STUDY LAUNCH WEBINAR

BOOSTING BUILDING EFFICIENCY
UNLOCKING EPC GAINS WITH BACS

THURSDAY
28 NOVEMBER
13:30-15:30

13:30 - 14:15 Keynote Speach from DG ENER and introduction to the Study

14:15 - 15:30 Panel Discussion and Q&A

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HOUSEKEEPING RULES

Audio & Video: All participants are muted, and cameras are off by default

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STUDY LAUNCH WEBINAR

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Delivering on the European Green Deal and Fit for 55

The Smart Building Measures in the recast EPBD

Boosting Building Efficiency: Unlocking EPC Gains with BACS – 28 November 2024

Marco Morini
European Commission – DG ENERGY
Unit B3 - Buildings and Products

Objectives of the recast EPBD

entered into force in May 2024

Fit for 55

Contribute to **reducing GHG emissions** & **final energy consumption** by 2030

Long term vision for buildings' contribution to 2050 targets

Renovation Wave Strategy: aims at doubling renovations by 2030 and foster deep renovations

Climate target plan 2030: reduce buildings' GHG emissions by 60%, their final energy consumption by 14% and energy for heating and cooling by 18%.

RePowerEU and EU Save Energy Communication further increasing ambition

2050 Long Term Strategy: climate-neutral economy

Climate Target Plan 2040: reduction of 90% of net GHG emissions

European Commission

Focus Areas of the recast EPBD

Renovation

- Minimum Energy Performance Standards
- National trajectories for the progressive
- renovation of the residential building stock
  National Building Renovation Plans (BRPs)

Decarbonisation

- Introduction of zero-emission buildings
- as standard for new buildings
- Solar deployment in buildings
- Calculation of whole life cycle carbon
  Phasing out incentives for fossil fuels and new legal basis for national bans

Enabling framework

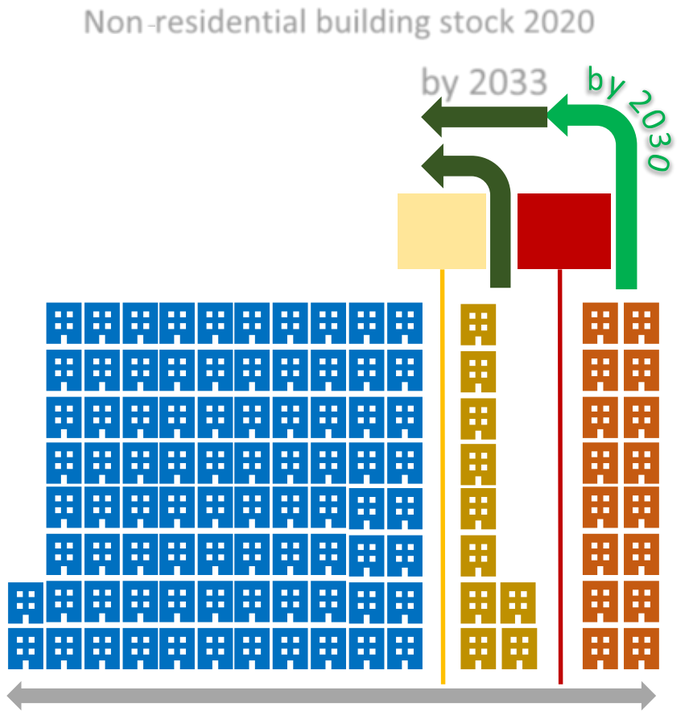
- Strengthened Energy Performance Certificates
- Renovation passports
- Sustainable finance & energy poverty
- One-stop-shops
- Deep renovation standard
- National energy performance databases

Modernisation & system integration

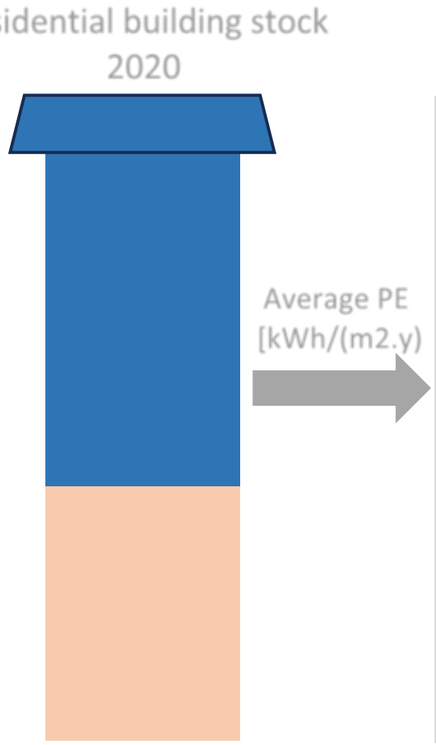
- Infrastructure for sustainable mobility
- Smart Readiness Indicator
- Indoor air quality: ventilation and other technical
- building systems
  Digitization, data access and exchange

