# Introduction

An **EPC database** represents a **core source of information** on the building stock.

This information can be exploited:

- to create the **archetypes**, which are representative of clusters within the building stock

- to classify the main **energy efficiency measures** (EEMs) related to different archetypes

- to analyse the **energy performance status** of the building stock

- to assess **energy saving scenarios** for the building stock

- to formulate national/regional/local **building renovation plans**

Building stock energy model flowchart
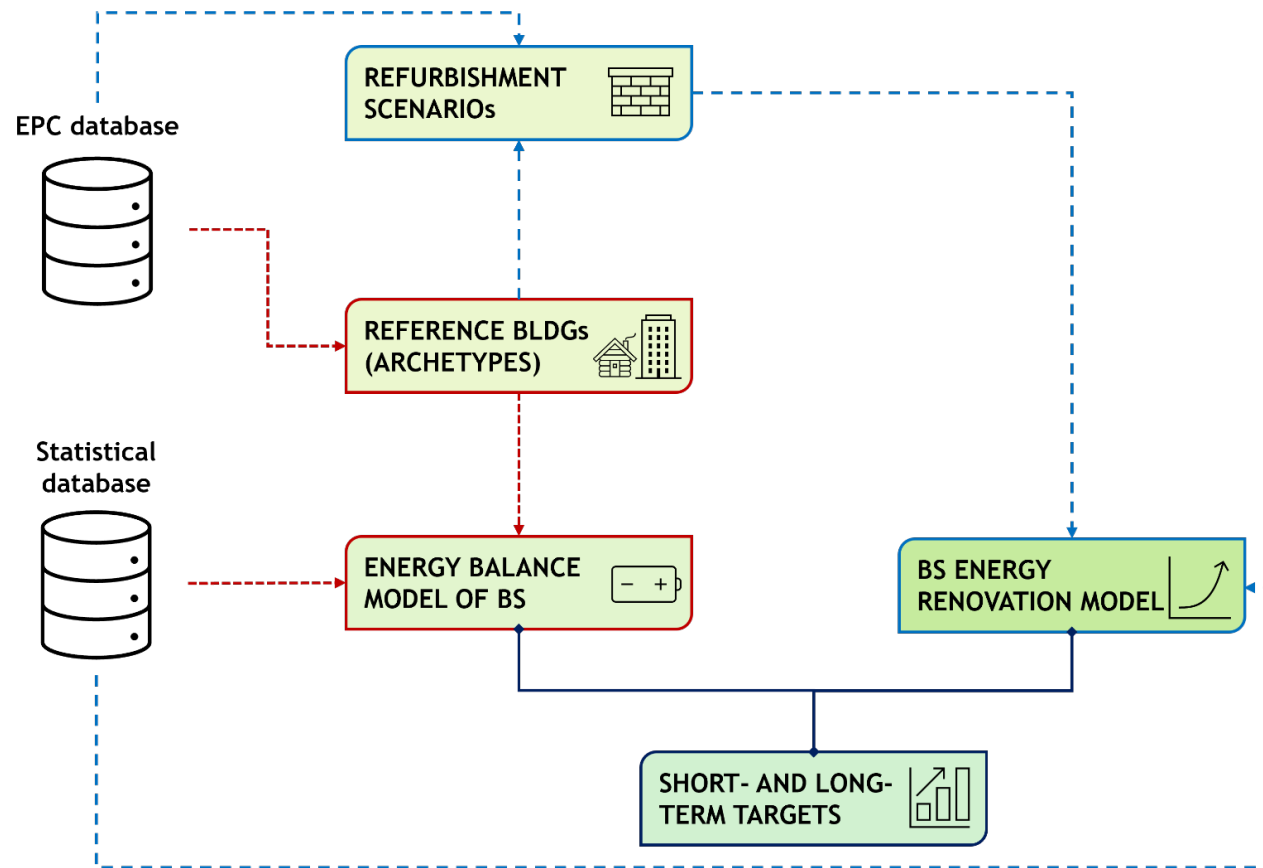
