AEE INTEC

EBC
Energy in Buildings and Communities Programme

IEA EBC Annex 56

Cost-effective energy and carbon emission optimization in building renovation

Detailed Case Studies – main results, conclusions and lessons learnt from the analysis of real case studies from the residential building stock of participating countries

Renovating Buildings with Cost-Effective Reductions in Energy and Carbon Emissions – Findings from IEA EBC Annex 56

Webinar, 08 - November - 2016

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Agenda

1. Which buildings are “Detailed Case Studies” in the IEA EBC Annex 56?
2. Objectives of the analysis
3. Strategy to test the methodology
4. Renovation packages and results
5. Conclusions and lessons learnt

What are Detailed Case Studies?

- **The Detailed Case Studies are both residential and non-residential buildings**
- **Which serve as model projects for renovations in each individual country**
- **The specific aim of the case study activity of this project was to provide significant and useful feedback from practice on a scientific basis.**

Detailed Case Studies

A **Austria** – multi-family building

B **Czech Republic** – elementary school

C **Denmark** – multi-family building

D **Portugal** – two-family building

E **Spain** – multi-family building

F **Sweden** – multi-family building

Detailed Case Studies

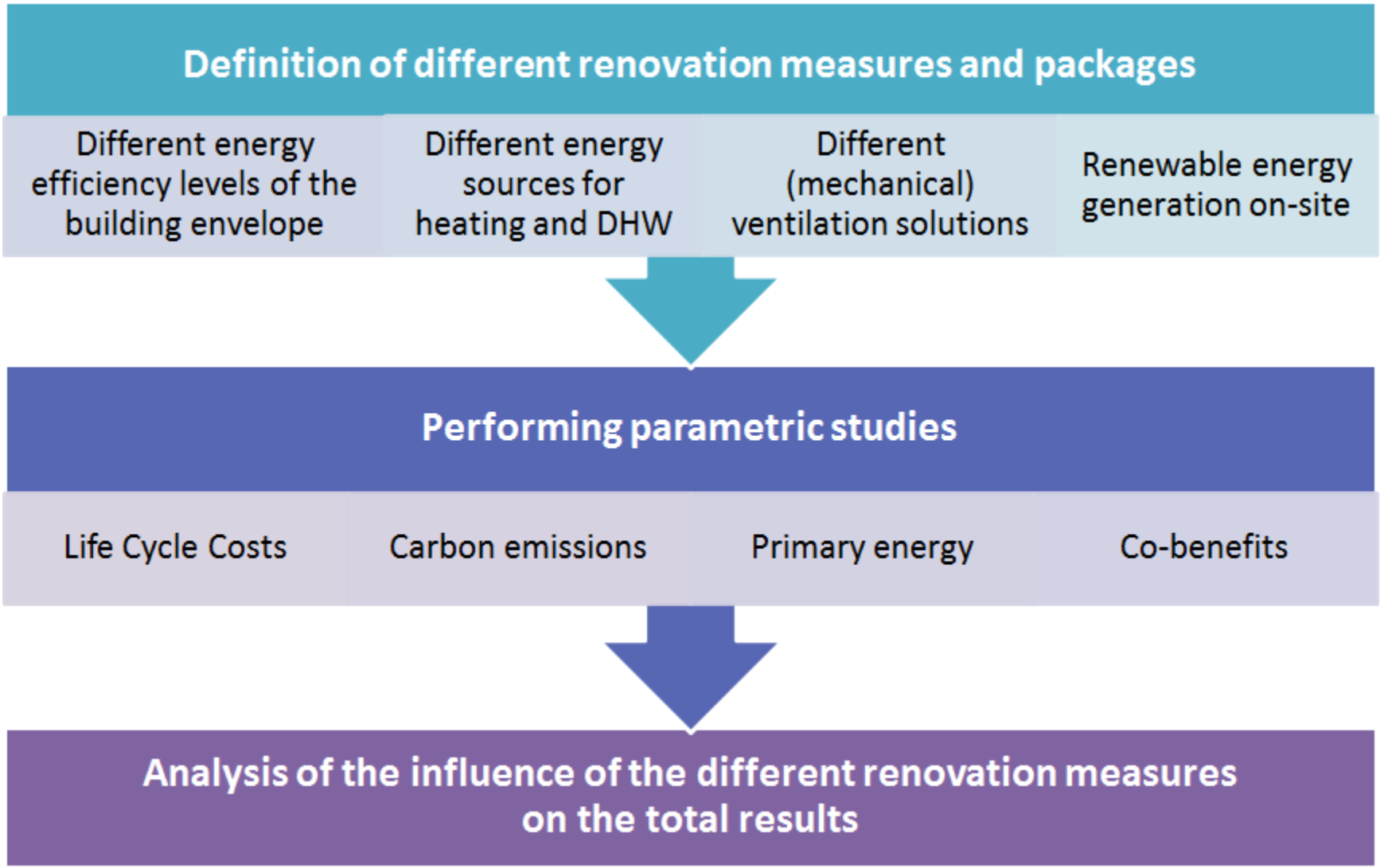
	Country	Before	After	Site	Building type	Year(s) of construction	Year(s) of renovation	Gross Heated Floor Area
A	Austria			Johann-Böhmstraße, Kapfenberg	Multi-family building	1960 – 1961	2012 – 2014	2845 m²
B	Czech Republic			Kamínky 5, Brno	Elementary School	1987	2009 – 2010	9909 m²
C	Denmark			Traneparken, Hvalsø	Multi-family Building	1969	2011 – 2012	5293 m³
D	Portugal			Neighborhood RDL, Porto	Two-family Building	1953	2012	123 m²
E	Spain			Lourdes Neighborhood, Tudela	Multi-family Building	1970	2011	1474 m²
F	Sweden			Backa röd, Gothenburg	Multi-family Building	1971	2009	1357 m²