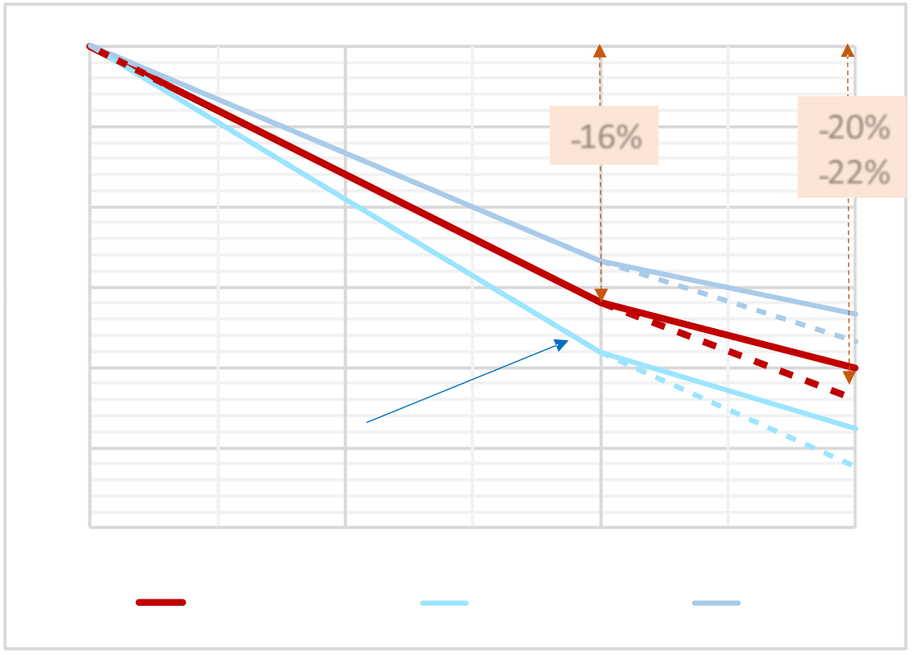
Key renovation measures for non-residential and residential building stock (Article 9)

Non-residential: Minimum Energy Performance Standards (MEPS)



