ALDREN

ALliance
for Deep RENovation
in buildings

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

ALDREN Final Conference

“Every ending is a new beginning“

ALDREN ALliance for Deep RENovation in buildings

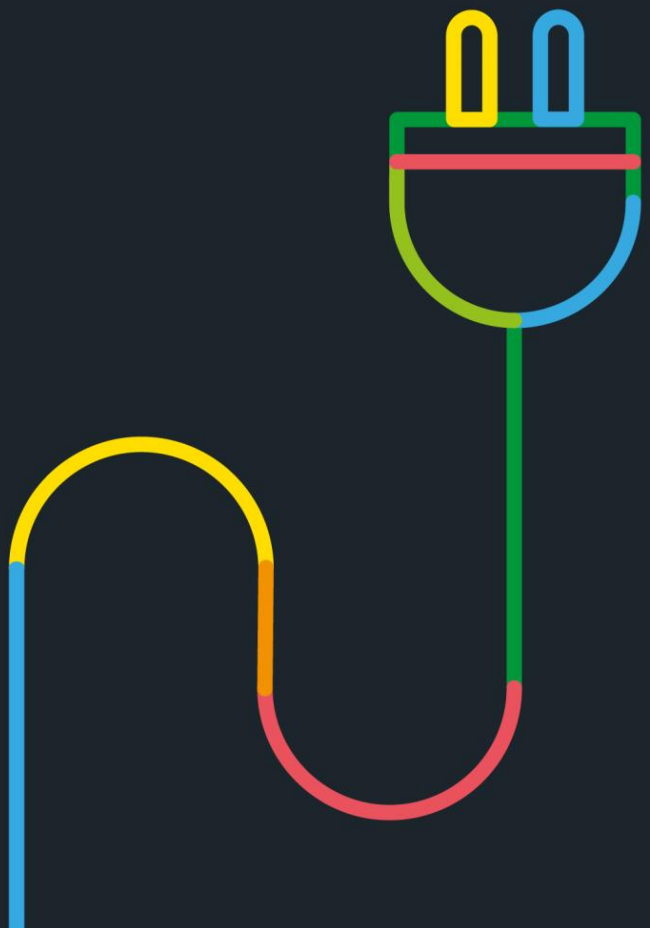
Implementing the European Common Voluntary Certification Scheme, as back-bone along the whole deep renovation process

Session #1

ALDREN

ALliance for Deep RENovation in buildings

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



Introduction to ALDREN

A holistic and voluntary modular framework

ALDREN ALliance for Deep RENovation in buildings

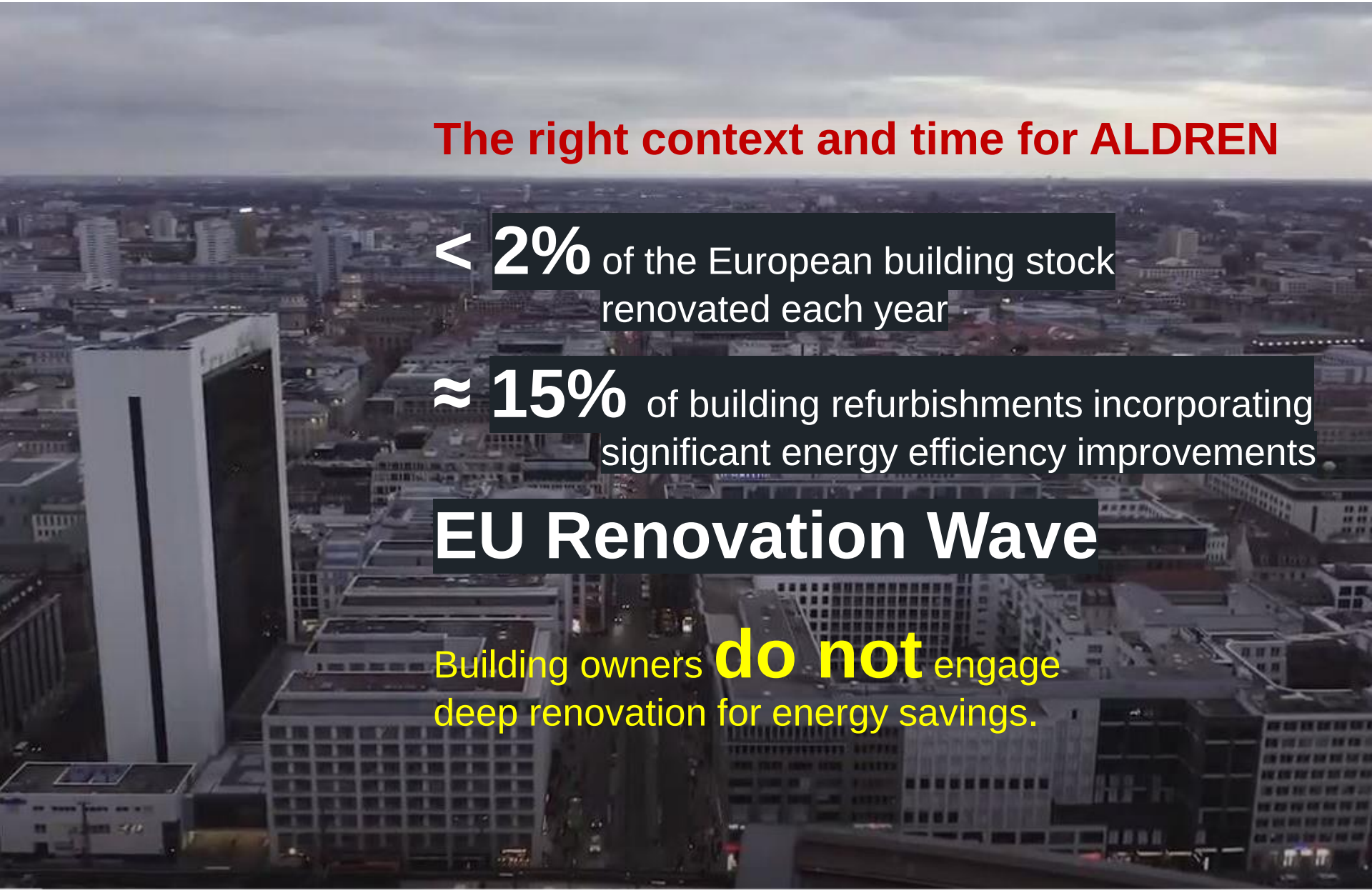
CSTB le futur en construction

ALDREN Final Conference

29th September, 2020

M. RIVALLAIN, O. GRESLOU, J. ZIRNGIBL


ALDREN



The right context and time for ALDREN

< 2% of the European building stock renovated each year

≈ 15% of building refurbishments incorporating significant energy efficiency improvements

EU Renovation Wave

Building owners **do not** engage deep renovation for energy savings.

Engaging the Building sector in deep renovation, NZEB

- Respond professionals' clear expectations in terms of **reliability**, **comparability**, **transparency** of building energy ratings, promoting European quality benchmarking tools, based on **ISO CEN standards**
- Raise **confidence**, verifying the predicted energy performances
- Assess the benefits beyond energy performance, and include **comfort, health and wellbeing** according to a holistic approach.
- Link the deep renovation technical performances with **cost, value and risk analysis**
- Deliver **tangible roadmaps** for deep renovation and NZEB
- Develop a **common language**

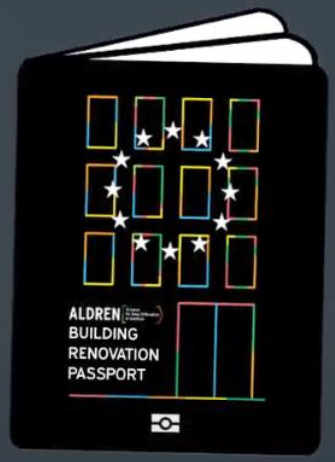
4 Standalone modules

ALDREN ALliance for Deep RENovation in buildings

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

2 Reporting tools

2 REPORTING **TOOLS**



EVC:
EUROPEAN VOLUNTARY CERTIFICATE

BRP:
BUILDING RENOVATION PASSPORT

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

ALDREN Alliance

The ALDREN Alliance is a keystone to work out the consolidation and articulation of the overall ALDREN protocols, in a business perspective, all along deep renovation projects development.

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

ALDREN Opportunities for stakeholders

BUILDING OWNERS, INVESTORS, DEVELOPERS

- **Visibility and readability** of performance **by EU quality mark** (stand alone, existing voluntary, mandatory schemes)
- Take **advantage** of **harmonization, reliability, risk and cost reduction**

FINANCIAL SECTOR

- Harmonized procedures for **financing renovation** based on **reliable quality benchmarking of buildings**
- Increased **predictability** of investment in energy efficiency

BUILDING PROFESSIONALS

- Applying harmonized **energy performance evaluation EU wide**
- Increased **professional skills** based on best practice

INDUSTRIALS

- Level playing field, **fair competition, technical neutrality**
- **Common data bases**

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

ALDREN Market uptake, a modular approach

- ALDREN Modular architecture
  to favor further integration & development
  in existing volunteer certification schemes

BREEAM®

DGNB
Deutsche Gesellschaft für Nachhaltiges Bauen
German Sustainable Building Council

bes
BIENESTAR EN ESPACIOS SOSTENIBLES
OFICINA

HQE
BÂTIMENT DURABLE
CERTIFIÉ PAR CERTIVEA

- ALDREN EVC, a candidate for prospective EPC scheme
  and support to public policies (EPBD Recast)
  in different EU Member States

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

8 EU Partners collaborating through an H2020 project to increase the building energy retrofit rate and quality

DTU

CSTB
le futur en construction

POLITECNICO
MILANO 1863

Technical & Research Institutions

CertiveA

Instituto Valenciano de la Edificación
aniversari 1986-2016

Building Certifiers

ENBEE
Environment & Building Energy Efficiency

verco

REHVA
Federation of European Heating, Ventilation and Air-conditioning Associations

Companies & Professional Association

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

JOIN ALDREN!

mathieu.rivallain@cstb.fr
olivier.greslou@cstb.fr
johann.zirngibl@cstb.fr

WEB: www.aldren.eu

E-NEWSLETTER subscription

TWITTER: @H2020_ALDREN

FACEBOOK: H2020Aldren

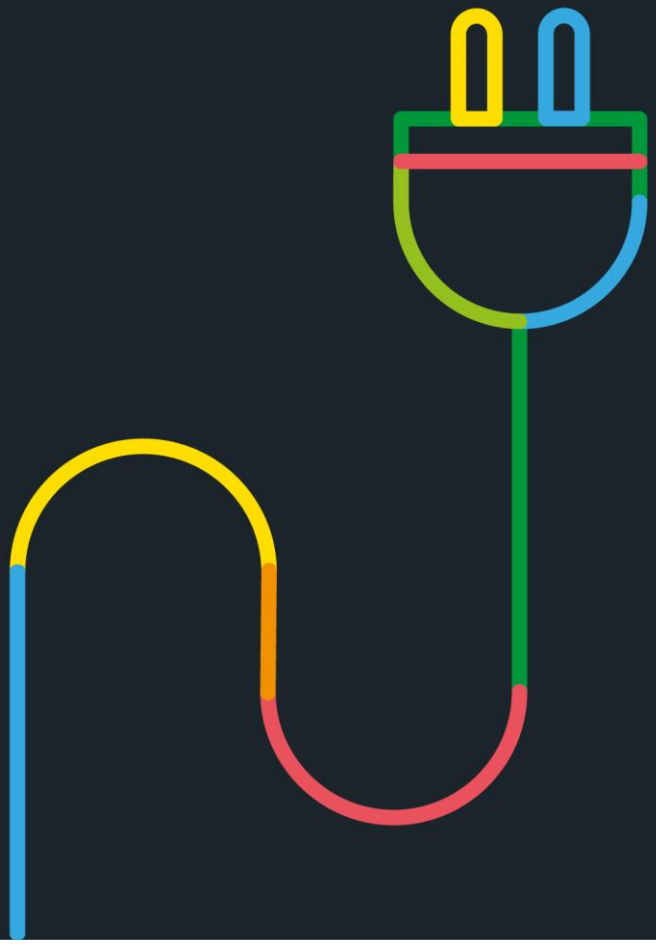
Thank you!

ALDREN ALliance for Deep RENovation in buildings

CSTB le futur en construction

www.aldren.eu

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



A European Voluntary Certificate and Energy Rating

ALDREN ALliance for Deep RENovation in buildings

ENBEE

Jana Bendžalová, ENBEE
bendzalova@enbee.eu

Final Conference, September 29th 2020

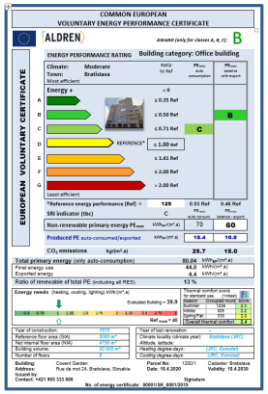
CONTEXT AND OBJECTIVES

Common EU commitments towards a carbon neutral building stock

- ✓ **Different assessment methodologies**
- ✓ **Different indicators** for benchmark
- ✓ **Different ambition levels for rating** and targets towards carbon neutrality

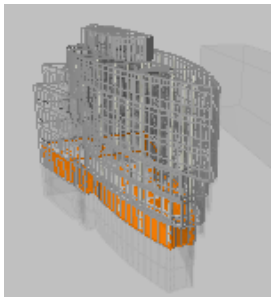
Who could profit from common comparable EU tool?

- ✓ **Owners of non-residential buildings**
  - International (branches, real estate funds, developers)
  - For EP assessment based on transparent and best today know-how (hourly simulation, CEN EN / ISO standards)
- ✓ **EU market – professionals** able to work EU wide**, products, software**
- ✓ **Banks for green financing** (**green bounds**)
- ✓ **Public authorities** - implementation of EPBD (amendment 844/2018)
- ✓ **EU funds, Renovation Wave (Green Deal) (EVC before-after renovation)**
- ✓ **EU Commission -** EPBD Art. 11(9) - voluntary common EU certification scheme for the energy performance of non-residential buildings



THE MAIN PRINCIPLES FOR THE METHODOLOGY

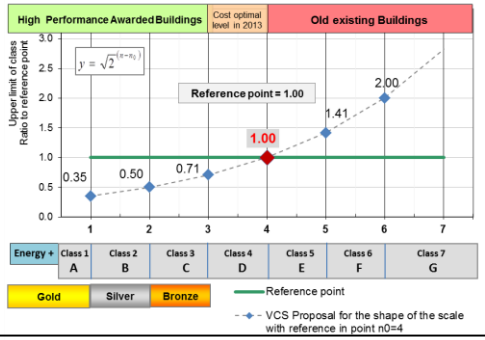
CALCULATION METHODOLOGY



- ✓ **Based on CEN standards** as the reference methodology in line with EPBD, Annex I, using the **hourly calculation step, climate** of building location (JRC TMY) - **close to actual consumption**

INDICATORS & SCALE

- ✓ **Indicators** in line with EPBD, harmonized with existing schemes (BREEAM, DGNB, HQE, BES-IVE) to enable EVC to be used as an energy module. Indicators are compliant with Level(s)
- ✓ **Ambitious scale** able to show also **step-by-step renovation**



DEFINITION OF ALDREN NZEB

- ✓ **Setting targets for 4 criteria:** primary energy, the needs related to fabrics and geometry, the efficiency of systems, **thermal comfort score** (**new**) to link energy and EN 16798

Steps required are close to the usual practice of energy assessor

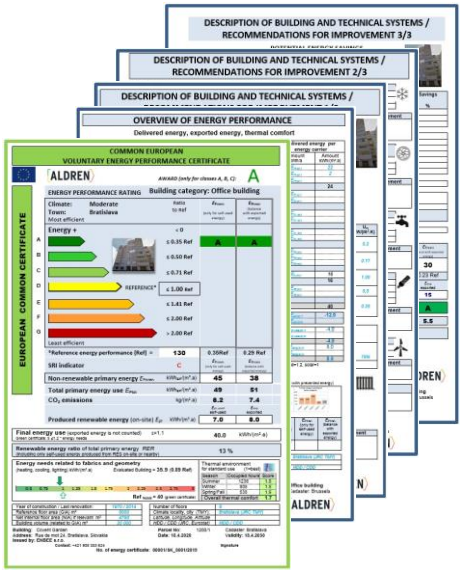
Data collection, modelling → **Calculation of indicators** → **Energy rating, scale** → **European voluntary certificate**

Common European Voluntary Certificate (EVC, EVC+)

EVC

is reporting results on several pages:

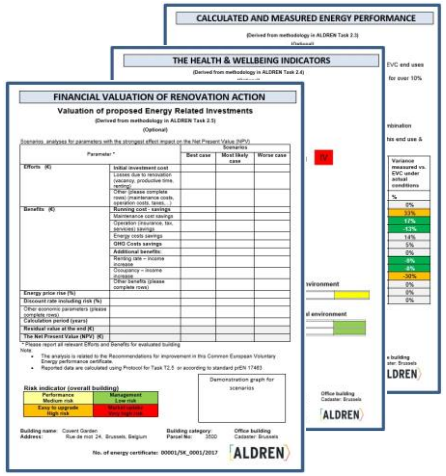
- ✓ The first page (**can be displayed) – Energy class** - **rating**, environmental indicators, highlighting NZEB level by **Green Certificate**
- ✓ Details on **delivered energy** per service / energy carrier – link to **energy costs**
- ✓ **Recommendations for improvement to NZEB**, energy savings, reference to BRP (**RenoMap**)



EVC+

One additional page per each ALDREN task (optional)

- ✓ Gap measured vs. calculated energy
- ✓ Health & Wellbeing, IEQ
- ✓ Financial valuation, Risk Indicator on obsolescence



The content is in line with all requirements on EPC in EPBD Art. 11

Thank you!

