

INDICATE LIFE: Methodological development for Whole Life Carbon (WLC) assessment of the Italian building stock

Dr Irene Mazzei

Professor Elisabetta Palumbo

University of Bergamo, Department of Engineering and Applied Sciences

9th October 2025



UNIVERSITÀ
DEGLI STUDI
DI BERGAMO

Department
of Engineering
and Applied Sciences

The Italian consortium



Non-profit association



Consultancy firm

since 1990

HARPACEAS

Your digital partner

Research and Innovation (R&I) Division

Academia



**UNIVERSITÀ
DEGLI STUDI
DI BERGAMO**

Department
of Engineering
and Applied Sciences



**Politecnico
di Torino**

Dipartimento
di Architettura e Design



**POLITECNICO
MILANO 1863**

DIPARTIMENTO DI ARCHITETTURA,
INGEGNERIA DELLE COSTRUZIONI
E AMBIENTE COSTRUITO

Public research authority



ITALIAN NATIONAL AGENCY FOR NEW TECHNOLOGIES,
ENERGY AND SUSTAINABLE ECONOMIC DEVELOPMENT

Project coordination team

Smith



KU LEUVEN



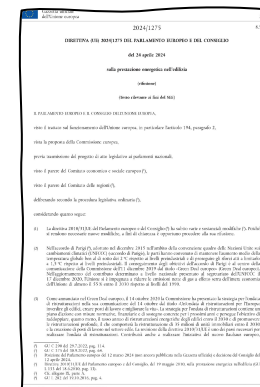
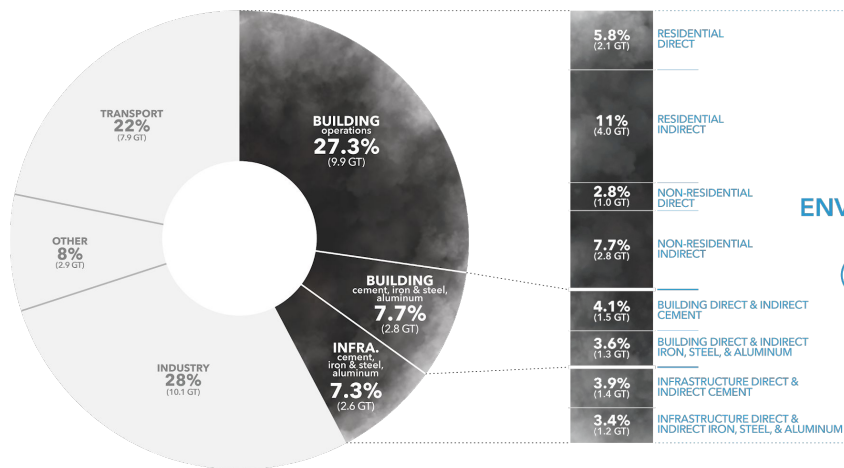
rise



Background and introduction



TOTAL ANNUAL GLOBAL CO₂ EMISSIONS
Direct & Indirect Energy & Process Emissions (36.3 GT)

