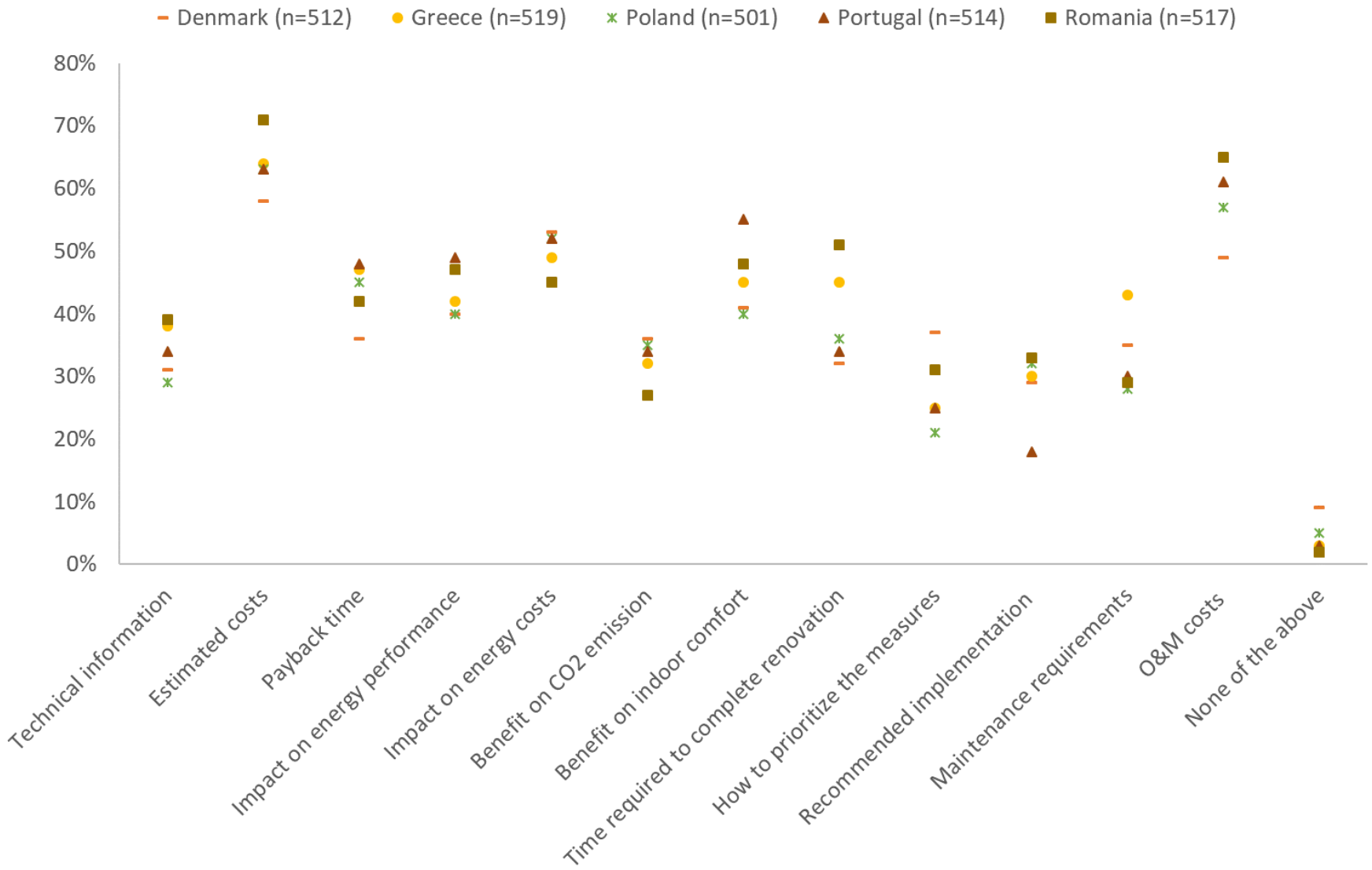
X-tendo implementing countries currently provide one of these options

Tailored recommendations Polls (I)

- 9. Which TOP 3 types of information included in the EPC is more relevant for end-users?
  - Expected impact on energy performance (19 answers)
  - Expected impact on energy costs (19 answers)
  - Expected payback time of the renovation measures (19 answers)
  - Expected impact on comfort and indoor air quality (6 answers)
  - Expected impact on CO_2 emission (5 answers)

Which recommendations are most useful?