Residential: trajectory to reduce the average primary energy use

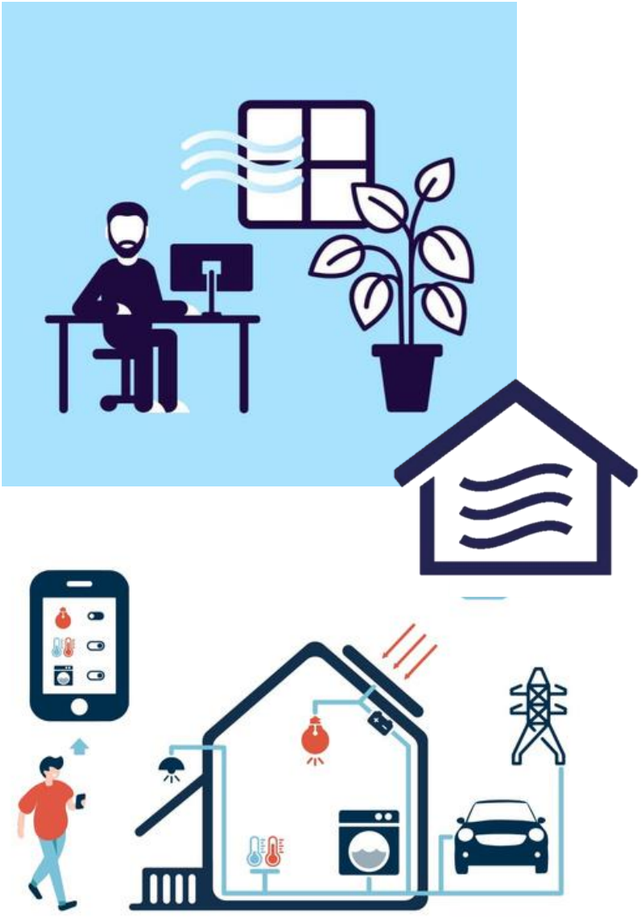




European Commission

Provisions on Smart Buildings & technologies Articles 11, 13

- Expansion of existing provisions on **BACS for large non-residential buildings***, introduction of IEQ monitoring as of 29 May 2026 and lower **70 kW threshold** as of 2030
- **Mandatory monitoring and control functionalities for residential buildings***, new or undergoing major renovation + the capacity to react to external signals & adjust the energy consumption. Possible exclusion for single-family houses
- Gradual introduction of **requirements for automatic lighting controls** in large non-residential buildings*
- ZEBs to offer* the **capacity to react to external signals** & adapt its energy use, generation or storage

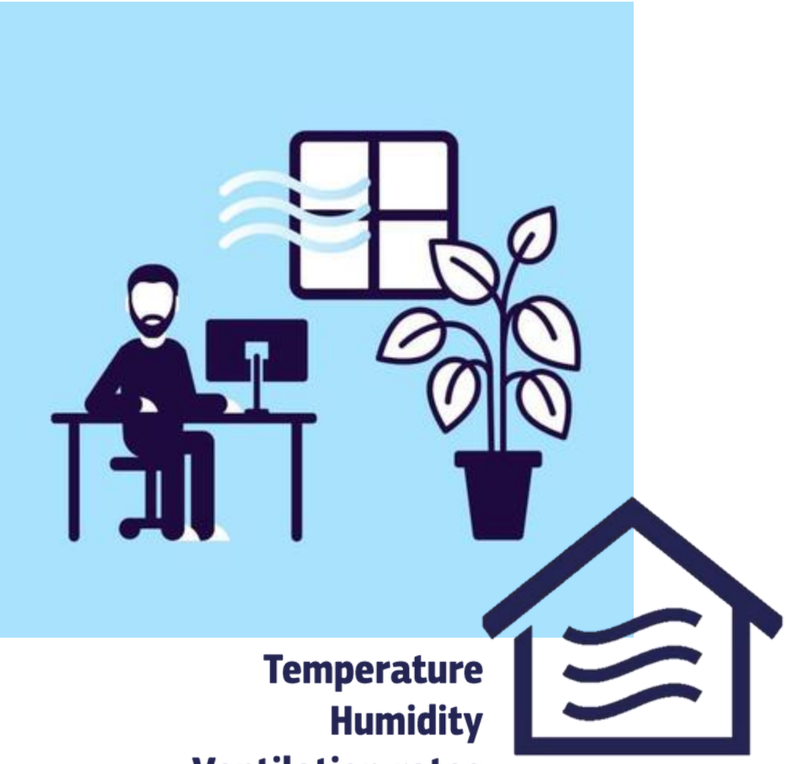


** When technically, economically and functionally feasible*

European Commission

Provisions on Indoor Environmental quality (Articles 1, 2, 5, 7, 8, 13, 20, 23 + Annexes)

- Multiple references – Comprehensive approach
- Clear visibility in Article 1
- Definition of **Indoor Environmental Quality**
- Optimal IEQ to be **addressed in new & renovated buildings**, and accounted for Minimum Energy Performance Requirements
- Measuring & control devices for IAQ
- Integration of IEQ monitoring in BACS
- Visibility of IEQ in SRI, EPCs, Building Renovation Passports
- Policies and Measures addressing the improvement of IEQ in Building Renovation Plans



Temperature
Humidity
Ventilation rates
Presence of contaminants…

European Commission

Energy performance certificates
Articles 19, 20, Annexes V, VI

Main changes introduced:

- Energy performance **classes** from A to G
- Common **template** with energy, GHG and other indicators + voluntary indicators
- Extension of scope of the **recommendations** to improve the building
- More trigger points for **issuing** and accessing EPCs

Strengthened **quality** framework

European Commission

Smart Readiness Indicator
Article 15, Annex IV

- The Commission is tasked to submit a **report on the testing phase** of the SRI by June 2026
- Taking into account the outcome of the report, the Commission shall **adopt a delegated & implementing act by June 2027** requiring the application of the SRI in **large non-residential buildings**