Source: TIMEPAC *Deliverable 2.5 Procedures and services to undertake large-scale statistical analysis of EPCs databases Transversal - Deployment Scenario 5*
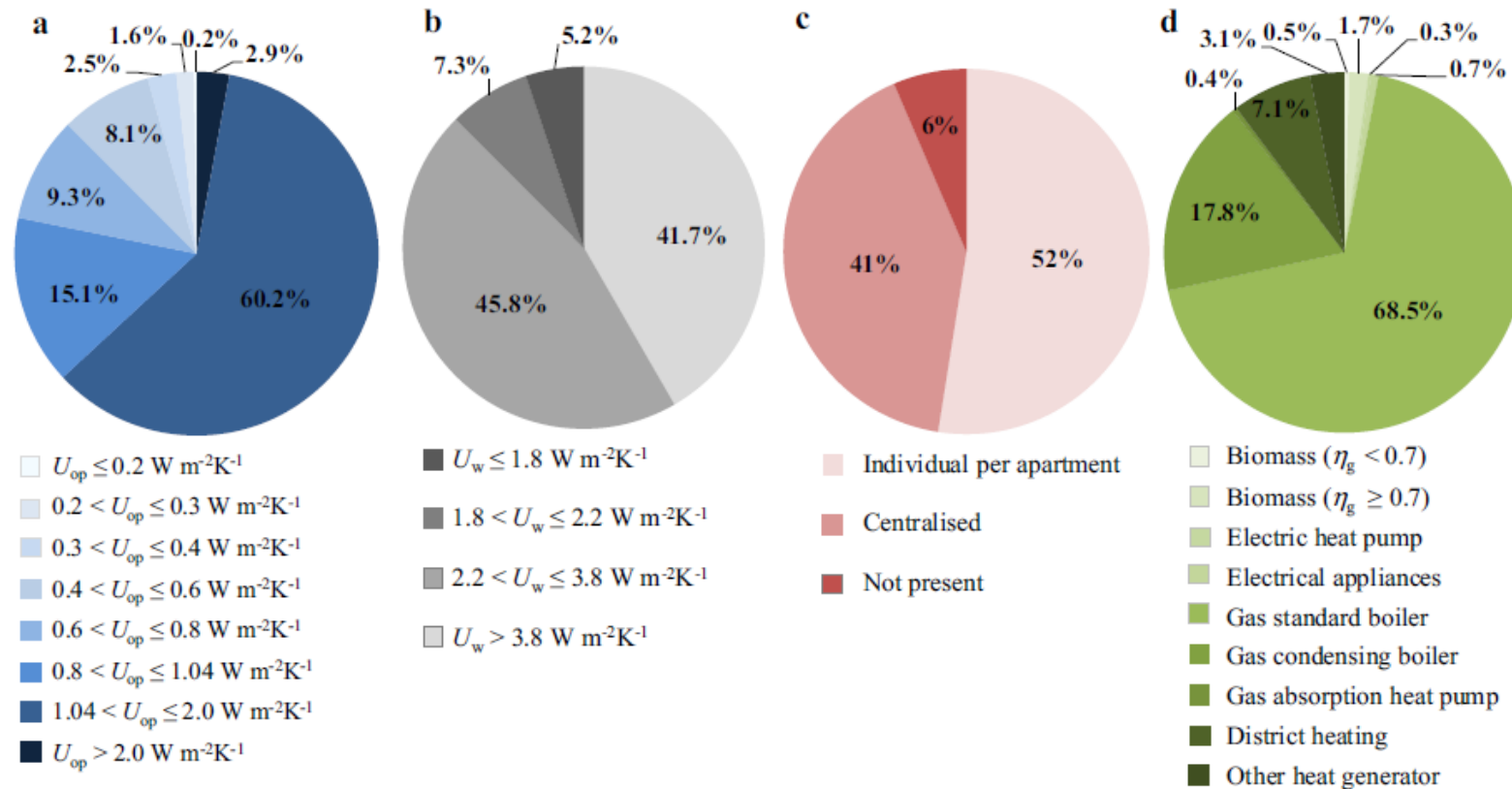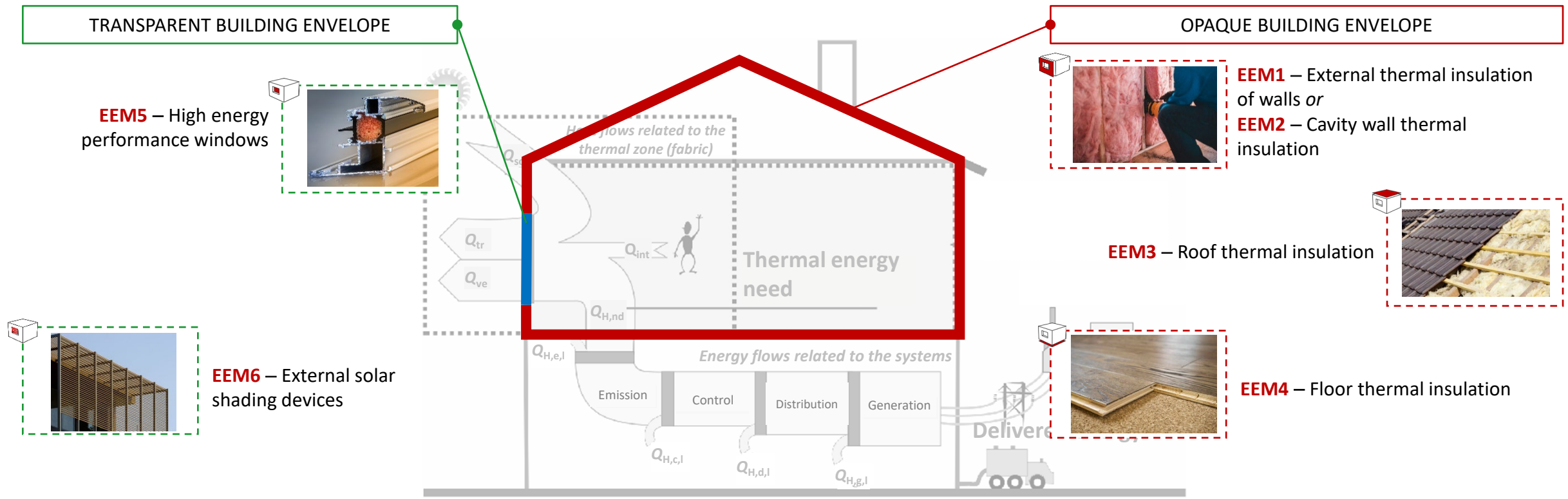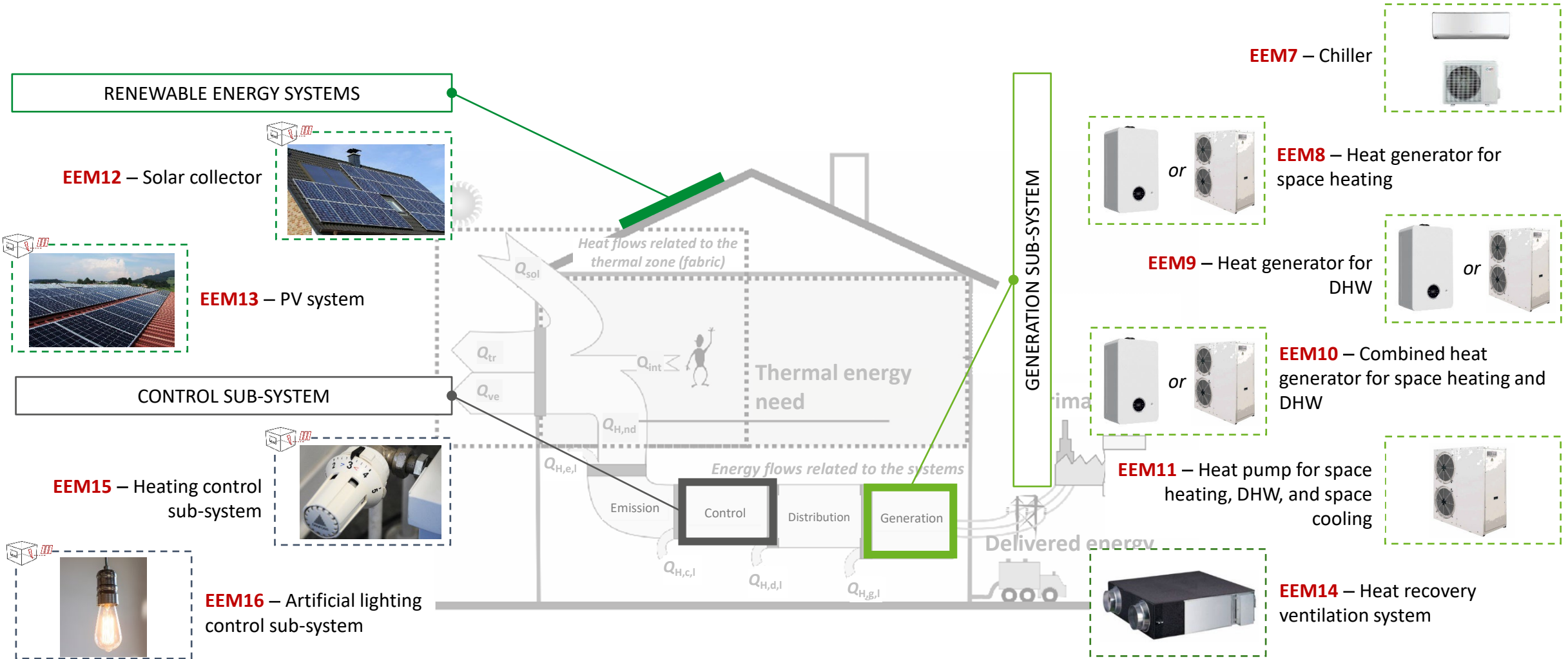
Example of data extracted from an EP data base

