

eurac research



Adaptable and adaptive RES envelope solutions to maximize energy harvesting and optimize EU building and district load matching

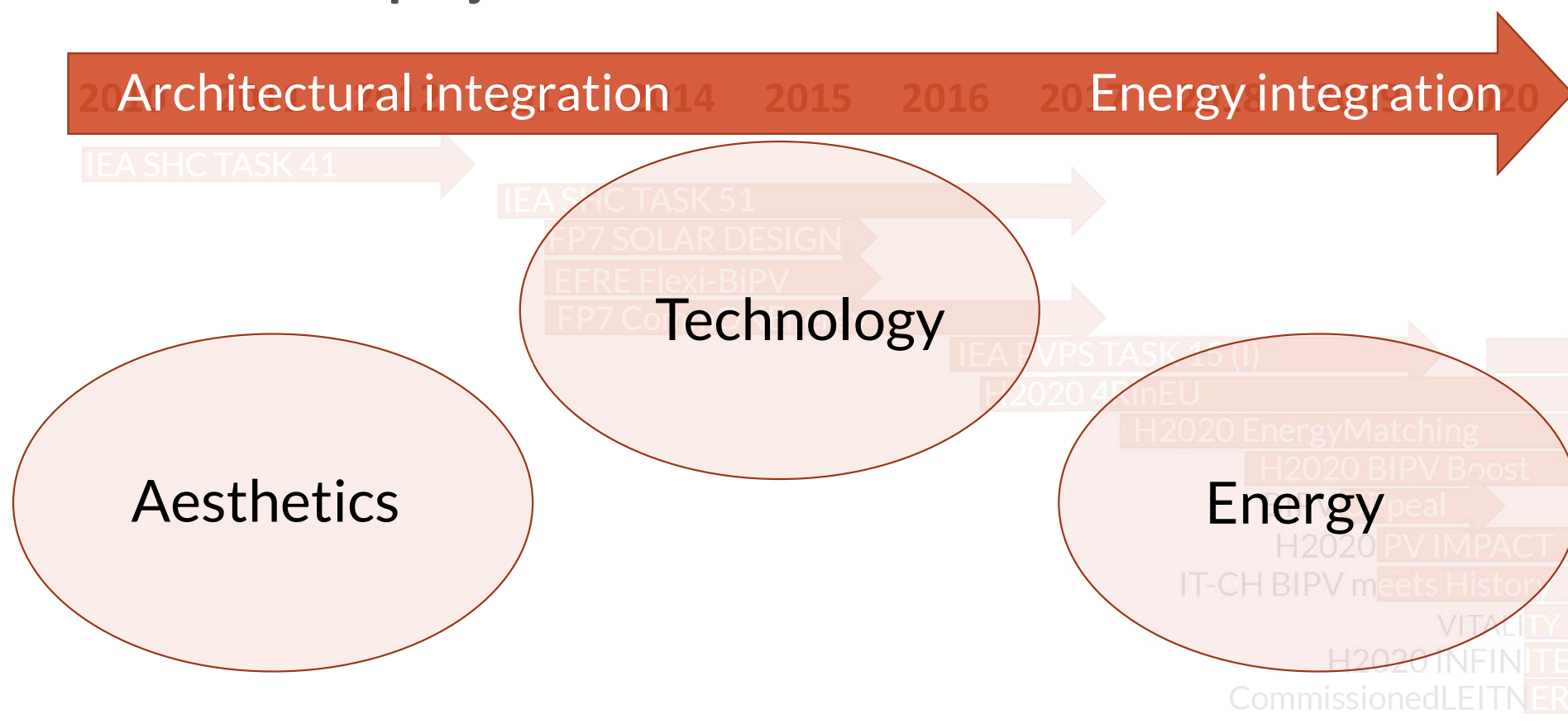