ALDREN ALliance for Deep RENovation in buildings

ENBEE Environment & Building Energy Efficiency

www.aldren.eu

Jana Bendžalová
bendzalova@enbee.eu

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

The information in this publication does not necessarily represent the view of the European Commission.

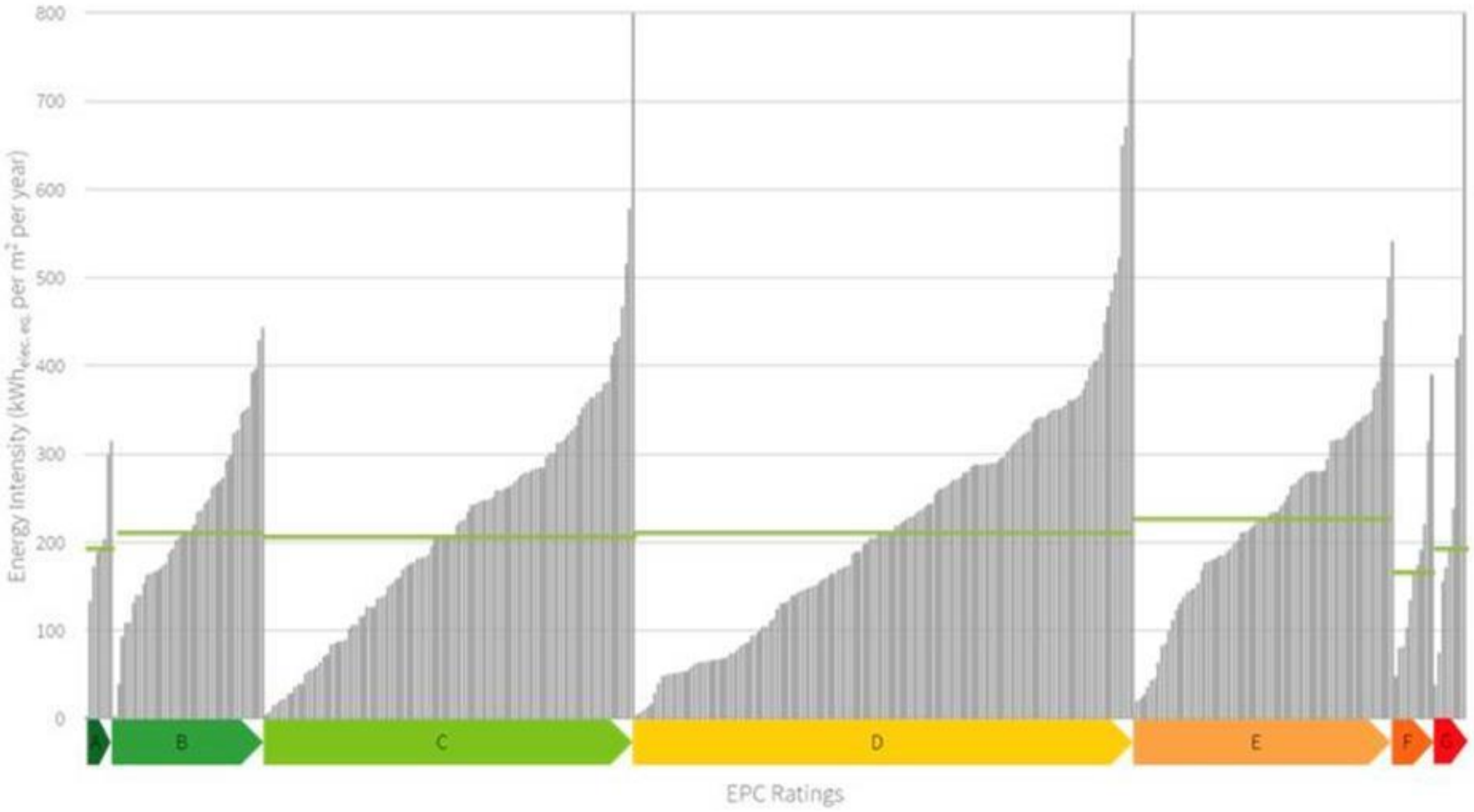
Verification of performance

ALDREN ALliance for Deep RENovation in buildings

verco

Dr Robert COHEN
on behalf of the ALDREN Task 2.3 Verco team
ALDREN Final Conference
29 September 2020

Context: today the EPC does not reflect reality



Objective: an EVC verified by measurements

Like-for-like comparison

EVC End uses:

HVAC

- Heating
- Cooling
- Ventilation
- Pumps
- DHW

Lighting

Excluded end uses:

For offices

- IT equipment
- Servers
- Other ‘small power’

For hotels

- Cooking
- Laundry
- Swimming pools

Modelled and measured energy use same boundary conditions over the year of comparison:

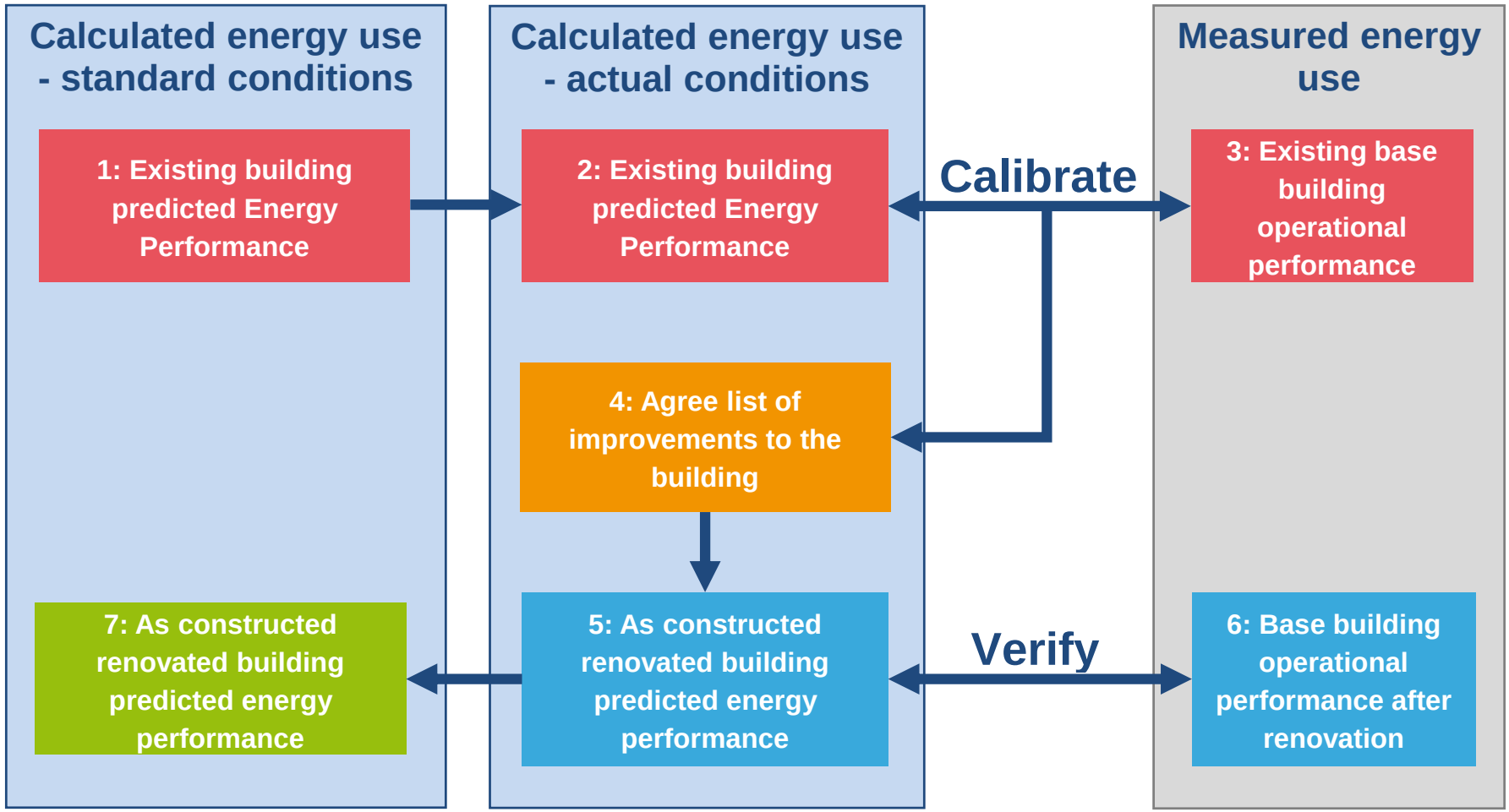
*** Occupant numbers**

*** Hours of use**

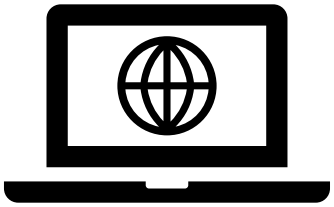
*** Power loads (W/m2)**

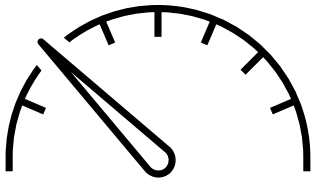
*** Climate**

Main principles for the methodology



Key ingredients for success





Better simulation models and tuning building to model

Better metering, monitoring & verification

Better control of HVAC and lighting to match design intent

Format for the result

GREEN	All values for this end use meet 25% variance criterion
AMBER	End use meets 25% variance criterion, but this end use & fuel combination exceeds 25% variance
RED	End use exceeds 25% variance criterion due to high variance in this end use & fuel combination
	Significant end use

Table 31: EVC Verification

Energy	Scope	End Use	EVC under actual conditions kWh/m²	Measured kWh/m²	Variance measured vs. EVC under actual conditions kWh/m²	Variance measured vs. EVC under actual conditions %
Electricity	Base building	Space Heating	0.0	0.0	0.0	0%
Electricity	Base building	Hot water	0.0	0.0	0.0	0%
Electricity	Base building	Cooling	0.0	0.0	0.0	0%
Electricity	Base building	Fans	26.7	31.3	4.6	17%
Electricity	Base building	Pumps	2.3	11.6	9.3	412%
Electricity	Base building	Controls	0.0	3.5	3.5	0%
Electricity	Base building	Humidification	0.0	0.0	0.0	0%
Electricity	Base building	Lighting (common parts)	4.0	6.6	2.6	65%
Electricity	Tenancy spaces	Lighting	16.0	24.7	8.6	54%
Fossil fuel	Base building	Space Heating	1.6	0.0	-1.6	-100%
Fossil fuel	Base building	Hot water	0.0	0.0	0.0	0%
Heat	Base building	Space Heating	67.9	101.3	33.4	49%
Coolth	Base building	Cooling	88.7	68.4	-20.3	-23%
Heat	Base building	Hot water	1.6	0.1	-1.5	-93%
All		EVC uses	209	247		

EVC verified?	No

Thank you!

ALDREN ALliance for Deep RENovation in buildings

verco

www.aldren.eu

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

The information in this publication does not necessarily represent the view of the European Commission.

TAIL

An awareness raising health and well-being indicator

ALDREN ALliance for Deep RENovation in buildings

Technical University of Denmark DTU

Pawel WARGOCKI, DTU
paw@byg.dtu.dk

Final Conference, September 29th 2020

Rationale: A need for inclusion of IEQ in the scope of deep energy renovation

1) To guarantee that IEQ is not degraded during renovation.

2) To document any improvements in IEQ after renovation.

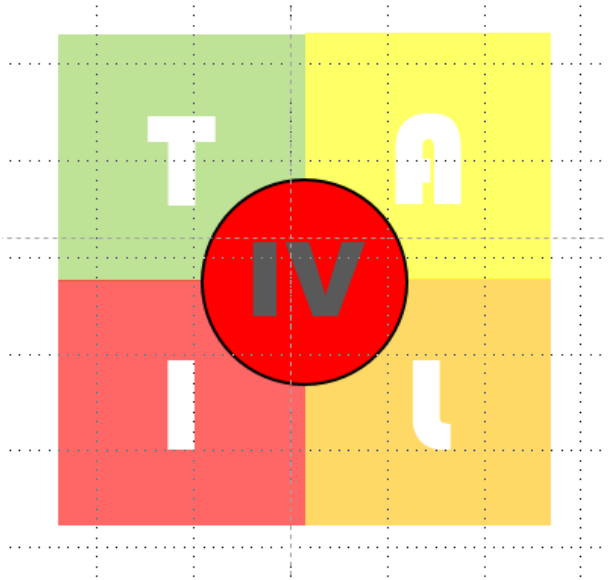
3) To estimate potential additional benefits from renovation including benefits for health and well-being, as well as the financial benefits from improved productivity and increased value of a building on a market.

4) To satisfy EPBD mandate.

A new method for IEQ rating - the TAIL index

Four components:

- **T**hermal environment
- **A**coustic environment
- **I**ndoor air quality
- **L**ight – Luminous (visual) environment



Overall IEQ:

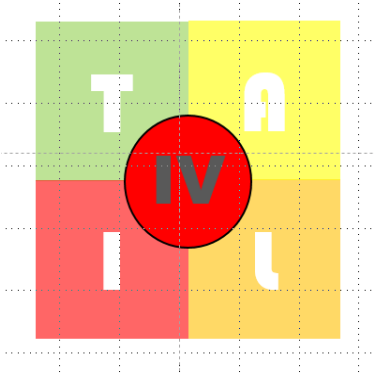
- I II III IV

Wargocki et al. (2019) ASHRAE Journal

Parameters selected to define TAIL components

	IEQ parameter	Measured	Modelled	Visual inspection
T	Indoor temperature (°C)	×	(×)	
A	Noise level (dB(A))	×		
I	CO_2 (ppm)	×	(×)	
	Ventilation rate (L/s)	×	(×)	
	Formaldehyde (µg/m³)	×		
	Benzene (µg/m³)	×		
	$PM_{2.5}$ (µg/m³)	×		
	Radon (Bq/m³)	×		
	Indoor air relative humidity (%)	×	(×)	
	Visible mold (cm²)			×
L	Daylight factor (%)		×	
	Illuminance (lux)	×		

Summary of IEQ rating developed by ALDREN



- TAIL is the **framework** for rating of IEQ and its components. It can used to develop other metrics compatible with TAIL.
- TAIL is an integrated comparative index describing IEQ level in offices & hotels that undergo deep energy renovation – it is used for rating of IEQ level **before and after** renovation.
- TAIL integrates all IEQ components and is based on **actual IEQ conditions** and measuring results. No arbitrary credits are given.
- TAIL treats all IEQ components equally. **No weightings** are used.
- TAIL complements the existing approaches for IEQ ratings and addresses EPBD mandate.
- TAIL is **compliant with major certification schemes**, EN16798-1 and Level(s).
- TAIL needs validation.
- TAIL may be extended (used) to schools and homes; must be verified.
- Even though TAIL may be perceived as fairly crude, it is expected to increase the interest of **investors** in IEQ and the rate of renovations.

Thank you!

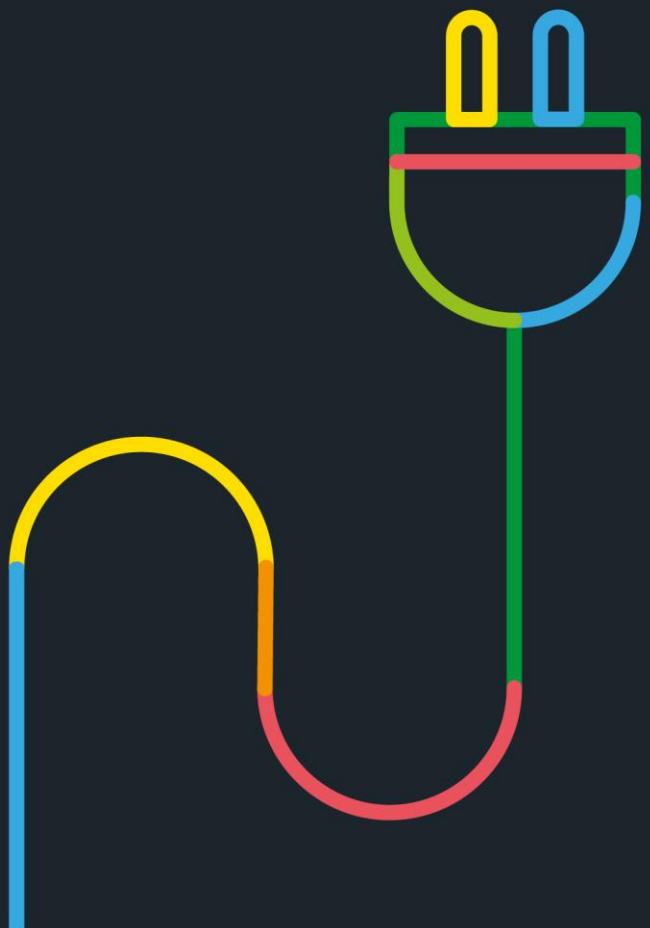
ALDREN ALliance for Deep RENovation in buildings

Technical University of Denmark DTU

www.aldren.eu

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

The information in this publication does not necessarily represent the view of the European Commission.



