



ALDREN

ALLiance
for Deep RENovation
in buildings

Implementing the European
Common Voluntary Certification
Scheme, as back-bone along the
whole deep renovation process



This project has received funding from the under the European Union's Horizon 2020 research and innovation programme under grant agreement No. 754159

ALDREN Training Workshop

**Feedback & proposals
for the training program**



ALDREN ALLIANCE
for Deep RENovation
in buildings

REHVA Brussels Summit, Brussels
12 November 2018

AGENDA



Chairs Andrei Litiu,
Tiziana Buso

11:
30 *Warm-up live poll*

11:
40 **Introduction
to ALDREN** *Johann
Zirngibl*

11:
55 **EVCS ratings** *Jana
Bendžalová*

12:
05 *Live poll session 1
and open discussion*

12:
30 *Lunch*

13:
30 **Energy performance
verification** *Mathieu
Rivallain*

13:
40 **Health & well-being** *Tiziana
Buso*

13:
50 **BRP & renovation
strategies** *Mathieu
Rivallain*

14:
05 *Live poll session 2
and open discussion*



Warm-up live poll



Introduction to ALDREN, ALliance for Deep energy RENOvation in buildings



Johann ZIRNGBL, ALDREN coordinator
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8 European partners are working together

CSTB
le futur en construction



POLITECNICO
MILANO 1863

(research)

CertifeA



Instituto
Valenciano de
la Edificación

(certification)

ENBEE
Environment & Building Energy Efficiency

Verco

REHVA
3E Federation of
European Heating,
Ventilation and
Air Conditioning
Associations

(application)



ALDREN Resume – Why ALDREN ?

- Create a **European quality benchmark**, based on **EU CEN standards**

*(Building professionals are asking for: **comparability, transparency and quality**)*

- **Offer support to policy i.e. EPBD**

*(Help Member States to fulfil the **revised Directive on Energy Performance in Buildings, building stock observatory, cost effective approaches, building passport, evidence based of expected energy savings, wider benefits, health + well-being**)*

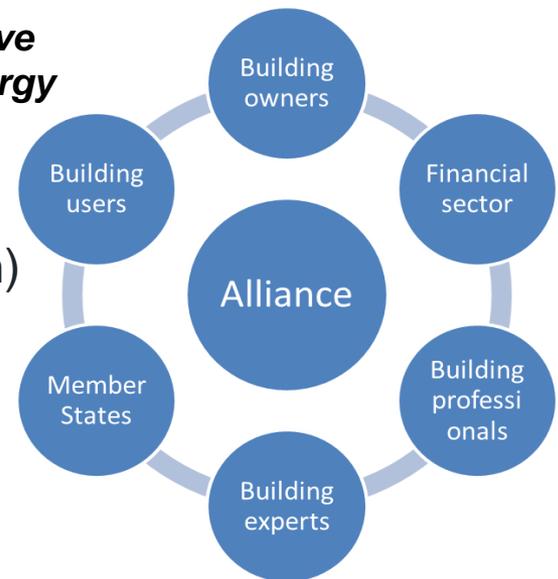
- Work out a **common language** (supporting the **holistic approach** in deep renovation)

How can a thermal bridge talk to a banker?

- Set up an **ALDREN ALLIANCE among buildings stakeholders**

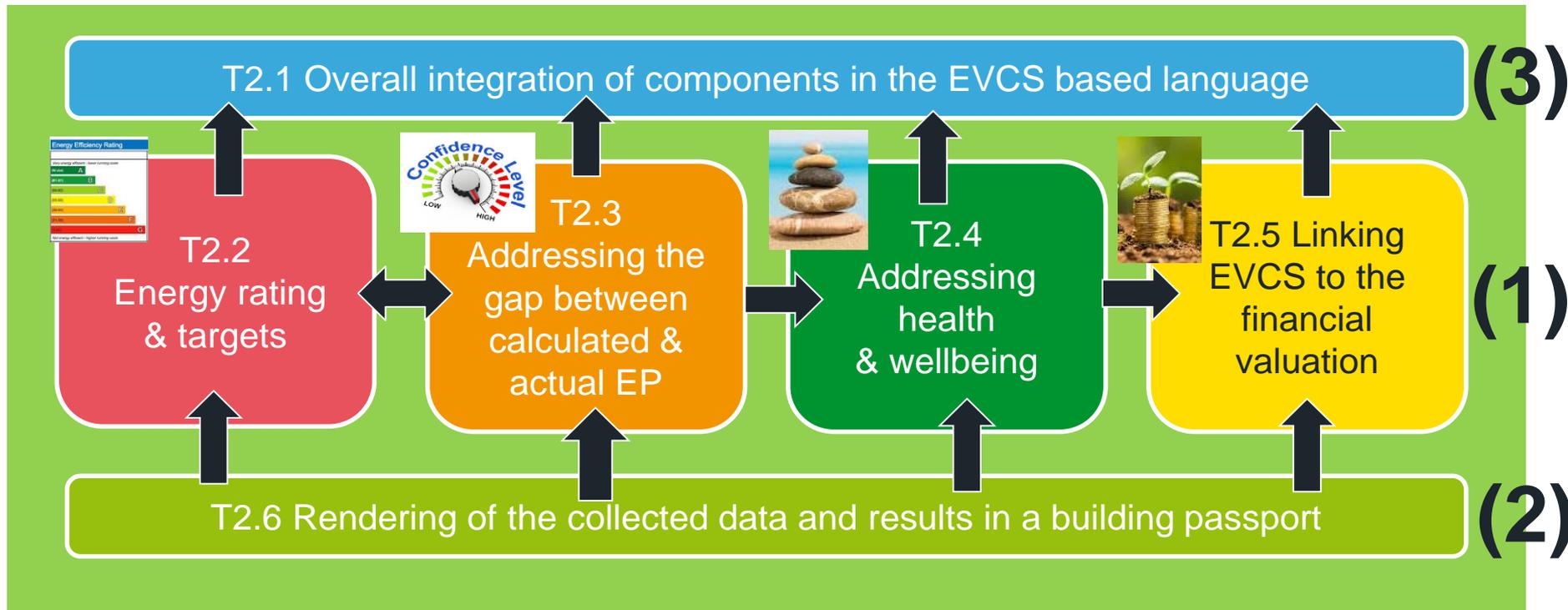
(Nobody can trigger building energy renovation alone)

The building owner needs the financial sector, the professionals, etc.



The ALDREN Outcomes / Results

6 tasks for consolidation and adaptation of an EVCS (European Voluntary Certification Scheme) based on common language



Amended EPBD and ALDREN outcomes (policy support)

DIRECTIVE (EU) 2018/844 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency

	T2.1 Overall integration	T2.2 EVCS	T2.3 Measured energy	T2.4 Health Wellbeing	T2.5 Financial evaluation	T2.6 Building passport	T3.2 Training
Art 1 Amendments Directive 2010/31/EU							
'(1) Article 2							
'(2) Article 2a Long-term renov. Strategy							
'1 highly energy efficient and decarbonised building stock by 2050,							
(b) cost-effective approaches considering potential relevant trigger points							
(c) introducing an optional scheme for building renovation passports;							
(f)... skills and education in construction and energy efficiency sectors;							
(g) evidence of expected energy savings and related to health, and air quality.							

ALDREN outcomes are related to 17 paragraphs of EPBD amendments

How to implement the outcomes

> ALDREN operational procedures

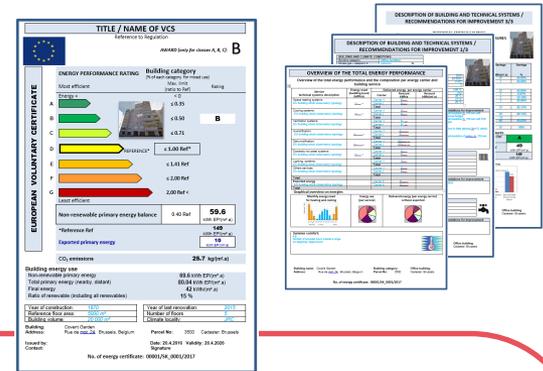
- **Articulate the protocols** with the **deep renovation stages**
- **Identify the data** to be collected
- Specify **responsibilities**
- Mention or **detail reference documents/procedures**

RIBA STAGE	ALDREN STAGE
0_Strategic Definition	DECISION (set requirements)
1_Preparation and Brief	
2_Concept Design	DEVELOP DESIGN
3_Developed Design	
4_Technical Design	DETAILED DESIGN
5_Construction	WORKS
6_Hand over and Closeout	
7_In Use	IN USE

ALDREN uses as much as possible existing know-how

Tasks outcomes

Individual tasks outcomes



T2.2

T2.3

T2.4

T2.5

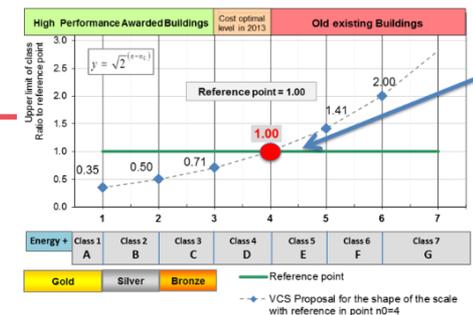
T2.6

EVCS, Energy rating procedure

(Indicators, targets, scales, reference, **tools**, template)

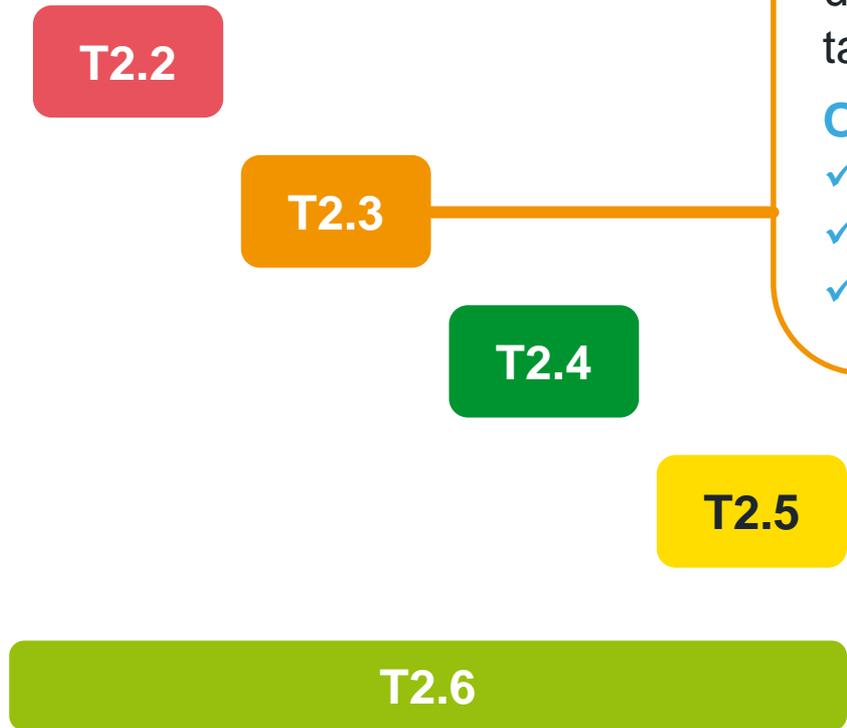
Offering

- ✓ Comparability
- ✓ Transparency across EU!