Objectives of the Case Studies

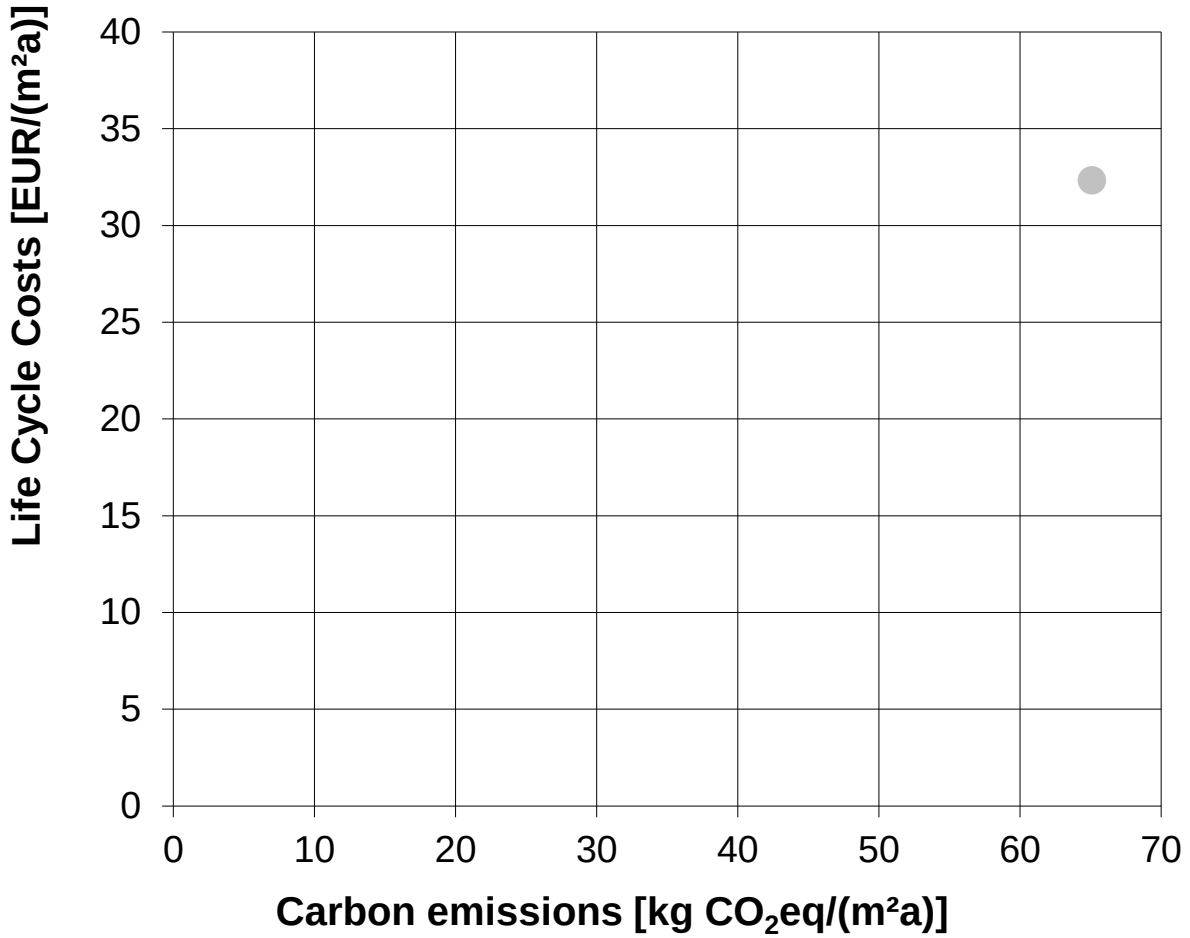
The main objectives of this work were:

- **To test the methodology**
- **To reach an in-depth understanding of the performance of the selected Case Studies**
- **To understand barriers and constraints for high performance renovations**
- **To support decision-makers and experts with profound, science based information for their future decisions**
- **To show successful renovation projects in order to motivate decision-makers and stimulate the market towards more ambitious renovations.**

Strategy to test the developed methodology



Results – „Case Study Kapfenberg, Austria“



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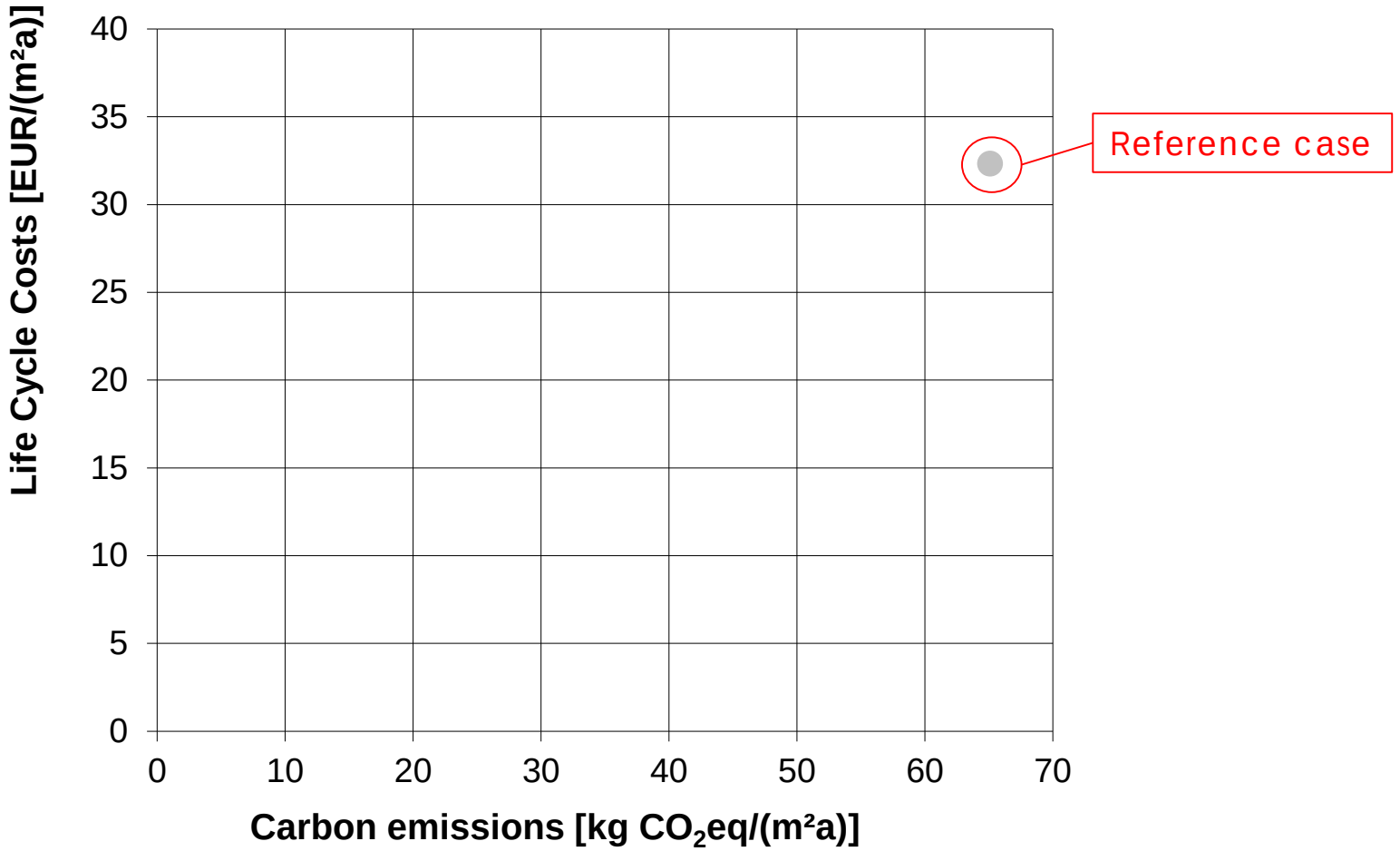