Fig. 1. Share of RBS floor area by U-value of walls (a) and windows (b), by type of space heating system (c) and heat generator for space heating (d) (elaborations from the EPCs database of Piedmont).

Source: *V. Corrado, I. Ballarini / Energy and Buildings 132 (2016) 91–106*

EEMs related to the building envelope

TRANSPARENT BUILDING ENVELOPE

OPAQUE BUILDING ENVELOPE

EEM5 – High energy performance windows

EEM6 – External solar shading devices

EEM1 – External thermal insulation of walls *or*
EEM2 – Cavity wall thermal insulation

EEM3 – Roof thermal insulation

EEM4 – Floor thermal insulation

Q_{sol}

Q_{int}

Thermal energy need

Q_{tr}

Q_{ve}

$Q_{H,nd}$

Heat flows related to the thermal zone (fabric)

$Q_{H,e,l}$

Energy flows related to the systems

Emission

Control

Distribution

Generation

Delivered

$Q_{H,c,l}$

$Q_{H,d,l}$

$Q_{H,g,l}$

EEMs related to technical building systems

RENEWABLE ENERGY SYSTEMS

EEM12 – Solar collector

EEM13 – PV system

CONTROL SUB-SYSTEM

EEM15 – Heating control sub-system

EEM16 – Artificial lighting control sub-system

EEM7 – Chiller

GENERATION SUB-SYSTEM

EEM8 – Heat generator for space heating

or

EEM9 – Heat generator for DHW

or

EEM10 – Combined heat generator for space heating and DHW

or

EEM11 – Heat pump for space heating, DHW, and space cooling

EEM14 – Heat recovery ventilation system

Heat flows related to the thermal zone (fabric)