Tasks outcomes

Individual tasks outcomes



Performance verification protocol

(Measurement, metering & verification plan / Analysis of the gap / Predicted energy use under actual conditions / performance target)

Offering

- ✓ Confidence (Got what has been promised!)
- ✓ Enhanced building value
- ✓ Management tools

RED+ $x > +25\%$
AMBER+ $10\% < x < 25\%$

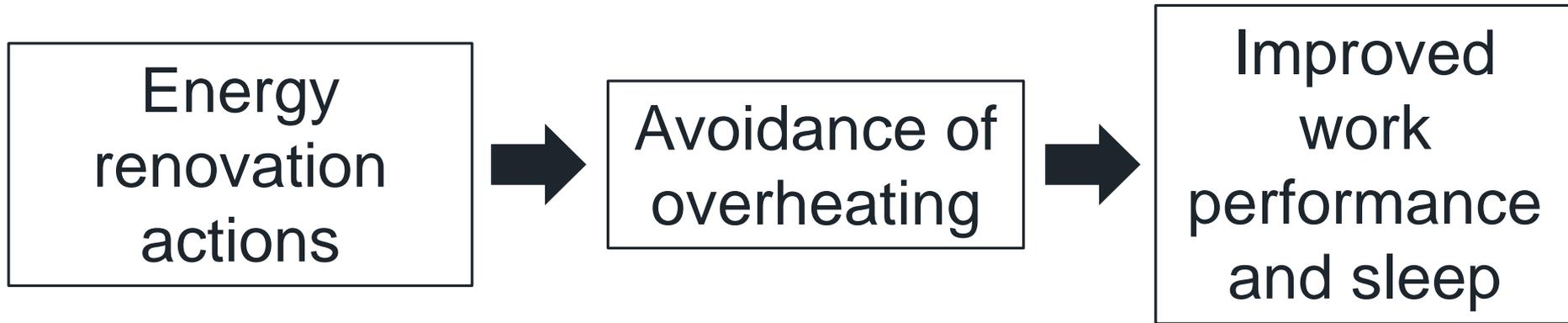
End use	EVCS - actual conditions	Measured	Variance (kWh)	Variance (%)
Space Heating	8,775,673	5,072,482	-3,703,191	-73%
Hot water	674,887	826,126	151,240	18%
Refrigeration	2,136,180	2,340,840	204,660	9%
Fans	121,605	102,209	-19,397	-19%
Pumps	1,430	1,421	-9	-1%
Controls	1,128,920	980,400	-148,521	-15%
Humidification	1,007,449	1,073,800	66,351	6%
Lighting (Internal)	774,040	822,385	48,345	6%
Total	14,620,184	11,219,664	-3,400,521	-30%

$\leq +10\%$
 $\geq -10\%$
 $> x > -25\%$
 $\geq 25\%$

T2.4 Integration of indoor air quality, comfort and health in the scope of deep energy renovation

Deep energy renovation  Energy + Non-energy benefits

Example

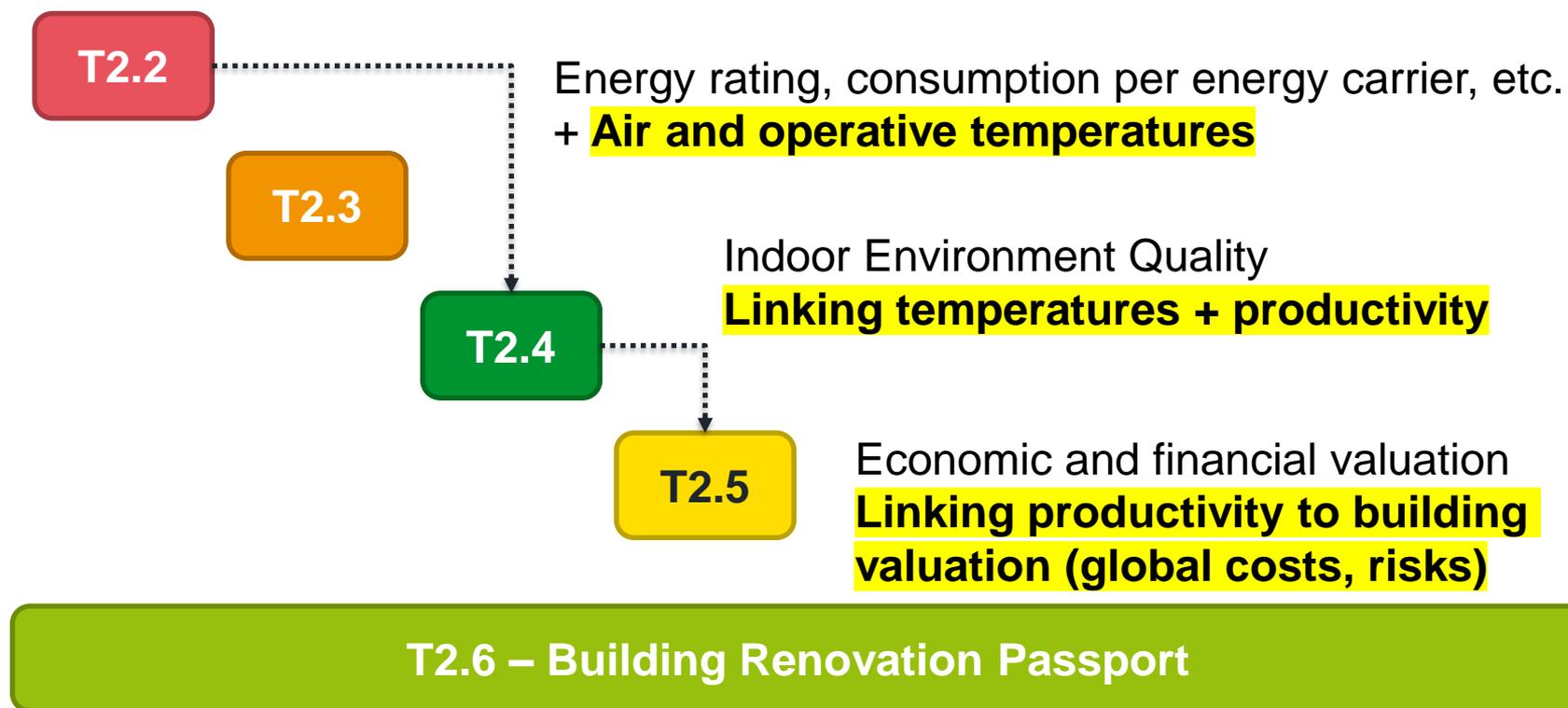


Tasks interactions / integration

(example of the ALDREN common language)

From “energy simulation” to “health & well-being”
to “economic/financial assessment”

(e.g. how a thermal bridge talks to a banker)



Market uptake and roll-out – ALDREN “in-side”

- Can be up taken as a **energy module by existing schemes** (energy rating, EP verification, health & well-being, financial valuation, ALDREN Building renovation passport A-BRP)
 - **HQE** (CERTIVEA is in the ALDREN consortium),
 - **IVE** (IVE in the ALDREN consortium),
 - **BREEAM**,
 - **DGNB**,
- Can be up taken as a **mandatory EPC by EU Member States**



OPPORTUNITIES FOR STAKEHOLDERS

BUILDING OWNERS, INVESTORS, DEVELOPERS

- **gain recognition** for good performance by **EU quality mark**
- take advantage of **comparability, reliability, risk elimination**

FINANCIAL SECTOR

- financing instruments for **energy efficiency investments**
- harmonized procedures based on **reliable benchmark rules**

THE BUILDING PROFESSIONALS, INDUSTRIALS

- **harmonized procedures** (training , tools)
- **harmonized databases** (industrials, building owners)
- **A coherent and transparent level playing field** (technology neutral).

PUBLIC AUTHORITIES

- **Policy support, (save money, common EU approach)**

ALDREN ALLIANCE

- **Effective vehicle for future cooperation and communication**

European Voluntary Certification Scheme ratings and targets



Jana BENDŽALOVÁ
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ALDREN Energy Rating

Voluntary Common EU Certificate (EVC)



The ALDREN EP rating methodology

- Provides direct comparability of EP and transparency across the EU for **EU buildings stocks management**
- Takes into account in the same way the **innovative solutions and all technical systems**
- Brings together **societal and building owner interests** (environment ↔ costs)

EVC = advisory tools for building owner, tenant, financial institutions and policy makers.