Linking sustainability metrics to financial valuation

ALDREN ALliance for Deep RENovation in buildings

CSTB le futur en construction

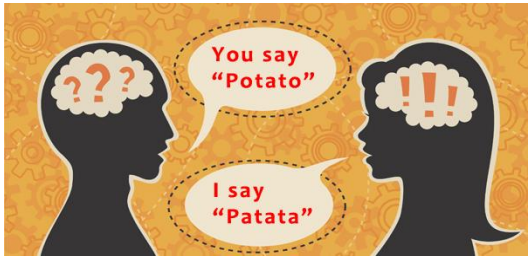
ALDREN Final Conference

29th September, 2020

Olivier GRESLOU – olivier.greslou@cstb.fr

Context

- Current levels of investment are insufficient to deliver on the Union's energy objectives for 2030
- €100 billion was needed annually to achieve Europe’s 2020 energy efficiency targets, less than half has been invested (> 2015)
- Sustainability topics: gap between an engineer’s approach of **building performance** and a financial analyst’s **appraisal of real estate assets**
- Sustainability information remains underexploited in multi-year plan provisions, financial valuation and asset risks appraisal



Main objectives of the approach

ALDREN approach

→ working out **a common language** to better highlight direct and indirect financial benefits of energy, health and comfort upgrades in terms of asset value and risk protection

- Informing renovation decision-makers through dedicated indicators provided as a direct output of the ALDREN Protocol

  Renovation Costs

  ALDREN-related Obsolescence Risks

- Outlining guidelines for better integration of sustainable performance assessment results into renovation decision-making process and value appraisals

  Asset Value (Investment worth)

Overview of the protocol : tools and indicators

Costs	Risks	Value
Energy costs and revenues	B Sustainability-risks rating	Rental value
Maintenance costs		Rental growth
Other running costs		Discount rate
Replacement costs		Vacancy and reletting costs
GhG costs		Occupation rate (hotels)
		Room price (hotels)
A Global costs/life cycle costs		C Investment worth

Risk rating: from current building and local market outlooks

Global costs calculations
Business as Usual + renovation scenarios

Discounted Cash Flow calculations
Business as Usual + renovation scenarios

Applying the protocol through time: main steps

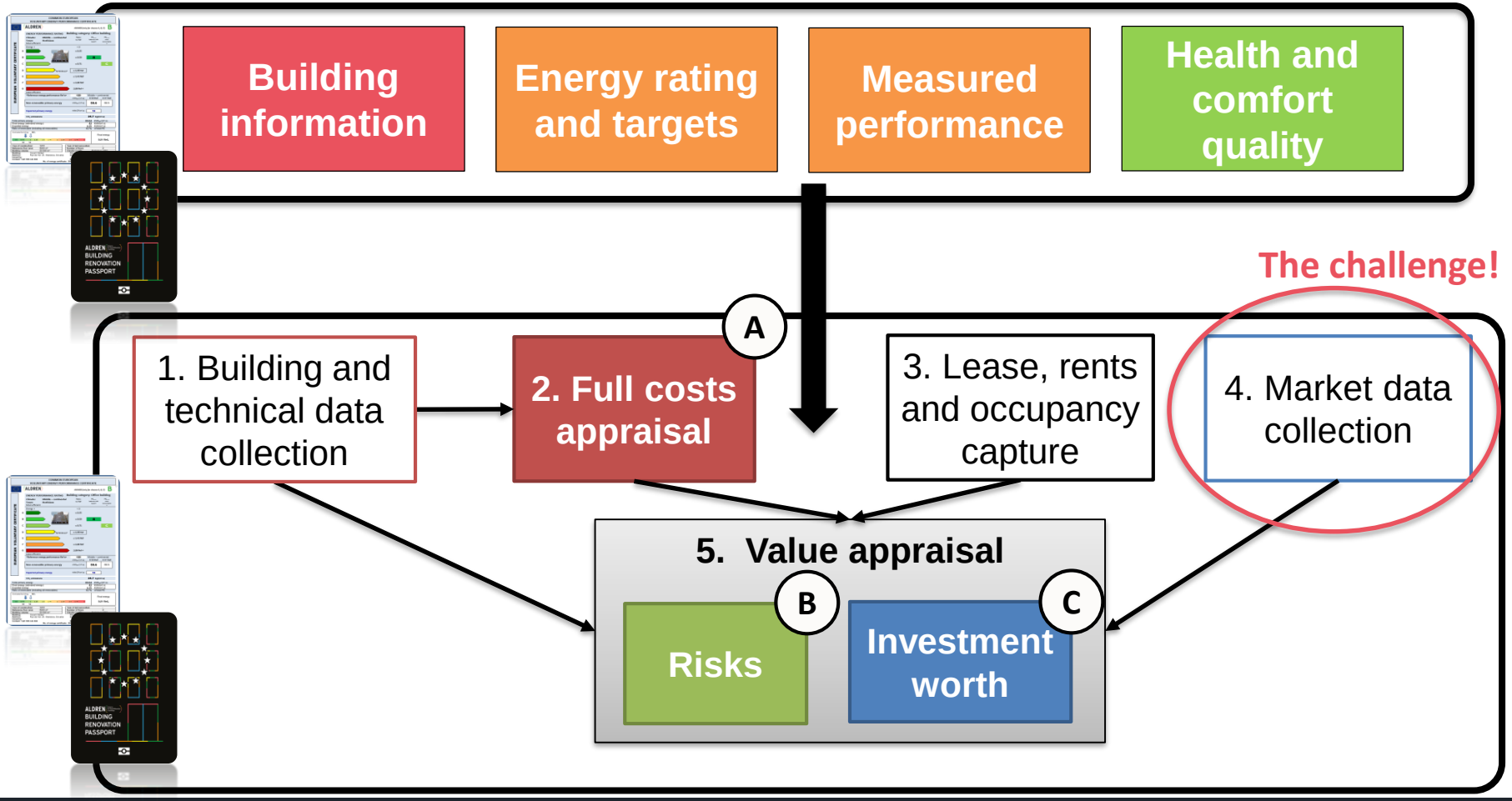
1: CURRENT SITUATION	2: RENOVATION SCENARIOS	3: RENOVATION DECISION	4: WORKS	5: IN USE
Data collection (building characteristics / energy, health and well-being performance, operating expenses, etc) **Existing building economic and financial appraisal** (business-as-usual scenario)	Definition of renovation actions and packages Agree improvements Identify timelines to implement renovation packages **Definition of renovation scenarios with the building owner and their financial appraisal**	Engage with stakeholders to detail financing mechanisms and identify further sources of investment returns **Decide to undertake renovation works**		Analysis of actual energy performance (e.g.: comparison with national benchmarks) Review of financing conditions and contracts whenever possible (e.g: lease) **Updated economic and financial appraisal of refurbished building**

Comparison

Comparison

Evaluating key indicators for one renovation scenario

Outcomes from other ALDREN assessment procedures are inputs for financial assessment



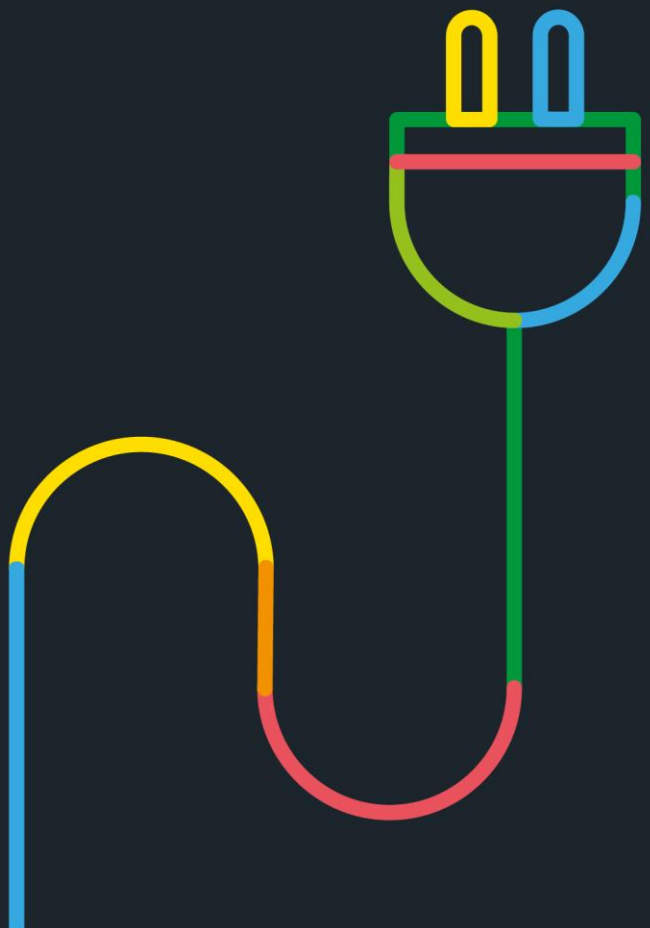
Thank you!

ALDREN ALliance for Deep RENovation in buildings

CSTB le futur en construction

www.aldren.eu

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



ALDREN RenoMap

Renovation Roadmap

ALDREN ALliance for Deep RENovation in buildings

CSTB le futur en construction

CertiVéA

September 28th 2020
Simon LIGIER
simon.ligier@cstb.fr

ALDREN RenoMap – Context and Objectives

EPBD - Feasibility study 19a – Art 2, 10, 20

→ Tool to support building owners in short and long-term strategy to renovate their buildings

→ **Multi-criteria decision support in the early phases of a renovation**
Shaping the coming project and avoiding lockin effect

→ **Hindsight on building potential and global pathway**

Renovation projects = events triggering a new way to manage building life cycle

Piece of ALDREN BRP : for building managers and owners
Applied by project management assistance / ALDREN assessor

ALDREN RenoMap – Methodology

PROTOCOL

BRP_M7

- Owner's upstream interview
- Detailed audit
- Definition of Elementary Renovation Actions
- Owner's final interview
- Evaluation of Elementary Renovation Actions

BRP_M8

- Reference states calculation and evaluation
- Processing of renovation strategy
- Evaluation of primary renovation packages
- Selection of intended immediate renovation

ALDREN RenoMap – Methodology

PROTOCOL

BRP_M7

- Owner's upstream interview
- Detailed audit
- Definition of Elementary Renovation Actions
- Owner's final interview
- Evaluation of Elementary Renovation Actions

BRP_M8

- Reference states calculation and evaluation
- Processing of renovation strategy
- Evaluation of primary renovation packages
- Selection of intended immediate renovation

Two levels of multi-criteria evaluation :

Priority	Qualitative criteria
1a	Existing components obsolescence
1b	Owner will
2	Economic benefit
3	Energy performance improvement
-	Technical constraints and interactions

ALDREN RenoMap – Methodology

PROTOCOL

BRP_M7

- Owner's upstream interview
- Detailed audit
- Definition of Elementary Renovation Actions
- Owner's final interview
- Evaluation of Elementary Renovation Actions

BRP_M8

- Reference states calculation and evaluation
- Processing of renovation strategy
- Evaluation of primary renovation packages
- Selection of intended immediate renovation

→ **Consistent roadmap proposal for short and long-term renovation management**

Two levels of multi-criteria evaluation :

Priority	Qualitative criteria
1a	Existing components obsolescence
1b	Owner will
2	Economic benefit
3	Energy performance improvement
-	Technical constraints and interactions

ALDREN quantitative indicators

- Final and Primary energy consumption
  Standard [EPBD uses] or actual conditions
- Financial indicators
  Investment Cost, IC/AV, ES/IC, Global Cost
- IEQ indicators
  PredicTAIL framework

ALDREN RenoMap – Results and outcomes

→ List of NZEB compliant Elementary Renovation Actions

Qualitative multi-criteria assessment

				Obsolescence (1a/4)		Owner will (1b)		levels		Economics (2)		cf. Table A Energy efficiency (3)	cf. Table B
ERA #	Elementary Renovation Actions	ERAS' conception settings	Current state of the related component	Priority	Period (yr)	Decision	Time or opportu			Investment cost (k	typical return on investme	Upgrade of the component	verify IEQ & interactions (1-4)
E.	**ENVELOPE**												
E.1	**Thermal insulation of external walls**												
E.1.A	External walls, additional internal insulation	18 cm Glass wool U= 0,17W/m².K	4 cm Insulation U= 1,19W/m².K	1		0	3	2	4	2271	*	**	
E.2	**Thermal insulation of roof surfaces**												
E.2.A	Roof additional insulation	14cm polyurethane U=0,17W/m².K	10 cm Isolant U= 0,29W/m².K	1		0	3	3	4	44	*	*	
E.3	**Thermal insulation of bottom floor surfaces**												
E.4	**Thermal bridges treatment : Facades to roof**												
E.5	**Thermal bridges treatment : Windows to walls**												
E.6	**Windows replacement**												
E.6.A	Triple glazing high efficiency	Triple glazing - U=0,8 W/m².K	Low perf double glazing - U = 3W/m².K	1		0	3	2	4	4467	*	**	
E.7	**Doors replacement**												
E.8	**Integration of a double-door entrance**												
E.9	**Blinds and solar protections**												
E.9.A	Shading device and control	External semi-automatic shading device	none	1		0	3	1	4	101	**	***	
E.10	**Envelope air tightness treatment**												
E.10.A	Air tightness treatment	Correction of infiltration		1		0	3	2	4	308	No data	No data	
V.	**VENTILATION**												
V.1	**Ventilation : Ventilation system replacement**												
V.1.A	Central ventilation system / double-flow	Central ventilation system / double-flow	Old Central ventilation system / double-flow (no pre-heating)	2		0	3	3	4	1290	*	*	
V.2	**Ventilation : Controls**												
V.2.A	Ventilation regulation	optmised ventilation control	None	0		0	3	1	4	5	***	***	
H.	**HEATING**												
H.1	**Heating : Heat generation system replacement**												
H.2	**Heating : Distribution network replacement**												
H.3	**Heating : Thermal insulation of distribution network**												
H.3.A	Thermal insulation replacement	Class 4	Class 3	2		0	3	3	4	20	*	*	
H.4	**Heating : Emission systems replacement**												
H.5	**Heating : Controls**												
H.5.A	Control : Heating	Automatic management	Thermostats	0		0	3	3	4	5	*	*	
C.	**COOLING**												

ALDREN RenoMap – Results and outcomes

→ List of NZEB compliant Elementary Renovation Actions

Qualitative multi-criteria assessment

→ Current situation and final renovation potential

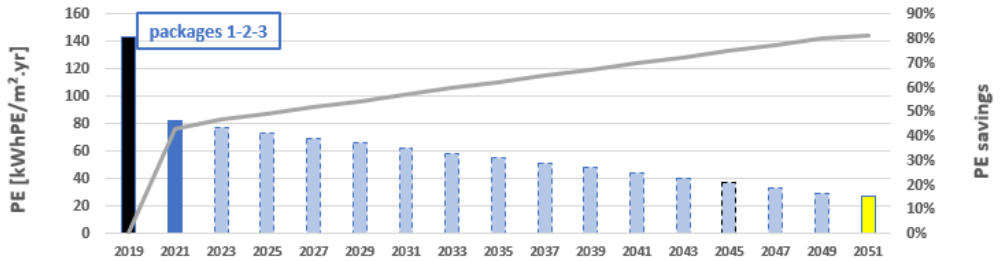
Positioning the coming project against the building reference states

Summary

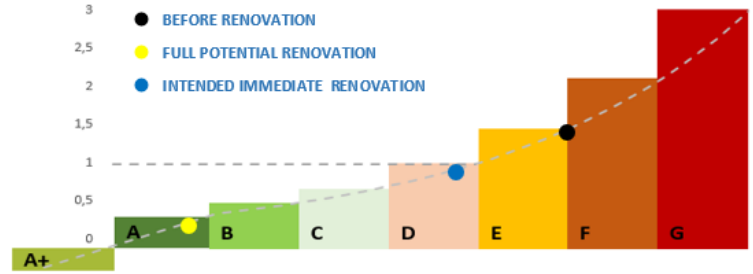
	Energy performance: Final energy consumption [KwhFE/m².y] STANDARD USES: heating	cooling	ventil.	DHW	lighting	aux.	other 1...	Ren. prod.	TOTAL ENERGY USE		Standard evaluation: Primary energy consumption [KwhPE/m².y] STANDARD USES: EPBD USES		LABEL	Cost indicators: INVESTMENT COST (IC) [k€]	ENERGY SAVINGS/IC [kWh/k€]	IC/ASSET VALUE [%]	GLOBAL COST [k€-%]	IEQ-TAIL: I - Thermal Comfort	L - Visual comfort
BEFORE RENOVATION	107,6	4,3	4,9	1,1	23,6	1,8	-	0	143,3		184,1		F						
INTENDED IMMEDIATE RENOVATION	47,3	5,4	3,2	1,1	23,6	1,5	-	0	82,1	43%	120,3	35%	D	1653	995				
FULL POTENTIAL RENOVATION	13,5	6,3	3,2	1,1	4,3	1,5	-	-2,6	27,3	81%	37,0	80%	A	9253	410				

*electricity, *District Heating/Cooling, ...