Laura Maturi
Eurac Research

www.energymatching.eu

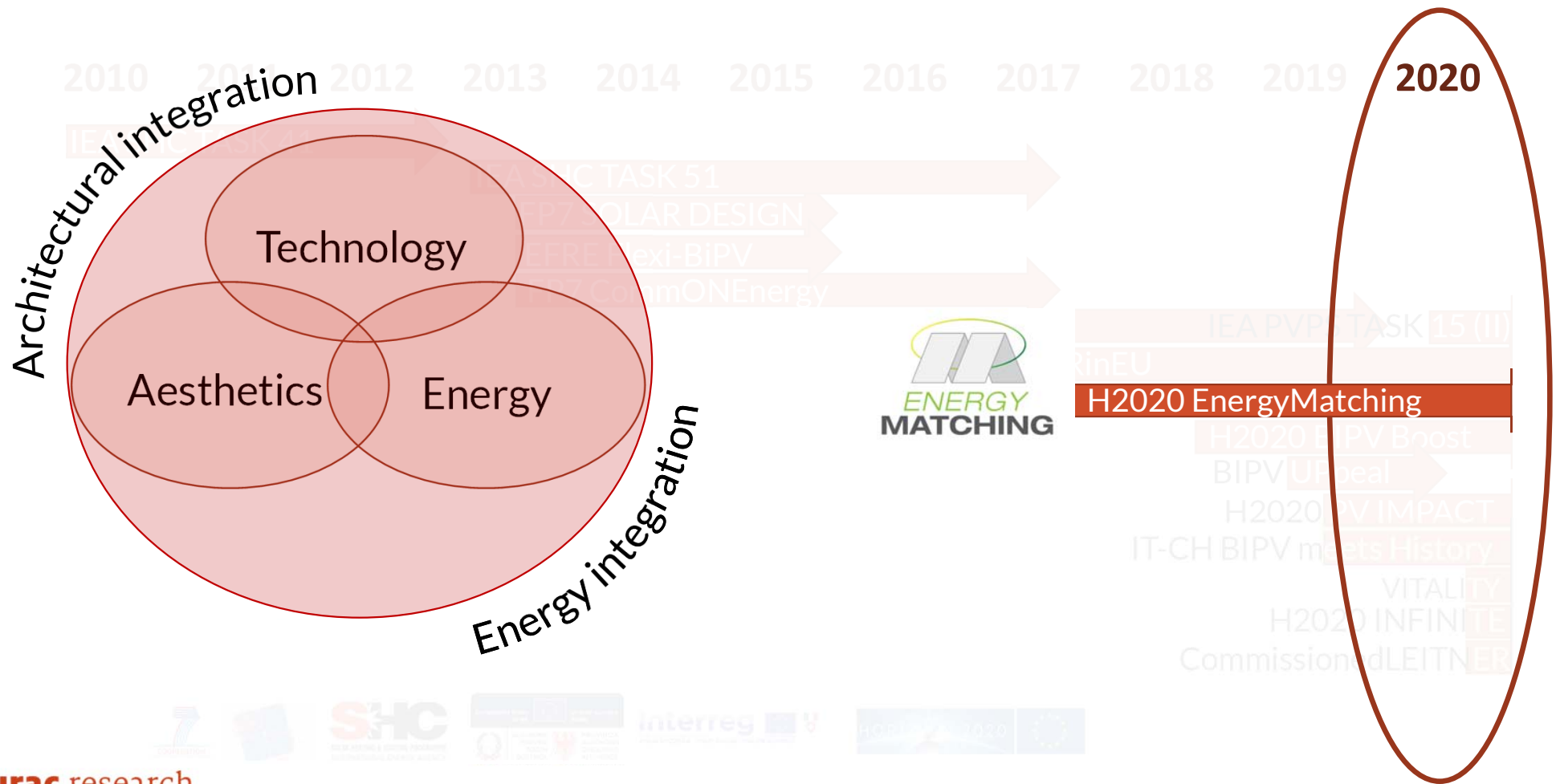


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°768766.