Asked by EPBD for subsidies before – after renovation
Stand alone or energy module in other scheme



Calculation of EP indicators

Building Modelling

B1a - office building

(4.9.2018)



Data collection

- ✓ Provided by building owner
- ✓ Collected by expert on-site, fieldwork
- ✓ Check the parameters influencing EP (materials, systems, time schedule, temperature set points)

Number of input data depends on software used (may be less for hourly method than for monthly)

Calculation methodology

- ✓ **CEN / ISO standards 2017** (M/480)
- ✓ Default choices in ANNEX B
- ✓ **Hourly** calculation step
- ✓ National use patterns
- ✓ EU primary energy factors (**comparability before-after renovation for subsidies**)
- ✓ **Climate of the specific location** instead of national standard climate (JRC hourly climate data)

Tabelle 15: Primärenergiefaktoren

Energieträger ⁴⁷		Primärenergiefaktor
Fossile Brennstoffe	Heizöl / Erdgas	1,1
Biogene Brennstoffe	Holz	0,2
	Biogas, Bioöle	0,5
Umweltenergie	Solarenergie, Umweltwärme etc.	0,0
Nah- und Fernwärme aus Kraft-Wärme-Kopplung (Anteil $\geq 70\%$) ⁴⁸	Fossile Brennstoffe	0,7
	Biogene Brennstoffe	0,0
Nah- und Fernwärme aus Heizwerken	Fossile Brennstoffe	1,3
	Biogene Brennstoffe	0,1
Strom	Strom-Mix (aktuell)	2,6
	Strom-Mix ab 2014 ⁴⁹	2,0
	Strom-Mix ab 2016 ^{48, 49}	1,8
	Verdrängungs-Strommix ⁵⁰	2,8

Source:
Report from cost optimal level calculation 2013 Germany

Buildings Modelling

CALCULATION OF EP INDICATORS

B1a - office building

(4.9.2018)



Software tool

- ✓ Based on the set of **CEN / ISO EPB standards (M480)** = the reference methodology
- ✓ **Software with an hourly calculation step allowed** (it should be proved in the future during software accreditation if the results are close to the CEN EPB standards)
- ✓ Today we use CYPETHERM COMETH
- ✓ Tomorrow we will have the Italian software

INDICATORS

THE MAIN INDICATOR

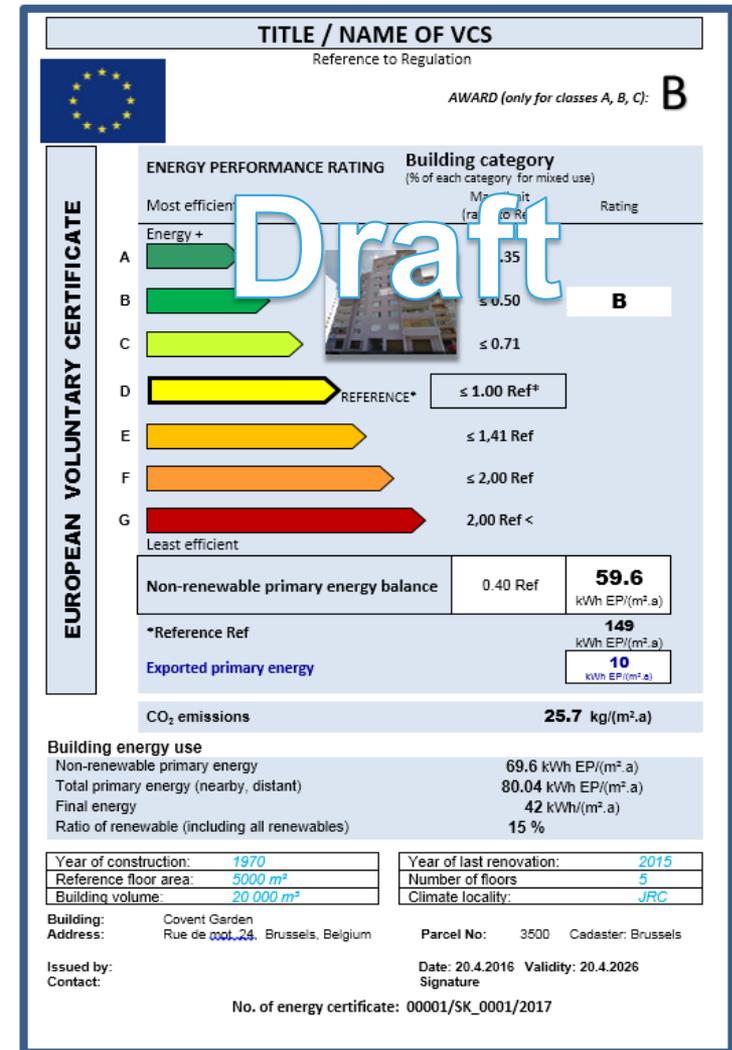
= non-renewable primary energy balance

with compensation by exported energy

THE ADDITIONAL INDICATORS

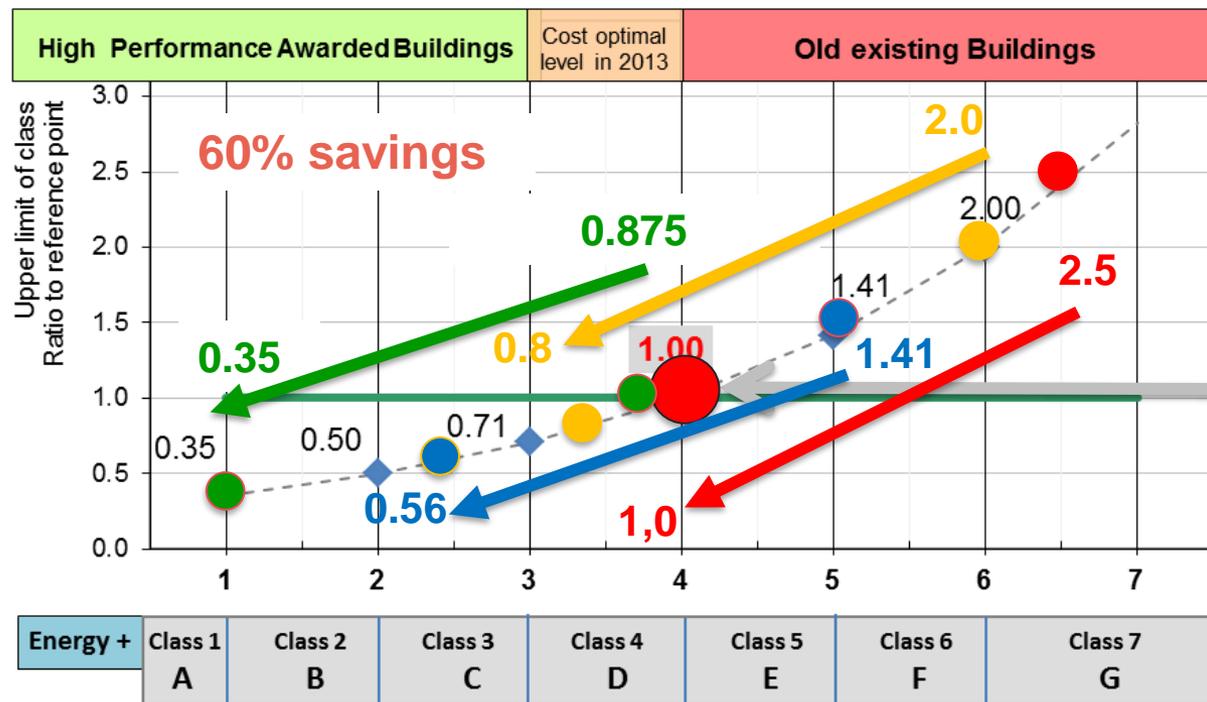
- Total primary energy
- Final energy
- Delivered energy per energy carrier
- Share of renewables
- Heating and cooling needs
- CO₂ emissions (environment)

Indicators needed for existing certification schemes (DGNB, HQE, BREEAM, BES-IVE) included (potentially used as energy module)



Based on Public consultation, Tender No. ENER/C3/2015-545, 2016

THE ENERGY PERFORMANCE RATING SCALE



Class	Energy classes
Energy +	EP < 0
A	0 Ref ≤ EP ≤ 0,35 Ref
B	0.35 Ref < EP ≤ 0.50 Ref
C	0.50 Ref < EP ≤ 0.71 Ref
D	0.71 Ref < EP ≤ 1.00 Ref
E	1.00 Ref < EP ≤ 1.41 Ref
F	1.41 Ref < EP ≤ 2.00 Ref
G	2.00 Ref < EP

≈ Cost optimal level (2013)

Identification of relative EP targets, renovation actions (step-by-step)

towards deep renovation (60% savings or NZEB)

Relative scale - the ratio to the „reference“

Reference = value expressed in kWh/(m².a)

Class „A“ - approximation to the NZEB definition

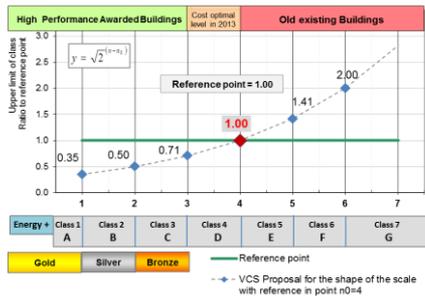
Different efforts

needed from different pre-renovation stages

The Scale

Reference point

Class	Energy classes
Energy +	EP < 0
A	0 Ref ≤ EP ≤ 0,35 Ref
B	0.35 Ref < EP ≤ 0.50 Ref
C	0.50 Ref < EP ≤ 0.71 Ref
D	0.71 Ref < EP ≤ 1.00 Ref
E	1.00 Ref < EP ≤ 1.41 Ref
F	1.41 Ref < EP ≤ 2.00 Ref
G	2.00 Ref < EP



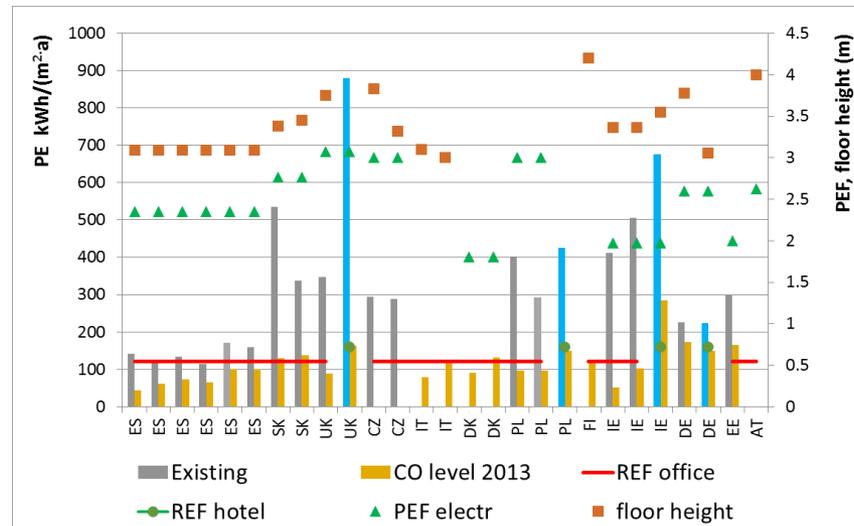
Different type of PE, floor height, temperature set-points, with and without cooling ...