The SRI is a common EU framework for rating the smart readiness of buildings, aiming to promote the use of smart building technologies in EU.
It assesses buildings/units based on their capacity to satisfy 3 key functionalities.
- Delegated Reg. (EU) 2020/2155 established an optional common EU scheme
- Implementing Reg. (EU) 2020/2156 detailed the technical implementation modalities

European Commission

Overview of the MS test phases

2021

Austria Czech Republic

Denmark

France

2022

Croatia

Finland

Spain

2023

Slovenia

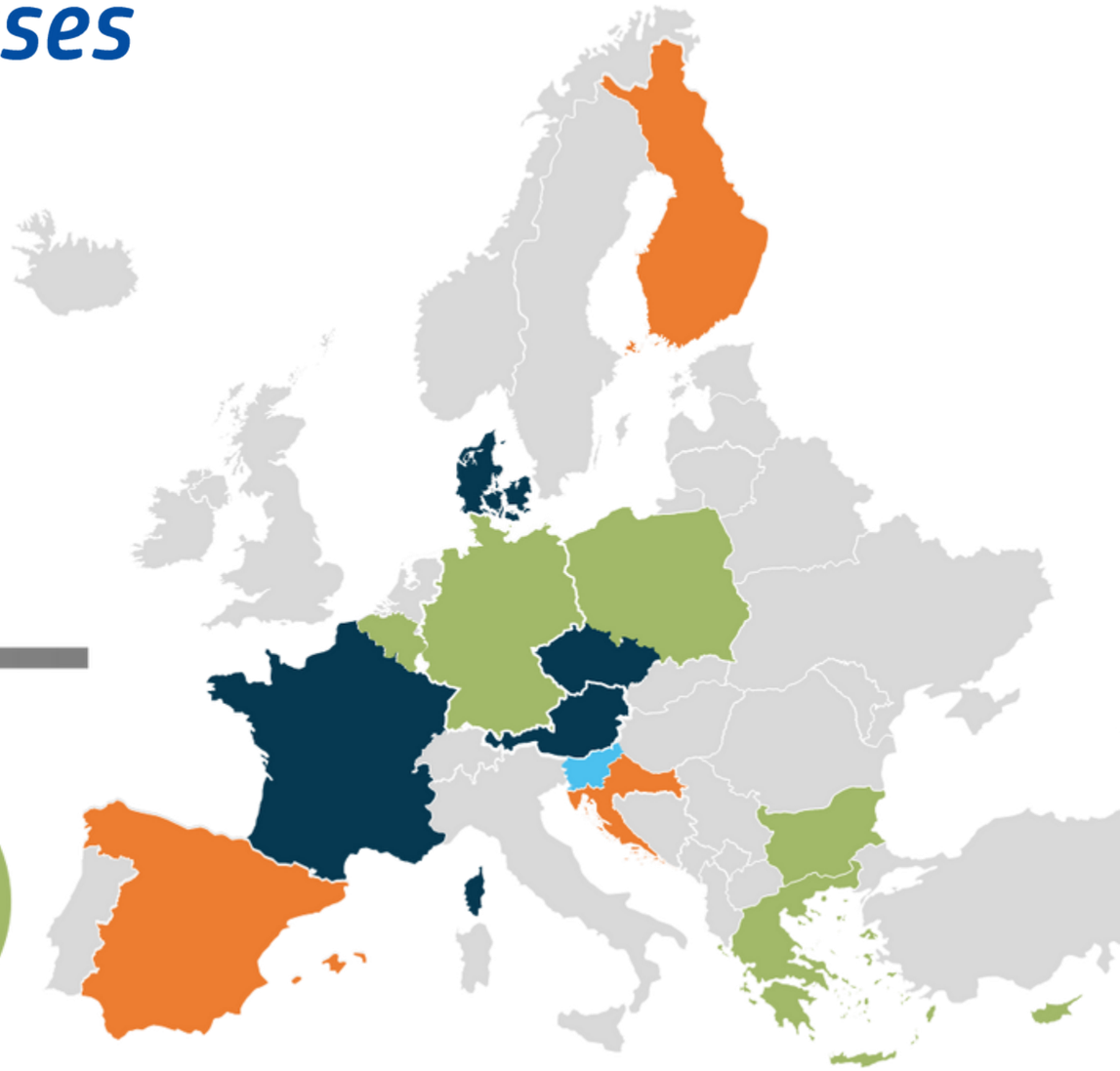
2024

Belgium/Flanders

Bulgaria Cyprus

Germany Greece

Poland



European Commission

Final Remarks

- The use of smart technologies in buildings can be a cost-effective way to contribute to **healthier and more comfortable buildings** with **lower energy consumption** and carbon emissions, as well as to the **balance and flexibility of the electricity grid**.
- Smart and digitalized energy systems are **key to decarbonization**, e.g. to support the integration of increasing shares of renewables; enable the electrification of end-uses; strengthen the overall resilience of the system; and empower consumers.