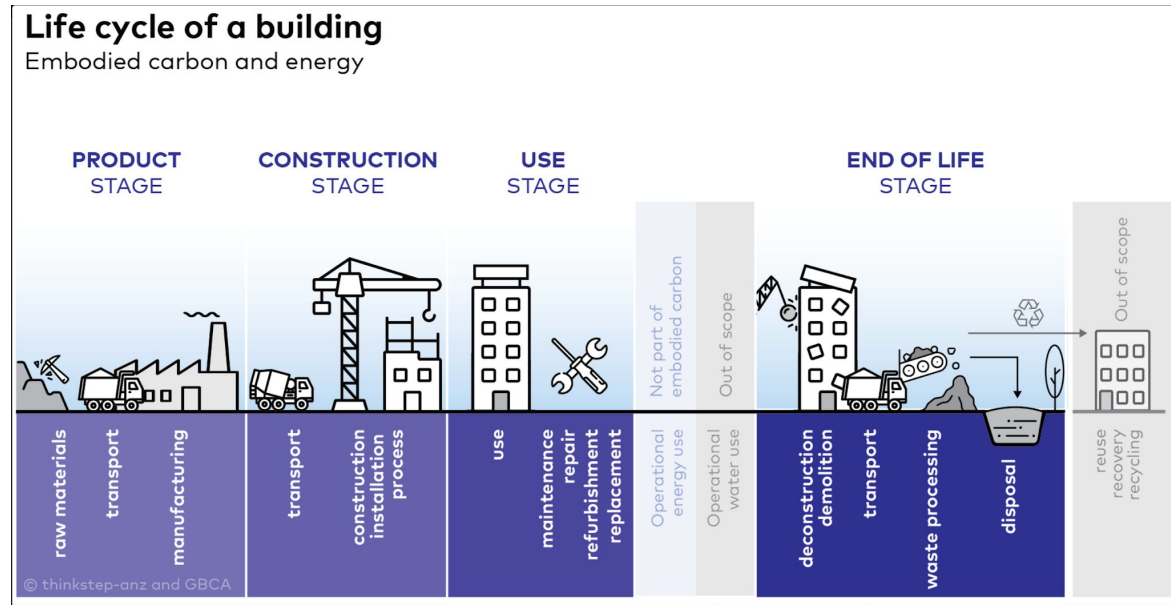


Energy Performance of Building Directive (2024/1275)

© Architecture 2030. All Rights Reserved.
Analysis & Aggregation by Architecture 2030 using data sources from IEA & Statista.

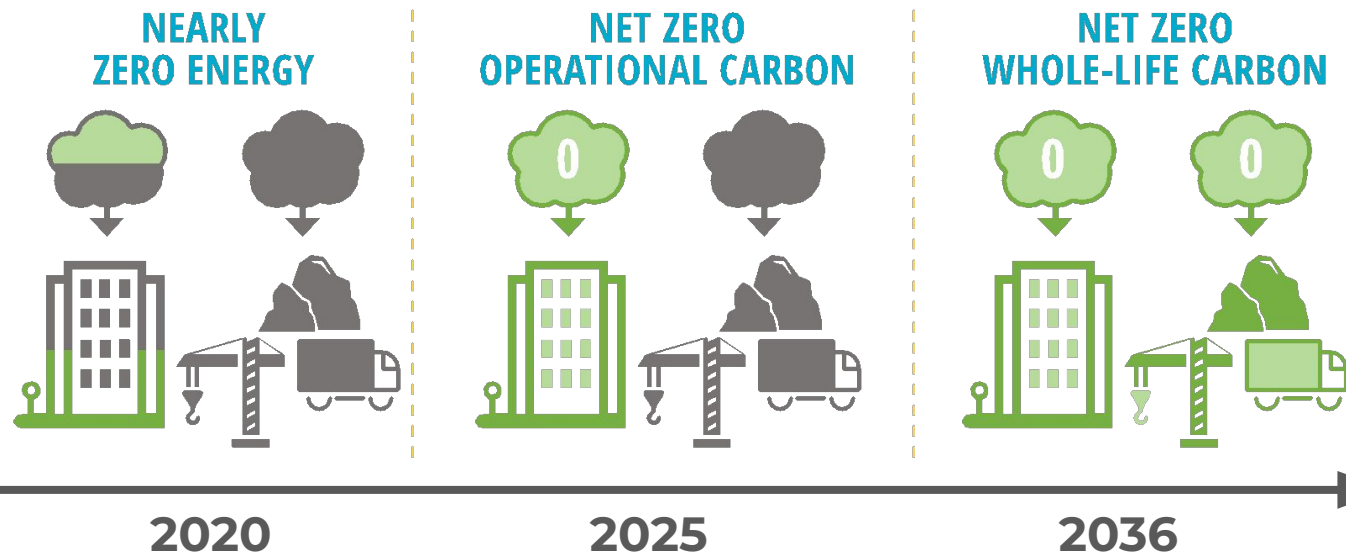
Background and introduction

The revised directive (2024) introduces requirements for **Whole Life Carbon (WLC)** calculations for new buildings. This means that every building will need to disclose its total carbon footprint across its entire life cycle.