Proposal for EVCS

Fixed values

- Offices: Ref = 120 kWh/(m².a);
- Educational buildings: Ref = 120 kWh/(m².a);
- Retail trade buildings: Ref = 240 kWh/(m².a);
- Wholesale buildings: Ref = 150 kWh/(m².a);
- Hotels and restaurants: Ref = 160 kWh/(m².a);
- Assembling halls: Ref = 140 kWh/(m².a);
- Hospitals: Ref = 240 kWh/(m².a);

Review of Reports from cost optimal level calculation in 2013 (offices and hotels):



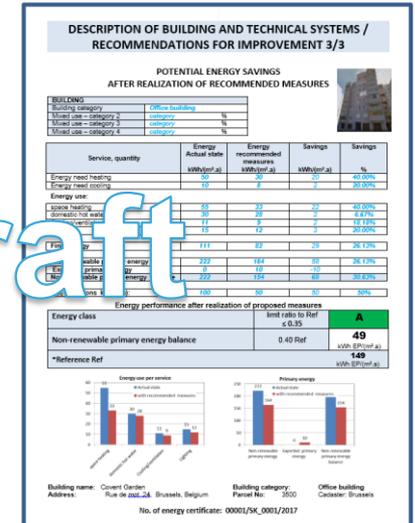
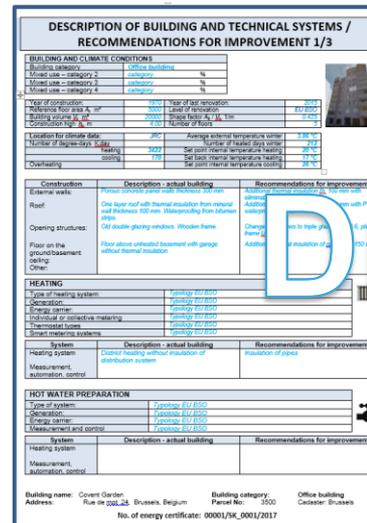
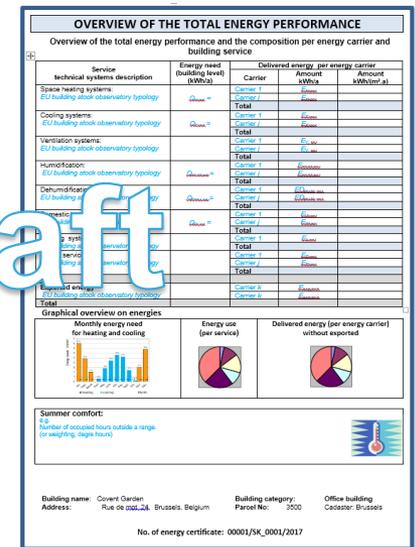
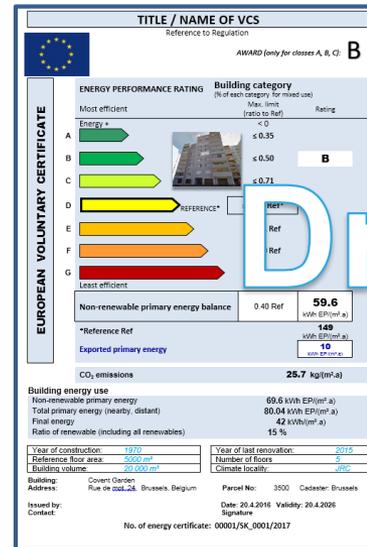
Note: MSs may report the EP of existing building in different quantities (e.g. for UK it is a total measured energy)

TEMPLATE OF EVC

- ✓ Common template
- ✓ Energy performance class
- ✓ Award (e.g. gold, silver, bronze)

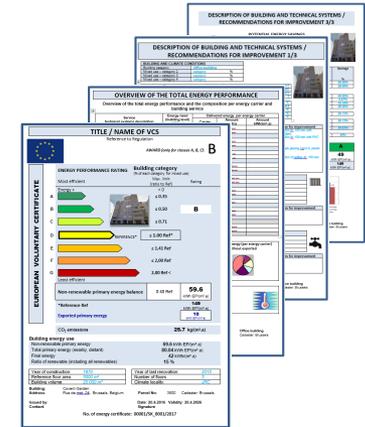
NEXT PAGES

- ✓ Delivered energy per carrier (costs)
- ✓ Description of constructions / systems
- ✓ **1 page per each ALDREN task** (measured energy, well-being, financial valuation) - **optional**
- ✓ **Recommendations for improvement** with potential energy savings – link with the **building renovation passport** - **optional**



Based on Public consultation, Tender No. ENER/C3/2015-545, 2016

Connection with other ALDREN tasks



Energy rating & targets (T2.2)

Outcomes from EP calculation as inputs in other tasks

Measured performance verification (T2.3)

Comparison of EP under standard and real conditions

Health and well-being (T2.4)

Hourly IEQ data
air/operative temperature, humidity, mold risk, light

Linking EVCS to the financial valuation (T2.5)

Direct cost savings due to renovation (energy costs, maintenance costs)

Building Renovation Passport (T2.6)

Data collection in BRP, renovation actions towards 60% savings / NZEB

Live poll & open discussion



Energy Performance Verification



Mathieu RIVALLAIN
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Rapporteur for Verco team

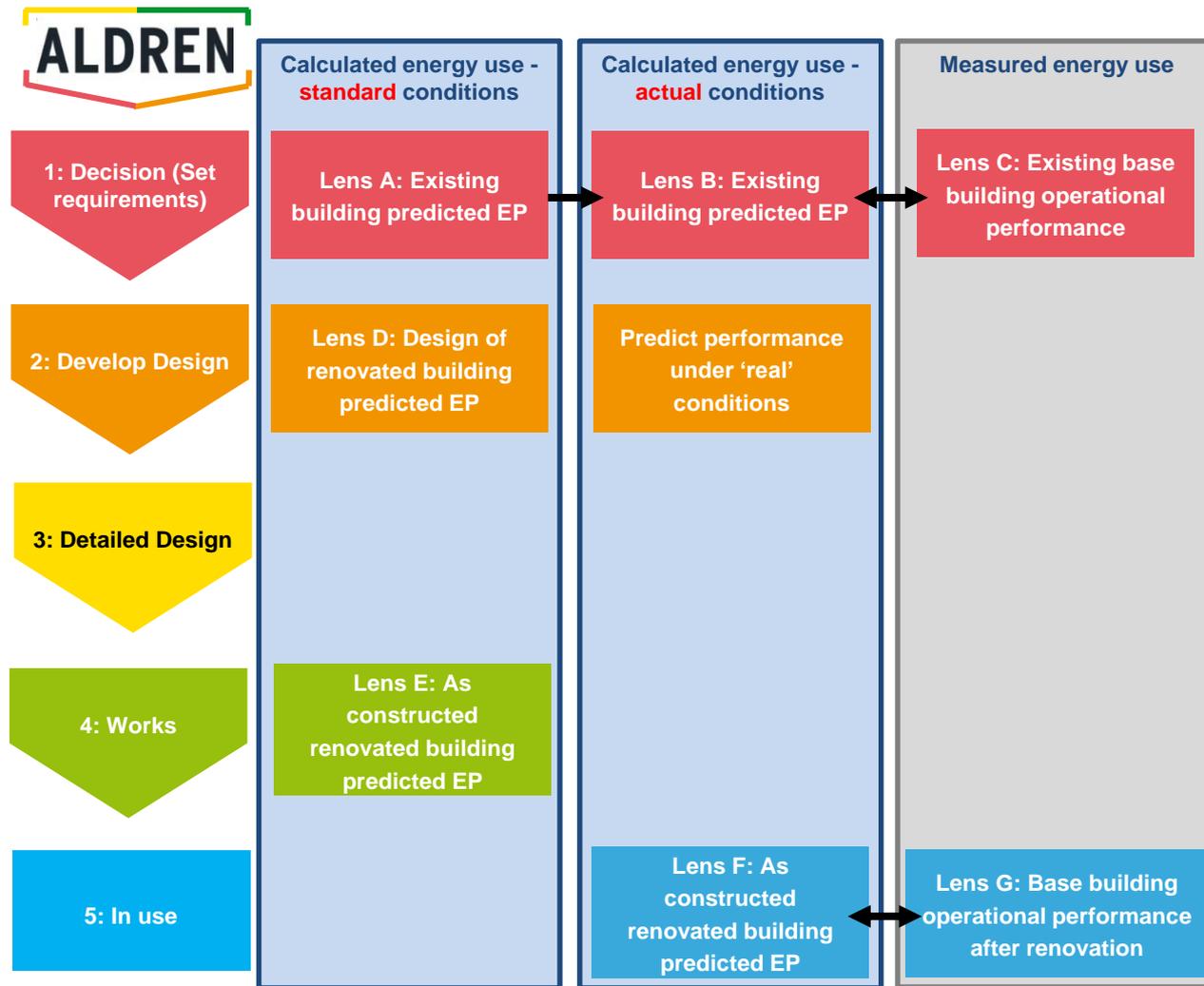


Task 2.3: Energy performance verification

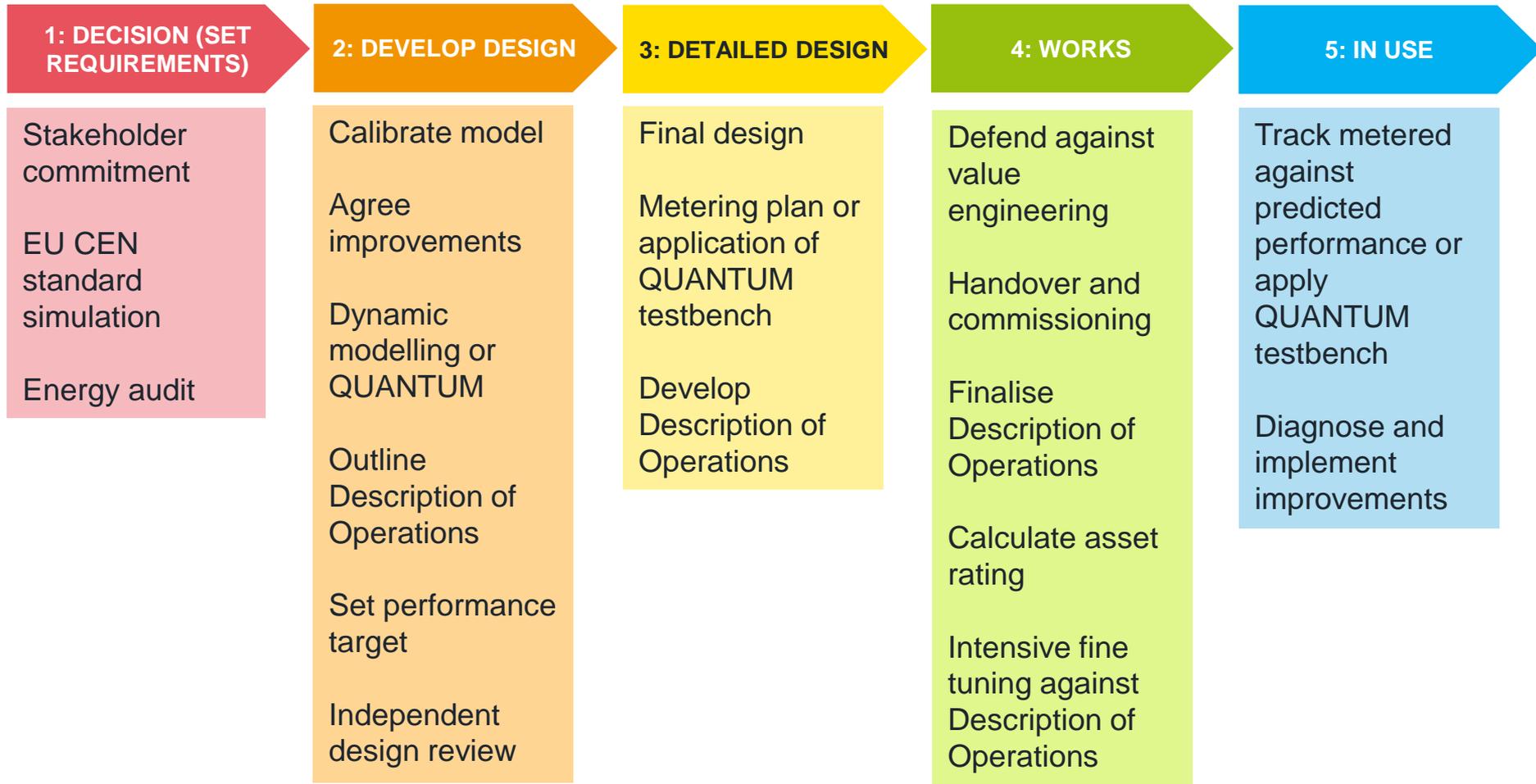
This ALDREN task is about the verification of energy performance and includes:

- A **protocol** to follow which documents the renovation process on an individual project
- A **verification tool** to capture monthly predicted and measured performance by energy end-use
- A **translation** of the verification tool into multiple European languages

Task 2.3: Energy performance verification

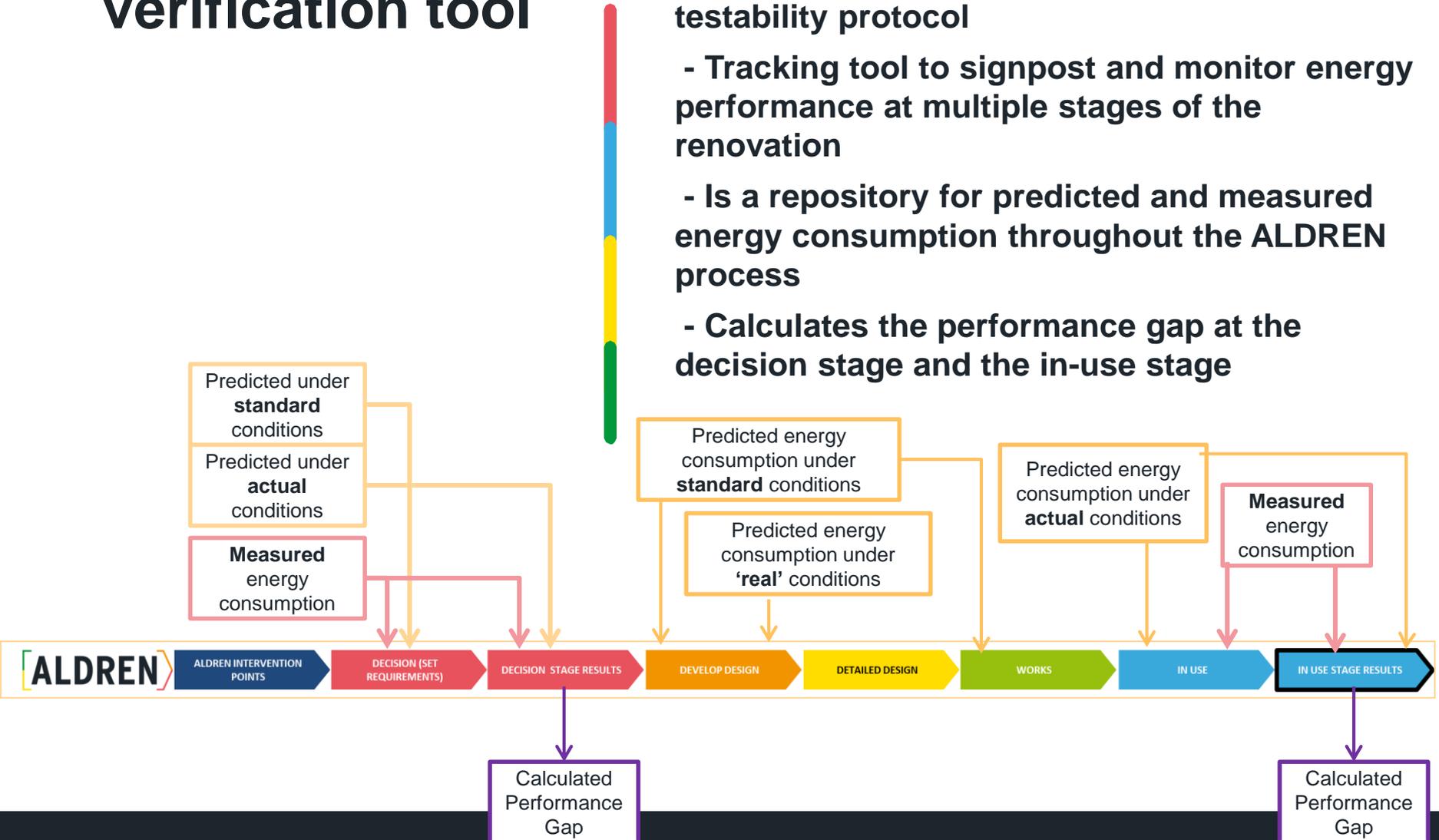


Design for testability protocol tool



Performance verification tool

- To be used in parallel with the Design for testability protocol
- Tracking tool to signpost and monitor energy performance at multiple stages of the renovation
- Is a repository for predicted and measured energy consumption throughout the ALDREN process
- Calculates the performance gap at the decision stage and the in-use stage



Performance verification tool (hotel example)

Energy end uses

Variance to calculated energy performance



Energy	End use	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	Annual
Elec	Space Heating (hosting functions)	-20%	235%	-65%	536%	52%	-26%	725%	1589%	1332%	233%	6%	548%	92%
Elec	Hot water (hosting functions)	-7%	-56%	-71%	151%	-20%	-19%	460%	5%	-20%	-91%	102%	-49%	-13%
Elec	Refrigeration (hosting functions)	-40%	-77%	-61%	500%	-52%	-19%	224%	-49%	-63%	46%	5572%	408%	-6%
Elec	Fans (hosting functions)	87%	-82%	20%	-87%	3128%	-96%	23%	-22%	2058%	44%	-19%	-70%	-10%
Elec	Pumps (hosting functions)	819%	-27%	321%	46%	8995%	-36%	-28%	-14%	-30%	-45%	-81%	-28%	11%
Elec	Controls (hosting functions)	-25%	50%	-41%	133%	5%	1915%	-96%	68%	-99%	-14%	188%	3%	-2%
Elec	Humidification (hosting functions)	-16%	-70%	-84%	-5%	352%	632%	-3%	-26%	223%	-28%	-43%	49%	1%
Elec	Lighting (hosting functions)	-36%	-19%	-12%	25%	989%	-73%	2504%	-6%	-67%	-6%	-50%	2684%	14%
Elec	Plug loads (hosting functions)	19%	-55%	-4%	-10%	67%	-35%	12%	5%	55%	-2%	-75%	62%	-8%
Elec	Vertical Transport (lifts & escalators)	89%	37%	-12%	260%	492%	3558%	-24%	-90%	-44%	133%	9419%	-4%	28%
Elec	Catering (hosting functions)	24%	22%	1122%	-69%	9%	25%	-68%	-56%	16%	-32%	-59%	65%	2%
Elec	Car park ventilation and lighting	24%	148%	-42%	375%	33%	26%	-58%	91%	1197%	-91%	66%	-51%	35%
Elec	Lighting (External)	-31%	73%	-82%	291%	-94%	-16%	130%	-35%	-78%	4%	-84%	1553%	-21%
Elec	Spa	172%	-44%	-24%	11%	111%	-10%	-54%	6451%	233%	78%	94%	75%	34%
Elec	Swimming pool	24%	-51%	211%	541%	-94%	-82%	334%	-97%	23858%	550%	19%	-16%	27%
Elec	Sauna	-97%	43%	-9%	162%	32%	1481%	24%	7%	-9%	-99%	-5%	-7%	8%
Elec	Gym	58%	-23%	-54%	-2%	0%	4262%	-73%	166%	-65%	-88%	-69%	283%	-9%
Elec	Kitchen	-60%	86%	-84%	-36%	-60%	270%	-29%	1298%	-50%	214%	88%	51%	17%
Elec	Laundry	176%	60%	100%	118%	126%	1023%	17%	-8%	-90%	-65%	6%	-60%	14%
Elec	Other Electricity use	-70%	120%	8%	433%	3%	-4%	101%	90%	-40%	-46%	-52%	-91%	-4%
Fossil	Space Heating - Fossil	-17%	-37%	105%	60%	-55%	-34%	18%	9%	62%	-12%	-29%	67%	1%
Fossil	Hot water - Fossil	-36%	793%	-84%	-77%	-27%	140%	-54%	-12%	333%	-80%	-49%	6%	-19%
Fossil	Spa - Fossil	18%	-17%	-28%	-80%	-36%	-96%	604%	-12%	-99%	91%	-67%	42%	-29%
Fossil	Swimming pool - Fossil	-82%	65%	12%	-27%	50%	-3%	114%	129%	111%	-50%	871%	100%	14%
Fossil	Sauna - Fossil	2267%	36%	-31%	372%	1176%	-70%	-31%	438%	176%	-10%	288%	-47%	37%
Fossil	Gym - Fossil	296%	8%	-70%	72%	409%	-32%	-89%	-29%	235%	623%	155%	-9%	14%
Fossil	Kitchen - Fossil	-91%	146%	-39%	-3%	-4%	-70%	-49%	210%	-57%	-78%	-92%	-99%	-50%
Fossil	Laundry - Fossil	-40%	-60%	-20%	775%	-32%	-97%	246%	77%	-55%	-65%	121%	-90%	-1%
Fossil	Retail incl Food & Bev (open to public)	158%	1133%	4%	92%	-72%	-52%	82%	17%	67%	0%	137%	270%	48%
Fossil	Other Fossil Fuel use	998%	88%	-31%	31%	-63%	161%	2139%	-87%	-2%	-40%	-84%	-85%	-2%
DH	Space heating - District heating	-95%	-76%	126%	-59%	82%	-24%	85%	39%	289%	-84%	378%	-35%	9%
DH	Hot water - District heating	-82%	-92%	51%	100%	-8%	-6%	104%	-80%	45%	296%	-17%	55%	-5%
DC	Refrigeration - District cooling	240%	81%	-51%	32%	-67%	266%	509%	-47%	-39%	14%	-94%	-39%	1%
	Total Electricity	1%	-1%	-16%	67%	49%	19%	0%	2%	3%	-12%	-3%	20%	8%
	Total Fossil fuel	6%	44%	-25%	42%	-8%	-34%	45%	14%	14%	-30%	-1%	-28%	0%
	Total District heating	-84%	-83%	85%	-25%	29%	-14%	94%	-57%	126%	17%	54%	29%	1%
	Total District cooling	240%	81%	-51%	32%	-67%	266%	509%	-47%	-39%	14%	-94%	-39%	1%