Q_{sol}

$Q_{int} \lesssim$

Q_{tr}

Q_{ve}

$Q_{H,nd}$

Thermal energy need

Energy flows related to the systems

$Q_{H,e,l}$

Emission

Control

Distribution

Generation

$Q_{H,c,l}$

$Q_{H,d,l}$

$Q_{H,g,l}$

Prima

Delivered energy

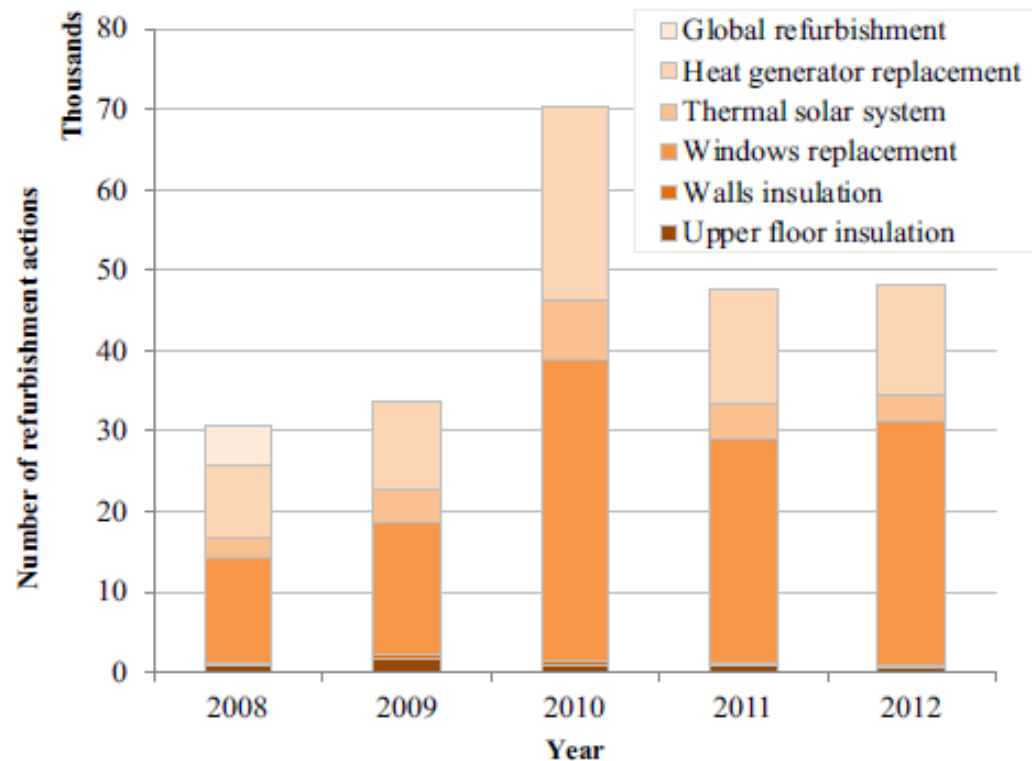# Energy refurbishment actions from an EP data base

Fig. 2. Energy refurbishment actions in Piedmont dwellings (yearly values from 2008 to 2012).