- When relevant and correctly installed, **BACS will play a crucial role** in optimizing the level of Smart Readiness of buildings and improving buildings energy performance as well as ensuring the compliance with several new provisions (including MEPSs).

Thank you!

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Energy & Strategy

Building Automation and Control Systems impact on EPC classes in Europe

Leonardo Mondonico

POLITECNICO MILANO 1863 SCHOOL OF MANAGEMENT

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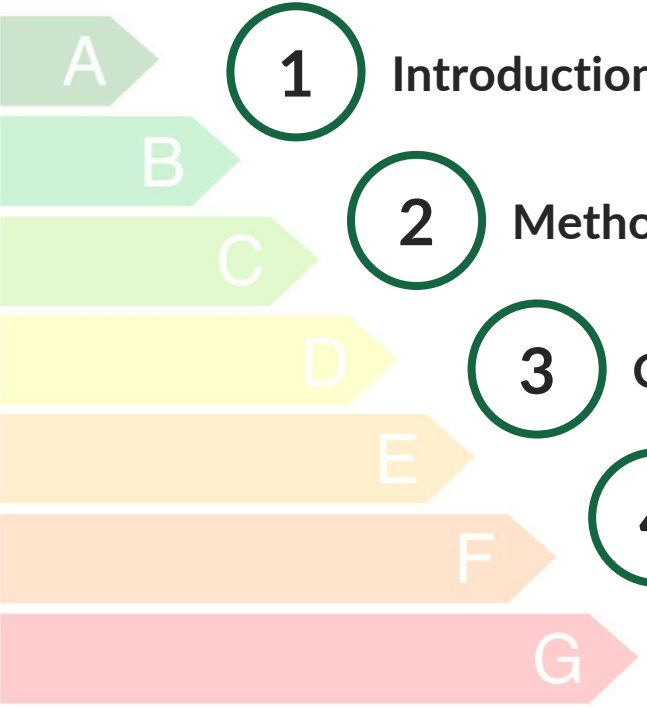
Building Automation and Control Systems impact on EPC classes in Europe



Methodology description

Used databases and UNI ISO

- **Buildings energy consumption data** → "*Intelligent Energy EU Program*", classified by building types.
- **Thermal energy savings → UNI EN ISO 521201-1** standard, matching the database building types with ISO categories.

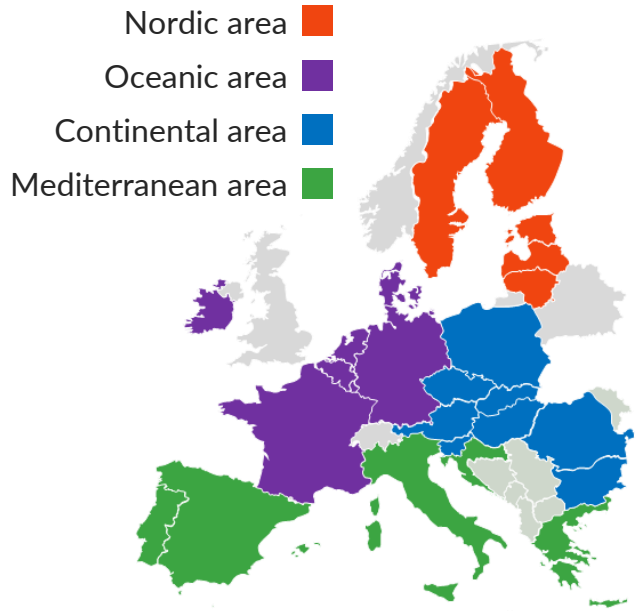
ISO 521201-1 building types

Sector	Building type
Non-residential	Offices
	Wholesale and retail trade service
	Schools
	Hospital
	Hotels
	Restaurants
	Lecture hall
	Others (sport, storage, ind. Buildings)
Residential	Single family house, Apartment block, Others