Utility totals



Health & Wellbeing

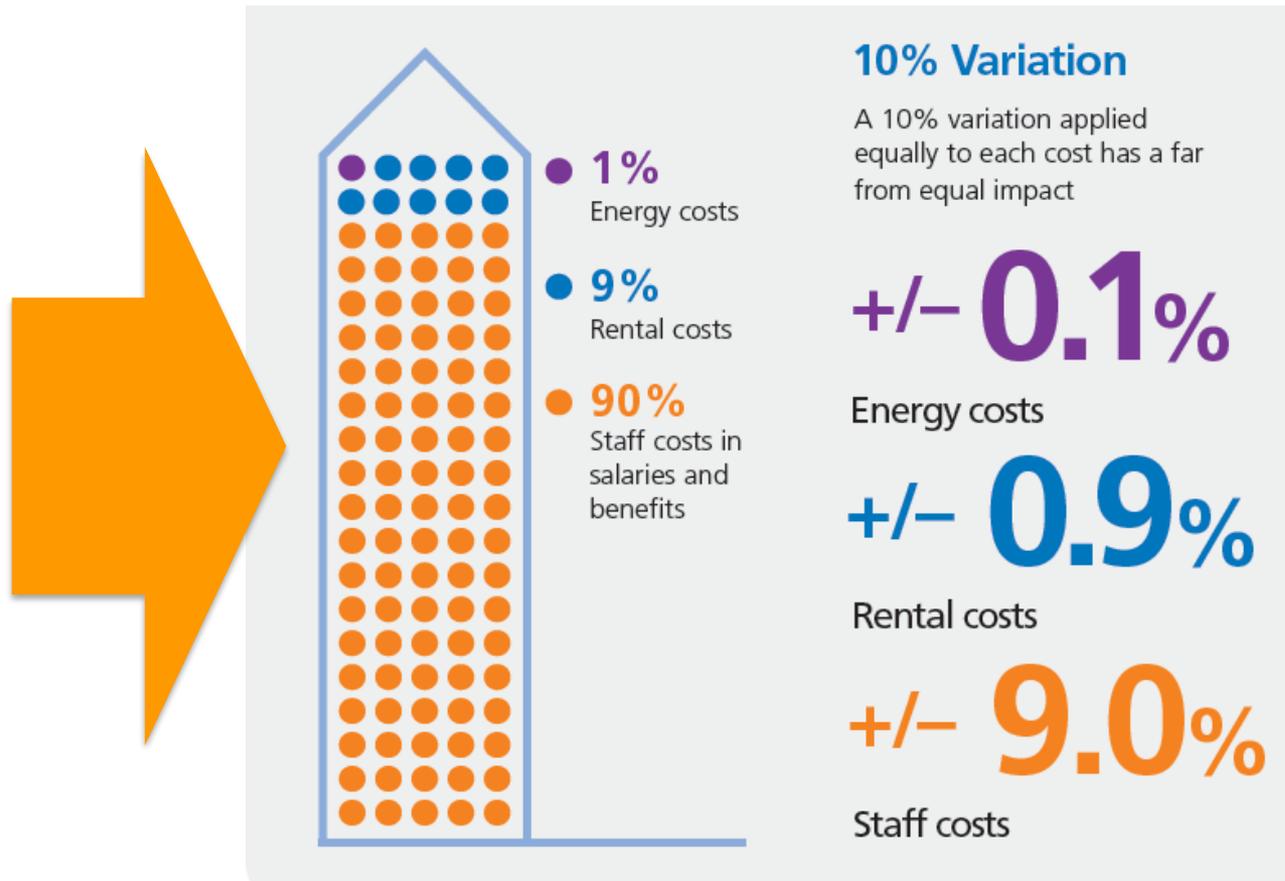


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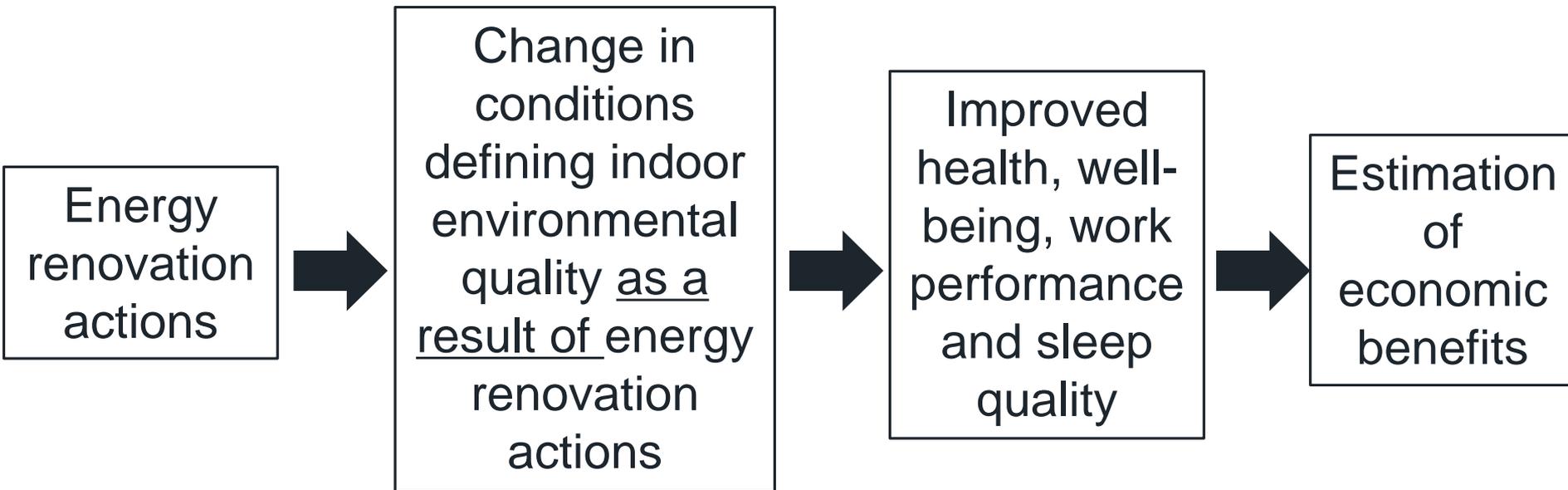
Rapporteur for DTU team

Non-energy benefits constitute dominant costs of running buildings

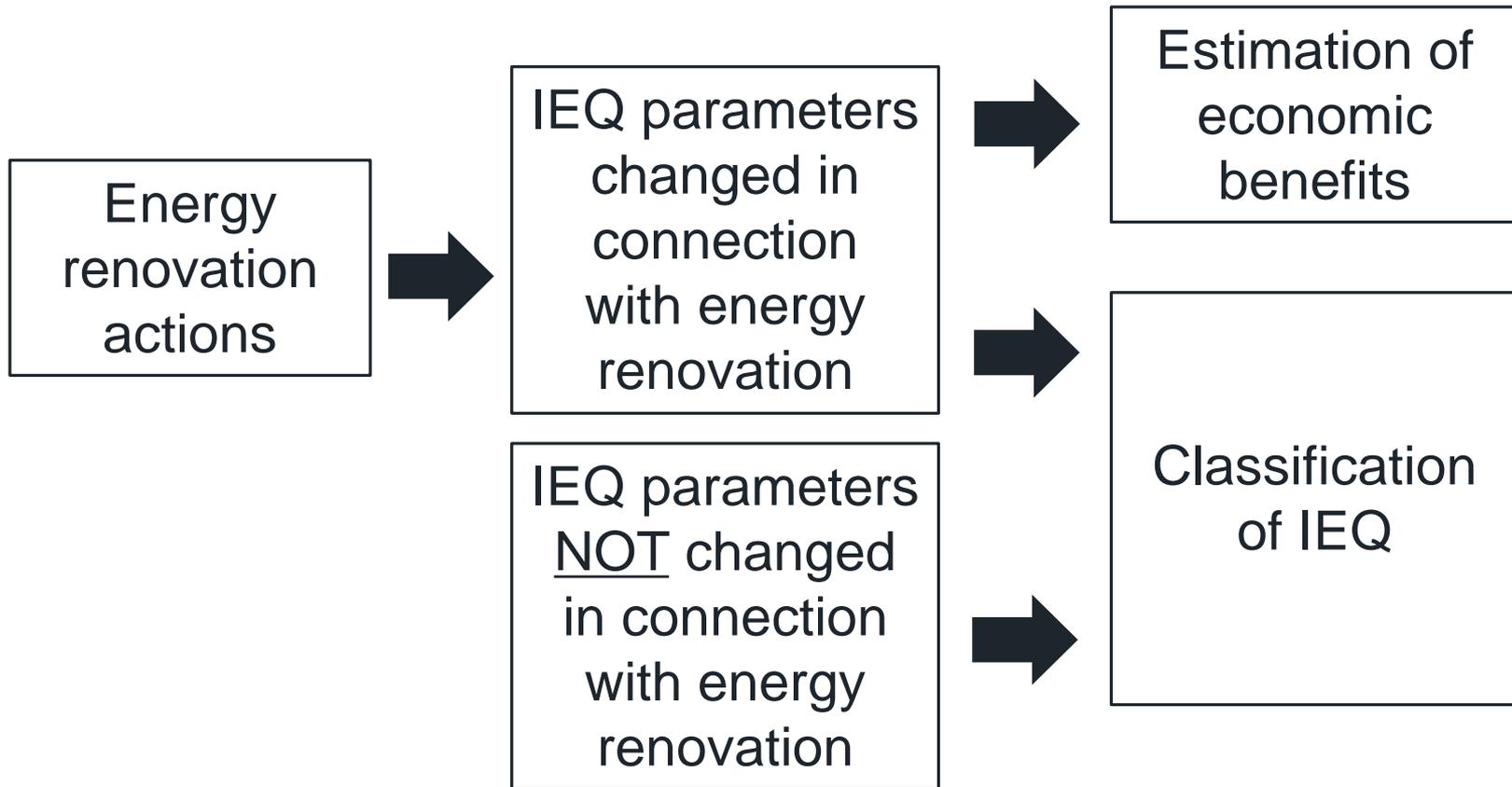


Source: World Green Building Council (2014)