- Results from the end-users survey
  - User could choose more than one option (under 13)
- Results: HIGH interest on cost-related information
  - Estimated costs
  - O&M costs



Vision of X-tendo for feature tailored recommendations

- provide more targeted tailored recommendations as this is done in todays EPC practices -> **cost (and cost range)** of the recommendations **and simplified economic indicators**

>> measure-by-measure recommendations, including measures' costs

- encourage **more ambitious** recommendations in terms of energy efficiency and carbon intensity, **consistent with long-term energy and climate policy targets** (which might go beyond national building code standards)

>> whole-building indicator, based on results from building stock modelling

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Tailored recommendations Polls (II)

- 10. What are the TOP 3 limitations of current recommendations included in EPCs?
  - They do not sufficiently consider the **technical implementation of recommended measures**. (16 answers)
  - They do not sufficiently provide information on **cost of recommended measures.** (16 answers)
  - They do not sufficiently consider the **behaviour of occupants.** (13 answers)
  - They do not sufficiently consider the **technical situation of the building**. (11 answers)
  - They do not sufficiently consider the **economic situation of the building owners**. (10 answers)
  - There is no shortcoming, **EPCs are fine as they are now**. (0 answers)

- 11. Which of the following aspects is most relevant when considering recommendations in EPCs?
  - Reliable information on the **costs and savings** of recommended measures (15 answers)
  - Well **detailed measures targeted** for each individual building component (6 answers)
  - Make sure that the recommended measures are consistent with **long-term energy and climate policy targets** (5 answers)

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One-stop-shops (OSS)

Neuza Rosa, ADENE (PT)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 845958

Feature 10: One Stop Shops

Partners: DEA, ADENE, AAECR, EST

WHY:

Reduce barriers and transaction costs for finding information

FOR WHOM:

Public authorities/Homeowners/Experts

Financial institutions/EE Companies

HOW:

Approaches to link EPC data to one-stop-shops

TESTING WHERE:

DK, PT, RO, UK

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Concrete outputs
Toolbox

- Explain how can **reduce barriers and transaction costs** for finding information regarding support schemes, public authorities
- Describe **OSS functionalities** that can be adopted partially or completely
- Explain the **detailed information** to homeowners about their homes and **monitor** the uptake of improvement measures
- Facilitate **communication** between homeowners and expert
- **Link to testing phase:** Analysis of the existing OSS (where exists), discussions with stakeholder's about the possible design elements of OSS and corresponding link with EPCs, the identification of possible pathways to implement or upgrade OSS and how EPC data can be effectively integrated

TOOLBOX

Guidelines on how to link EPC data to one-stop-shops and boost the market

Surveys and engagement to stakeholders

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Common core needs

- Better use and **integration of EPC data** with other datasets
- Support **platform for homeowners**
- Identify which **OSS/business model** are the most suitable considering the current national market
- Make access to **OSS dependent on a valid EPC** to enable closer integration with databases and building logbooks (where possible)
- **Boost to relationship** and reduce the gap between energy experts, financial institutions, homeowners and public authorities
- **Allow** and **facilitate** advice to the costumer, through online, phone or face to face channels

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Results from end-users survey

- One stop shops are more interesting when they are **free**

	Total	Denmark	Greece	Poland	Portugal	Romania
% that would be willing to pay a small fee for such a service	**25%**	26%	26%	21%	20%	32%
% that would use the service but only if offered for free	**57%**	48%	63%	60%	64%	51%
% that would (probably) not use the service	**10%**	15%	6%	10%	10%	9%