E&S database building types

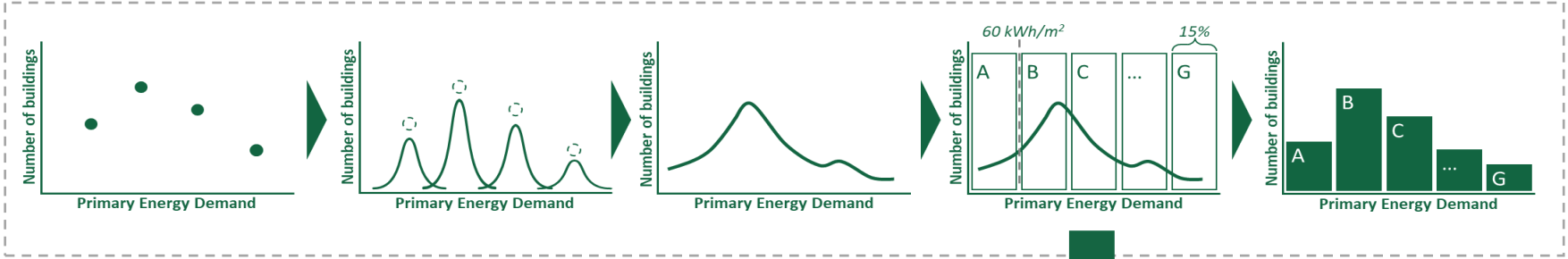
: estimated value

Sector	Building type	THERMAL ENERGY SAVINGS A	THERMAL ENERGY SAVINGS B
Non-residential	Offices	54%	47%
	Trade	62%	53%
	Education	33%	27%
	Health	34%	31%
	Hotels and Restaurants	46%	36%
	Others	49%	39%
Residential	Single family - Terraced houses	26%	20%
	Multifamily houses		
	Apartment blocks		

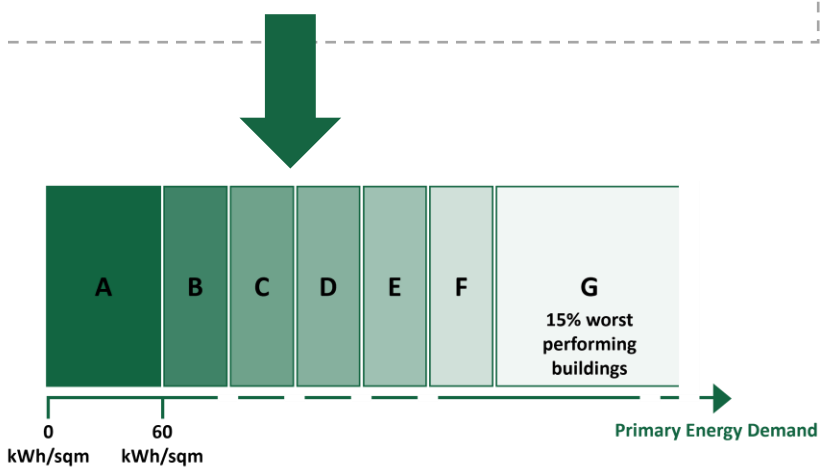


Methodology description

Calculation method



1. Estimate of **PED (Primary Energy Demand) distribution across building types**.
2. Evaluation of **total PED consumption distribution** for residential and non-residential.
3. Division in “fictitious”, **universal EPC classes** due to the difference in classes definitions across countries.



Costs efficiency of BACS

The cost of BACS and other solutions

The cost of BACS can be significantly lower than other efficiency solutions, considering the possible energy savings.

Sector	Building type	Class A [€/sqm]	Class B [€/sqm]
Non-residential	Offices	7,5	5,0
	Trade	7,5	5,0
	Education	5,5	3,5
	Health	5,5	3,5
	Hotels and Restaurants	5,5	3,5
	Others	7,5	5,0
Residential	Single family - Terraced houses	10,0	6,5
	Multifamily houses	7,5	5,0
	Apartment blocks	7,5	5,0