Framework for integration of indoor air quality, comfort and health in the scope of deep energy renovation



IEQ parameters, selection



IEQ parameters

Impacted by energy renovation actions

- **General and local thermal environment** (air temperature, mean radiant temperature, radiant asymmetry, reduced cold draft, reduced risk of overheating/overcooling and free cooling): thermal rehabilitation (insulation) of envelope, roof, ground floor, etc., new low-energy windows, installation of low temperature heating and high temperature cooling hydronic systems, air-based cooling and heating systems, improved control of heating/cooling systems, installation of sunscreens
- **Mold**: thermal rehabilitation (reduced cold bridges), installation of ventilation system
- **Moisture levels**: installation of ventilation system
- **Radon**: thermal rehabilitation of ground floor and cellars
- **Ventilation and air quality**: installation of ventilation system, low-emitting materials
- **Penetration of ambient pollution, airtightness**: tightening of envelope, thermal rehabilitation of envelope and new windows, installation of ventilation system
- **Ambient noise penetration**: new windows, tightening of envelope and thermal rehabilitation of envelope
- **Daylight**: skylights, new windows
- **Visual environment, illuminance**: renovation of low-energy artificial lighting system
- **Glare**: installation of sunscreens

- **No impact on IEQ**: use of renewable energy sources, heat pumps, more effective boilers, connection to district heating, etc.

List of IEQ parameters to be measured in connection with energy renovation (proposal)

ALDREN IEQ Parameters	Evaluation method	Compliance with standards
% time outside thermal comfort	Simulation Measurement	Level(s)
Ventilation rate	Simulation Measurement	EN16798-1 All certification schemes
CO ₂ concentration	Simulation Measurement	EN16798-1 All certification schemes
Relative humidity	Simulation Measurement	EN16798-1 All certification schemes
Thermal bridges	Simulation Measurement	-
Mould	Measurement Observation	Finish classification system
Health relevant pollutants: formaldehyde, benzene, PM2.5, NO ₂ , Radon	Measurement	WHO Air Quality Guidelines Some certification schemes
Low emission materials (new materials introduced during renovation)	Product characteristics	LCI EN16798-1 Some certification schemes
Noise level	Measurement	EN16798-1 Some certification schemes
Glare	Measurement	EN16798-1 Some certification schemes
Light color	Measurement	EN16798-1 Some certification schemes
Illuminance	Measurement	EN16798-1 Some certification schemes
Possibility to control IEQ: thermostats, blinds, operable windows, task light, quiet rooms	Observation	-

Procedures for quantification/measurement of IEQ parameters (proposal)

- Simulation – comparison of IEQ conditions prior to and after renovation that are the output parameters from energy simulation tools (basic)
- Simulation and verification - comparison of IEQ conditions prior to and after renovation that are the output parameters from energy simulation tools verified by measurements, and supplemented by measurements at locations indicated during simulation as critical (optimal)
- Measurements of IEQ parameters that cannot be simulated prior to and after renovation using the standardized methods (supplementary)
- Observation checklist (optional)

Classification - framework draft

- Parameters to be classified (mandatory, suggested)
 - IEQ before and after renovation to meet EPBD): unchanged, improved
 - COMFORT: according to EN16798-1 (building class I, II, III or IV)
 - HEALTH: compliance with WHO Air Quality Guidelines (Full, Partial, No)
 - ERGONOMY: ability to control (Full, Partial, None)
 - Level(s): compliance with procedures of Levels (L1, L2, L3)
- Parameters to be classified (optional)
 - Any local (or used) sustainability certification scheme
 - WELL certification

Building Renovation Passport & Renovation Strategies

CSTB
le futur en construction



POLITECNICO
MILANO 1863

Mathieu RIVALLAIN
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Rapporteur for POLIMI



ALDREN Building Renovation Passport (BRP)

ALDREN LOGBOOK

ML1	BUILDING PICTURE
ML2	ENERGY RATING ASSESSMENT
ML3	OPERATIONAL ENERGY RATING
ML4	COMFORT & WELL BEING
ML5	COST, VALUE & RISK
ML6	DOCUMENTATION & BIM

ALDREN ROADMAP

MR1	ALDREN RENOVATION TIMELINE
MR2	<i>LIST OF ELEMENTARY RENOVATION ACTIONS</i>
MR3	<i>DESC. OF ELEMENTARY RENOVATION ACTIONS</i>



ALDREN Renovation Roadmaps

REMINDERS

- ALDREN offers **methodologies / protocols**
No generic building energy retrofit packages
- **Property owners remain the decision makers**
ALDREN is to provide inputs so that property owners can further develop their own strategies
- **Different property owners may have different strategies !**
 - Public or private real estate
 - 1 building or stock management
 - Multiple locations (local/National/International)

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ALDREN Stage 1: DECISION-KEY REQUIREMENTS

Task #	Responsible	Responsible Description	Support	Participate (1-3) or Review (4-7)	Completion notes (e.g. whether undertaken in future, documentation produced, location)
1	1.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	1.1.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	1.1.2. Determine the objectives and expected outcomes for all building components and systems relevant to the building	Design team	
2	2.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	2.1.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	2.1.2. Determine the objectives and expected outcomes for all building components and systems relevant to the building	Design team	
3	3.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	3.1.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	3.1.2. Determine the objectives and expected outcomes for all building components and systems relevant to the building	Design team	
4	4.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	4.1.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	4.1.2. Determine the objectives and expected outcomes for all building components and systems relevant to the building	Design team	
5	5.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	5.1.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	5.1.2. Determine the objectives and expected outcomes for all building components and systems relevant to the building	Design team	
6	6.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	6.1.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	6.1.2. Determine the objectives and expected outcomes for all building components and systems relevant to the building	Design team	
7	7.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	7.1.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	7.1.2. Determine the objectives and expected outcomes for all building components and systems relevant to the building	Design team	
8	8.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	8.1.1. Determine the objectives and expected outcomes for all building components and systems relevant to the building	8.1.2. Determine the objectives and expected outcomes for all building components and systems relevant to the building	Design team	

ALDREN Renovation Roadmap[S]?

Potential approaches



Limited interest
for a step-by-step approach
to building renovation
(including energy retrofit)

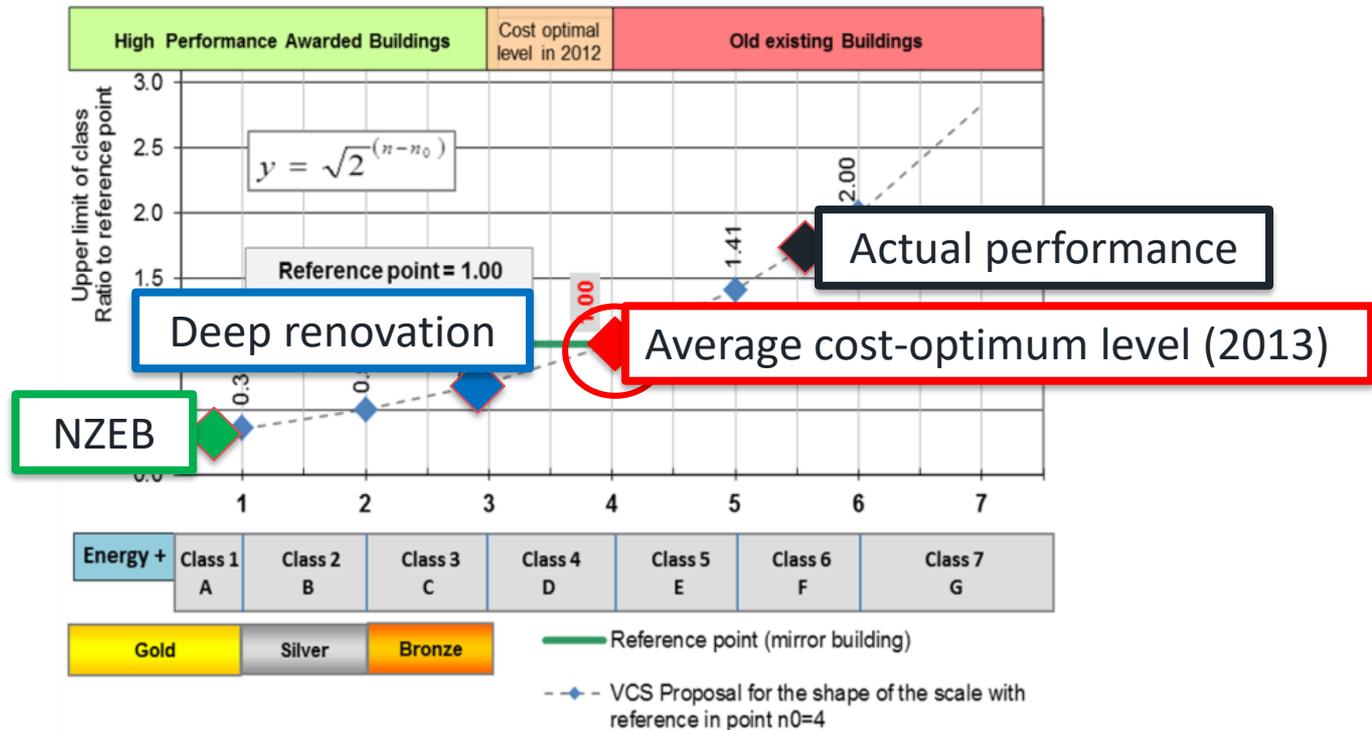
***“We go for deep renovation.
We do renovate hotels &
offices “once and for all”
according to high quality
standards”***