BIPV: Eurac projects and vision



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H2020 Energy Matching



CONSORTIUM: 17 PARTNERS (R&D, CONSTRUCTION COMPANIES, INDUSTRIAL PARTNERS)



PROJECT COORDINATOR: EURAC



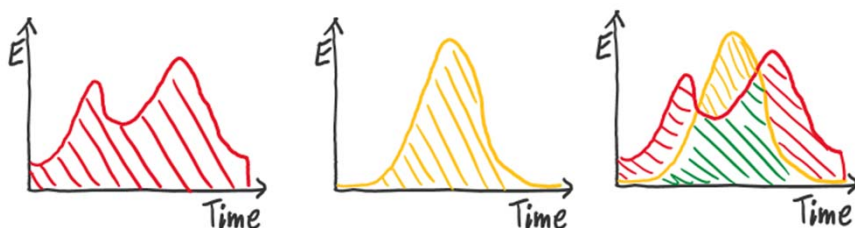
7 EUROPEAN COUNTRIES INVOLVED



01/10/2017 – 31/07/2022

TRL

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NIBE

TULIPPS
Solar System Solutions



Plastica

EUROFINESTRA
INNOVARE. NATURALMENTE



www.onyx-solar.com

pellinindustrie

www.pellinindustrie.net



www.solarwall.com



www.bouygues-construction.com

R2M
RESEARCH TO MARKET
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www.r2msolution.com

WIP RENEWABLE
ENERGIES

www.wip-munich.de



www.casaspa.it

LudvikaHem

www.ludvikahem.se

habitat 76

www.habitat76.fr

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Project Background

*EU policy is boosting the **reduction of the EU building stock energy demand** by 80% by 2050 through renovation.*

*In order to reach EU goals on energy demand, **buildings have to become active elements of the energy network**, not only consuming but also producing, storing and supplying energy, transforming the EU energy market.*

***Residential sector** represents most of the built floor surface area among all EU building stock typologies and thus a **huge potential to meet the EU policy goals related to NZEB** (Nearly Zero Energy Buildings).*



EnergyMatching will contribute to overcoming these issues by developing and demonstrating **methodologies and active envelope solutions** to maximize the RES (Renewable Energy Sources) harvesting in the built environment optimizing the matching between energy production and building loads, within an optimised building energy system connected into a local energy grid.
Target: retrofit of residential building sector.

Project Objectives

1

DEFINITION OF ADAPTIVE ENVELOPE SOLUTIONS FOR ENERGY HARVESTING AT BUILDING LEVEL

Developing active adaptive envelope solutions to maximize exploitation of solar energy.

2

INTEGRATION OF THE ENERGY HARVESTING SOLUTIONS INTO THE BUILDING AND DISTRICT ENERGY CONCEPT

Developing load match aggregation strategies, energy harvesting management systems, control algorithms and optimization tools to maximize the potential for integration and optimisation of renewable energy sources and to connect buildings with various entities like suppliers and distribution system operators through different networks.

