



# iNSPiRe



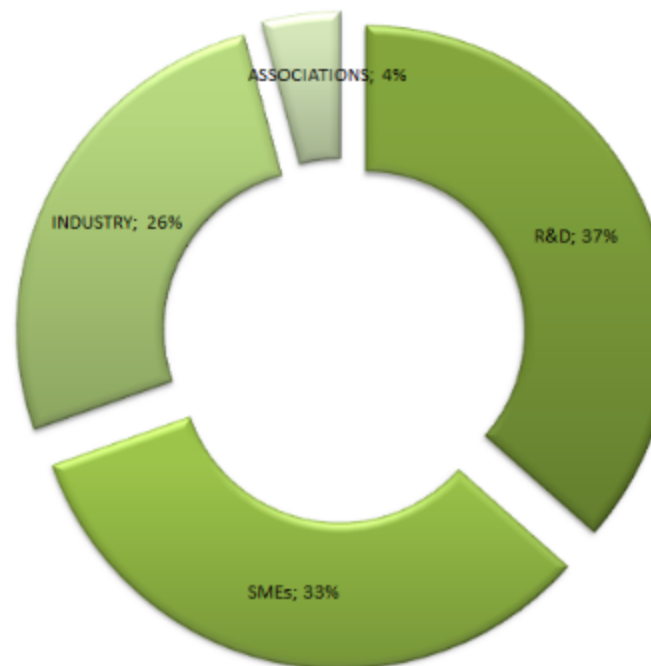
Roberto Fedrizzi - EURAC  
ACE General Assembly 22<sup>nd</sup> April 2016 - Berlin

# Consortium composition

Duration 4 years - 1115  
Person Months

Budget 11 M€ - 70% R&D and  
20% Demonstration activities

24 partners - 50% Industry



# Objective

Renovation of existing buildings through an integrated approach that includes

- ... envelope technologies,
- ...energy generation systems integrating a large amount of Renewable Energy Sources (RES)
- ...energy distribution and lighting systems.

aiming to ...

- ...reduce the HVAC energy consumption to less than 50 kWh/(m<sup>2</sup>year)
- ... reduce the lighting energy consumption by at least 50%.



# Three Milestones



1. To develop standardized systemic **Renovation Packages**

*Approaches for renovating buildings through optimized combinations of envelope, energy generation and energy distribution system.*

Complex task requiring multiple competences

2. To develop multifunctional **Renovation Kits**

*Industrial solutions allowing practical, fast and economic achievement of the renovation packages.*

To build value chains at industrial level, allowing prefabrication of plug&play solution

3. To demonstrate Packages and Kits

# Renovation packages

## Building stock analysis



Home / Building Stock Statistics

### BUILDING STOCK STATISTICS

#### What is the database?

This is based on figures available in reviewed literature. The database shows publically available literature. In this database, Europe has been divided into seven climate regions, grouped together based on how many heating degree days (HDD), the latter parameter varying from about 500 to 2,500. Each climate region covers countries in Europe (Italy, Spain, France, Germany, UK, Poland and Sweden) and these countries are home to...

The database also shows each country's population, its total available floor space and floor space being heated...

#### How to use it

Select climate type, country, type of building and type of energy used. You can select more than one of each...

#### What it tells us

This is a simple look-up table - a tool devised to compare existing data.

So, it tells us the average energy used and consumed for heating, cooling, domestic hot water and lighting in Europe for both residential or office buildings. In addition to energy use, the number of literature references believed to be reliable, as well as the standard deviation of the used data points are also reported for each...

By using the filters you can select one or more of the types of energy so comparisons can also be made between...