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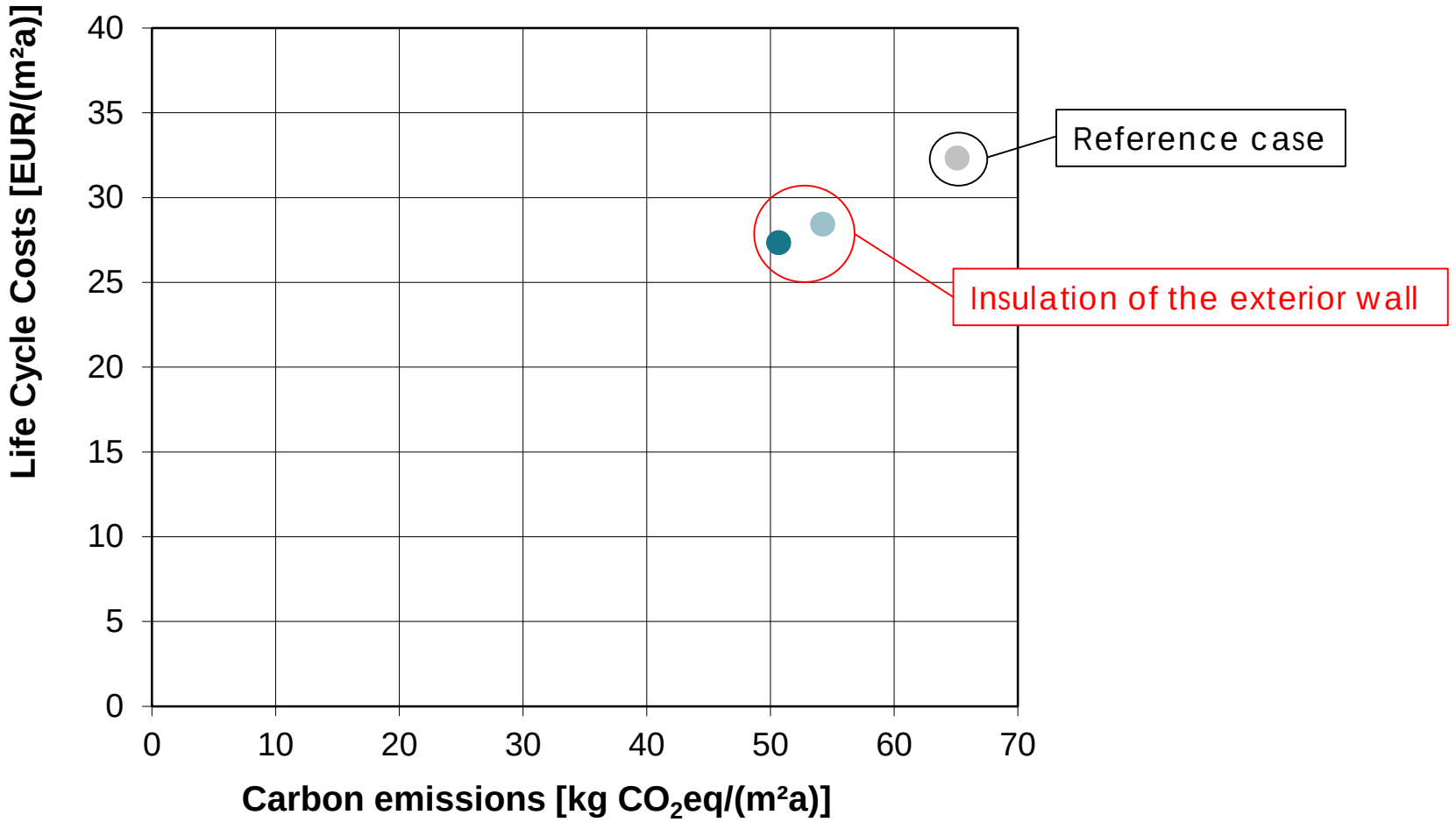