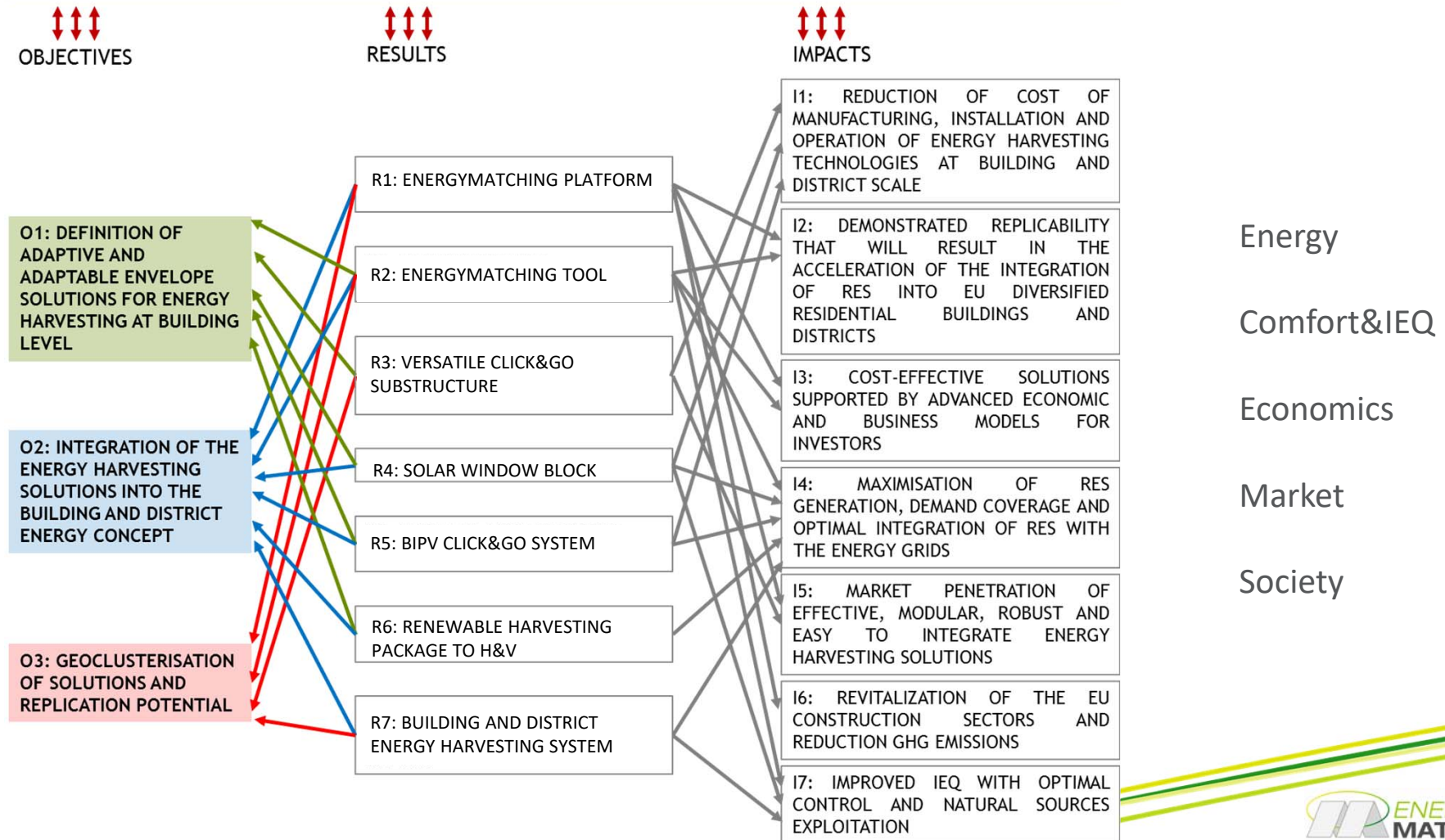
3

GEOCLUSTERISATION OF SOLUTIONS AND REPLICATION

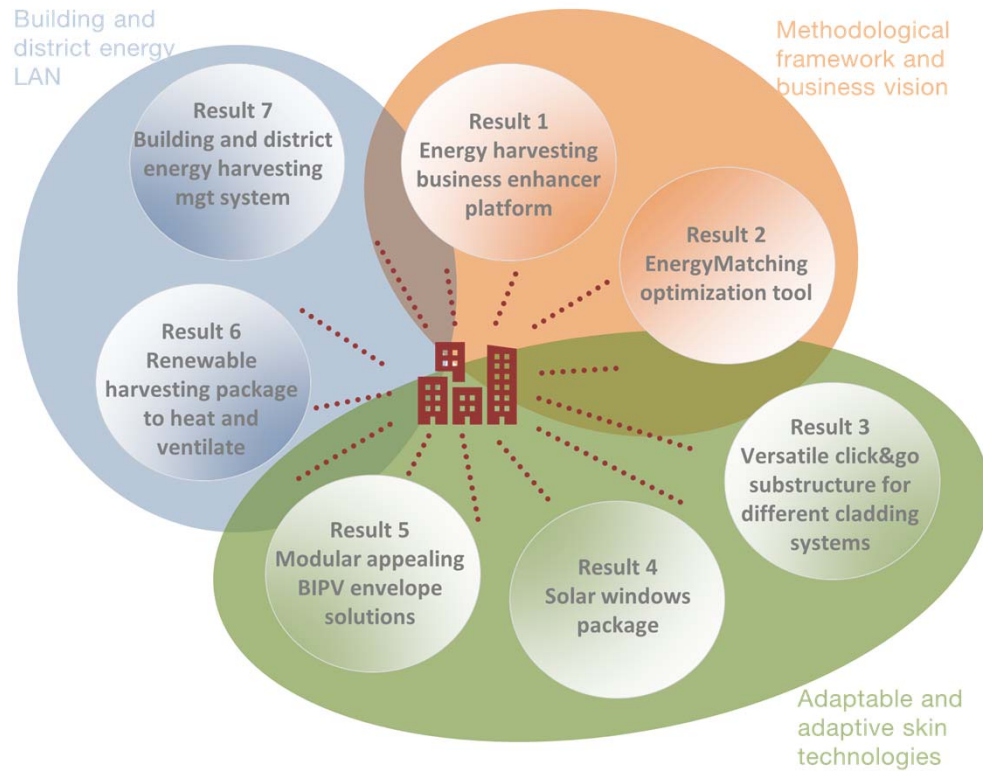
Developing tools and strategies to ensure applicability and optimal use of solutions in different geographical areas, tailoring the general solutions for each technology result, and evaluating both technical and economic viability