Long-term trajectory



Standard energy labels



ALDREN RenoMap – Results and outcomes

→ List of NZEB compliant Elementary Renovation Actions

Qualitative multi-criteria assessment

→ Current situation and final renovation potential

Positioning the coming project against the building reference states

→ Primary renovation packages / Long-term tineline

Gathering of consistent and prioritized renovation action for decision support

Primary renovation packages

PRIORITY LEVEL	#	RENOVATION ACTIONS	REPLACEMENT PERIOD / OPPORTUNITY	MOTIVATIONS	Energy performance: Final energy consumption [KwhFE/m².y] STANDARD USES: heating	cooling	ventil.	DHW	lighting	aux.	other 1...	Ren. prod.	TOTAL ENERGY USE		Standard evaluation: Primary energy consumption [KwhPE/m².y] STANDARD USES: EPBD USES		LABEL	Cost indicators: INVESTMENT COST (IC) [k€]	ENERGY SAVINGS/IC [kWh/k€]	IC/ASSET VALUE [%]
1a-1b	H.3.A	Thermal insulation replacement	change of Owner	Immediate need of works	47,3	5,4	3,2	1,1	23,6	1,5	-	0,0	82	43%	120,3	35%	D	1653	995	0,7%
	H.5.A	Control : Heating	change of Owner	Interaction opportunity																
	C.3.A	Thermal insulation replacement	change of Owner	Immediate need of works																
	C.5.A	Control : Cooling	change of Owner	Interaction opportunity																
	V.1.A	Central ventilation system / double-flow	change of Owner	Immediate need of works																
	E.10.A	Air tightness treatment	change of Owner	Interaction opportunity																
	V.2.A	Ventilation regulation	change of Owner	Interaction opportunity																
+2	L.1.A	Offices floors complete replacement	change of Owner	high return on investment	58,1	3,3	3,2	1,1	4,7	1,5	-	0,0	72	50%	87,7	52%	C	357	2358	0,1%
	L2..A	Lighting controls : Offices floors	change of Owner	Interaction opportunity																
	L.1.B	Ground floor specific replacement	change of Owner	high return on investment																
	L.2.B	Lighting controls : Ground floor	change of Owner	Interaction opportunity																
+3	E.9.A	Shading device and control	change of Owner	high energy gains	13,5	6,3	3,2	1,1	4,3	1,5	-	-2,6	27	81%	42,4	77%	A	7234	159	2,9%
	E.6.A	Triple glazing high efficiency	change of Owner	Interaction opportunity																
	E.1.A	External walls, additional internal insulation	change of Owner	Interaction opportunity																
	E.2.A	Roof additional insulation	change of Owner	Interaction opportunity																
	DHW.4.A	Low consumption taps/WC	change of Owner	Potentially immediate																
	Ren.1.A	PV on roof	change of Owner	high energy gains																

Thank you!

ALDREN ALliance for Deep RENovation in buildings

CSTB le futur en construction

www.aldren.eu

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

ALDREN ALliance for Deep RENovation in buildings

Building Renovation Passport

ALDREN ALliance for Deep RENovation in buildings

POLITECNICO MILANO 1863

Final Conference
2020 09 29, Marta Maria SESANA, POLITECNICO DI MILANO

© Chamaki

#1 - Context

EU Renovation Rate varies from 0.4% to 1.2%

Decarbonised building stock by **2050** and at a cost-effective transformation of existing buildings into **nZEBs** (2018/844/EU Art 2a)

Commission (Directive 2018/844/EU Art 19a) shall, **before 2020** … introduce …**an optional building renovation passport**

- All Building Passport initiatives cover the energy component but few cover other aspects (i.e materials, health, etc.).
- Mostly are of the nature of certification and the reporting no feasible recommendations.

30+ BRP Initiatives ongoing worldwide

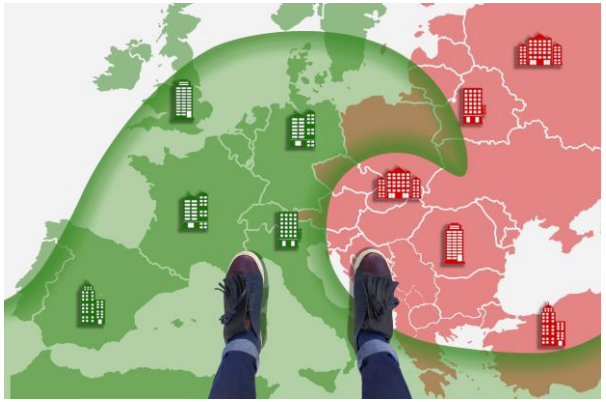
>30% in the EU
15+ EU Countries

#1 - …and objectives

INVESTOR OWNER POLICY MAKER

1. “2050 READY”

- Boost energy renovation on the building stock and avoid the lock-ins
- Improve health & wellbeing (indoor air quality, climate change resilient buildings)

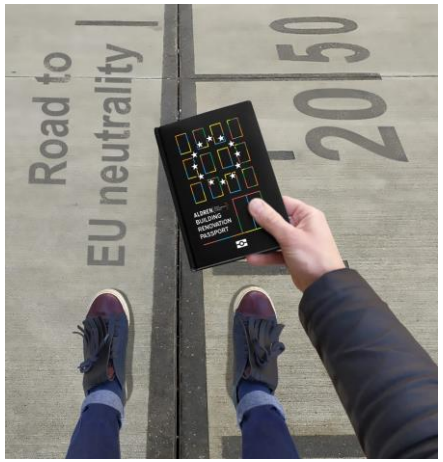


2. DATA CHALLENGE

- Storage centralized
- Common language
- Favor communication between stakeholders;
- Accessibility and quality

3. ALDREN BRP

- Comparable & reliable instrument all over EU
- Define roadmaps to nearly Zero Energy Building (nZEB)



#2 - Main principles for the ALDREN BRP

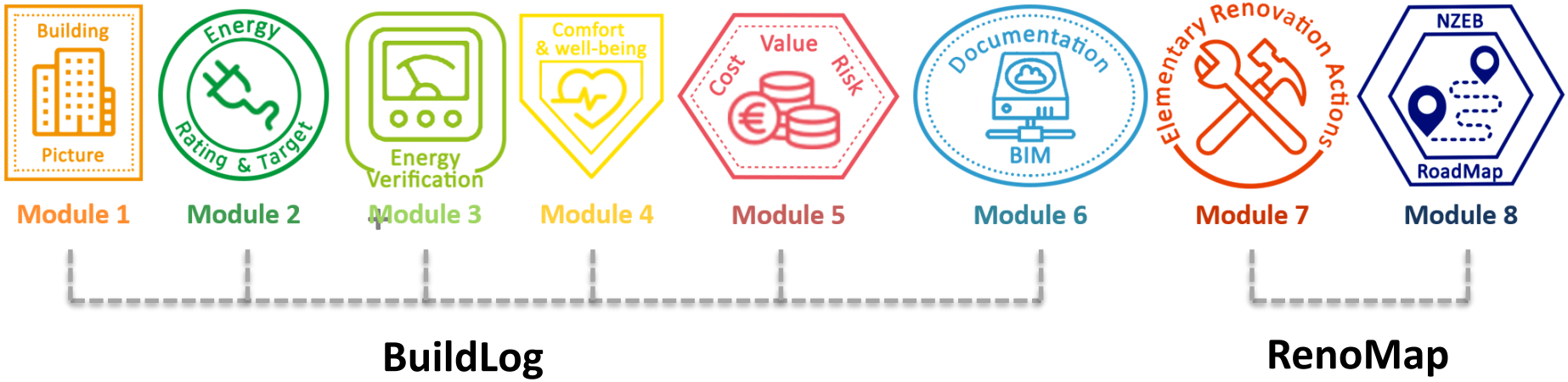
PRINCIPLES	**COMPLIANCY**	**HARMONIZATION**
	 Digital - paper instrument, complementary to the EPC and structured into 2 main elements: BuildLog and RenoMap.	 Harmonized procedure for building data gathering through the time, with a common language in a cost-effective renovation long-term plan.
TARGET	**BUILDING TYPOLOGY**	**ENERGY TARGET**
	 - Data sets for non- residential buildings (hotels/offices). - BRP structure suitable also for residential= BuildLog + RenoMap	 - Follow the ALDREN protocols steps for BRP creation. - Collect users willing and use them for the RenoMap creation.
USERS	**OWNER/ INVESTOR**	**ALDREN AUDITOR**
	 - Refer to a unique instrument. - Comprehension of real current state of the building. - Awareness on the renovation actions feasibility.	 - Refer to the ALDREN protocols guidance for the BRP creation based on step by step procedure. - Collect users willing and use them for the RenoMap creation.

#2 - Main principles for the BRP protocol

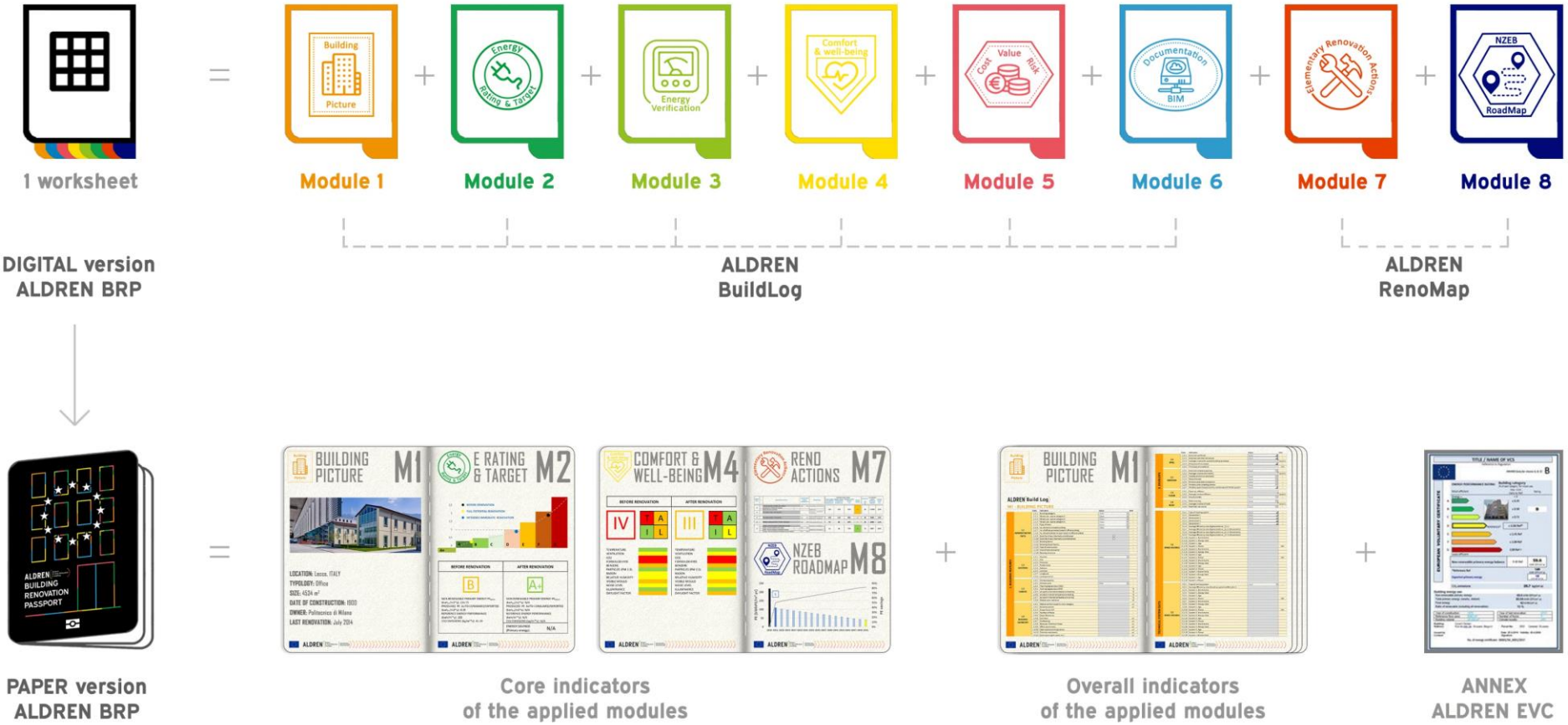
- The ALDREN BRP has been developed for **non-residential buildings,** in particular for **office** and **hotel** typologies.

- The whole ALDREN approach foreseen <u>different calculation protocols</u> for each of the modules in which the ALDREN BRP is structured and rendered in a **unique instrument**.

- This modular structure could be implemented or modified in future according to new upcoming needs, target, indicators, etc.



#3 - ALDREN BRP format and versions



ALDREN ALliance for Deep RENovation in buildings

BUILDING RENOVATION PASSPORT

ALDREN Build Log

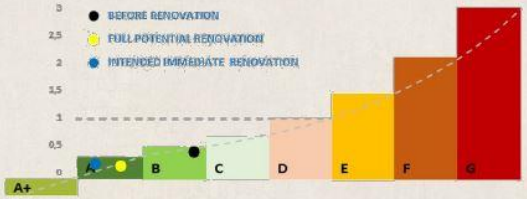
M1 - BUILDING PICTURE

BUILDING NAME	BUILDING 8 - POLITECNICO DI MILANO, LECCO CAMPUS
OWNER NAME	POLITECNICO DI MILANO
LOCATION	LECCO, IT
TYPOLOGY	OFFICE
REFERENCE FLOOR AREA	4534 m^2
YEAR OF CONSTRUCTION	1900
YEAR OF LAST RENOVATION	2014

Lecco, IT 4 *BUILDING 8 - POLIMI*

ALDREN Build Log

M2 - ENERGY RATING & TARGET

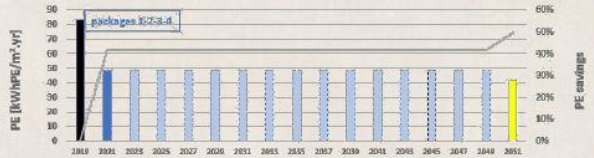


BEFORE RENOVATION	AFTER RENOVATION
B	A
NON-RENEWABLE PRIMARY ENERGY PE_{NREN} (kWh_{EP}/m^2y): **61.42** PRODUCED PE AUTO-CONSUMED (kWh_{EP}/m^2y): **0.62** REFERENCE ENERGY PERFORMANCE (kWh/m^2y): **130** CO_2 EMISSIONS (kg/m^2y): **1.68**	NON-RENEWABLE PRIMARY ENERGY PE_{NREN} (kWh_{EP}/m^2y): **30.93** PRODUCED PE AUTO-CONSUMED (kWh_{EP}/m^2y): **0.62** REFERENCE ENERGY PERFORMANCE (kWh/m^2y): **130** CO_2 EMISSIONS (kg/m^2y): **1.68**
	ENERGY SAVINGS (Primary energy): **29.60**
FINAL ENERGY (kWh_{FE}/m^2y): **34.29** HEATING FE (kWh_{FE}/m^2y): **51.01** COOLING FE (kWh_{FE}/m^2y): **10.80** VENTILATION FE (kWh_{FE}/m^2y): **5.20** DHW FE (kWh_{FE}/m^2y): **10.41** LIGHTING FE (kWh_{FE}/m^2y): **5.49**	FINAL ENERGY (kWh_{FE}/m^2y): **17.28** HEATING FE (kWh_{FE}/m^2y): **21.47** COOLING FE (kWh_{FE}/m^2y): **4.57** VENTILATION FE (kWh_{FE}/m^2y): **2.64** DHW FE (kWh_{FE}/m^2y): **10.41** LIGHTING FE (kWh_{FE}/m^2y): **3.91**
	ENERGY SAVINGS (Final energy): **48 %**

ALDREN Reno Map

M7 - ELEMENTARY RENOVATION ACTIONS

M8 - NZEB ROADMAP



JOIN US TO TEST THE ALDREN BRP

www.aldren.eu

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

The information in this publication does not necessarily represent the view of the European Commission.