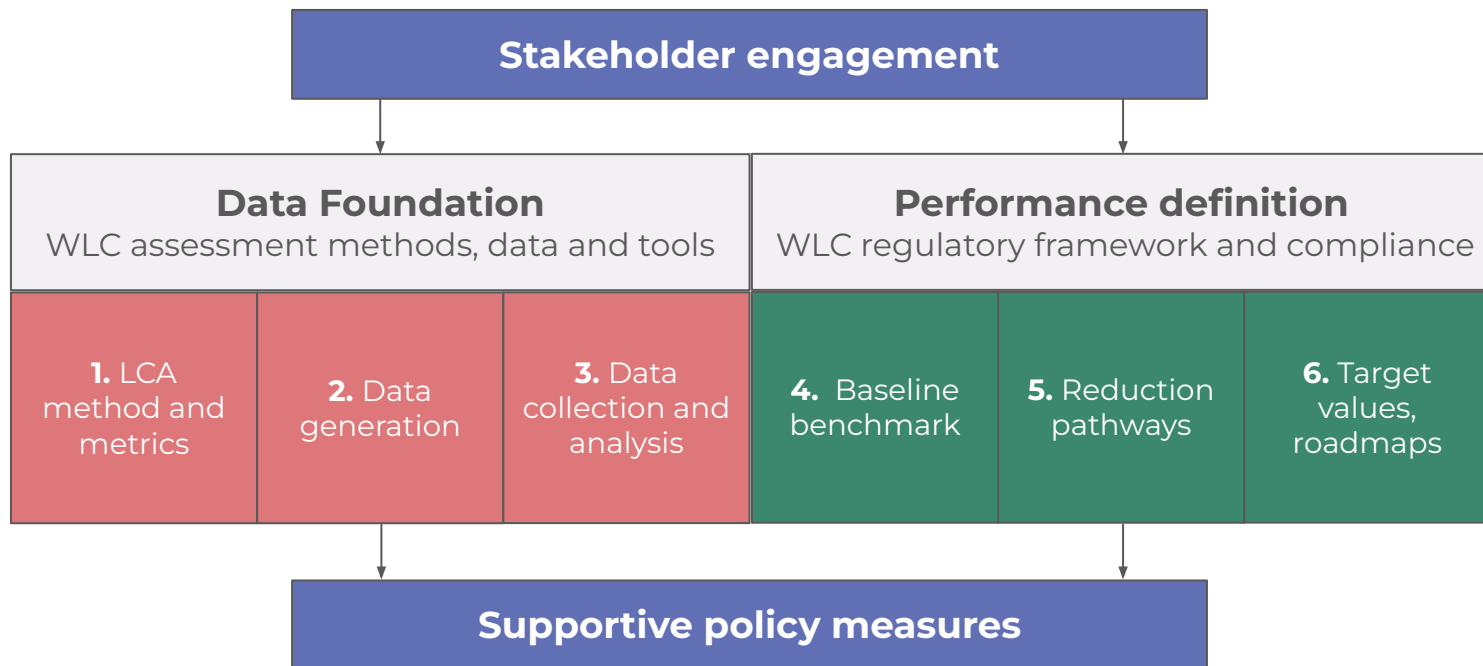
Source: ©Thinkstep-anz & GBCA

Background and introduction



Background and introduction

What is **INDICATE LIFE**'s role?



Source: BPIE & INDICATE "How to establish Whole Life Carbon benchmarks", 2024

The INDICATE project



<https://www.indicatedata.com/>

1 - What is it?

2 - What are the objectives?

3 - Project phases

4 - National progress

5 - Next steps

INDICATE LIFE

- EU-funded project (2024–2026) under the **LIFE Programme**
- Focus: improving **Whole Life Carbon (WLC)** data for buildings across Europe
- Supports the development of **national benchmarks** and policies to reduce lifecycle emissions in the construction sector

Why it matters

- The built environment accounts for around **40% of global CO₂** emissions
- **Reliable LCA** (Life Cycle Assessment) data is essential for effective decarbonisation policies
- Helps align construction with **EU climate neutrality goals** by 2050

Partners

- Green Building Councils of Austria, Croatia, Italy, Luxembourg, Hungary
- BPIE – Buildings Performance Institute Europe
- KU Leuven
- Smith Innovation