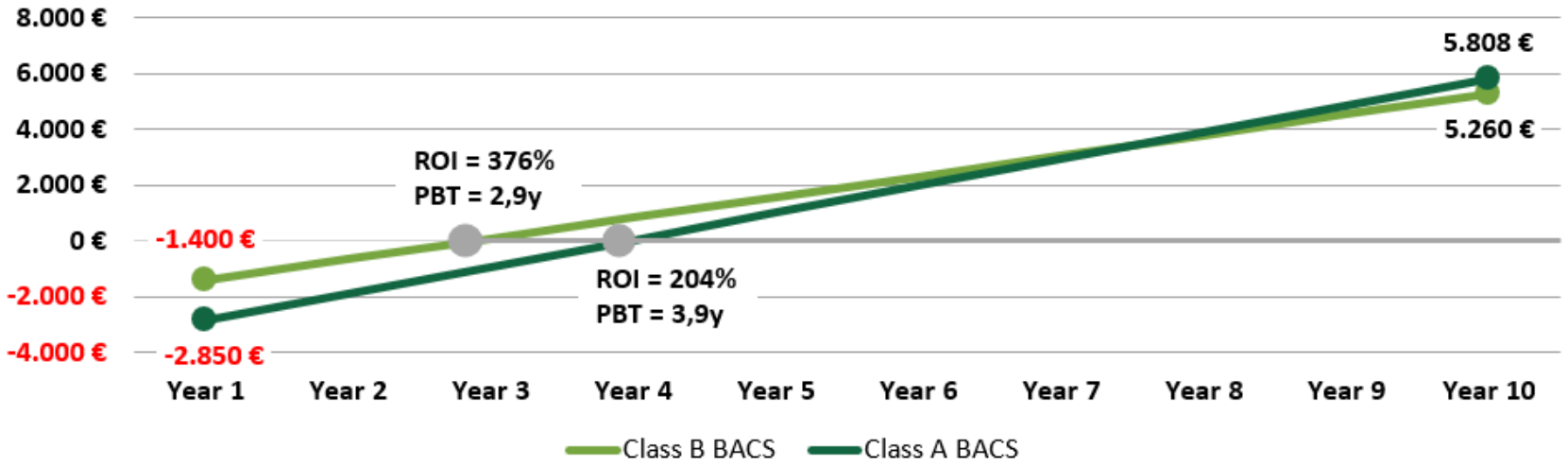
Example: 110 sqm apartment

- **BACS (thermal)** → 26% saving – 1,100€
- **Other systems combined** → 80% saving – 45,000€

SYSTEM	INVESTMENT
Thermal envelope	27.000 €
Efficient windows	18.000 €
Heat pump installation	7.000 €
Condensing boiler installation	3.000 €
Photovoltaic panels	3.700 €

Costs efficiency of BACS

Thermal BACS case study



- BACS require an initial investment in the order of a few thousands' euros, possibly limiting adoption.
- Considering the investment over BACS lifespan (10 years), the benefits achieved allow for a **significant return on the investment**, with a **payback time of 3 to 4 years** (considering BACS for thermal application) varying with BACS class.

BACS impact on energy performance

The impact of BACS on EPC classes

BACS adoption can achieve an EPC class improvement of up to **two classes**.

The performance improvement is especially **highlighted for lower-class** buildings and **non-residential** sector.

BACS can thus be a **remarkably effective and simple way** for improving energy efficiency **in older, less energy-efficient non-residential buildings.**

	RESIDENTIAL		NON-RESIDENTIAL	
EPC CLASS	**Class A BACS**	**Class B BACS**	**Class A BACS**	**Class B BACS**
A	0,1	0,1	0,2	0,1
B	0,4	0,3	0,3	0,3
C	0,6	0,5	0,6	0,5
D	0,8	0,6	0,8	0,7
E	1,0	0,8	1,2	1,0
F	1,2	0,9	1,6	1,4
G	1,9	1,6	2,0	1,8

BACS impact on energy performance

The EPC impact and required investment | Non-residential

EPC class improvement can be achieved through BACS extensively for a significant portion of buildings.

For non-residential buildings, assuming a **full adoption of class A and B** in different geographical regions, the cost of this implementation is in the order of **few bln€ for each region**.

NON-RESIDENTIAL SECTOR		GEOGRAPHICAL REGION			
		Mediterranean	Nordic	Continental	Oceanic
#buildings (mln units)		3,2	0,3	1,3	4,6
Class A	EPC improvement	1,1 classes	1,3 classes	1,1 classes	1,1 classes
	Cost* (bln€)	5 - 7	0,8 - 1,2	3 - 7	20 – 25
Class B	EPC improvement	1,0 classes	1,1 classes	0,9 classes	1,0 classes
	Cost* (bln€)	3 - 5	0,5 - 1	2 - 4	13 - 18

BACS impact on energy performance

The EPC impact and required investment | Residential

For the residential sector, the investment is higher due to the higher number of units.