Session #2

ALDREN

ALliance for Deep RENovation in buildings

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

Market uptake through certifying bodies

Implementation and testing on the non-residential sector (offices and hotels)

ALDREN ALliance for Deep RENovation in buildings

CertiveA

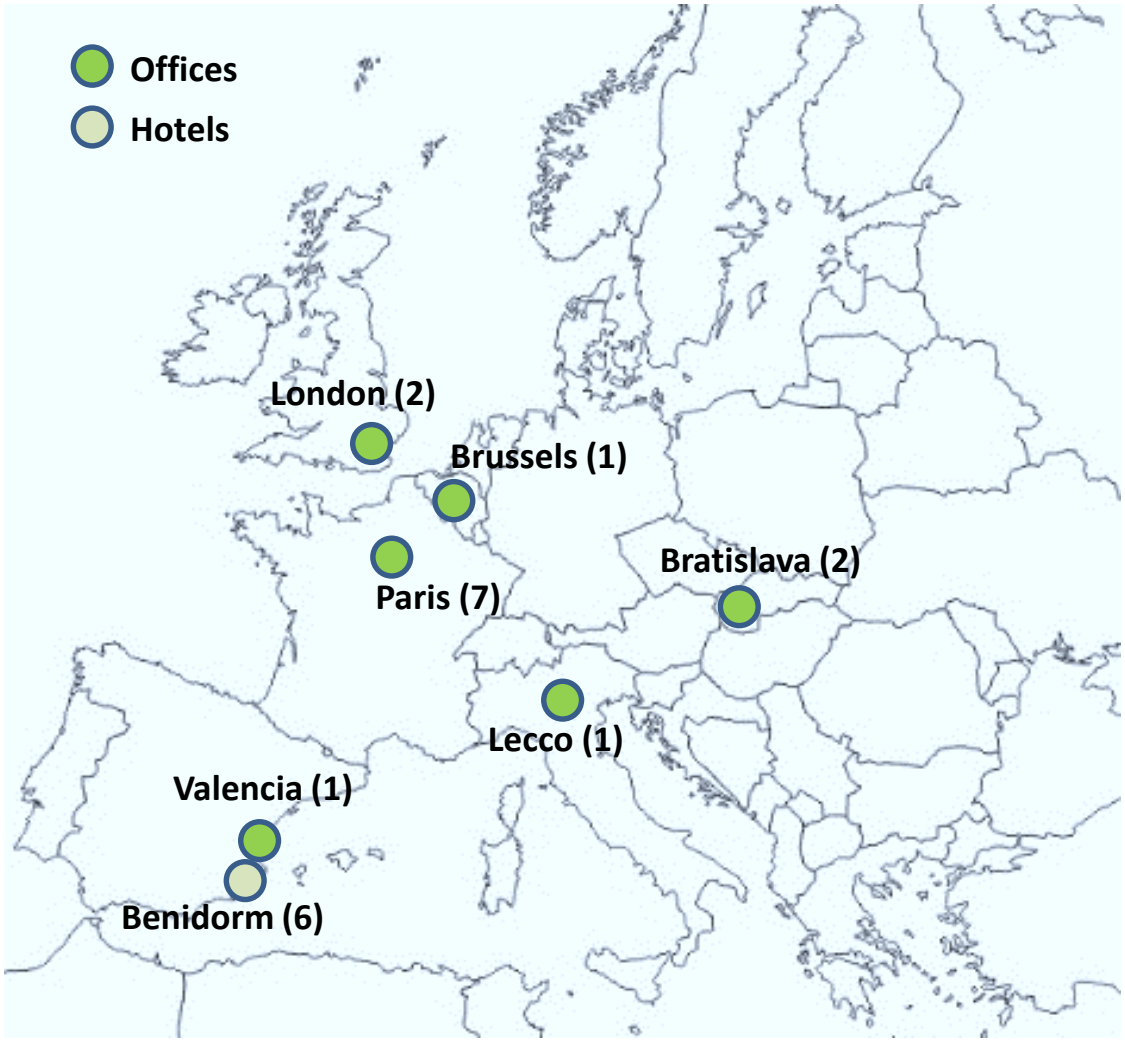
Final event
2020 09 29, Christophe GERARD, Certivea

Task 3.1

1. Pilot buildings
2. Main results
3. Main feedbacks and improvements brought by pilot studies
4. Market uptake

Pilot buildings

- 20 pilots in 6 European countries
- 14 offices, 6 hotels
- All renovation phases concerned (decision, design, works, operation)
- Average area *: around 11000 m² (≈ 11800 m² for offices and 9500 m² for hotels)
- All ALDREN tasks applied



** GIA: Gross Internal Area (m²)*

Pilot buildings

Registration

(June 2018 – June 2019)

- Looking for pilots
- Meetings to explain the pilot phase
- Pilot buildings register officially

Data collection and tests

(Novembre 2018 – June 2020)

- Collecting data from buildings
- Data collection meetings between ALDREN consortium members in charge of the tests and pilots
- On-site audits/visits
- Exchanges between ALDREN consortium members and pilot teams (design teams, Consultants, building managers, owners) to verify the data completeness
- Test of ALDREN methodologies
- Meetings during the tests between ALDREN members and pilots to optimize tests and discuss about intermediate results

Feedback

(July 2020 – September 2020)

- Meetings with each pilot building to explain results
- ALDREN final event with delivery of the ALDREN pilot “award” (BRP)

Tasks applied

16 buildings

7 buildings

11 buildings

3 buildings

Simulated energy performance : **European energy rating & renovation objectives**

Addressing the **gap** between calculated and **actual energy performance**

Evaluating Indoor Environmental Quality : **health and well-being**

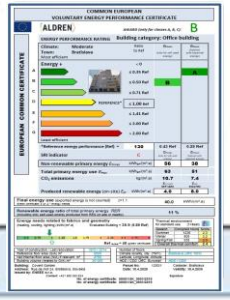
Linking environ. performance (energy, health, comfort) to **financial valuation**

ENVIRON. QUALITY – SIMULATIONS AND MEASUREMENTS

Collected data and evaluation results : holistic ALDREN tools

-> Benchmarking, Renovation planning, Decision-making

- **EVC** : *European Voluntary energy performance Certificate*
- **EVC+** : *EVC + additional pages on IEQ and financial value*
- **BRP** : *Comprehensive Building Renovation Passport*



STANDALONE MODULES : Indicators + Protocols

15 buildings (12 for BuildLog and 15 Renomap)

Main results

Energy savings triggered by the project (before/after renovation)

	Area (m² GIA)	Before (kWhEP/m².y)	After (kWhEP/m².y)
Total	220770	259,41	144,41
Offices	164013	213,36	105,01
Hotels	56757	392,49	258,25

-120 $kWh_{EP}/m^2.y$

(-26.62 GWh_{EP}/y)

=

Gain of **3 to 4 classes** on EVC rating

Majority of buildings reach **Class A** or **B**

Average values: around -110 $kWh_{EP}/m^2.y$ for offices and -150 $kWh_{EP}/m^2.y$ for hotels

Main results

Renewable energy production triggered by the project

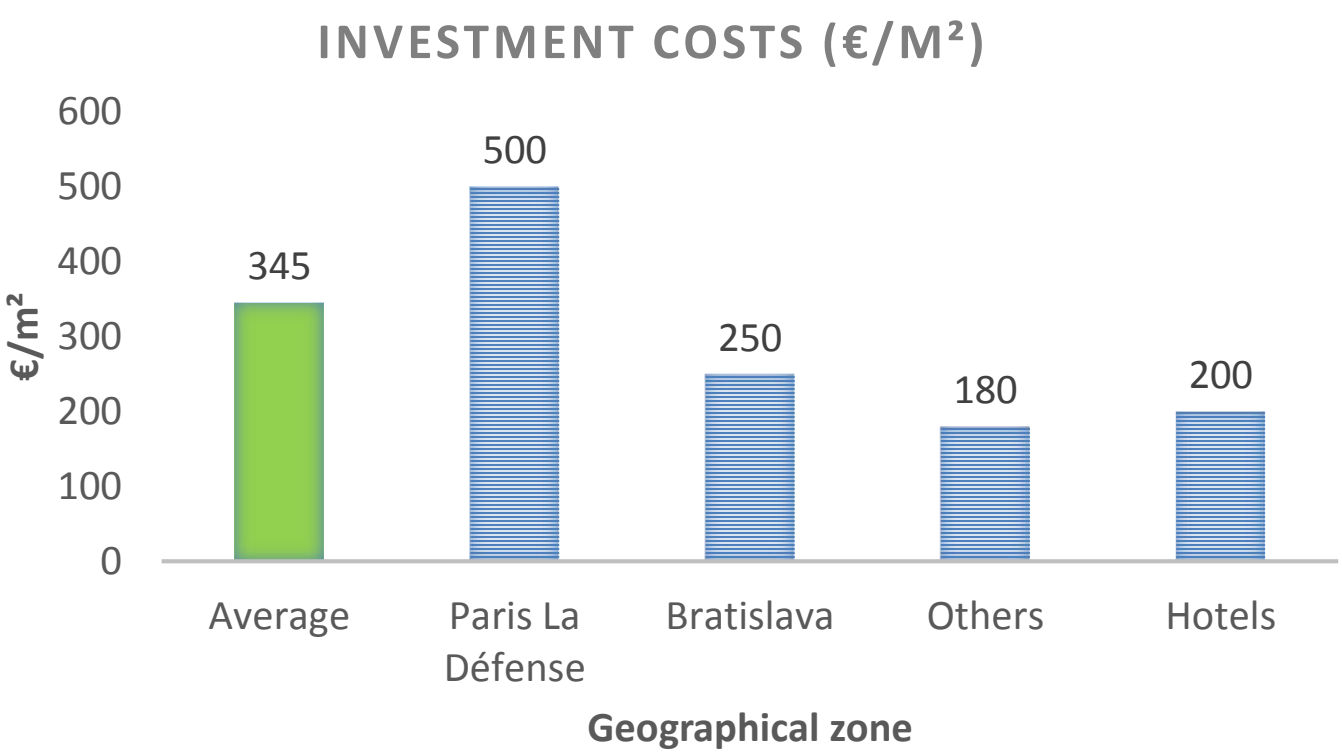
+4.13 GWh_{EP}/y

(PV panels, and district heating for 1 pilot)

Main results

Investment costs triggered by the project

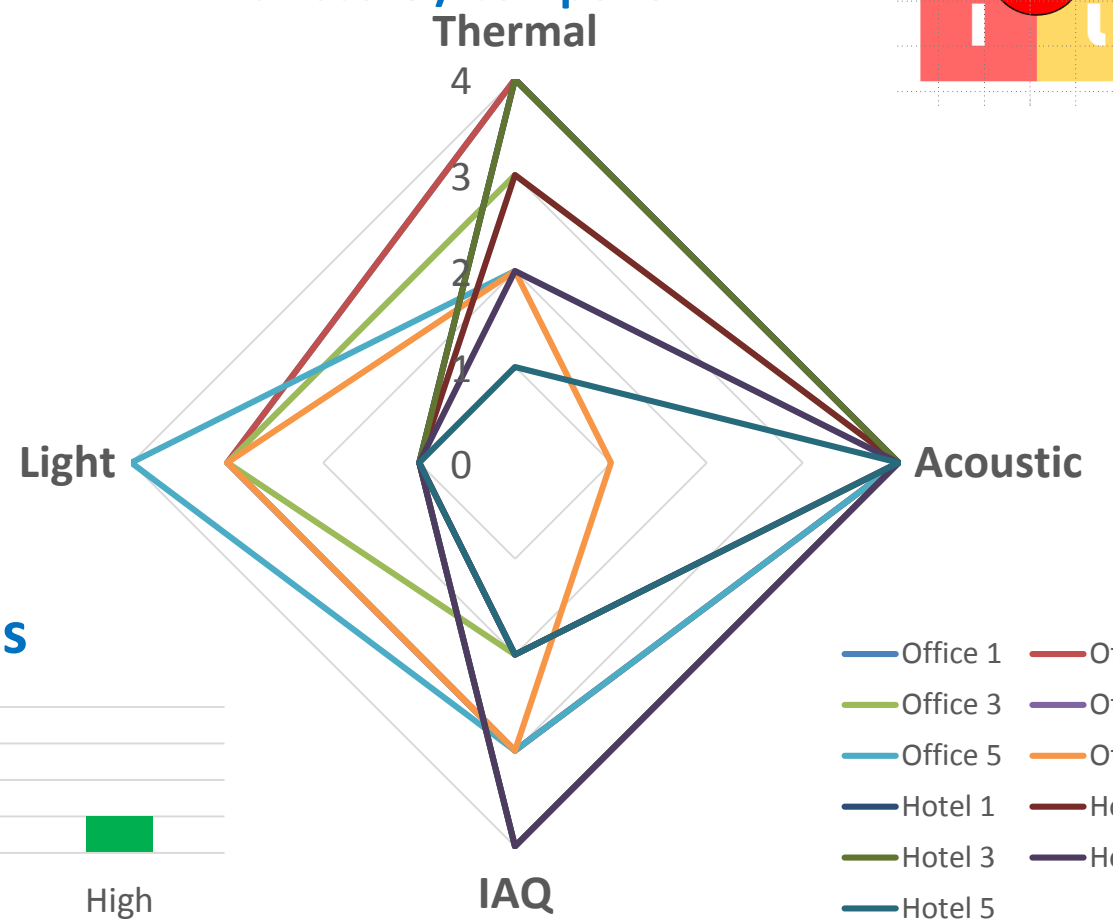
69.3 M€



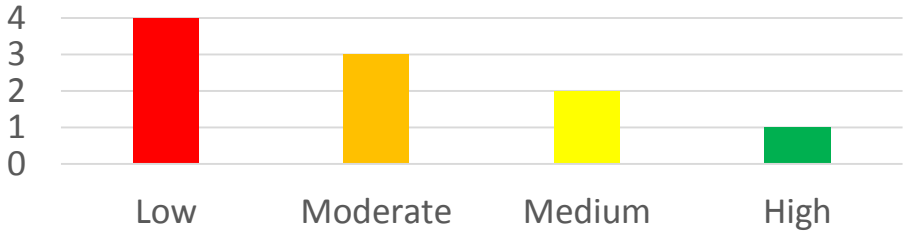
Main results

Poor IEQ in existing buildings

Tail score / component



Overall TAIL scores



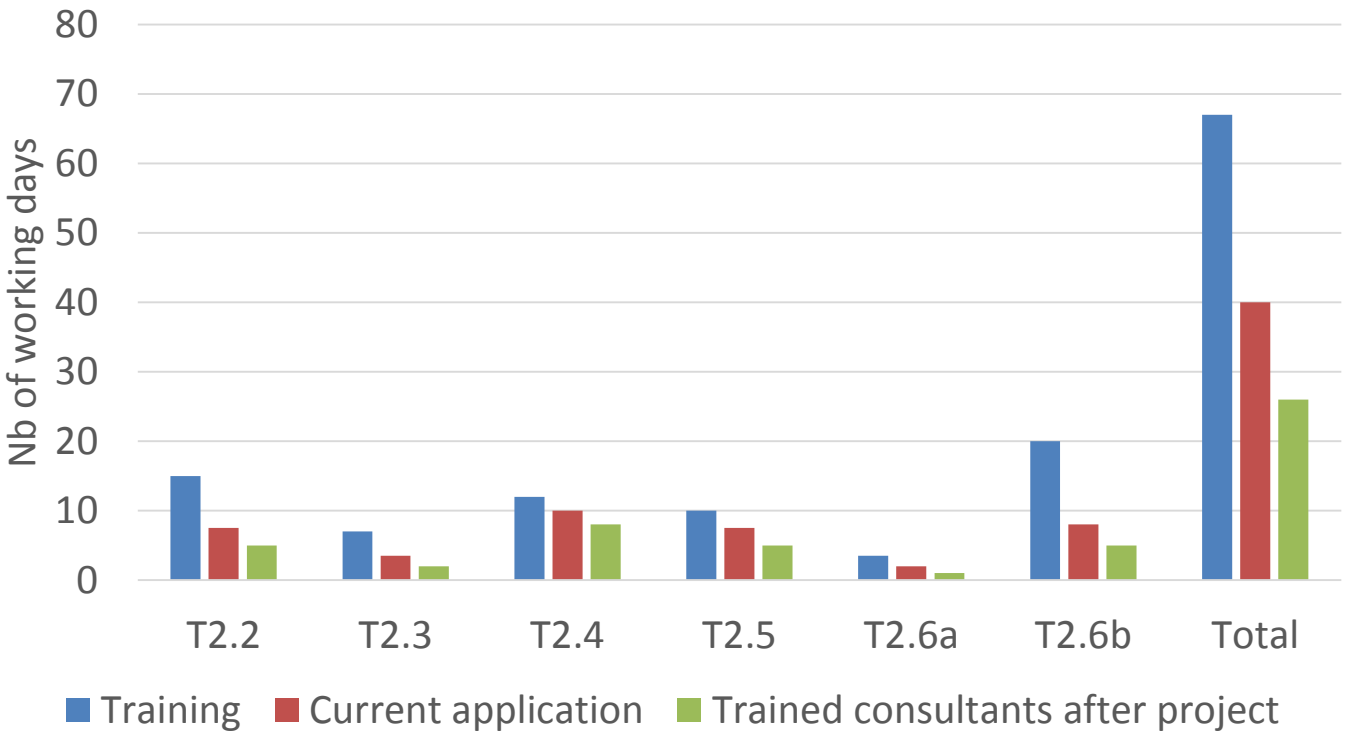
1 Office in « Moderate » all other buildings in « Low » quality (5 offices and 5 hotels)