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Climate	Countries	Type of building	Type of energy used	Inhabitants/employs (Mil.)	Total floor area in EU (Mm <sup>2</sup> )	Conditioned floor area (Mm <sup>2</sup> )
Southern dry	Portugal	Residential	Heating	10.6	410	240
Southern dry	Spain	Residential	Heating	46.2	1568	1263
Southern dry	Overall	Residential	Heating		1978	1504
Mediterranean	Cyprus	Residential	Heating	1.1	39	23
Mediterranean	Greece	Residential	Heating	11.3	323	311
Mediterranean	Italy	Residential	Heating	60.8	2577	1638

Home / Reference Building Simulations

### REFERENCE BUILDING SIMULATIONS

#### What is the database?

This is based on data generated from simulations on iNSPiRe's selected reference buildings, representing the large majority of the EU's building stock. These data sets complement the gaps in the Building Stock Statistics and provide a further means to prove the reliability (or not) of the information available in existing literature.

As with the Building Stock Statistics database, this database also divides Europe into seven climate regions. Country data was not included since this would have required an unjustified simulation effort. Data that is provided per climatic region, has used the most populated country as representative of the entire region's climate. In particular, Rome, Madrid, Lyon, Stuttgart, London, Gdansk and Stockholm have been used as exemplary climates.

The building typology in this database reflects the diversity of iNSPiRe's reference buildings, so displays a variety of buildings, from single family homes to large multi-family homes, as well as a several types of office buildings. All buildings are also categorized by age, from those built before 1945, between 1945 and 1970, 1970-1980, 1980-1990, 1990-2000 and those built after 2000.

#### How to use it

Select climate type, type of building, age of the building, preferred temperature, and heating or cooling. You can select more than one of each category if comparisons are to be made.

#### What it tells us

- What share of the total building stock in your selected climatic region your selected building type, or its age, makes up.
- The energy demand and consumption for the heating or cooling of your selection.
- How much primary energy is consumed and CO2 is produced in providing this heating or cooling requirement.

[Read the report](#)

Climate	Type of building	Age of construction	Indoor air set temperature	Type of load	S/V - External surface over Volume ratio	Share per Type	Share per age of construction	Demand (kWh/m2 y)	Consumption (kWh/m2 (y))
Southern dry	SFH - detached	pre 1945	18	heating	0.87	47%	1%	258	323
Southern dry	SFH - semidetached	pre 1945	18	heating	0.73	36%	1%	221	277
Southern dry	SFH - row	pre 1945	18	heating	0.58	17%	1%	182	228
Southern dry	SFH - detached	pre 1945	20	heating	0.87	47%	1%	336	420
Southern dry	SFH - semidetached	pre 1945	20	heating	0.73	36%	1%	290	363
Southern dry	SFH - row	pre 1945	20	heating	0.58	17%	1%	241	301
Southern dry	SFH - detached	pre 1945	22	heating	0.87	47%	1%	424	529
Southern dry	SFH - semidetached	pre 1945	22	heating	0.73	36%	1%	367	454