Table 1: Provision of one stop shop as a service

- **Top 3 services:** Cost savings, technical solutions and quotations

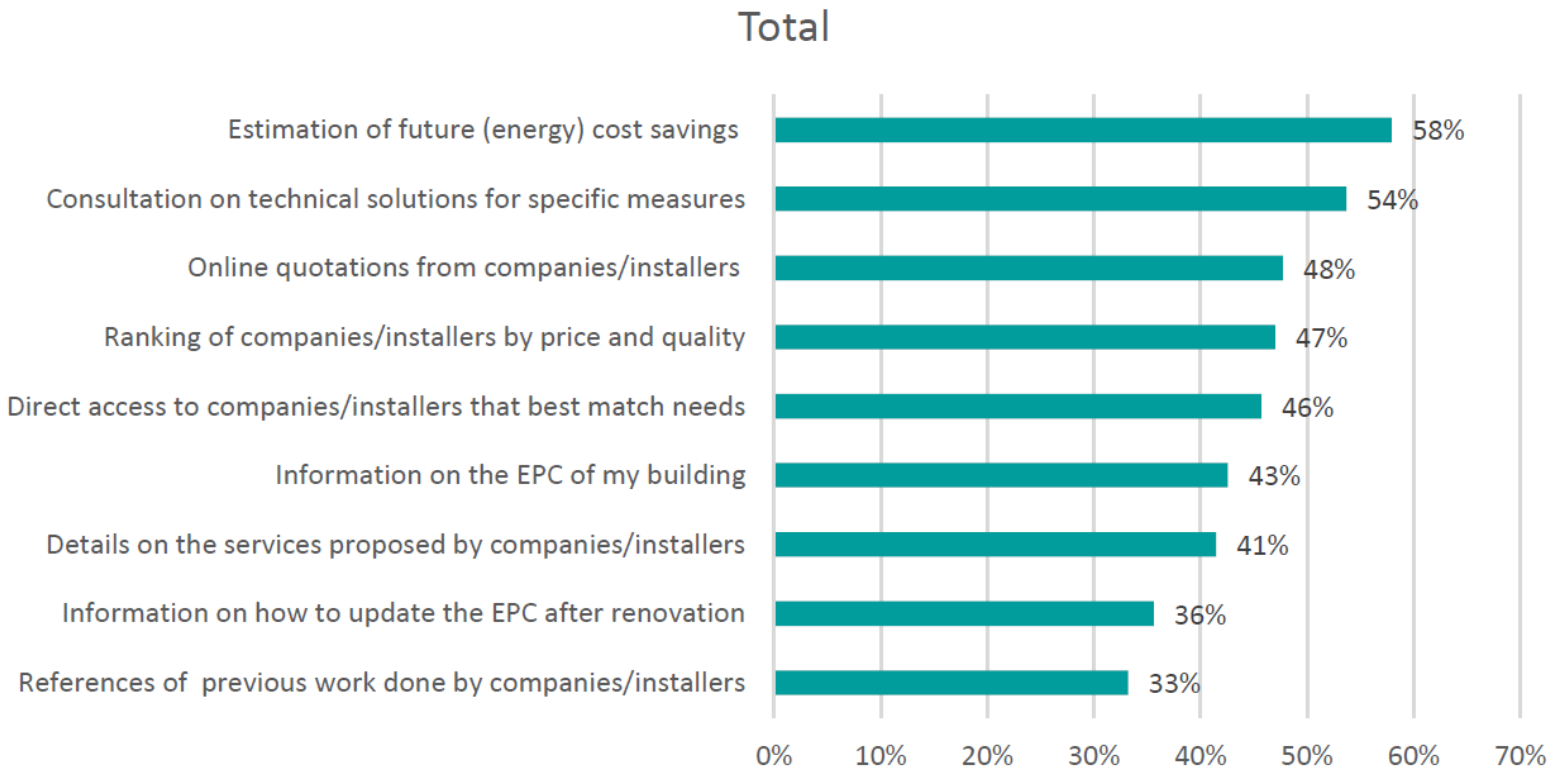

Table 2: Services consumers would like to receive in a one-stop web-portal

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Results from end-users survey

	Total	Denmark	Greece	Poland	Portugal	Romania
	2563	512	519	501	514	517
Energy cost savings	58%	48%	57%	59%	64%	62%
Consultation on technical solutions	54%	48%	66%	53%	44%	58%
Online quotations	48%	34%	65%	40%	63%	36%
Ranking of companies	47%	40%	49%	45%	54%	46%
Direct access to companies	46%	32%	46%	46%	48%	57%
Information on the EPC	43%	46%	47%	31%	43%	46%
Details on the proposed services	41%	30%	47%	38%	45%	47%
Information on how to update the EPC	36%	36%	38%	26%	42%	37%
References and basic information of companies	33%	30%	35%	32%	33%	36%
None of the above	7%	13%	4%	8%	6%	6%

Table 3: Services consumers would like to receive in a one-stop web-portal per country

