

CULTURAL-E -intro-

Designing Positive Energy Buildings Workshop

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Path to market valuable Plus Energy Buildings



COSTS



First PEH: Heliotrope

1994

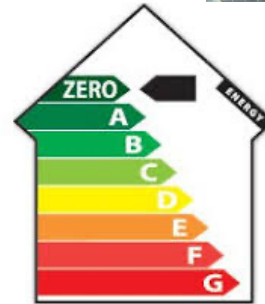


First Plus Energy neighborhood:
Solarsiedlung

2005



First multifamily PEH
Activ-Stadhaus, Frankfurt



EPBD
Nearly Zero Energy
Buildings

2010

All new buildings
shall be nearly ZEB

2015

2021

Multi-storey Plus
Energy Buildings as
power plant for the
neighborhood

2026

EPBD - Plus Energy Buildings



Positive Energy Building targets

- PEB shall contribute to **reduce the greenhouse gas emissions** in the surrounding energy system
- PEBs shall **support e.g., older buildings**, where the transition to zero energy state would not be cost-efficient
- PEBs shall contribute to **reduce the stress on energy grids** by providing a flexible energy asset that allows buildings and energy communities to act as integrated part of the energy system and exchange energy between among them or with the grid



Plus energy building targets

Besides the positive energy balance verification and flexibility, Plus Energy Buildings shall ensure an added value to environment and final users by providing:

- low carbon emission over the entire **life cycle**
- accessible, comfortable and healthy **indoor environments**
- easy access to **e-mobility**



The Gardens Elderly Center / Örebro, Sweden / Designed by: Marge Architects / Photo by: Johan Fowelin

Overall objective



To define viable, and tailorable technology concepts and business cases for Positive Energy Building.

Successful implementation requires an integrated **climate and cultural approach** that encompasses overall building configuration, technology selection, and user/systems interaction.

While the socio-technical combinations vary across contexts, **CULTURAL-E** solution-sets are being thought as comprehensive and easily replicable, thanks to reliable methods and practical guidelines



Expected Impacts

- Expected Impact 1: Similar costs in comparison to the nZEBs 2020 as an incentive to erect Plus Energy Houses
- Expected Impact 2: Contribute to reducing CO2 emissions in the residential sector by 88% in 2050 compared to the 1990 levels
- Expected Impact 3: Improved indoor environment quality (IEQ) and user satisfaction
- Expected Impact 4: Increase of the share of Plus Energy Houses with the view of 10% market uptake by 2030

Project pillars

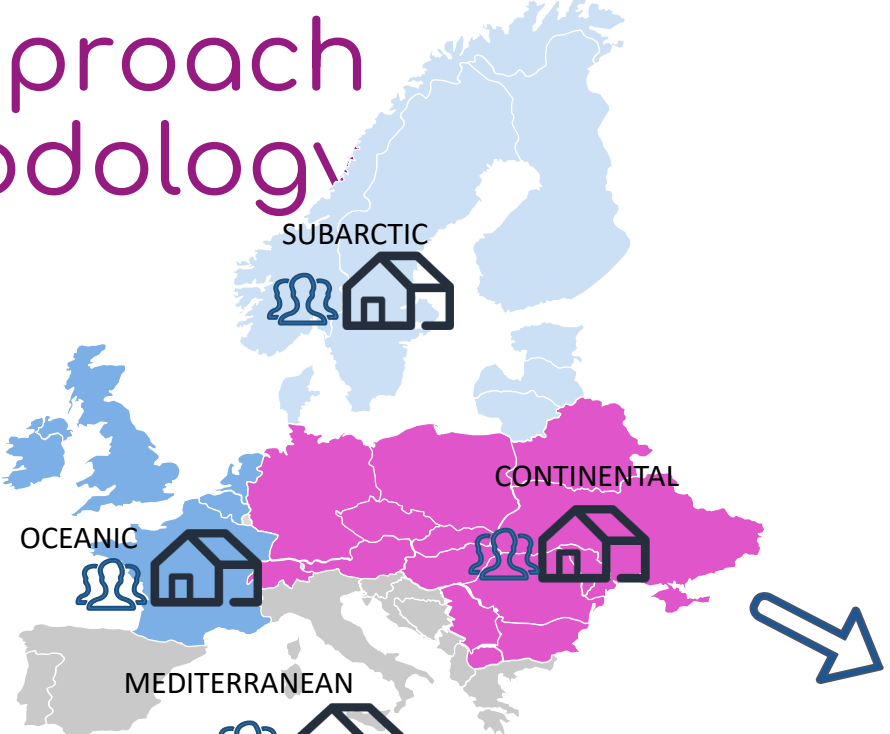


- Look at building energy demand also from a **socio-cultural perspective**
- Put **user/households at the center** i) understanding user's context, needs and expectations and ii) supporting them towards better energy practices
- **Agnostic approach to technology selection** for the solution sets
- Define **viable business models** that include attractive financial mechanism and co-benefit evaluation