The INDICATE project



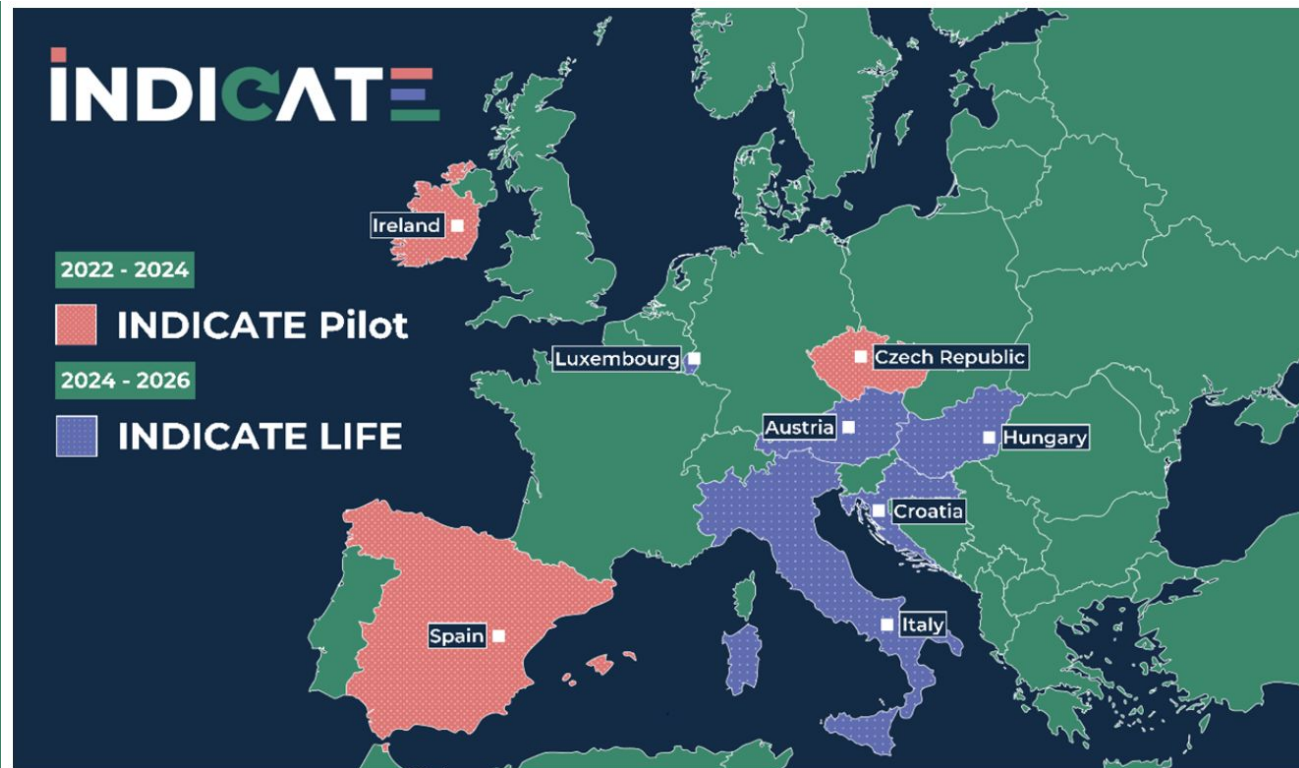
1 - What is it?

2 - What are the objectives?

3 - Project phases

4 - National progress

5 - Next steps



The INDICATE project



1 - What is it?

2 - What are the objectives?

3 - Project phases

4 - National progress

5 - Next steps

Challenge

The building sector lacks reliable and consistent LCA data, which is a major barrier to reducing WLC emissions.

Solution

Improve the quality and availability of building LCA data to create shared benchmarks and support effective decarbonisation policies.

Role of INDICATE LIFE

The project acts as a European accelerator, uniting Green Building Councils and research institutions to deliver robust data and drive policy action on WLC.

The INDICATE project



1 - What is it?

2 - What are the objectives?

3 - Project phases

4 - National progress

5 - Next steps



1. **Harmonise Whole Life Carbon (WLC) methodologies** between Italy and other EU Member States



2. **Develop a robust national set of impact data** by applying WLC assessment to representative case studies



3. **Establish national WLC benchmarks and targets** to inform decarbonisation strategies, enabling policymakers and industry to set realistic, evidence-based pathways to net zero carbon emissions.