Financial resources
more constrained,
smaller property owners

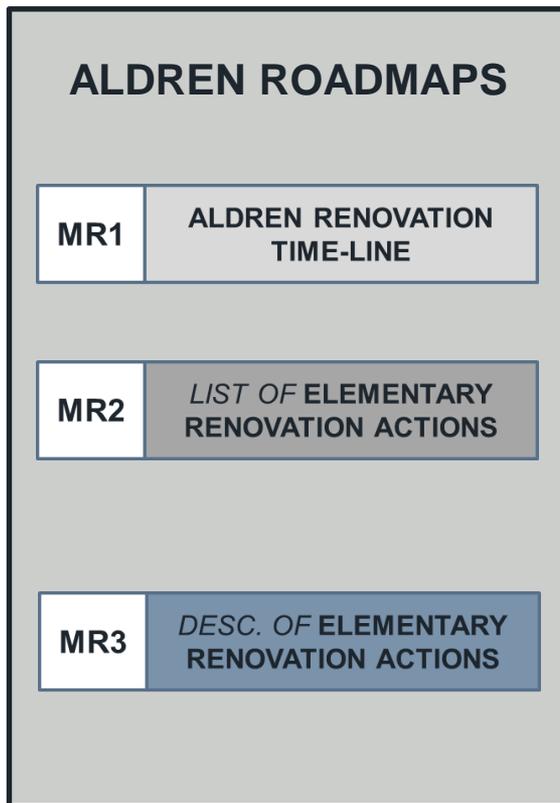
***“We need a pragmatic
renovation roadmap,
consistent with the
maintenance needs
and possibly offering
energy savings”***

ALDREN Approach

Actual performance / cost-optimum / deep renovation / NZEB



ALDREN Renovation Roadmaps



- Positioning of maintenance needs overtime
- List of individual options & “Packages”:
 - (a) Individual Elementary Renovation Actions
 - (b) Towards deep renovation,
 - (c) NZEB level
- Template describing the renovation actions

ALDREN Renovation timeline



ALDREN Alliance for Deep RENovation in buildings



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Building audit dating back: **2018**

BUILDING COMPONENT / SYSTEM	EXPECTED RENOVATION PERIOD	REMAINING LIFESPAN
Heating : Heat generation system replacement	2020 - 2025	2 - 7
Heating : Controls	2020 - 2025	2 - 7
DHW : Heat generation system replacement	2020 - 2025	2 - 7
DHW : Controls	2020 - 2025	2 - 7
Lighting : Lighting system replacement - lobby	2023 - 2028	5 - 10
Lighting : Controls - lobby	2023 - 2028	5 - 10
Lighting : Lighting system replacement - corridors	2023 - 2028	5 - 10
Lighting : Controls - corridors	2023 - 2028	5 - 10
Lighting : Lighting system replacement - bedrooms	2023 - 2028	5 - 10
Lighting : Controls - bedrooms	2023 - 2028	5 - 10
Cooling : Heat generation system replacement - Group 1	2025 - 2027	7 - 9
Facade renovation S (main street)	2025 - 2027	7 - 9
Windows replacement (2nd - 5th floor ; bedrooms)	2028 - 2033	10 - 15
Roof water tightness renovation	2030 - 2035	12 - 17
Ventilation : Ventilation system replacement	2030 - 2035	12 - 17
Ventilation : Controls	2030 - 2035	12 - 17
Cooling : Heat generation system replacement - Group 2	2033 - 2038	15 - 20
Cooling : Emission systems replacement	2033 - 2038	15 - 20
Cooling : Controls	2033 - 2038	15 - 20
Facade renovation N (courtyard)	2035 - 2040	17 - 22
Windows replacement (1st floor ; lobby)	2038 - 2043	20 - 25
Doors replacement	2038 - 2043	20 - 25

2018 ↓ 2050

- Scope: Building components and systems related to energy performance improvement
- Expected renovation periods and remaining (economic) lifespan characterization
- Granularity defined by building experts



List of Elementary Renovation Actions (ERA)



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BUILDING COMPONENT / SYSTEM	PHYSICAL PROPERTIES FEATURES	ENERGY CONSUMPTIONS	ENERGY SAVINGS [%]	INVESTMENT COST [k€]	GLOBAL COST 20Y. [k€]
ENVELOPE					
Thermal insulation of external walls E/N/W			-21%		
Level #1: "Cost optimum" compliant	U = xxx W/m2.K		-28%		
Level #2: "NZEB" compliant	U = yyy W/m2.K		-16%		
Thermal insulation of external walls S			-23%		
Thermal insulation of roof surfaces			-19%		
Thermal insulation of bottom floor surfaces			-18%		
Thermal bridges treatment : Facades to roof			-30%		
Thermal bridges treatment : Windows to walls			-27%		
Windows replacement (1st floor ; lobby)			-28%		
Windows replacement (2nd - 5th floor ; bedrooms)			-25%		
Doors replacement			-25%		
Integration of a double-door entrance			-3%		
Blinds and solar protections			-4%		
(envelope air tightness)			-1%		
VENTILATION					
Ventilation : Ventilation system replacement			-2%		
Ventilation : Controls			-38%		
HEATING					
Heating : Heat generation system replacement			-39%		
Heating : Thermal insulation of distribution network			-22%		
Heating : Emission systems replacement			-5%		
Heating : Controls			-24%		
DOMESTIC HOT WATER					
DHW : Heat generation system replacement			-23%		
DHW : Thermal insulation of the storage			-31%		
DHW : Thermal insulation of distribution network			-3%		
DHW : Emission systems replacement			-32%		
DHW : Controls			-17%		
COOLING					
Cooling : Heat generation system replacement - Group 1			-28%		
Cooling : Heat generation system replacement - Group 2			-40%		
Cooling : Thermal insulation of distribution network (fluids)			-7%		
Cooling : Emission systems replacement			-2%		
Cooling : Controls			-11%		
LIGHTING					
Lighting : Lighting system replacement - lobby			-40%		
Lighting : Controls - lobby			-17%		
Lighting : Lighting system replacement - corridors			-5%		
Lighting : Controls - corridors			-25%		
Lighting : Lighting system replacement - bedrooms			-5%		
Lighting : Controls - bedrooms			-11%		
RENEWABLES					
Renewable energies : Photovoltaics			-24%		

- Description, physical properties
- Energy consumptions [kWhFE/m2.an] [kWhPE/m2.an]
- Energy saving [%]
- Investment cost [k€]
- Investment efficiency [saved kWh/€]
- Global cost 20 Y. [k€]

2 levels :
Regulatory & NZEB



ERA Description template



ALDREN ALliance for Deep RENovation in buildings

Implementing the European Commission's Architecture for Innovation, its task force among the world's deep renovation projects

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ELEMENTARY RENOVATION ACTION

FACADE EXTERNAL THERMAL INSULATION

DESCRIPTION



PROPERTIES

Thermal transmittance, U-Value [W/m².K]
Acoustic performance
etc.
Investment cost [€/m]

"Cost optimum" compliant "NZEB" Compliant

"Cost optimum" compliant	"NZEB" Compliant

RENOVATION HOLISTIC APPROACH

- Possibly coupled with windows replacement to reduce thermal bridges
- To be coupled with the installation or control of the ventilation system

TO BE CHECKED

- Fire safety, etc.

- **ILLUSTRATE**
- Set the performance levels to **“Avoid the locker effect”**
 - **“Regulatory” (cost optimum compliant)**
 - **“NZEB”**
- Introduce the **holistic approach** **“No regression on health, comfort, IEQ, risks”**



Ex. NZEB Renovation roadmap



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Building audit dating back: **###**

RENOVATION ACTION	DESCRIPTION PHYSICAL PROPERTIES	ENERGY CONSUMPTIONS [KwhPE/m2.y]	ENERGY SAVINGS [%]	Energy Rating	INVESTMENT COST [k]	GLOBAL COST 20Y. [k]	EXPECTED REPLACEMENT
"BEFORE RENOVATION"				G			
Potentially immediate							
Thermal insulation of bottom floor surfaces							
Integration of a double-door entrance							
Blinds and solar protections							
Heating : Thermal insulation of distribution network			- XX %	E			
DHW : Thermal insulation of the storage							
DHW : Thermal insulation of distribution network							
Cooling : Thermal insulation of distribution network (fluids)							
Renewable energies : Photovoltaics							
Potential sequence overtime (in line with renovation-maintenance needs)							
Heating : Heat generation system replacement			-YY %	D			### - ###
Heating : Controls							### - ###
DHW : Heat generation system replacement							### - ###
DHW : Controls							### - ###
Lighting : Lighting system replacement - lobby							### - ###
Lighting : Controls - lobby							### - ###
Lighting : Lighting system replacement - corridors			- ... %	D			### - ###
Lighting : Controls - corridors							### - ###
Lighting : Lighting system replacement - bedrooms							### - ###
Lighting : Controls - bedrooms							### - ###
Cooling : Heat generation system replacement - Group 1			- ... %	D			### - ###
Thermal insulation of external walls S							### - ###
Windows replacement (2nd - 5th floor ; bedrooms)							### - ###
Thermal bridges treatment : Windows to walls			- ... %	C			### - ###
Envelope air tightness							### - ###
Ventilation : Ventilation system replacement							### - ###
Ventilation : Controls							### - ###
Thermal insulation of roof surfaces							### - ###
Thermal bridges treatment : Facades to roof				B			### - ###
Cooling : Heat generation system replacement - Group 2							### - ###
Cooling : Emission systems replacement				B			### - ###
Cooling : Controls							### - ###
Thermal insulation of external walls N							### - ###
Windows replacement (1st floor ; lobby)				A			### - ###
Thermal bridges treatment : Windows to walls							### - ###
Doors replacement				A			### - ###

- Methodology
- Rearrangement of the time sequence
- Gathering of required additional renovation actions
- ERAs = NZEB level



Live poll & open discussion



Conclusions & next steps

- ALDREN offers a **European harmonized quality benchmark**, based on **EU CEN standards**, and a **holistic approach to assess deep renovation benefits** and impacts on **building valuation, guaranteeing comparability, transparency and quality.**
- Upcoming activities:
 - **Consolidation of the proposed protocols**
 - **Implementation in offices and hotels**
 - **ALDREN Alliance**: Create together an effective vehicle for future cooperation and communication of stakeholders, to overcome the barriers for deep renovation.
- We need **your opinion and feedback!**



**JOIN
ALDREN !**

ALDREN Alliance
for Deep RENovation
in buildings

Implementing the European
Common Voluntary Certification
Scheme, as back-bone along the
whole deep renovation process



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