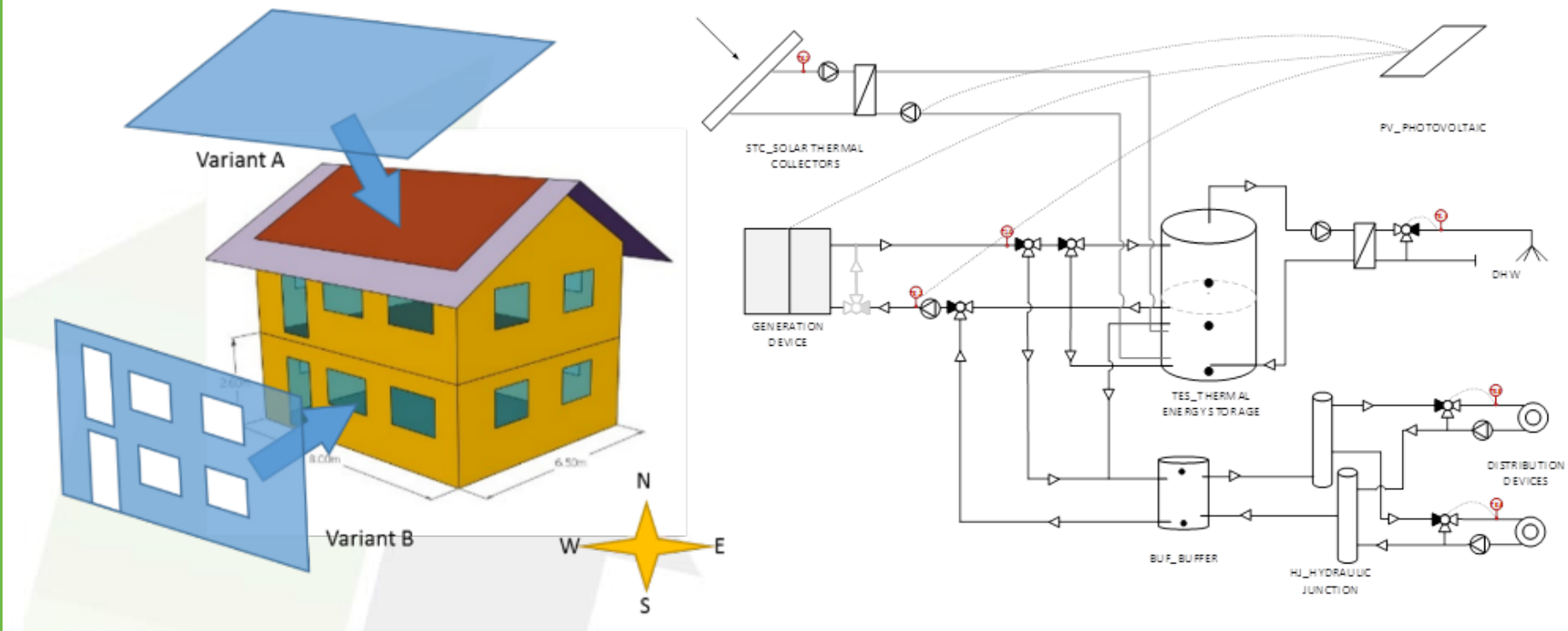
# Renovation packages



## Simulations of renovation measures

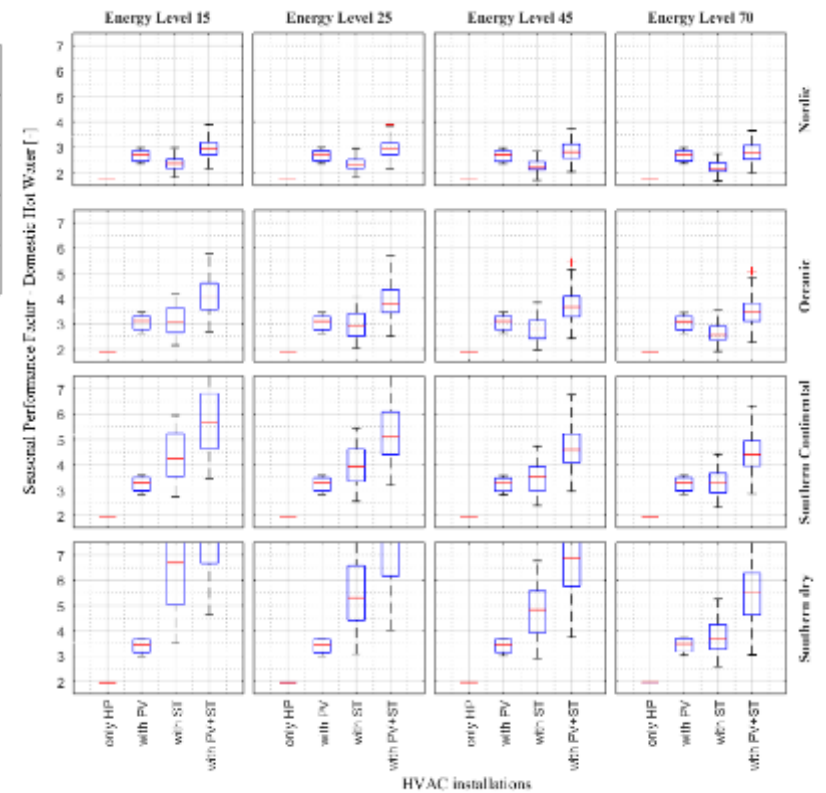