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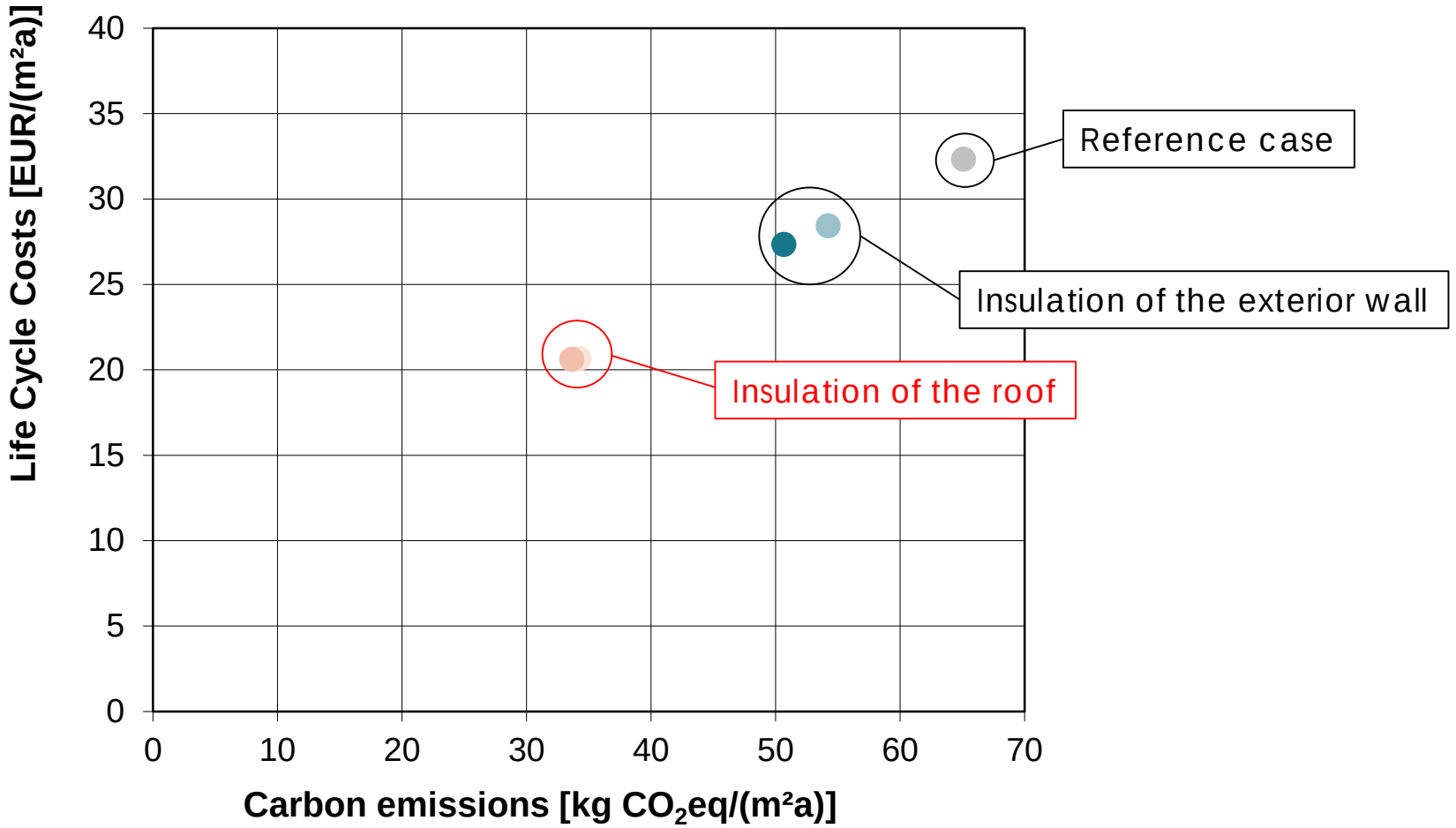

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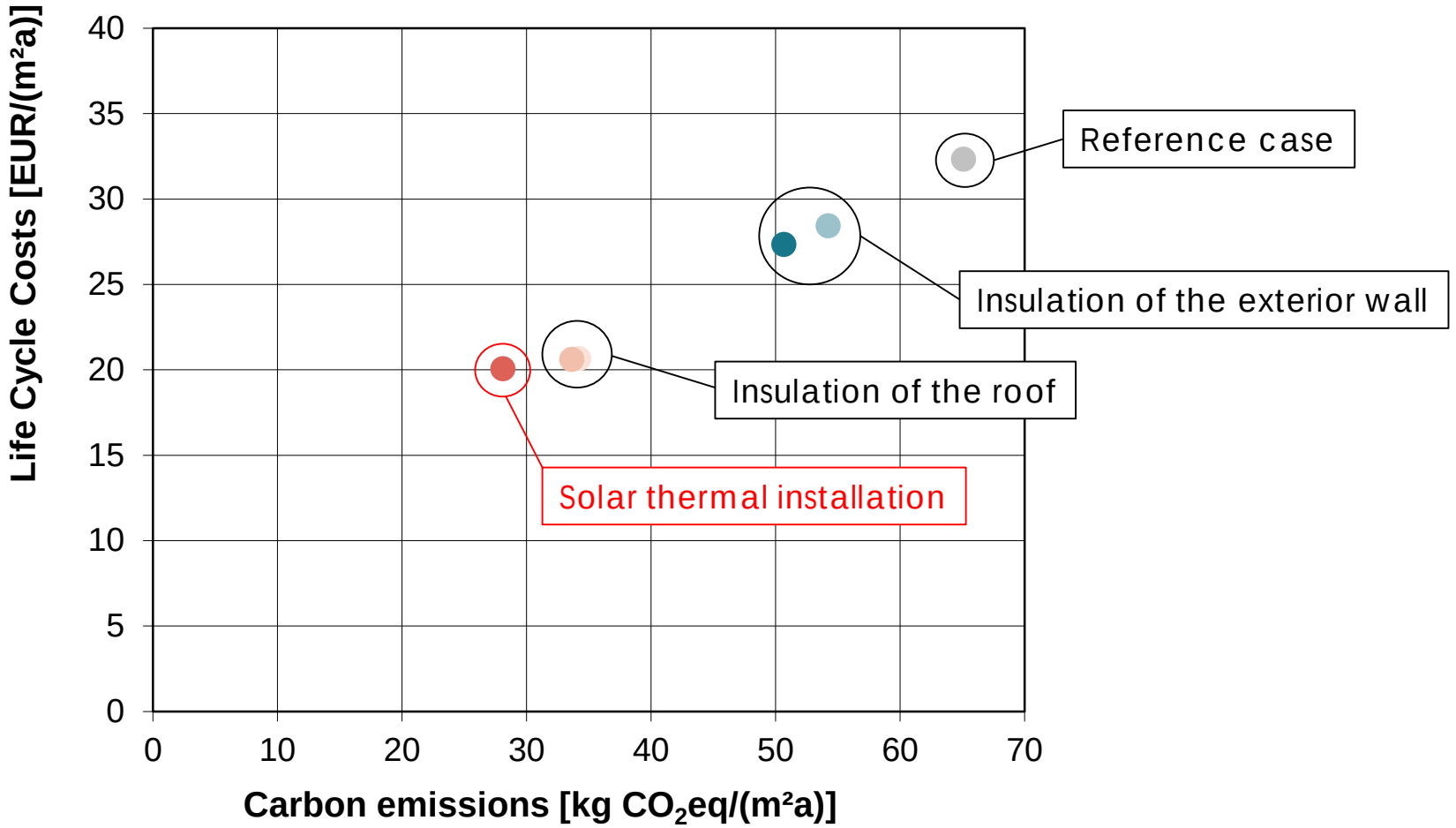