Source: *V. Corrado, I. Ballarini / Energy and Buildings 132 (2016) 91–106*

Effect of combined EEMs on the building stock

EP percentage decrease per combinations of energy efficiency measures (RENs) for single family houses in Piedmont Region (Italy) by construction period
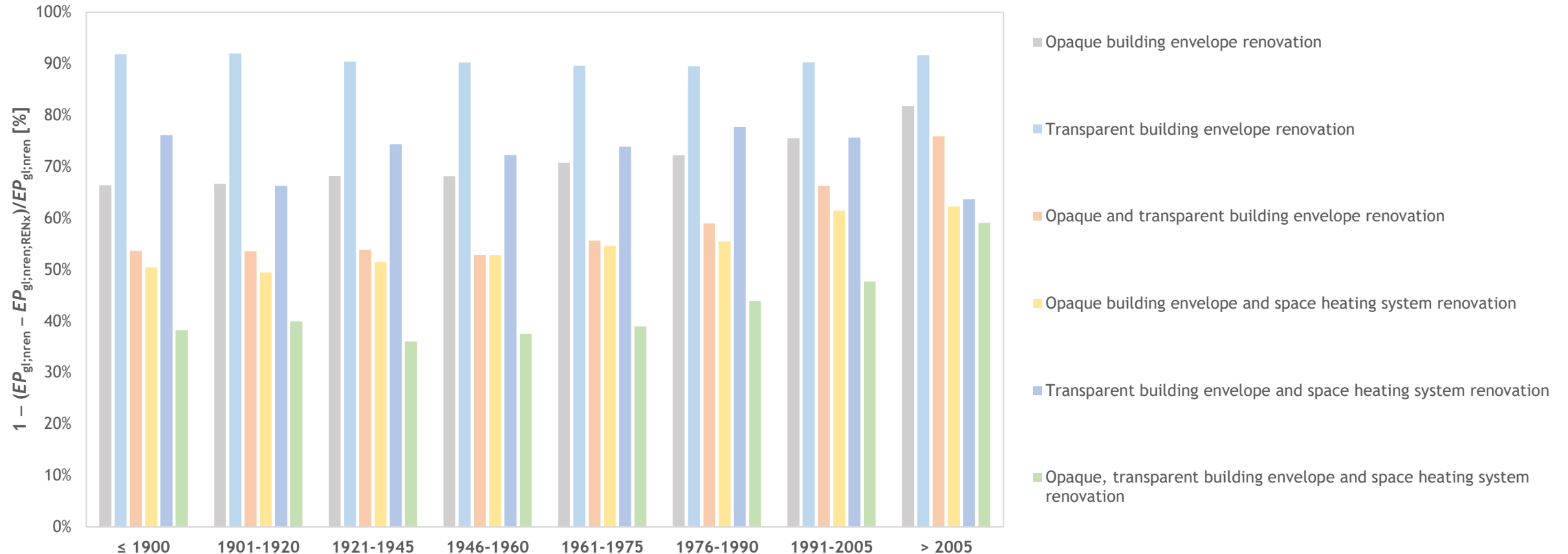
Source: TIMEPAC Deliverable 2.5 Procedures and services to undertake large-scale statistical analysis of EPCs databases Transversal - Deployment Scenario 5

Building stock energy performance tool overview

1. The tool developed in the TIMEPAC project allows to perform the calculation for residential building stock,

2. Three building sizes and shapes can be input into the tool:
    *   Single family house (SFH),
    *   Building units in apartment block or multi-family house (BU(AB)), and
    *   Apartment block (AB).

3. Building stock energy intensity is determined through standard energy performance indicators ($EP_{H;nd}$, $EP_{H;nren}$, $EP_{gl;nren}$, etc.) derived from EPC,

4. Simplified calculation for GHG emission of the building stock through the input of two energy carrier types per energy performance indicator.