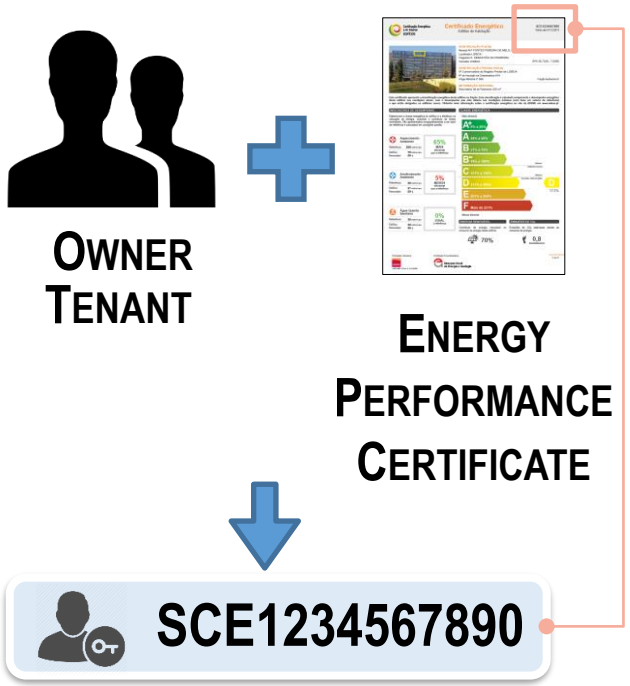
Portuguese case

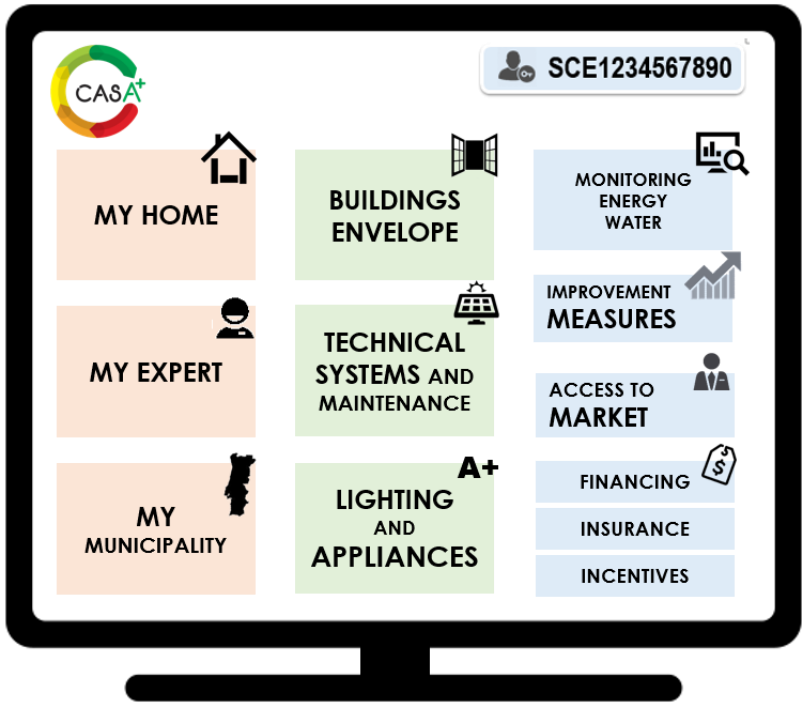
Portuguese case:
One Stop Shop for Energy Efficiency

https://portalcasamais.pt/

Portuguese case – Portal casA+

- Access to the portal





Data

1. Provided by EPC
2. Added by user

Portuguese case – Portal casA+

- Recommendations measures dashboard

My house is D
Similar houses are B
7 recommendations
My house can be A+

Best package
Costs, savings, rating

Individual Recommendations
Detailed information
Costs, savings, benefits
Call to action – "Ask for proposals to implement"

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One-stop-shop Polls

- 12. Which TOP 3 types of information do you consider most relevant to have in a one-stop-shop?
  - Access to different financing options available (18 answers)
  - Information about the building energy performance (and its EPC) (17 answers)
  - Information about Companies/Installers that can implement measures (17 answers)
  - Access to proposals from Companies/Installers that can implement measures (13 answers)
  - Administrative and building construction information (4 answers)

- 13. Which TOP 3 key success factors do you consider more relevant for a one-stop-shop?
  - Commitment of public authorities to its implementation and supply of data (12 answers)
  - Inclusion of a forum for stakeholders and participants to share best practices (and other info) (7 answers)
  - Aggregator of all available financing and incentives available (5 answers)
  - Technical support and direct access to experts (0 answers)
  - Simulation tools (investments, savings, benefits…) (0 answers)

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Any questions?