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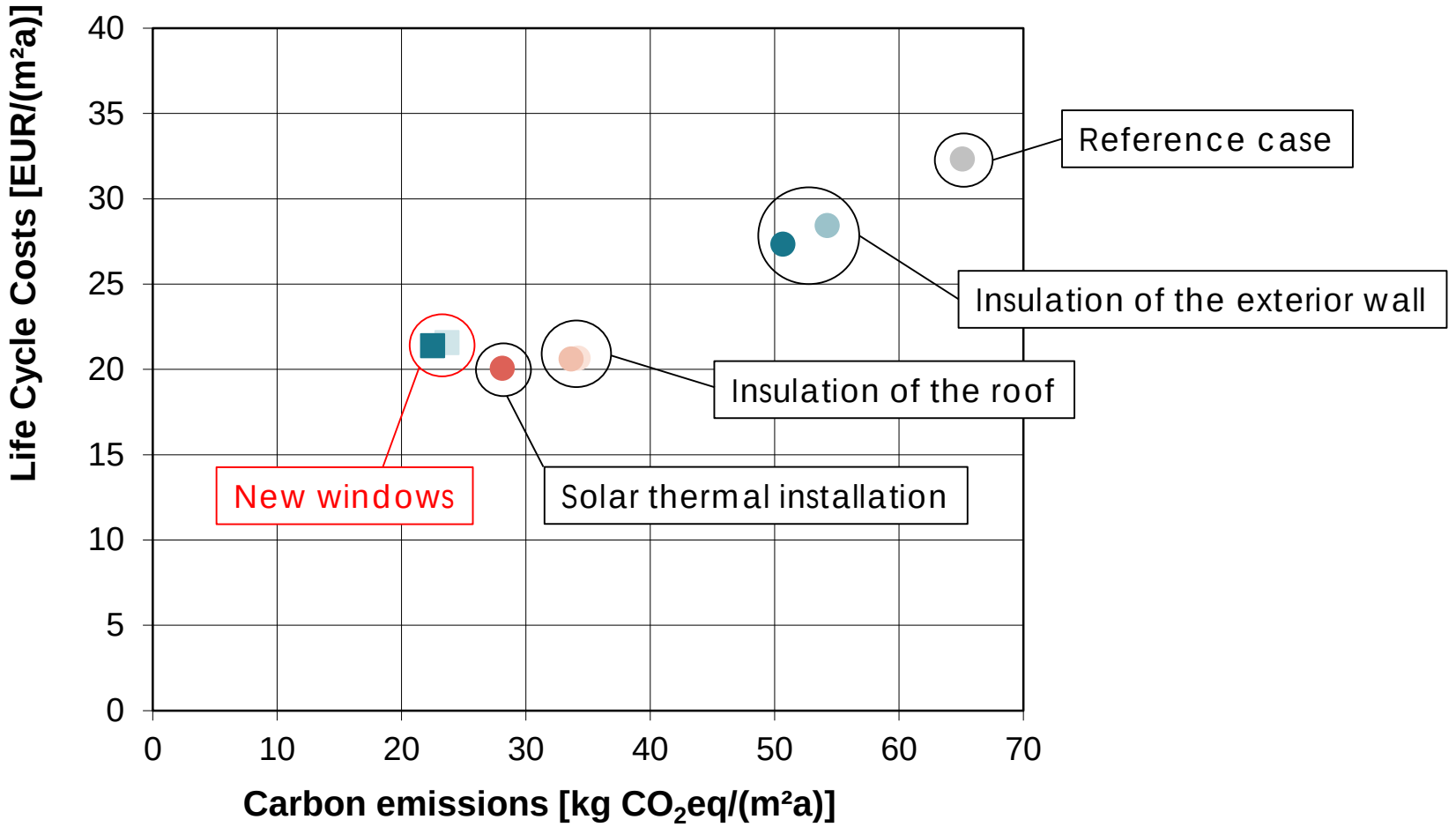

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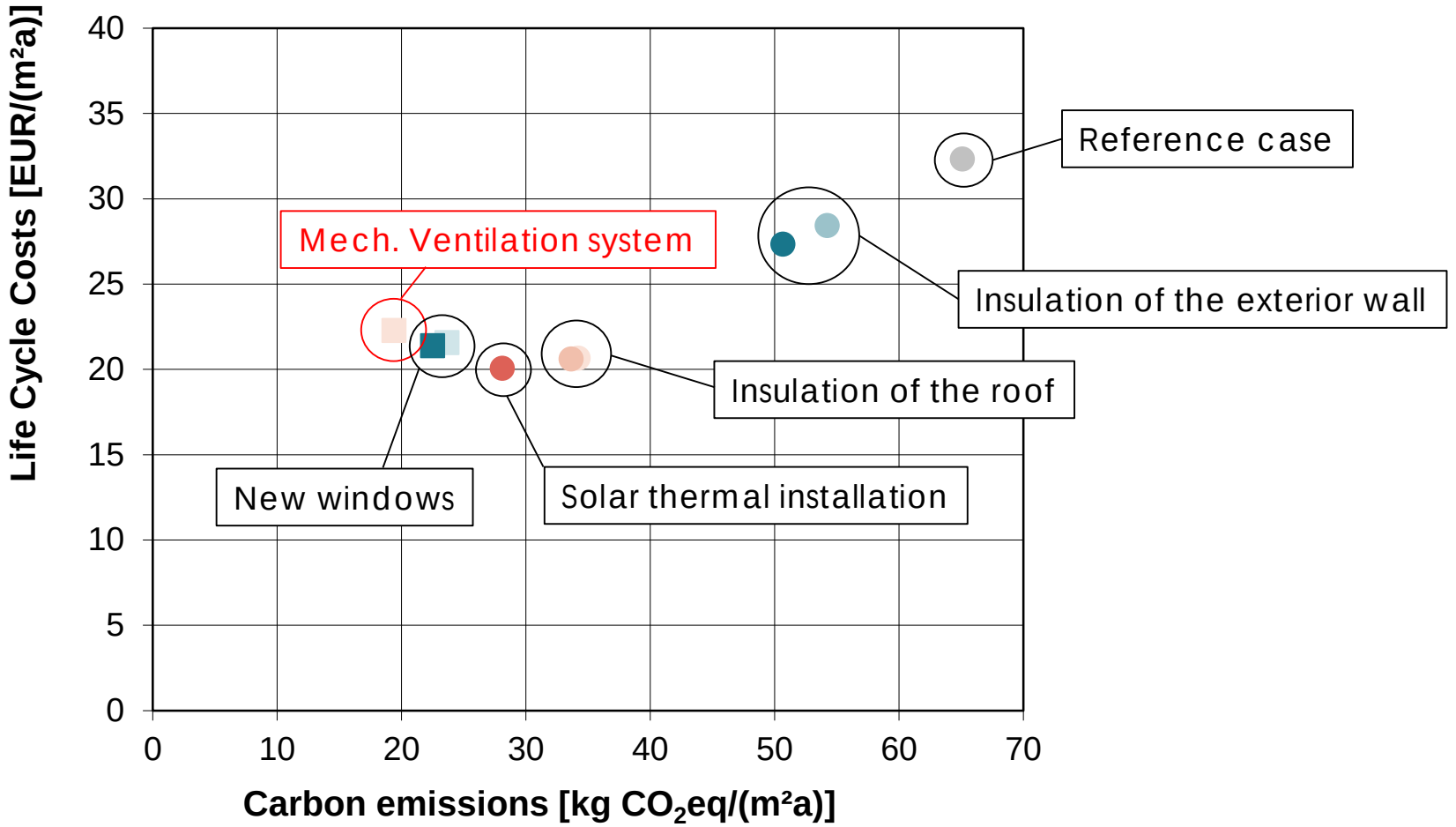