The INDICATE project



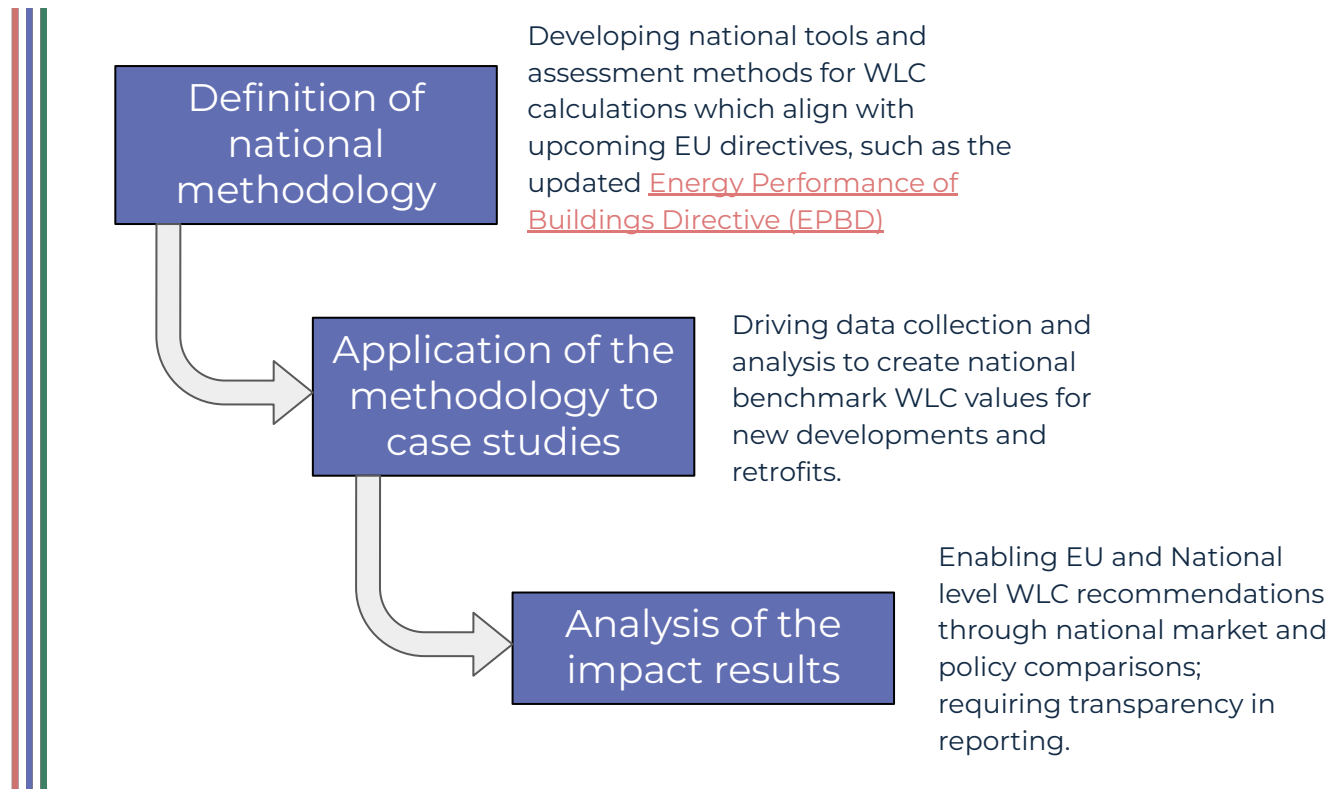
1 - What is it?

2 - What are the objectives?

3 - Project phases

4 - National progress

5 - Next steps



The Italian methodology

1 - What is it?

2 - What are the objectives?

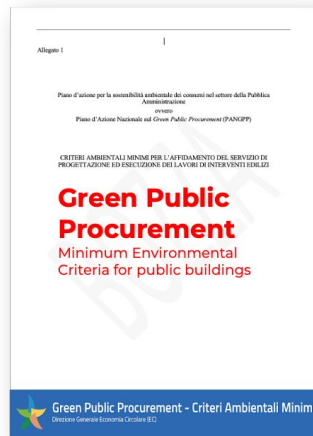
3 - Project phases

4 - National progress

5 - Next steps

No National methodology or harmonised method to calculate LCA at the building level.

Therefore, starting from the existing 2 approaches (GPP and WLC GBC Italy report) we have analysed the following **key aspects**:



GPP 'Minimum Environmental Criteria' for Public Buildings



Whole Life Carbon and Circular Economy accounting of a building (GBC Italy)



INDICATE LIFE Italian methodology

Scope and design
features

Assessment and
calculation
methods

Data sources

Calculation tools

Reporting and
aggregation

The Italian methodology

1 - What is it?

2 - What are the objectives?