Main results

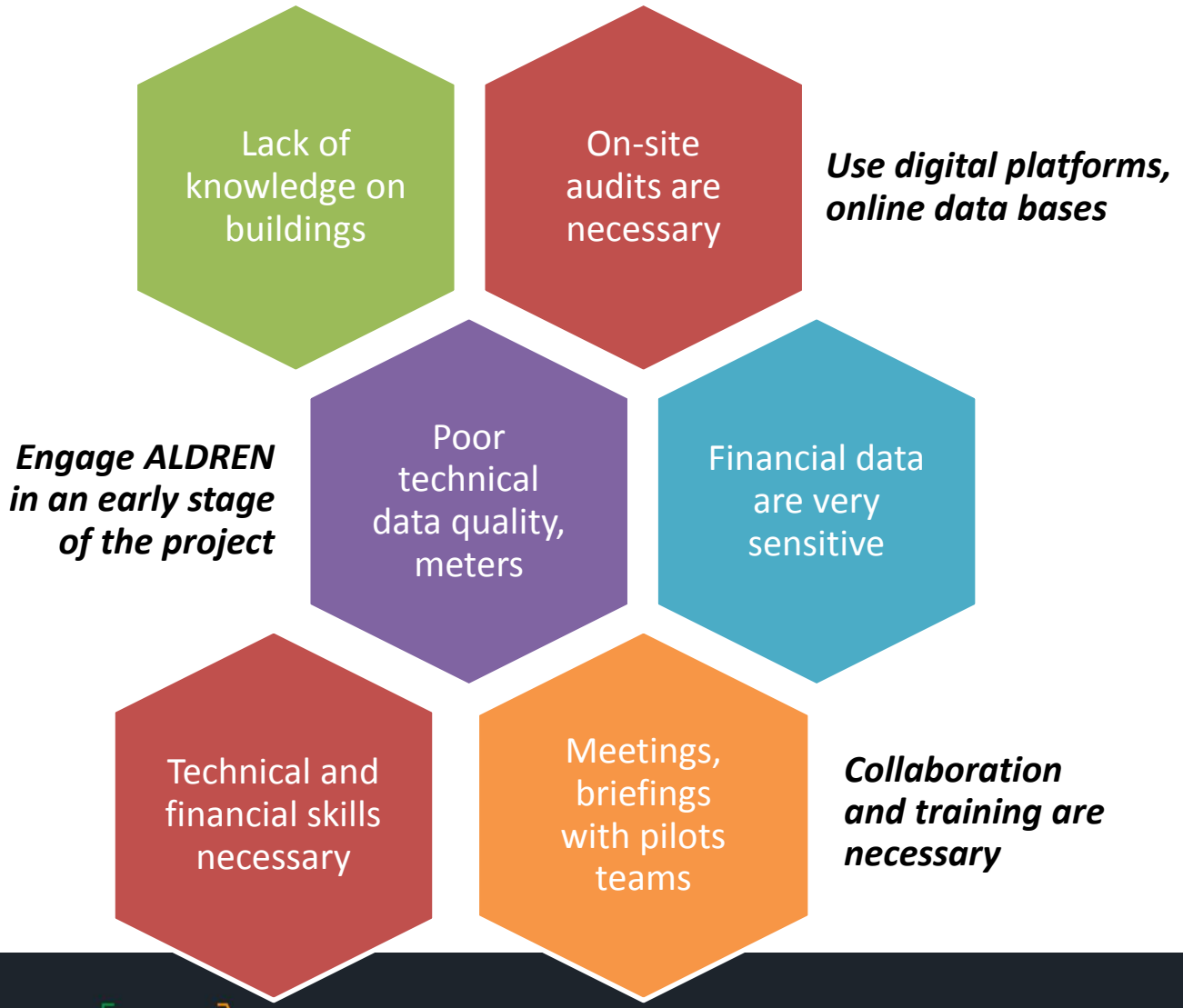
Working days to apply ALDREN tasks on pilot buildings

≈ -50%
during project

≈ -75%
after project



Feedbacks brought by pilot studies



Some major improvements of ALDREN protocols brought by the pilot studies

- Optimization of EVC scale (especially for hotels)
- Optimization of assessment classes of Performance Verification Tool
- Adjustments of TAIL protocol and addition of PredicTAIL
- Adaptation of 2.5 protocol for hotels
- Structure of BuildLog
- New structure and interactions matrix of the Renomap
- Final model of BRP
- …

Interests of pilot buildings owners in ALDREN

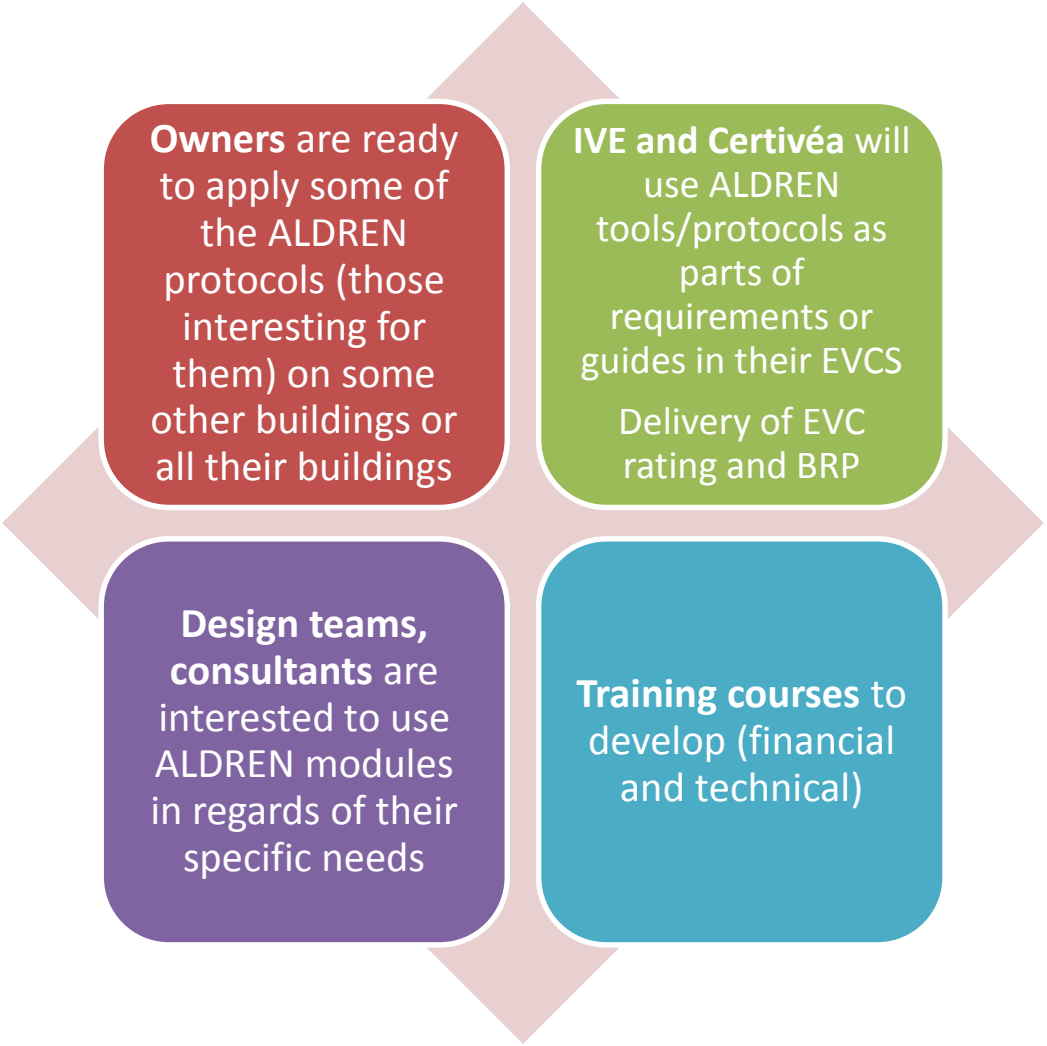
Better knowledge of their buildings and their operating

Clear vision of possible performance and renovation actions to reach it in a timeframe

To be competitive in real estate market compared to neighbour new buildings in terms of energy performance, health and comfort

Link between renovation actions and costs / value of the building to discuss with investment / property funds

Conclusions / Market uptake



Thank you!

ALDREN ALliance for Deep RENovation in buildings

CertiveA

www.aldren.eu

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

The information in this publication does not necessarily represent the view of the European Commission.

Addressing health and well-being

Implementation on pilot buildings

ALDREN ALliance for Deep RENovation in buildings

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

CSTB le futur en construction

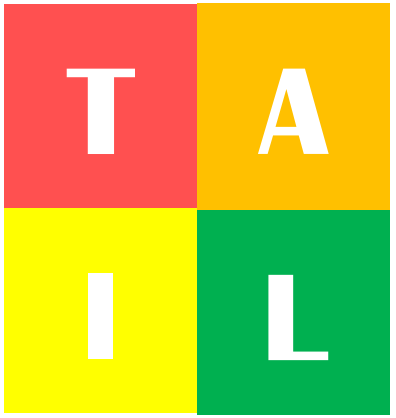
ALDREN Final Event, September, 2020
Corinne Mandin on behalf of the ALDREN T2.4 team

An integrated index: The ALDREN-TAIL index

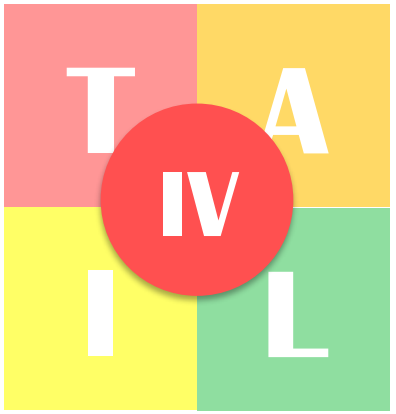
Addressing the **4 major components of IEQ**:

- **T**hermal environment
- **A**coustic environment
- **I**ndoor air quality
- **L**ight – Luminous (visual) environment

Assessed respectively according to the levels of the **12 parameters**



Allowing the assessment of the **overall IEQ**



I II III IV

12 parameters selected to define IEQ components within 4 IEQ components

	IEQ parameter	Measured	Modelled	Visual inspection
T	Indoor temperature (°C)	×	(×)	
A	Noise level (dB(A))	×		
I	CO_2 (ppm)	×	(×)	
	Ventilation rate (L/s)	×	(×)	
	Formaldehyde (µg/m³)	×		
	Benzene (µg/m³)	×		
	$PM_{2.5}$ (µg/m³)	×		
	Radon (Bq/m³)	×		
	Indoor air relative humidity (%)	×	(×)	
	Visible mold (cm²)			×
L	Daylight factor (%)		×	
	Illuminance (lux)	×		

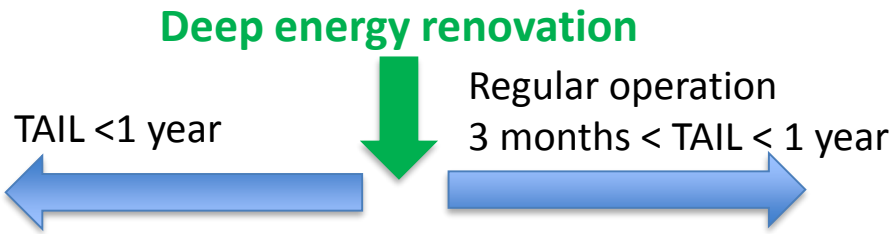
Each of the 12 parameters is assessed according to 4 categories

All the indicators are assessed against 4 categories defined by EN16798 (2019) standard and WHO guidelines, mainly:

- **Category I**: High level of expectation and recommended for spaces occupied by sensitive and fragile people with special requirements like some disabilities, sick, very young children and elderly persons, to increase accessibility
- **Category II**: Normal level of expectation
- **Category III**: Moderate level of expectation
- **Category IV**: Low level of expectation. Poor quality. Unacceptable regarding health

➔ Each indicator is associated to a category at every studied location in the building.

TAIL is determined before and after renovation



Same season before and after

Ideally two seasons before and two seasons after

During the on-site measurements, the building shall be **operated and occupied as usual**, to capture typical conditions.

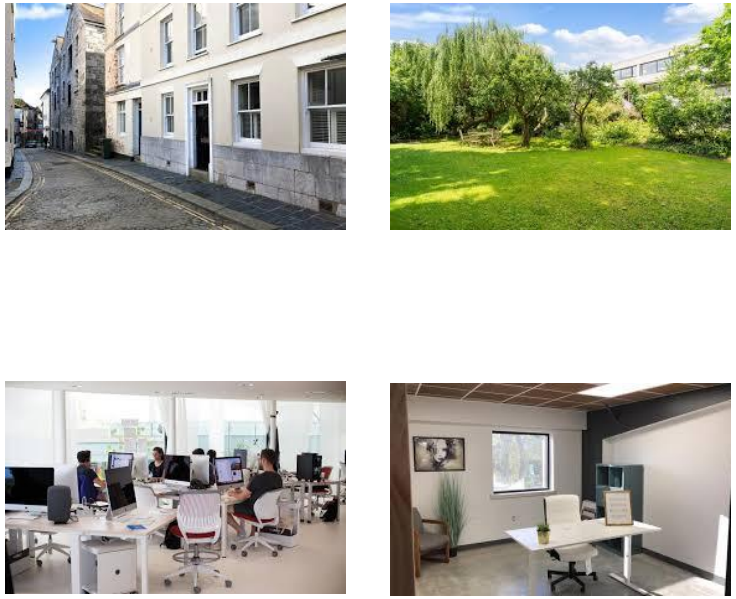
Number of sampling locations

- **A compromise** between the representativeness of the sampling locations regarding the whole building, and the technical and economic feasibility
- **At least 2 rooms – at maximum 10 rooms**
- The sum of the sampling location areas must address **at least 10% of the occupied area**, i.e., office floor area in office buildings and guest room floor area in hotels.

Choice of the sampling locations

- Only offices/workplaces in office buildings and rooms in hotels
  (no lobby or meeting rooms)

- Criteria to chose the sampling locations:
  - The **lowest occupied level and the highest occupied level**
  - **different orientations** (North/South/East/West) meaning different outdoor environment influence (street *versus* garden)
  - **different types of indoor spaces** (materials, ventilation system, occupancy, etc.)
  - **Normally occupied**



Single and open-plan offices in office buildings and the rooms of different sizes in hotels

Duration of sampling

- **One month** for temperature and relative humidity
- **Two months** for radon, if the building is in a radon-prone area
- For the other parameters, **one week:**
  - Monday to Friday in an office building
  - Monday to Monday, Tuesday to Tuesday, etc., in a hotel