Examples of building stock renovation scenarios
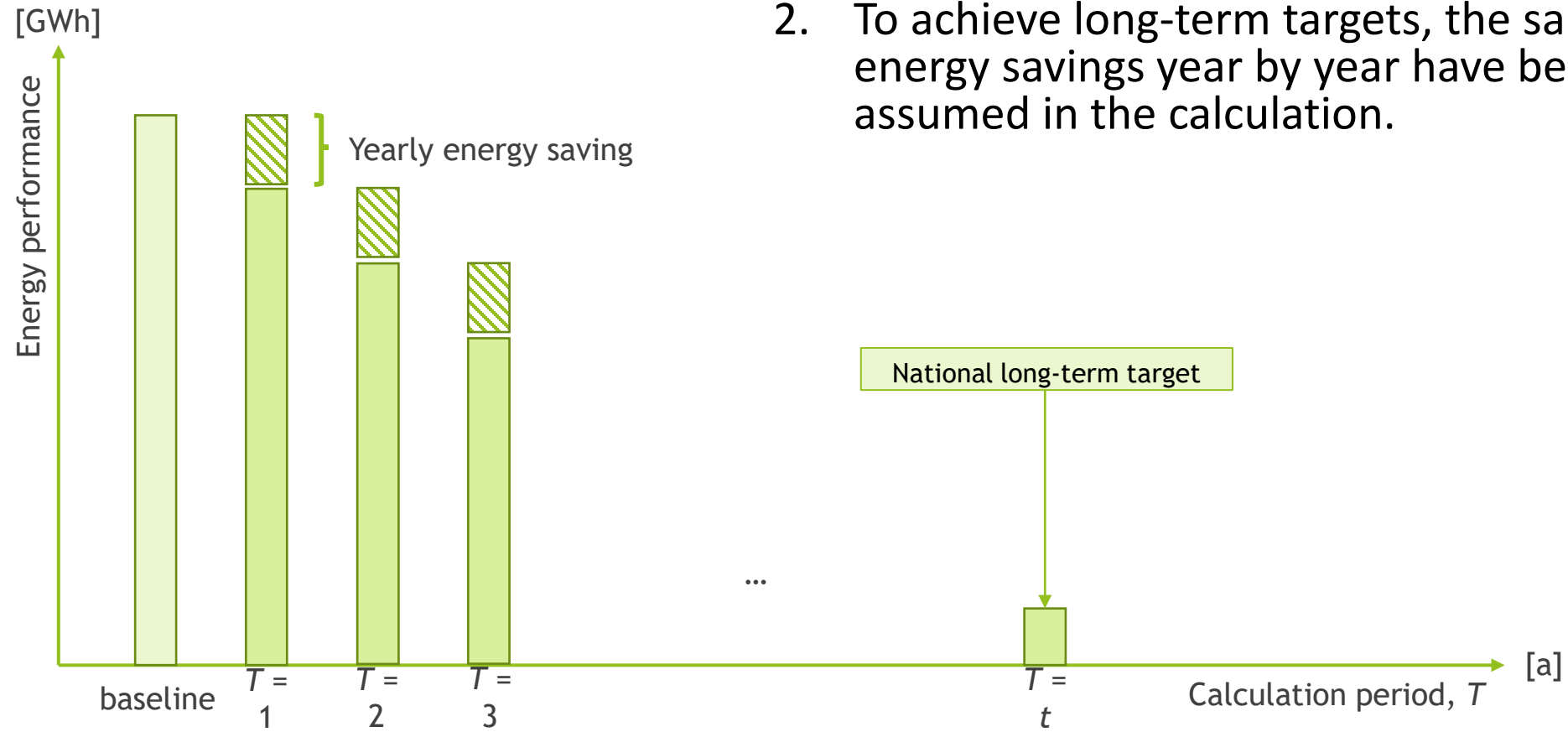
1. Three renovation scenarios have been implemented (REN1, REN2, and REN3),

2. To achieve long-term targets, the same energy savings year by year have been assumed in the calculation.

Conclusion

- *Long-term renovation strategies based on archetype-based building stock energy models derived from EPC data hold significant potential, especially in line with the ambitious decarbonization goals of the EU.*

- This activity can engage multiple stakeholders, including public administrations, urban planners, and local and national energy authorities.

- The success of this approach is linked to:
  - Availability of **reliable and up-to-date data** (quality checking of EPCs)
  - Use of **reliable energy assessment models**
  - Adoption of **standard procedures** for collecting data on buildings and energy retrofit interventions
  - Reliable and up-to-date **information on the evolution of costs**.

TIMEPAC The new EPC for Europe

If you would like more information, please visit www.timepac.eu or contact us at

vincenzo.corrado@polito.it

Thanks for your attention!