3 - Project phases

4 - National progress

5 - Next steps

Definition of national **building archetypes**

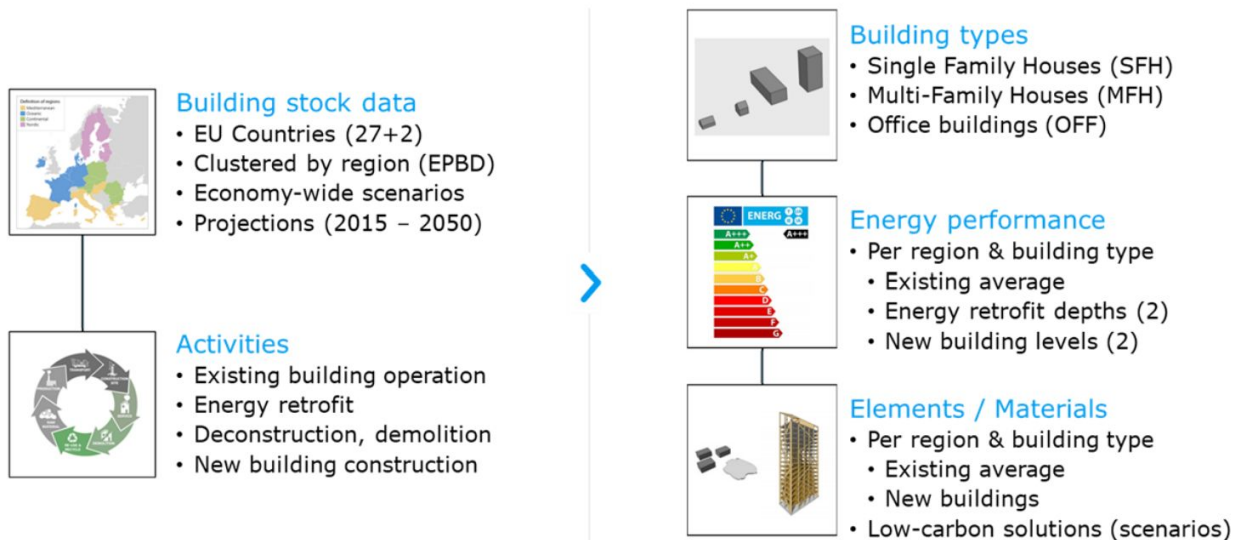


Figure source: Ramboll | BPIE | KU Leuven - Supporting a Roadmap for the Reduction of Whole Life Carbon in Buildings, 2023

The Italian methodology

1 - What is it?

2 - What are the objectives?