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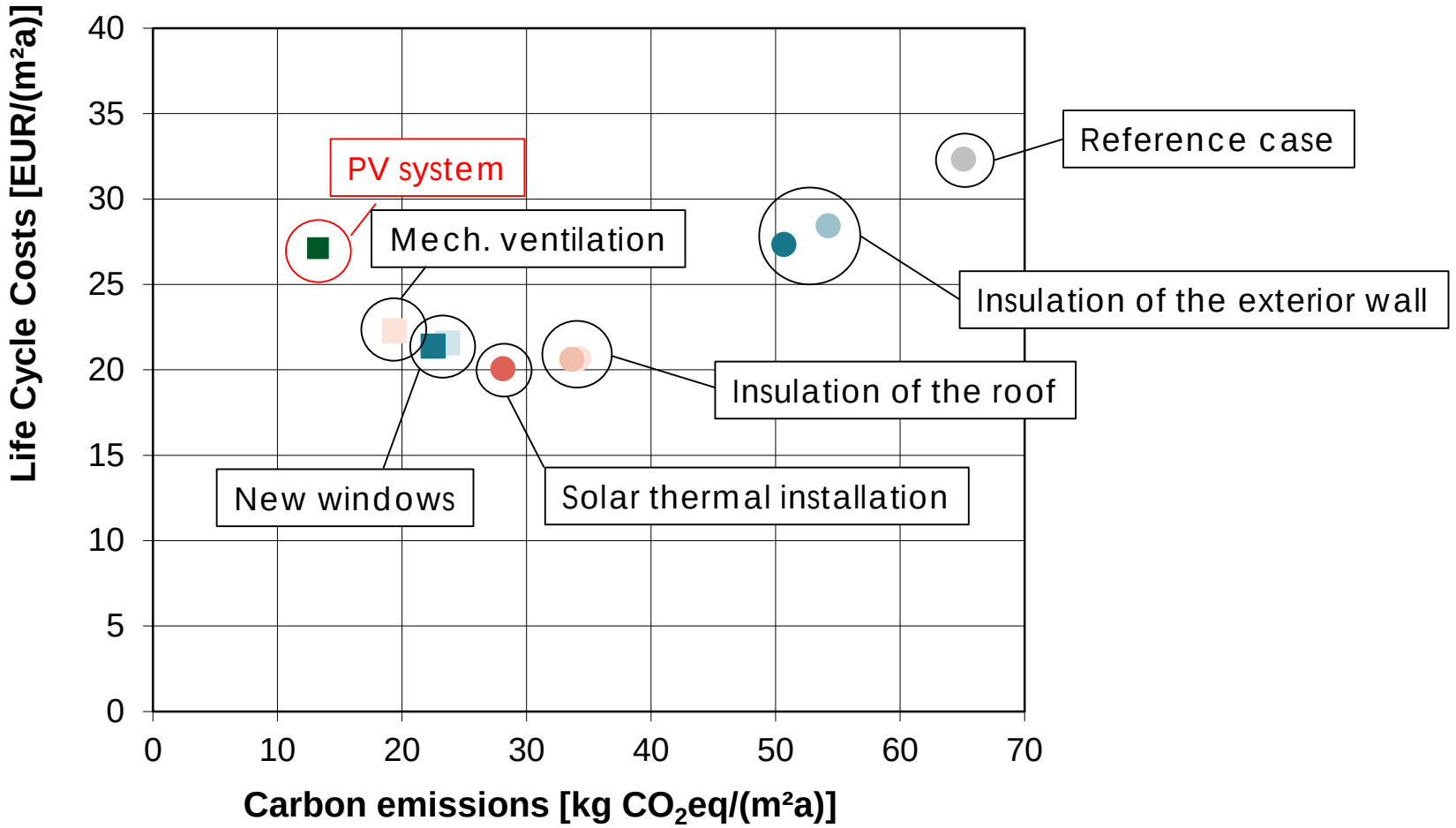