Assuming a **full adoption of class A and B** in different geographical regions, the cost of this implementation is in the order of **10-50 bln€ for each region**.

The possible EPC improvement however varies, prioritizing regions with higher benefits.

		GEOGRAPHICAL REGION			
RESIDENTIAL SECTOR		Mediterranean	Nordic	Continental	Oceanic
#buildings (mln units)		26,1	2,5	16,1	52,4
Class A	EPC improvement	0,8 classes	1,0 classes	1,0 classes	0,8 classes
	Cost* (bln€)	30 - 35	2 - 4	15 - 25	60 – 70
Class B	EPC improvement	0,6 classes	0,8 classes	0,7 classes	0,6 classes
	Cost* (bln€)	20 - 25	1 - 3	10 - 15	40 - 50

Role of BACS in MEPS achievement

MEPS for non-residential sector

- BACS can significantly help with MEPS achievement, renovating buildings in a cost-efficient way.
- **16% threshold (2030)** → **570 mln sqm** to be improved – **4 bln€** total investment (class A)
- **26% threshold (2033)** → **1,0 bln sqm** to be improved – **7 bln€** total investment (class A)

		Medit.	Nordic	Continental	Oceanic
#buildings (mln units)		3,2	0,3	1,3	4,6
#buildings to be improved (mln units)		0,51 → 0,83	0,05 → 0,08	0,21 → 0,34	0,74 → 1,20
Surface to be improved (mln sqm)		130,6 → 180,9	21,9 → 32,6	69,8 → 124,8	350,5 → 680,1
Class A	Cost (mln€)	**940 → 1.290**	**130 → 200**	**520 → 890**	**2.490 → 4.740**
Class B	Cost (mln€)	**620 → 860**	**90 → 130**	**350 → 590**	**1.650 → 3.130**

16% threshold requirement → 26% threshold requirement

Role of BACS in MEPS achievement

MEPS for residential sector

- BACS can significantly help with MEPS achievement, reducing PED[1] at low costs.
- **16% PED reduction (2030)** → **25 mln buildings** to be improved – **34 bln€** total investment (class A)
- **22% PED reduction (2035)** → **35 mln buildings** to be improved – **48 bln€** total investment (class A)

		Medit.	Nordic	Continental	Oceanic
Total #buildings (mln units)		26,1	2,5	16,1	52,4
Required PED reduction (TWh)		64,7 → 88,9	5,7 → 7,8	40,0 → 55,1	140,8 → 193,3
Class A	#bld to be impr. (mln)	5,5 → 8,4	0,9 → 1,2	5,0 → 6,6	13,6 → 18,9
	BACS cost (mln€)	8.600 → 11.900	1.000 → 1.400	5.800 → 8.400	19.000 → 26.200
Class B	#bld to be impr. (mln)	8,1 → 11,7	1,2 → 1,6	6,4 → 8,9	17,8 → 24,6
	BACS cost (mln€)	7.900 → 11.000	800 → 1.200	4.900 → 7.000	15.600 → 21.400

(1) Primary Energy Demand

16% reduction requirement → 26% reduction requirement

Key findings

1

Energy and cost efficiency

The implementation of BACS can be achieved at **remarkably low costs** compared to other energy efficiency measures. The installation of these systems requires a relatively **short timeframe** allowing rapid improvements in building performance.

2

Buildings energy performance improvement

BACS adoption can lead to **significant building's energy performance improvements**, increasing efficiency **by at least one EPC class**. Additionally, the achievement of Zero Energy Buildings results to be difficult without these systems.

3

Important BACS role in achieving MEPS

These technologies can **contribute significantly to achieving Minimum Energy Performance Standards** and enable the integration of other efficiency solutions leading to the "**BACS multiplier effect**".

The support for BACS

How to increase the adoption

Incentive programs

Governments should consider creating **incentive programs** that encourage the adoption of high-level BACS (subsidies, tax incentives, or low-interest loans for initial installation costs).

Regulatory support

Regulatory frameworks like the EPBD should be properly implemented to **prioritise the integration of BACS** in buildings, especially those with poor energy performance.

Awareness campaigns

Raising awareness about the benefits of BACS among building owners, facility managers, and the local authorities public is essential.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PANEL DISCUSSION

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