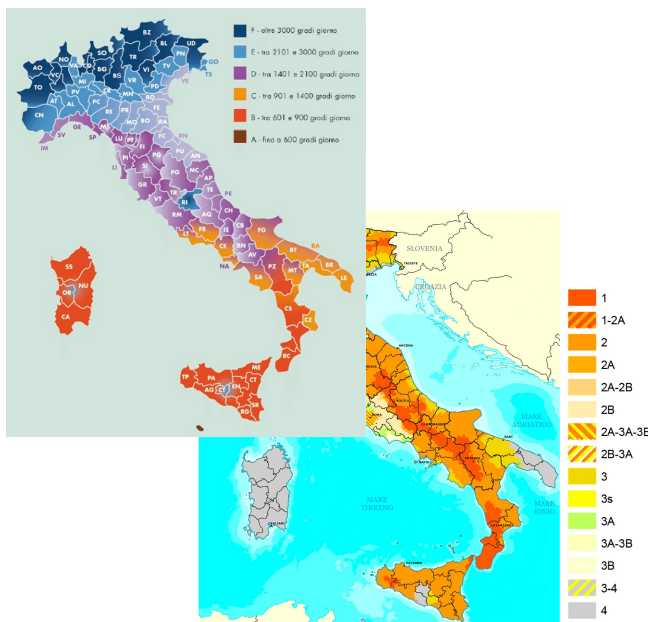
3 - Project phases

4 - National progress

5 - Next steps

Definition of national **building archetypes**

Seismic and climatic performance constraints



Building types



Construction types



The case studies

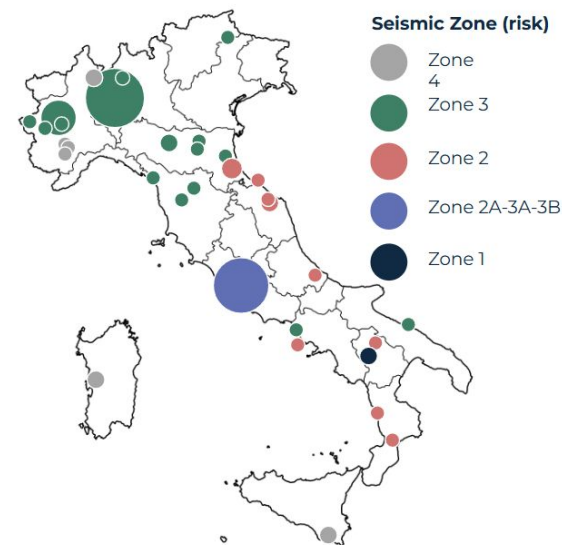
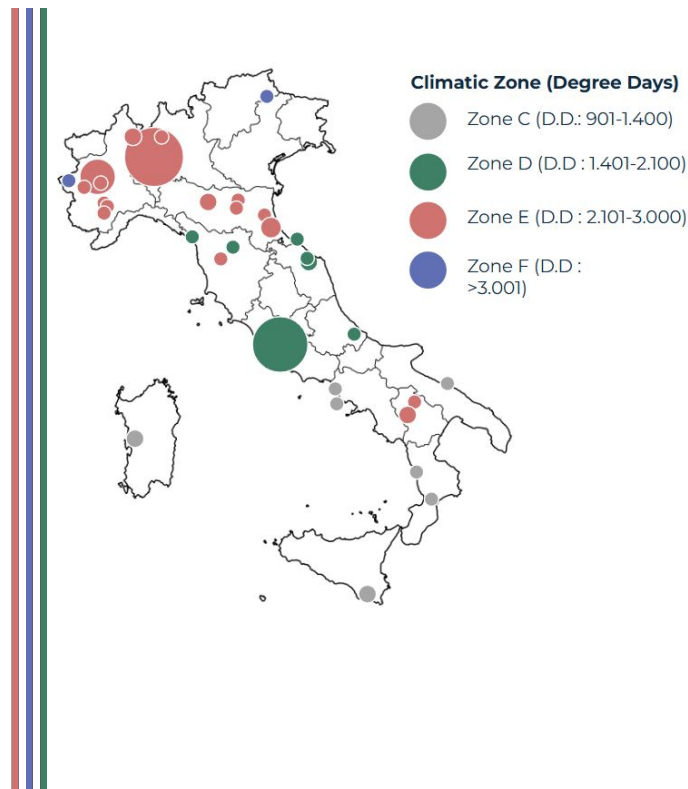
1 - What is it?

2 - What are the objectives?

3 - Project phases

4 - National progress

5 - Next steps



The assessment

1 - What is it?

2 - What are the objectives?

3 - Project phases

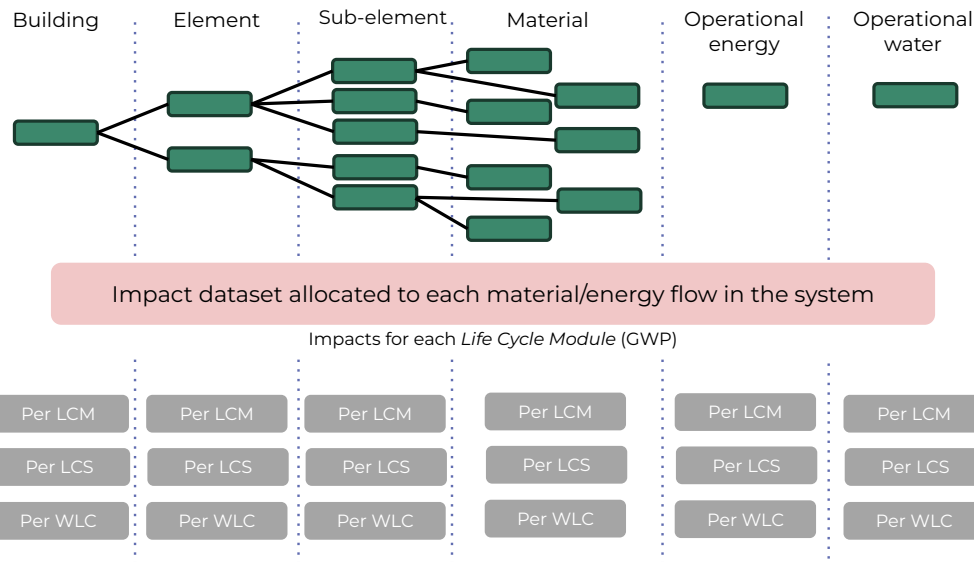
4 - National progress

5 - Next steps

1. Material allocation from Bill of Quantities

2. Life Cycle GWP

3. Report



Reporting results

1 - What is it?