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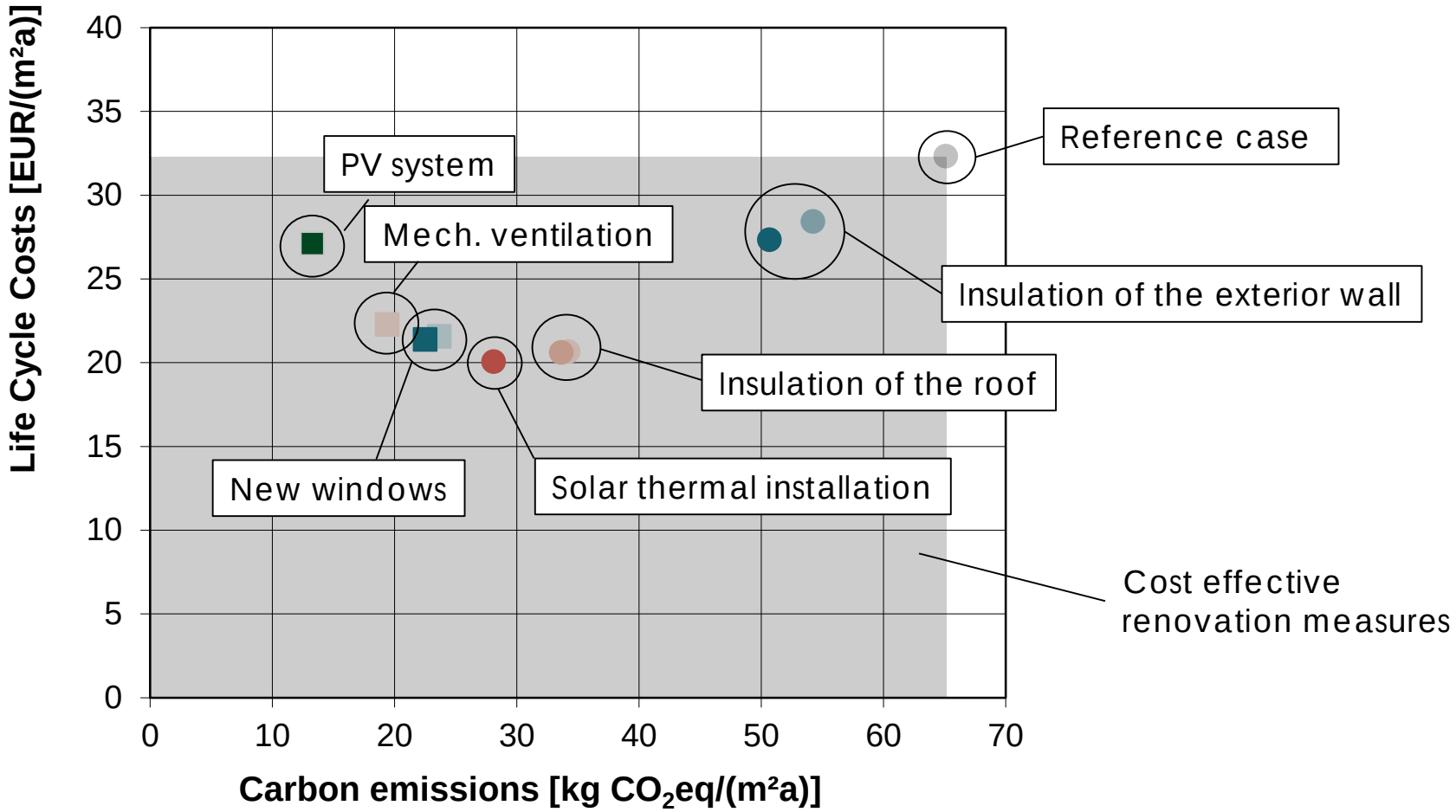

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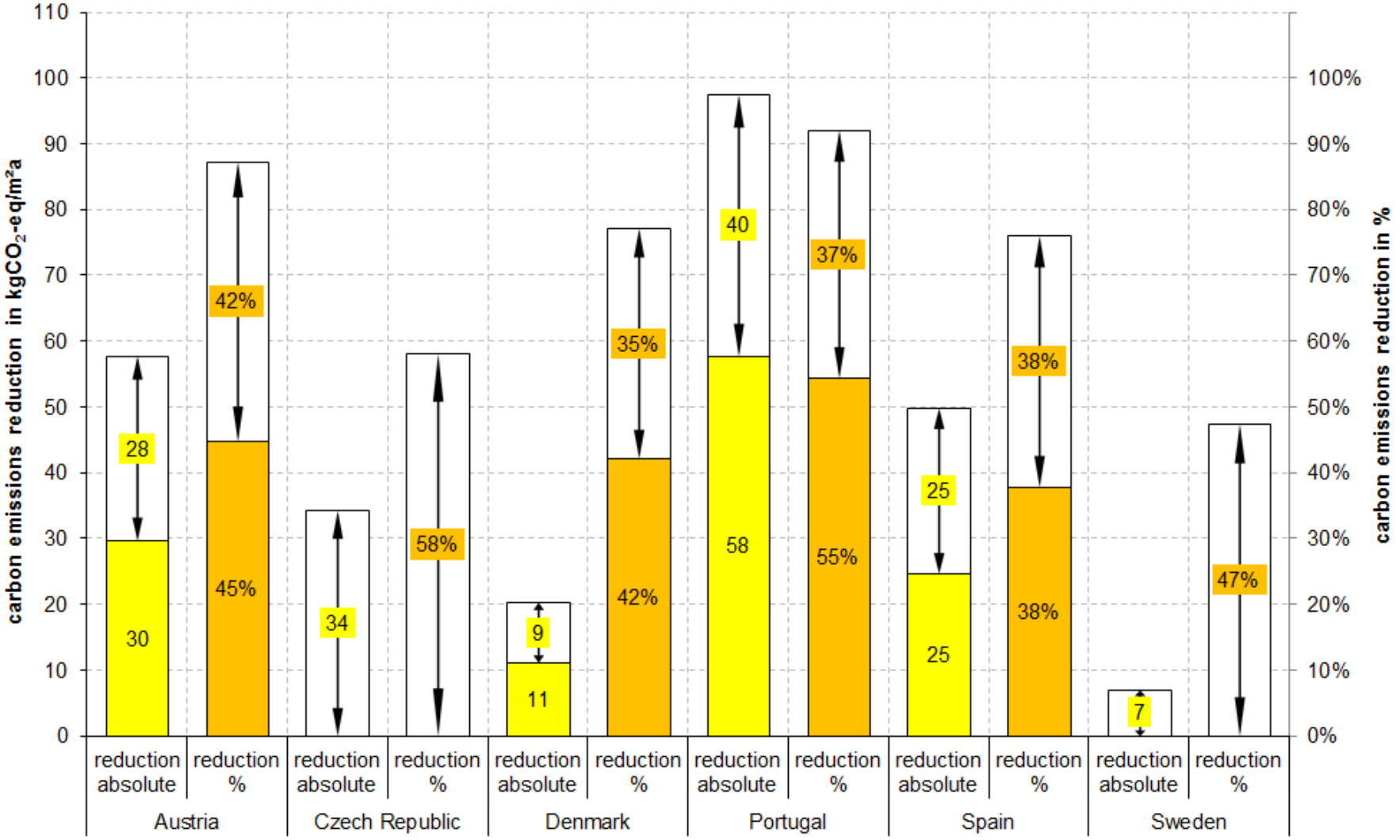
Overall results – carbon emissions