PROJECT IDEA

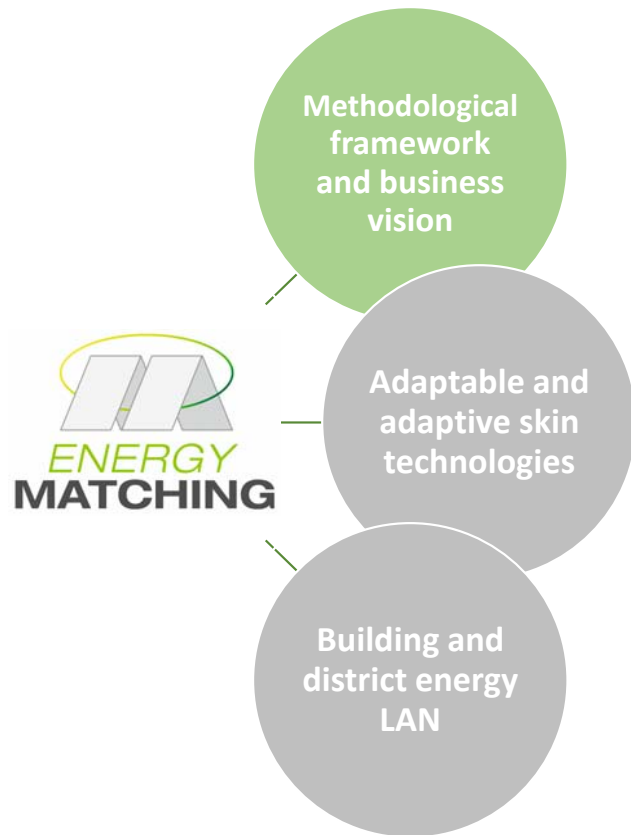
EnergyMatch: Adaptable RES envelope solutions to maximize energy harvesting and optimize EU building and district loads matching