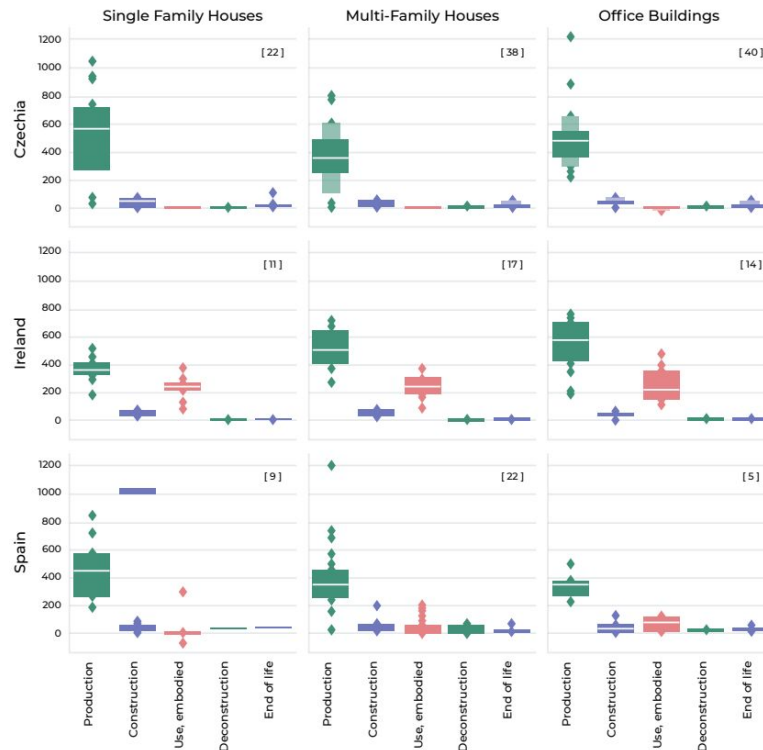
2 - What are the objectives?

3 - Project phases

4 - National progress

5 - Next steps

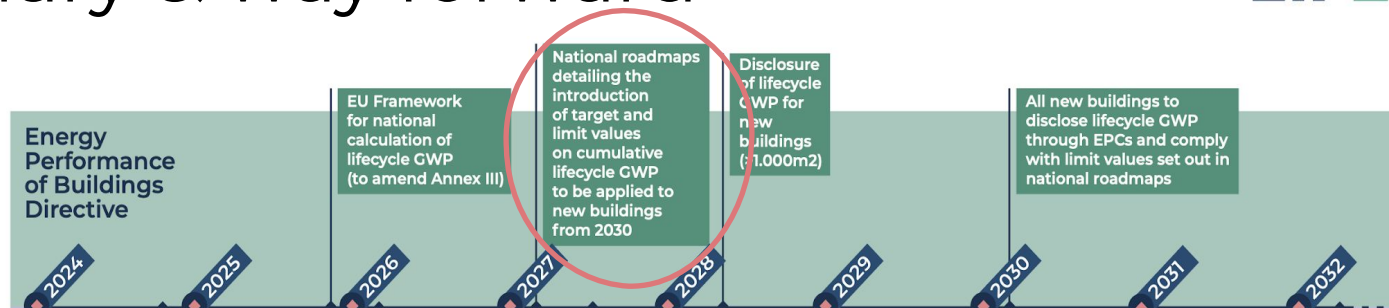
Embodied carbon intensity for selected key attributes



Results
from the
first
INDICATE
project

Buildings
Performance
Institute Europe
(BPIE). (2024).
*How to establish
whole life
carbon
benchmarks.*

Summary & way forward



- The results will support the development of a national roadmap: we are assessing >50 case studies
- This project is only the beginning for a robust development of national benchmarks which encompass the peculiarities of the Italian building stock
- Let's work together!

A vertical bar on the left side of the slide, composed of three parallel lines in red, blue, and green.

Thank you for your attention

Contacts

Dr Irene Mazzei: irene.mazzei@quest.unibg.it

Prof. Elisabetta Palumbo: elisabetta.palumbo@unibg.it