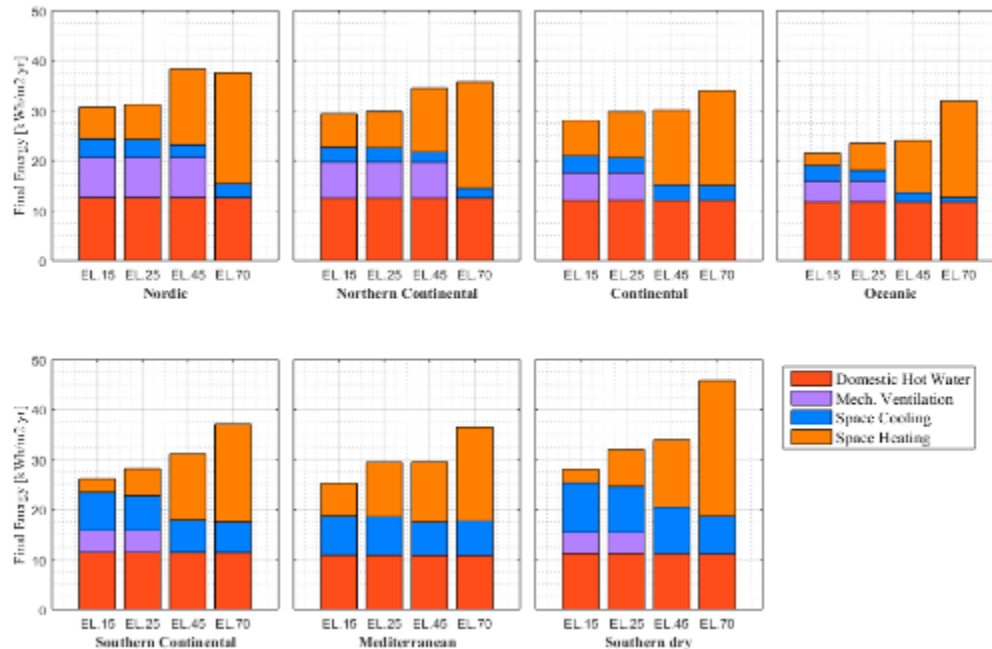
Based on building stock results, simulations of measures on different buildings typologies, climates and standards:

15 - 25 - 40- 70 kWh/m<sup>2</sup>y heating demand



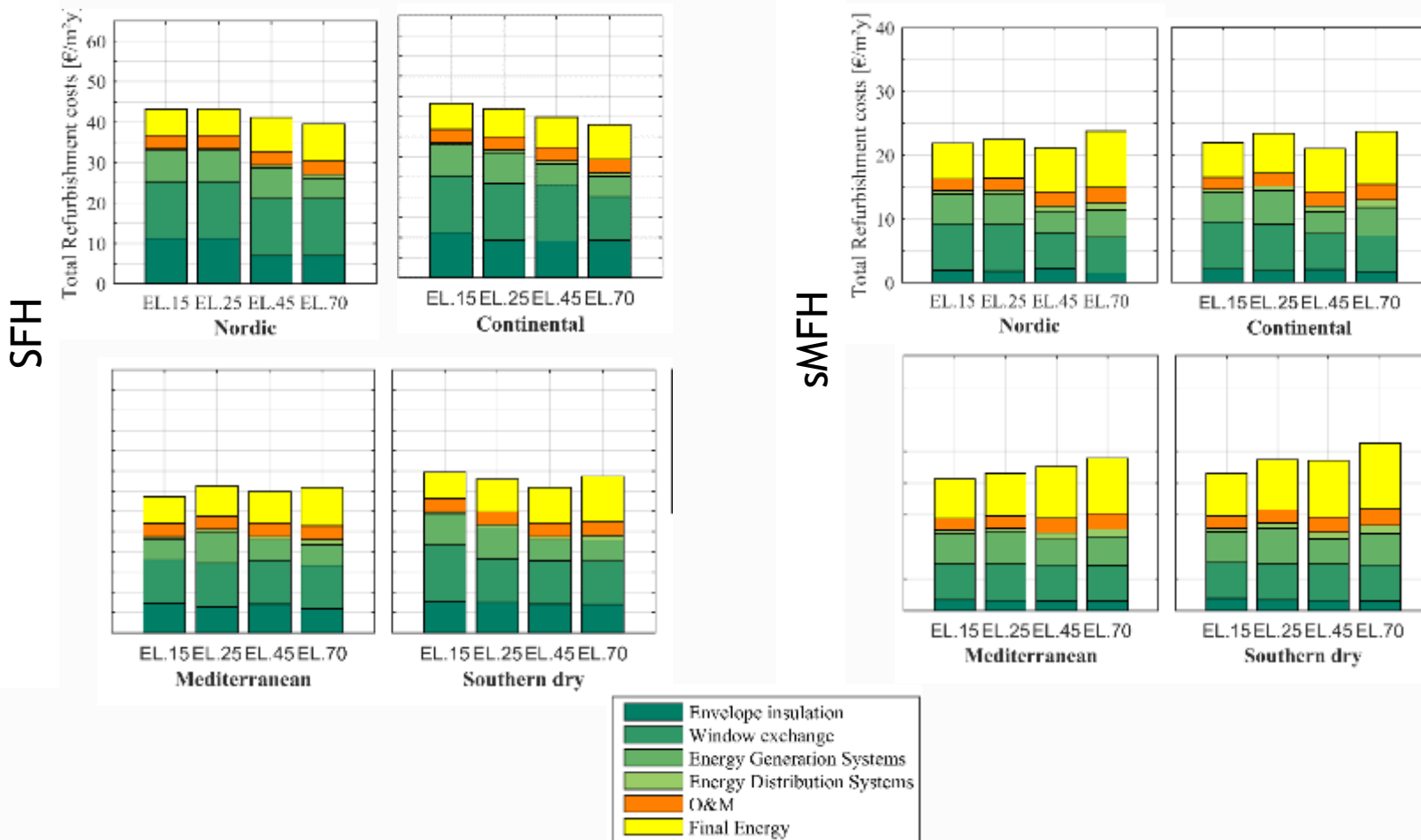
# Renovation packages

## Database of solutions: Energy + LCA



# Renovation packages

## Database of solutions: Economic evaluations

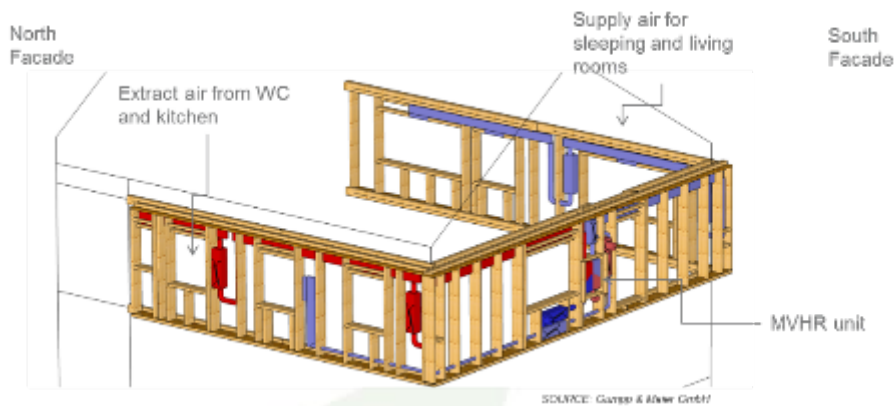




# Renovation Kits



## Envelope prefabricated solutions (Gumpp & Maier)



# Renovation Kits



Generation prefabricated solutions (EURAC - Manens-Tifs)



# Demonstration

## Wohnungsbau Ludwigsburg



# Demonstration

Madrid (EMVS - ACCIONA)





visit iNSPiRe website

<http://inspirefp7.eu>

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