Measuring equipment

Temperature measurement

Particles measurement

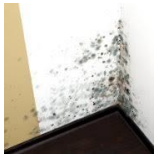
Chemical pollution

CO_2 measurement

Temperature and Relative Humidity measurement

Ventilation rate measurement

T A I L



Mould observations

Radon dosimeter

Noise measurement

Light measurement

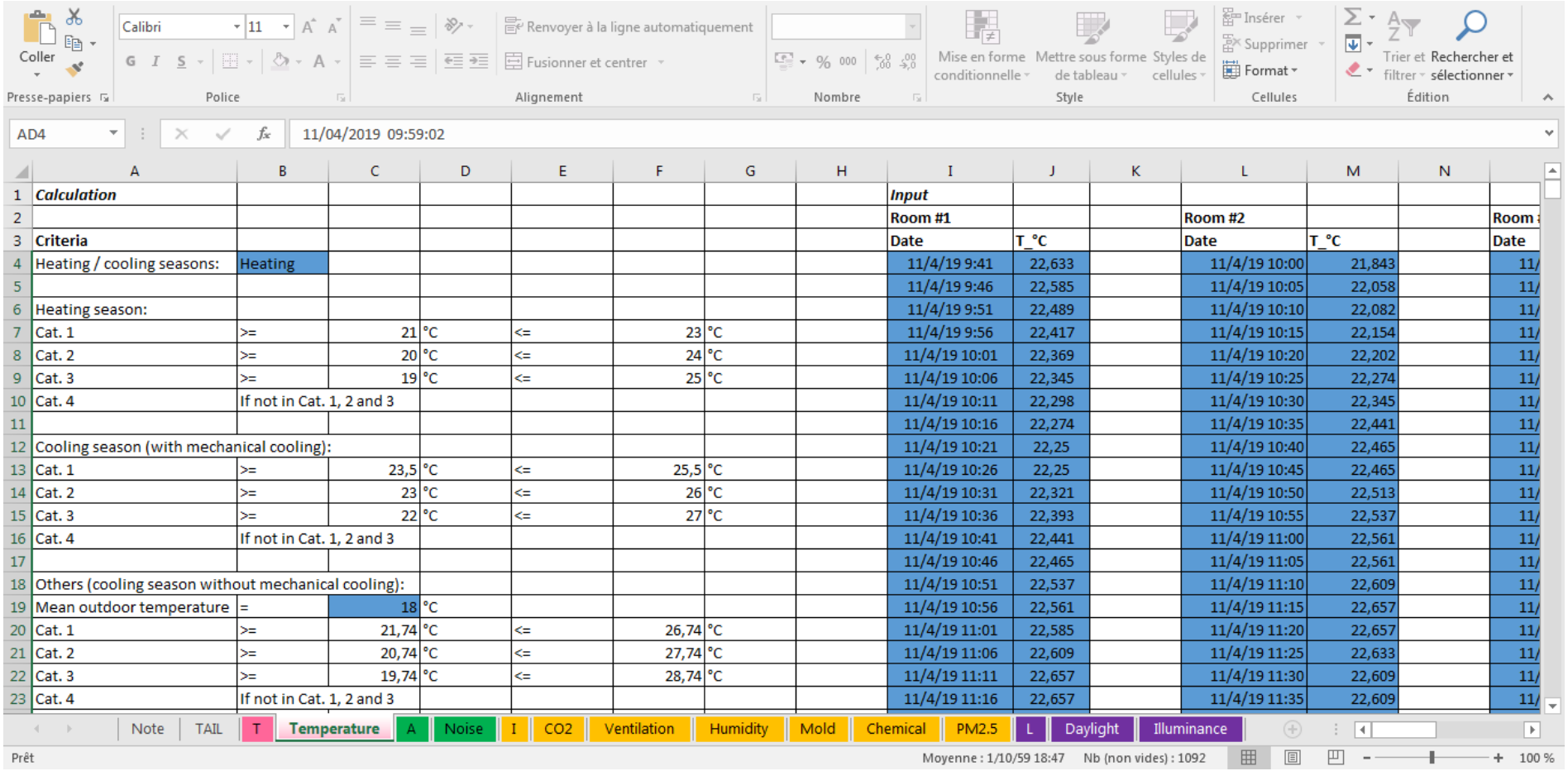
In the **center of the room**

Direct sun

Heating sources

Ventilation channels

TAIL calculation tool

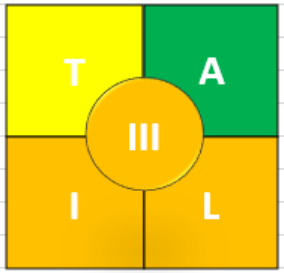


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1	***Calculation***								***Input***						
2									**Room #1**			**Room #2**			**Room**
3	**Criteria**								**Date**	**T_°C**		**Date**	**T_°C**		**Date**
4	Heating / cooling seasons:	Heating							11/4/19 9:41	22,633		11/4/19 10:00	21,843		11/
5									11/4/19 9:46	22,585		11/4/19 10:05	22,058		11/
6	Heating season:								11/4/19 9:51	22,489		11/4/19 10:10	22,082		11/
7	Cat. 1	>=	21	°C	<=	23	°C		11/4/19 9:56	22,417		11/4/19 10:15	22,154		11/
8	Cat. 2	>=	20	°C	<=	24	°C		11/4/19 10:01	22,369		11/4/19 10:20	22,202		11/
9	Cat. 3	>=	19	°C	<=	25	°C		11/4/19 10:06	22,345		11/4/19 10:25	22,274		11/
10	Cat. 4	If not in Cat. 1, 2 and 3							11/4/19 10:11	22,298		11/4/19 10:30	22,345		11/
11									11/4/19 10:16	22,274		11/4/19 10:35	22,441		11/
12	Cooling season (with mechanical cooling):								11/4/19 10:21	22,25		11/4/19 10:40	22,465		11/
13	Cat. 1	>=	23,5	°C	<=	25,5	°C		11/4/19 10:26	22,25		11/4/19 10:45	22,465		11/
14	Cat. 2	>=	23	°C	<=	26	°C		11/4/19 10:31	22,321		11/4/19 10:50	22,513		11/
15	Cat. 3	>=	22	°C	<=	27	°C		11/4/19 10:36	22,393		11/4/19 10:55	22,537		11/
16	Cat. 4	If not in Cat. 1, 2 and 3							11/4/19 10:41	22,441		11/4/19 11:00	22,561		11/
17									11/4/19 10:46	22,465		11/4/19 11:05	22,561		11/
18	Others (cooling season without mechanical cooling):								11/4/19 10:51	22,537		11/4/19 11:10	22,609		11/
19	Mean outdoor temperature	=	18	°C					11/4/19 10:56	22,561		11/4/19 11:15	22,657		11/
20	Cat. 1	>=	21,74	°C	<=	26,74	°C		11/4/19 11:01	22,585		11/4/19 11:20	22,657		11/
21	Cat. 2	>=	20,74	°C	<=	27,74	°C		11/4/19 11:06	22,609		11/4/19 11:25	22,633		11/
22	Cat. 3	>=	19,74	°C	<=	28,74	°C		11/4/19 11:11	22,657		11/4/19 11:30	22,609		11/
23	Cat. 4	If not in Cat. 1, 2 and 3							11/4/19 11:16	22,657		11/4/19 11:35	22,609		11/

TAIL calculation tool: output

TAIL Index for Health & Wellbeing

Building location	
Building type	
Date of renovation	



	Category
Thermal environment	2
Acoustic environment	1
Indoor air quality	3
Lighting (visual) environment	3
TAIL	III

Application to 6 office buildings and 5 hotels

Type	TAIL scores before renovation				
	Overall	T	A	I	L
Office	IV	4	4	3	3
Office	IV	4	4	3	3
Office	IV	3	4	2	3
Office	IV	4	4	2	1
Office	IV	2	4	3	4
Office	III	2	1	3	3
Hotel	IV	4	4	4	1
Hotel	IV	3	4	2	1
Hotel	IV	4	4	4	1
Hotel	IV	2	4	4	1
Hotel	IV	1	4	2	1

Lessons learnt from the pilot studies

- Applicability of the method
- Adjustment needed for the rating and applied to the final method
- Differences across the buildings
- Capacity to identify potential for IEQ improvement during renovation operations

Future developments of the rating method and the TAIL index

- Sensitivity analysis of the TAIL index on larger datasets
- Additional parameters underlying TAIL, e.g., inclusion of occupant ratings?
- Extension to other buildings, e.g., schools and dwellings
- Development of a framework for the prediction of TAIL after renovation = PredicTAIL included in the RenoMap
- Monetization of TAIL
- Development of a simple measurement box

ALDREN ALliance for Deep RENovation in buildings

CSTB le futur en construction

www.aldren.eu

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

The information in this publication does not necessarily represent the view of the European Commission.

Break

ALDREN
ALliance for Deep RENovation in buildings

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

HOSBEC & ALDREN.

Hotel experiences in Spain.

ALDREN ALliance for Deep RENovation in buildings

Final event
2020.09.29, Mayte García, HOSBEC

Index

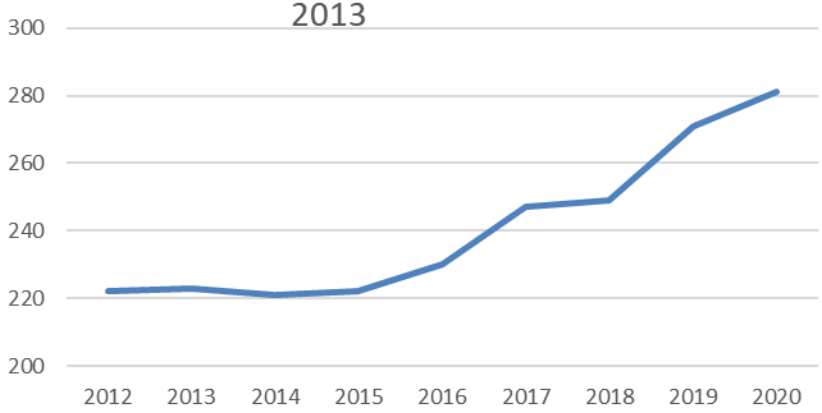
“HOSBEC” - Comunidad Valenciana Hotel and Tourism association

281 MEMBERS

ESTABLISHED IN 1977

210 HOTELS, 43 APARTAMENTS, 16 CAMPINGS, 12 LEISURE OFFER

Evolution in number of members from 2013



Hotels represents 75% of the members associated to HOSBEC, being the main sector of work and development of projects.

Other relevant information about Benidorm

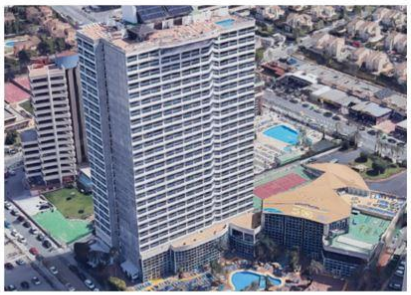
16,5 MILL OVERNIGHTS (HOTELS, CAMPSITES AND APARTAMENTS IN 2019

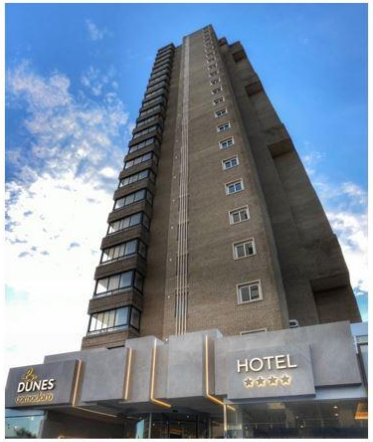
3TH PENINSULAR CITY IN SPAIN IN OVERNIGHTS, BEHIND BARCELONA AND MADRID

CITY WITH MORE SKYCRAPERS OF SPAIN

Hotel energy perfomance

- electric Energy 1Gwh/year
- 25% use renewable energy
- mainly to produce DHW, and to HVAC
- Energy indicators for benchmarking
  - Kwh/room/year
  - Kwh/overnight/year
  - Kwh/m2/year





- ✓ Bayren Parc & SPA
- ✓ Poseidón Playa
- ✓ Flamingo Oasis
- ✓ Dynastic
- ✓ Benidorm Centre
- ✓ Les Dunes Comodoro

Why ALDREN?

Objetive:
Aldren Project fits perfectly with our energy strategic.

- Energy Monitoring
- More especific information about energy perfomance
- Integrated information about energy efficiency
- Energy parameters in Deep renovations
- More information about financial risks and building costs

The future of ALDREN- new challenges

State of uncertainty with the pandemic situation

Opportunity to improve facilities and to perform Deep renovation

<u>Safety is a new Quality</u>

ALDREN is a complete tool to know the real energy performance and to prioritize the energy deep renovation of our building stock.

ALDREN ALliance for Deep RENovation in buildings

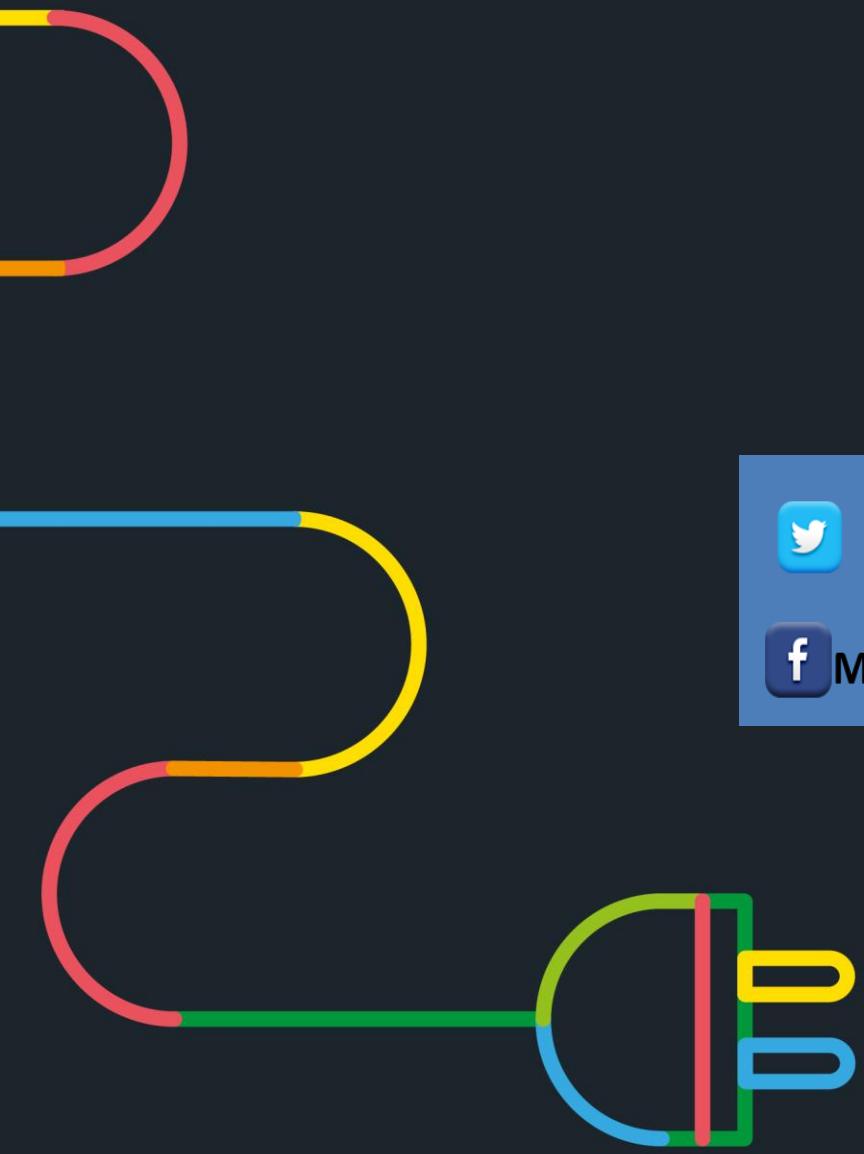
Thank you for your attention

@mgcorcoles

Mayte García Córcoles

Mayte García Córcoles

calidad@hosbec.com



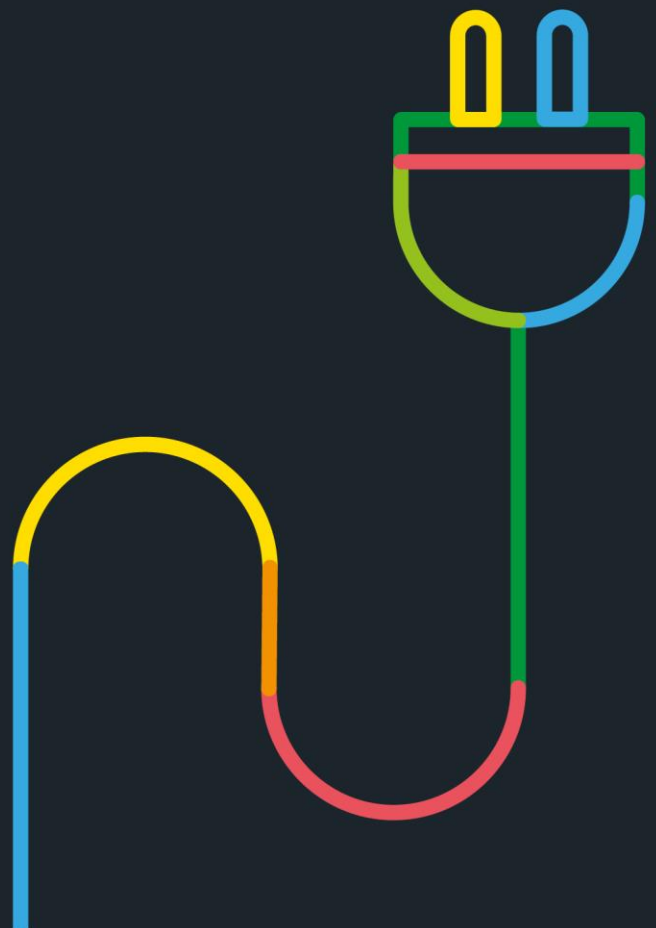
www.aldren.eu

Thank you!

ALDREN ALliance for Deep RENovation in buildings

www.aldren.eu

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



ALDREN & Hotel buildings

ALDREN ALliance for Deep RENovation in buildings

IVE INSTITUTO VALENCIANO de la EDIFICACIÓN

Final event
2020.09.29, Carlos Espigares, IVE

Index

IVE ALDREN Team

Pablo Carnero Melero
Energy Efficiency Eng.

Maria José Esparza
Communication Coord.

Miriam Navarro
Head of RD Department

Carlos Espigares
Project Coordinator

Pilot Program_Hotels

Benidorm Centre

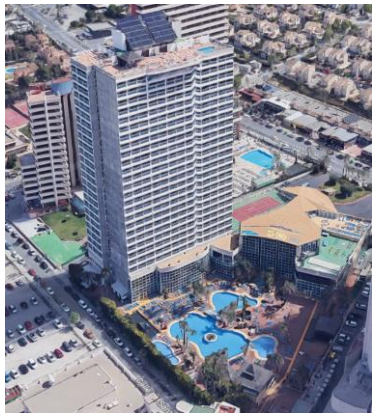
GIA / 5361.3M^2

Les Dunes Comodoro

GIA / 7151.3M^2

Dynastic

GIA / 11050M^2



Flamingo Oasis

GIA / 23057M^2

Poseidon Playa

GIA / 11193M^2

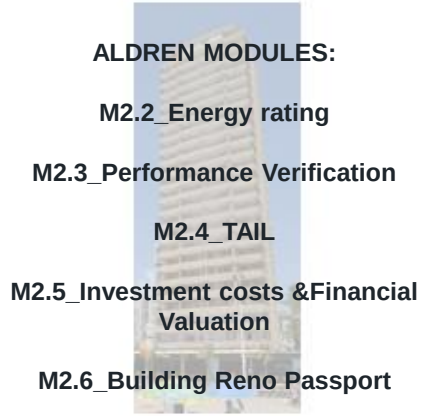
Bayren spa

GIA / 14048M^2

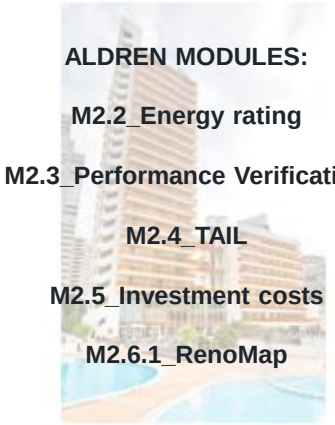
Pilot Program_Hotels

Modules applied to each pilot

Benidorm Centre



Les Dunes Comodoro



Dynastic

Flamingo Oasis

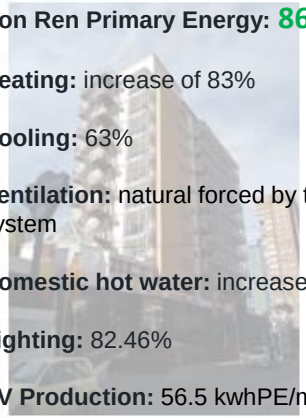
Poseidon Playa

Bayren spa

Pilot Program_Hotels

Modules 2.2 and 2.3_energy rating and verification

ENERGY SAVINGS



Non Ren Primary Energy: **86%**

Heating: increase of 83%

Cooling: 63%

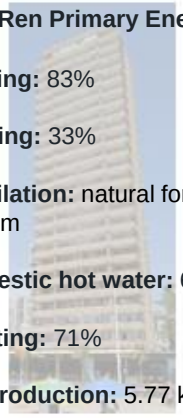
Ventilation: natural forced by the AC system