Overall approach and methodology

1) Mapping of climate and cultural geo-clusters



2) Key technology developments

Cloud-based HMS



Smart hybrid ventilation



Smart air movement



Decentralized packed HP



Strategies for building flexibility



3) Definition of solution sets for each climate-cultural geocluster



- shopping cart icon need
- checkmark icon acceptance
- lightning bolt icon energy
- diamond icon value



DECARBONIZE EU BUILDING STOCK
INCREASE THE SHARE OF PLUS ENERGY HOUSES



4) Demonstration in 4 demo cases



2019-2024

Demo cases



Elgfaret 80-82
Apartment building
for assisted living



Baerum, Norway



Private real estate



Private
social
housing



Leers, France

Eislingen,
Germany

Castenaso
(Bologna),
Italy



Private
cooperative



Specific objectives

OBJECTIVE 1: Define cultural peculiarities impacting building energy balance

OBJECTIVE 2: Define a framework for the performance evaluation of Positive Energy Building

OBJECTIVE 3: Develop solution sets for Positive Energy Building

OBJECTIVE 4: Understand users' behaviour and provide interventions to shift practices

OBJECTIVE 5: Identify and value the co-benefits from Positive Energy Building

OBJECTIVE 6: Demonstration of feasibility, reliability and replicability of solution sets

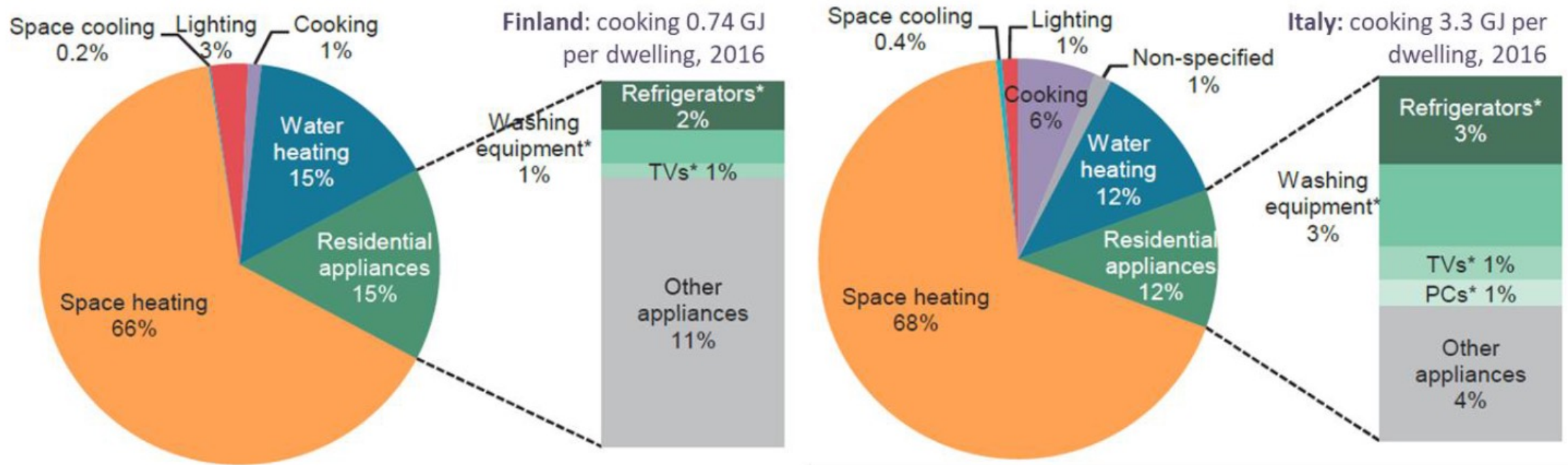
OBJECTIVE 7: Promote a European “ecosystem of policies” promoting Positive Energy Building

OBJECTIVE 8: Dissemination of projects achievements for promoting PEB feasibility

Cultural habits, preferences and expectations



understanding the interrelated variables that culture and climate bring into building science, is essential in developing clear guidance to enable successful PEB design



Residential energy consumption by end-use according to 2018 IEA energy efficiency indicators highlights



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Thank you for you attention!



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