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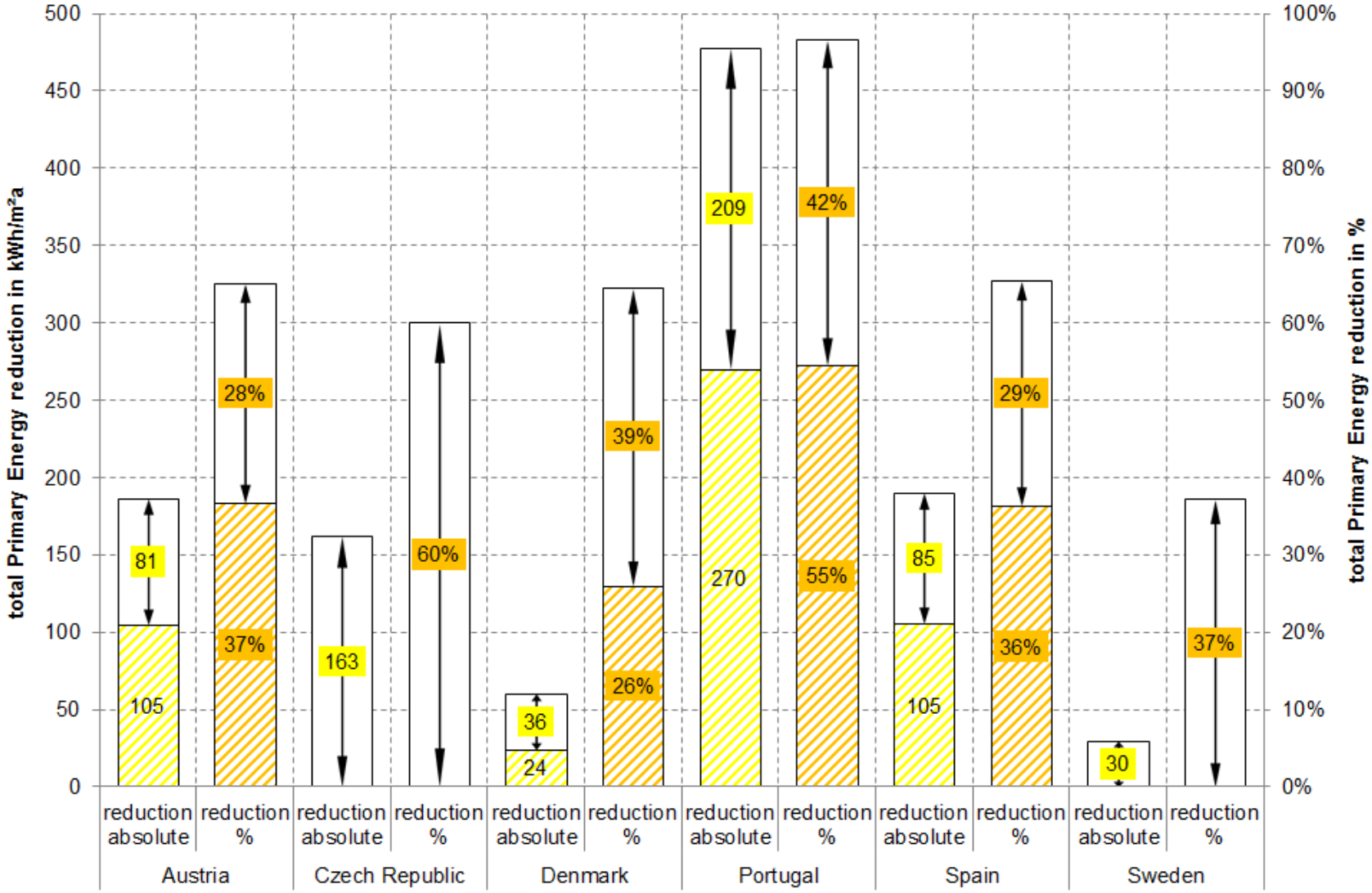
Overall results – total primary energy



source: IEA EBC Annex 56

Selected conclusions and lessons learnt (1/2)

- A switch to renewable energy sources reduces the carbon emissions more significantly than energy efficiency measures on one or more envelope elements.
- When the goal is to achieve high carbon emissions reductions, it is more cost effective to switch to renewable energy sources and carry out less far-reaching renovations on the building envelope than to focus on energy efficiency measures alone.
- Synergies can be achieved when a switch to renewable energy sources is combined with energy saving measures on the building envelope.
- The calculation results have shown that high carbon emissions and Primary Energy reductions are possible, where the corresponding renovation packages are also cost effective.
- However, results have also shown that not all investigated renovation measures bring a reduction of carbon emissions, primary energy and/or Life Cycle Costs. Moreover higher values, compared to the reference case, were calculated in some Case Studies.

Selected conclusions and lessons learnt (2/2)

- Missing good examples for successful renovations are often the biggest barriers for renovations towards nearly zero energy and emissions.
- The investigated Case Studies are such good examples, but more are needed.
- This means that national initiatives have to be launched to promote these kinds of building renovations. One of these initiatives could be the financial support or funding programs via direct funding or via research projects.
- A further important step towards cost effective building renovations is the consideration of the whole building life cycle. That means the Life Cycle Costs of the renovation packages should be regarded over the life cycle of the building and the building element. The investment costs should not be taken as main decision criterion.

Thank you for your attention!

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Supported by BMVIT -
Austrian Ministry for Transport, Innovation and Technology