Domestic hot water: increase of 52%

Lighting: 82.46%

PV Production: 56.5 kwhPE/m2y

Benidorm Centre



Non Ren Primary Energy: **44.2%**

Heating: 83%

Cooling: 33%

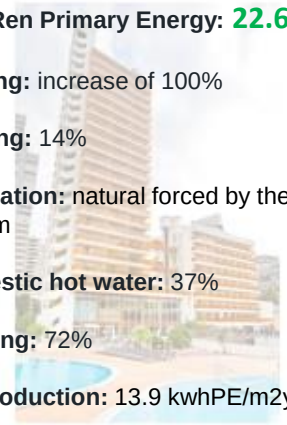
Ventilation: natural forced by the AC system

Domestic hot water: 60%

Lighting: 71%

PV Production: 5.77 kwhPE/m2y

Les Dunes Comodoro



Non Ren Primary Energy: **22.6%**

Heating: increase of 100%

Cooling: 14%

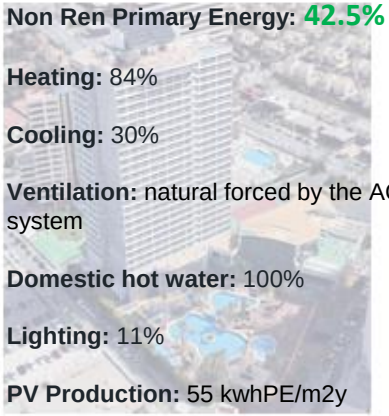
Ventilation: natural forced by the AC system

Domestic hot water: 37%

Lighting: 72%

PV Production: 13.9 kwhPE/m2y

Dynastic



Non Ren Primary Energy: **42.5%**

Heating: 84%

Cooling: 30%

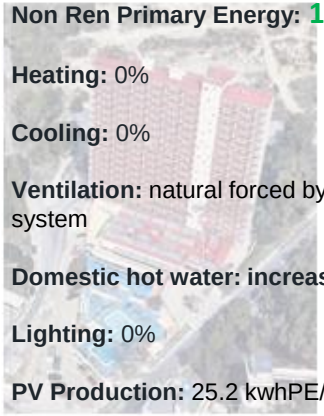
Ventilation: natural forced by the AC system

Domestic hot water: 100%

Lighting: 11%

PV Production: 55 kwhPE/m2y

Flamingo Oasis



Non Ren Primary Energy: **15%**

Heating: 0%

Cooling: 0%

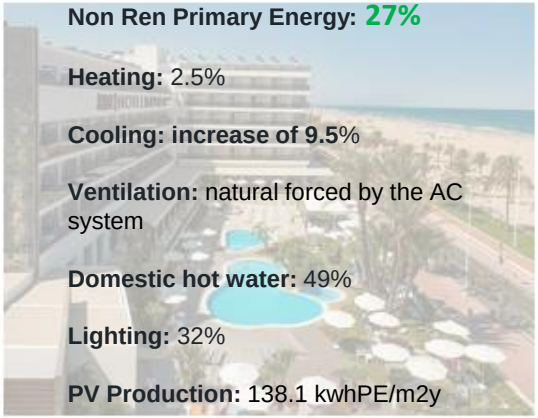
Ventilation: natural forced by the AC system

Domestic hot water: increase of 43%

Lighting: 0%

PV Production: 25.2 kwhPE/m2y

Poseidon Playa



Non Ren Primary Energy: **27%**

Heating: 2.5%

Cooling: increase of 9.5%

Ventilation: natural forced by the AC system

Domestic hot water: 49%

Lighting: 32%

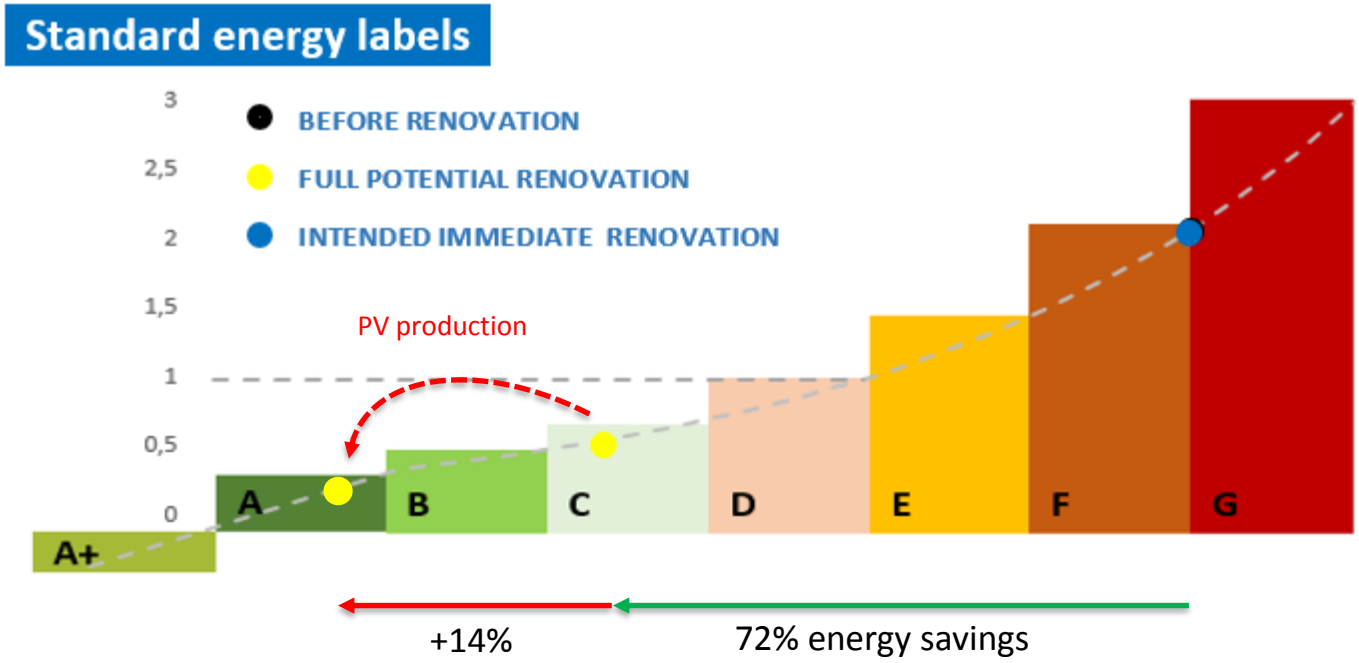
PV Production: 138.1 kwhPE/m2y

Bayren spa

Pilot Program_Hotels

Modules 2.2 and 2.3_energy rating and verification

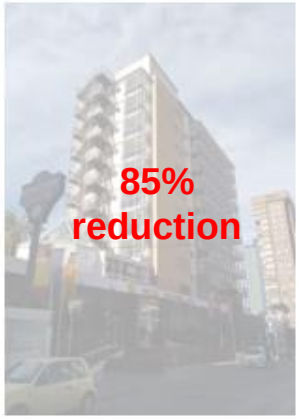
ENERGY SAVINGS



Pilot Program_Hotels

Modules 2.2 and 2.3_energy rating and verification

C02 EMISSIONS



Benidorm Centre

Les Dunes Comodoro

Dynastic

Flamingo Oasis

Poseidon Playa

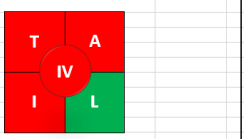
Bayren spa

Pilot Program_Hotels

Module 2.4_TAIL implementation on 5 Hotels

TAIL Index for Health & Wellbeing

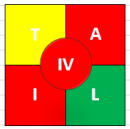
Building location	Spain
Building type	Hotel_FLA
Date of renovation	



	Category
Thermal environment	4
Acoustic environment	4
Indoor air quality	4
Lighting (visual) environment	1
TAIL	IV

TAIL Index for Health & Wellbeing

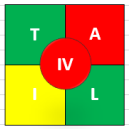
Building location	Spain
Building type	Hotel_POS
Date of renovation	



	Category
Thermal environment	2
Acoustic environment	4
Indoor air quality	4
Lighting (visual) environment	1
TAIL	IV

TAIL Index for Health & Wellbeing

Building location	Spain
Building type	Hotel_RHB
Date of renovation	



	Category
Thermal environment	1
Acoustic environment	4
Indoor air quality	2
Lighting (visual) environment	1
TAIL	IV

TAIL Index for Health & Wellbeing

Building location	Spain
Building type	Hotel_Dun
Date of renovation	

	Category
Thermal environment	3
Acoustic environment	4
Indoor air quality	2
Lighting (visual) environment	1
TAIL	IV

TAIL Index for Health & Wellbeing

Building location	Spain
Building type	Hotel_DYN
Date of renovation	

	Category
Thermal environment	4
Acoustic environment	4
Indoor air quality	4
Lighting (visual) environment	1
TAIL	IV

Pilot Program_Hotels

Module 2.6.1_Renovation Roadmap

1a	H0	Remove terrace HVAC installations (underfloor heating)	2019	2020	potentially immediate	1	31		28	45		251	0	356	3%		100%	A+	90460	1	347.9%
1a	H.1 / DHW 1	Natural gas supply replacing LPG	2019	2020	potentially immediate															
1a	H.2	Natural gas boiler provides only DHW. Shut down heating circuit	2019	2020	potentially immediate															
1a	L.1	LED lighting system replacement	2019	2020	potentially immediate															
1a	V1_C 1_H1	AHU dining room (variable speed Fan & CO2 sensors)	2019	2020	potentially immediate															
1a	V1_C 1_H1	AHU cafeteria and lobby (variable speed Fan)	2019	2020	potentially immediate															
1a	E6	Windows replacement to triple glazing in the GF	2019	2020	potentially immediate															
1a	E8	Integration of a double-door entrance (TBC)	2019	2020	potentially immediate															
1a	E9	Blinds and solar protections "	2019	2020	potentially immediate															
1a	E10	Envelope air tightness treatment on replaced windows	2019	2020	potentially immediate															
+																				
1b	H5	HVAC control / operation protocol	2023	2023	proposed to owner	5	19		28	14		229	0	295	19%		100%	A+	285910	1	1099.7%
1b	V2	Ventilation control in the Restaurant	2023	2024	proposed to owner															
1b	L.2	Lighting control / domotics	2024	2025	proposed to owner															
1b	L.1	LED lighting system replacement	2025	2026	proposed to owner															
1b	E.5	Double glazing windows low emissive coating on ever floor	2025	2026	proposed to owner															
1b	DHW 4	DHW : Emission-taps systems replacement"	2026	2027	proposed to owner															
1b	DHW 3	DHW : Thermal insulation of distribution network"	2027	2028	proposed to owner															
+																				
2	E6	Upgrade single glazing windows to double glazing on floor lobbies	2028	2029	proposed to owner	4	19		28	14		183	2	248	32%		100%	A+	57700	11	221.9%
2	E.5	Apply to upgraded single glazing windows low emissive coating at every floor	2028	2029	proposed to owner															
2	E10	Openings air tightness upgrade (Sika band or similar)	2028	2029	proposed to owner															
2	APL2	Improve Elevator Motors and operation	2029	2030	proposed to owner															
2	REN. 2	Replace the Solar Thermal installation with PVs	2030	2031	proposed to owner															
+																				
3	APL 1	appliances replacement: Kitchen	2031	2032	proposed to owner	6	20		11	14		159	6	209	43%		100%	A+	795080	1	3058.0%
3	E.1/E .2/E.	Envelope external thermal insulation (ETICS) / PUR	2032	2033	proposed to owner															
3	V1_H 1_C1	AHU rooms (variable speed Fan & CO2 sensors)	2033	2034	proposed to owner															
3	V2_C 5_H5	AHU rooms CONTROLS	2034	2035	proposed to owner															
3	DHW. 1	DHW: Replace Natural gas boiler with Air/water Heat Pump	2035	2036	proposed to owner															
3	REN. 1	PVs installation on terrace's roof	2036	2037	proposed to owner															

ENERGY RENOVATION ACTIONS PACKAGES | TIMELINE | IMPACT ON ENERGY PERFORMANCE | ENERGY RATING | INVESTMENT COST EVALUATION

Pilot Program_Hotels

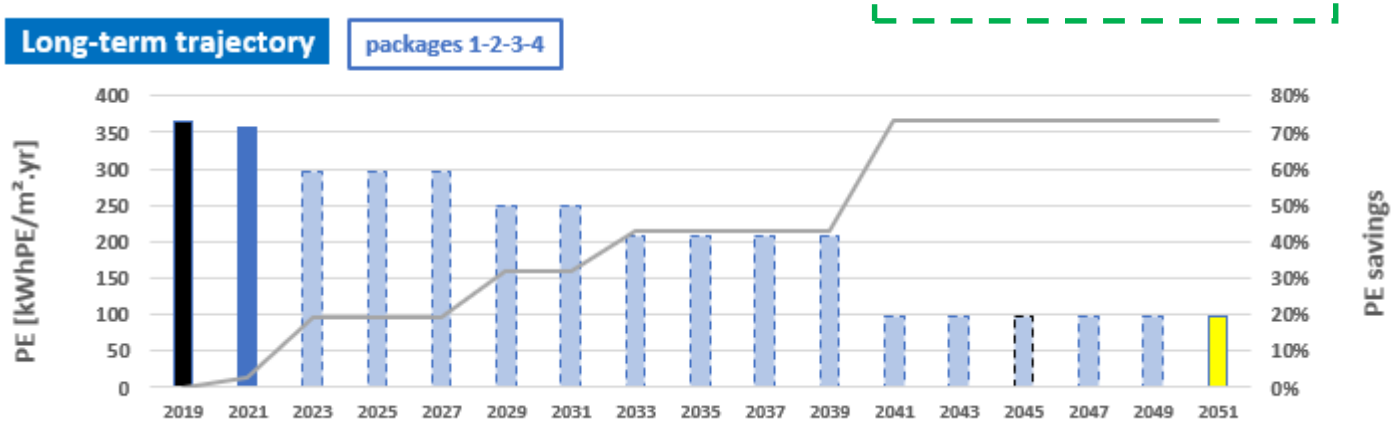
Module 2.6.1_Renovation Roadmap_Most common ERAs

ACTIVE

- LED lighting
- HVAC control
- Lighting control
- New elevator motors
- PV energy production
- HP system for DHW, heating and cooling
- High Spec Appliances in kitchen
- Biomass for DHW

PASSIVE

- High performance windows
- Blinds and solar protections
- Envelope air tightness treatment
- Integration of a double-door entrance
- Pipework thermal insulation
- Envelope ETICS
- passive shower
- Green roofing
- Slab soffit insulation



Pilot Program_Hotels

Module 2.5_Investment costs

PILOT	GIA (m^2)	STUDY TYPE	ENERGY SAVINGS		INVESTMENT
			NON PV (%)	PV (%)	€
Les Dunes Comodoro (Benidorm, Alicante)	7151.3	ACTUAL CONDITION	43	44.2	1,230,000
Flamingo Oasis (Benidorm, Alicante)	23057	ACTUAL CONDITION	31	42.5	1,740,000
Dynastic (Benidorm, Alicante)	11050	ACTUAL CONDITION	20	22.6	935,752
Benidorm Centre (Benidorm, Alicante)	5361	STANDARD CONDITION	72	86	878,680
Poseidon Playa (Benidorm, Alicante)	11193	STANDARD CONDITION	0	15	338,600
Bayren Spa (Gandía, Valencia)	14048	STANDARD CONDITION	3	27	267,500
AVERAGE	**12143.4**		**28**	**39.5**	**898,422**

Pilot Program_Hotels

Estimated Impact of ALDREN on HOSBEC´s associated companies/buildings

	EP_i [GWh/y]	EP_sav %	EP_sav [GWh/y]	Investment (M€)	Investment Savings (M€/y)
VALENCIA 26 HOTEL BUILDINGS	30.36	48.90	14.84	24.17	1.15
ALICANTE 164 HOTEL BUILDINGS	258.04	46.71	120.52	127.20	9.36
CASTELLON 20 HOTEL BUILDINGS	20.66	54.18	11.2	15.42	0.87
AVERAGE		**47.69**	**146.56**	**166.78**	**11.39**

Pilot Program_Hotels

Conclusions

The ALDREN objectives are to achieve higher renovation rates and better renovation quality by overcoming market barriers and preparing the ground for investment. On that terms, several oportunities appear:

1_ EP standards should represent better the hotel tipology and its use of energy.

2_There is great potential in the Deep energy renovation market for hotel buildings existing stock.

3_To include Energy Renovation Actions during the renovation design process is a must to achieve appropriate energy efficiency levels.

4_To trigger the market, it is essential to increase awareness between companies and hotel owners.

every ending is a new beginning…

Thank you!

ALDREN ALliance for Deep RENovation in buildings

IVE INSTITUTO VALENCIANO de la EDIFICACIÓN

www.aldren.eu

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

The information in this publication does not necessarily represent the view of the European Commission.

Session #3

ALDREN

ALliance for Deep RENovation in buildings

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