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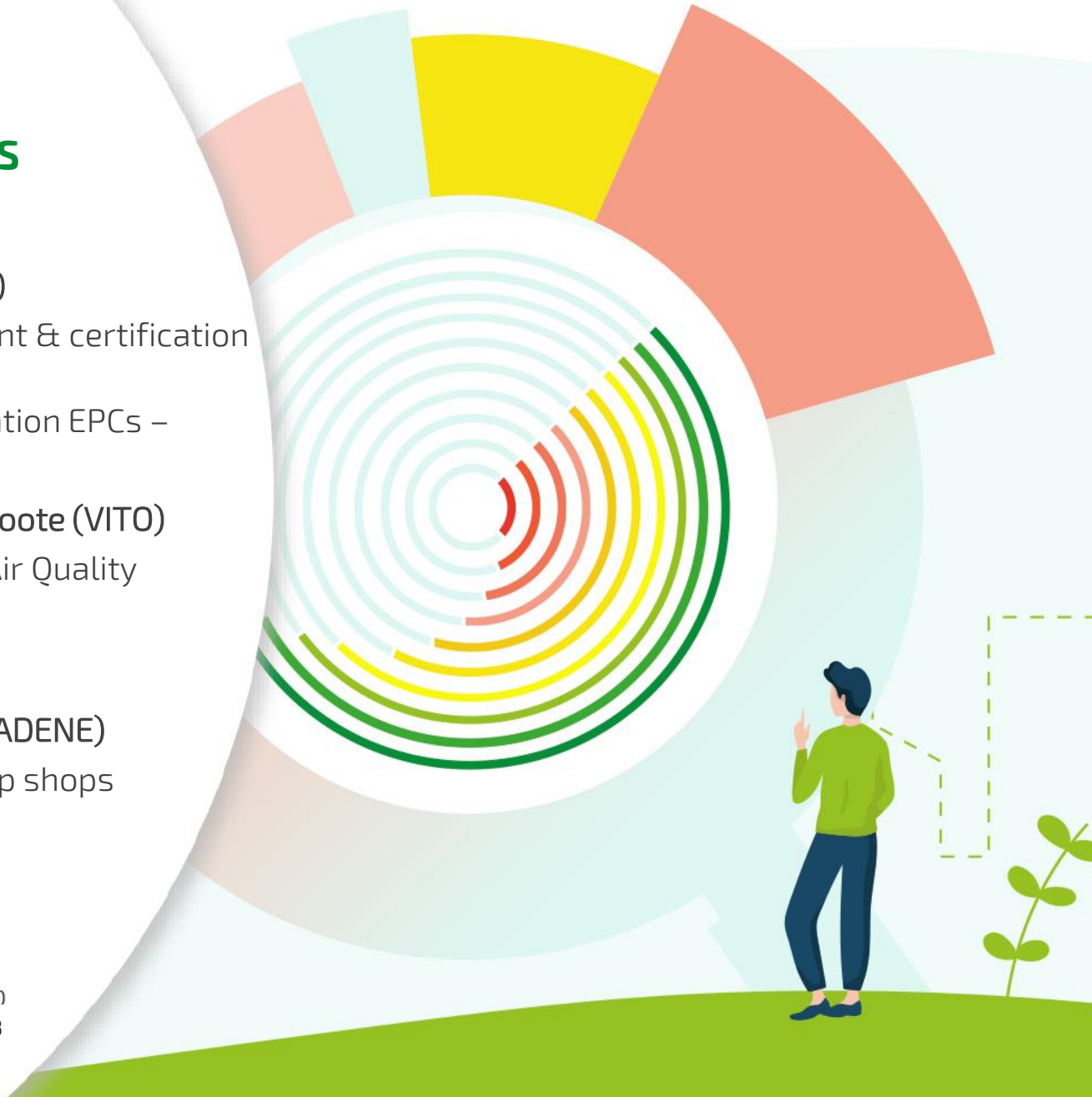
WORKSHOP: TOWARDS THE NEXT GENERATION ENERGY PERFORMANCE CERTIFICATES

Thursday, 1 October 2020, 13:30 – 16:00 CEST, online

13:30	Welcome and introduction - **Lukas Kranzl (TU Wien/ EEG)**
13:35	EU support for buildings' energy performance assessment & certification **Rebecca Kanellea (EASME)**
13:45	X-tendo and its new innovative features for next-generation EPCs – **Iná Maia (TU Wien/ EEG)**
13:55	Session 1: Feeling at home in your home – **Maarten De Groote (VITO)** Focus on: Smart Readiness Indicator, Comfort, Outdoor Air Quality Q&A
14:45	*Coffee Break*
15:00	Session 2: Creating market opportunities – **Rui Fragoso (ADENE)** Focus on: Logbook, Tailored Recommendations, One-stop shops Q&A
15:50	Conclusions and next steps
16:00	*End*



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AAECR Asociația Auditorilor Energetici pentru Clădiri din România

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Tartu Regiooni Energiaagentuur Tartu Regional Energy Agency

vito Energy Ville

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