Expected results

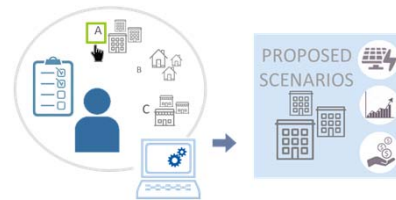


Expected Results



R1

ENERGYMATCHING PLATFORM



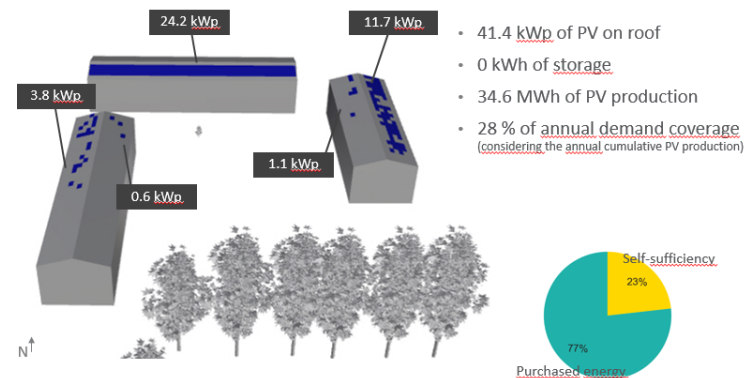
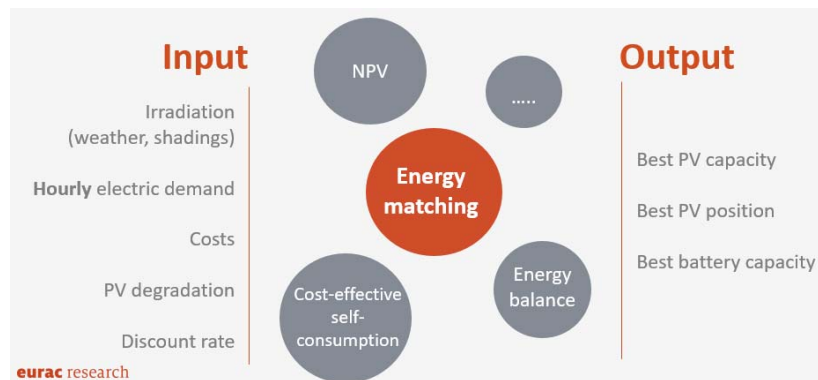
R2

ENERGYMATCHING TOOL



R2 EnergyMatching tool

EM-tool: tool for optimization of RES harvesting at building and district scale

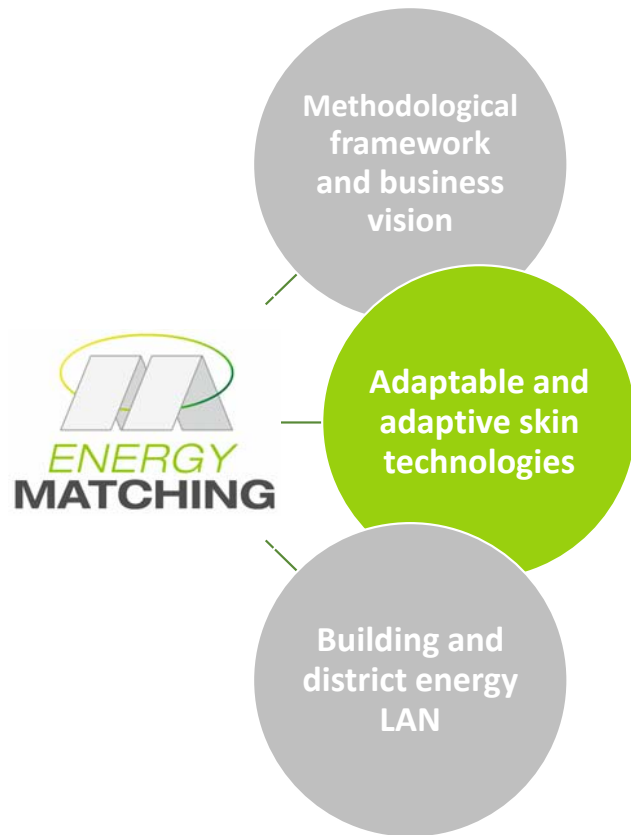




repository of simulations results (dedicated group: EURAC, R2M, WIP, HDA)



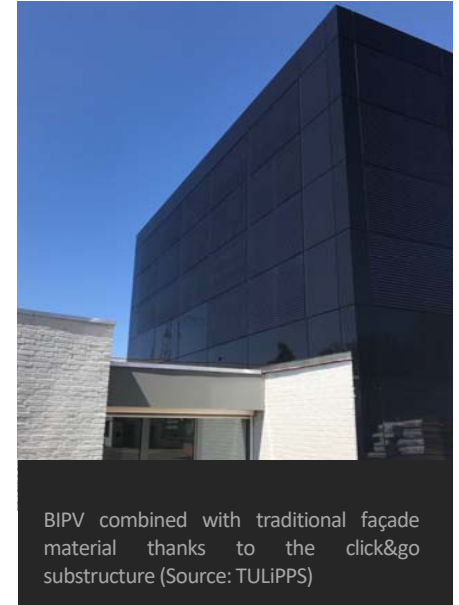
Expected Results



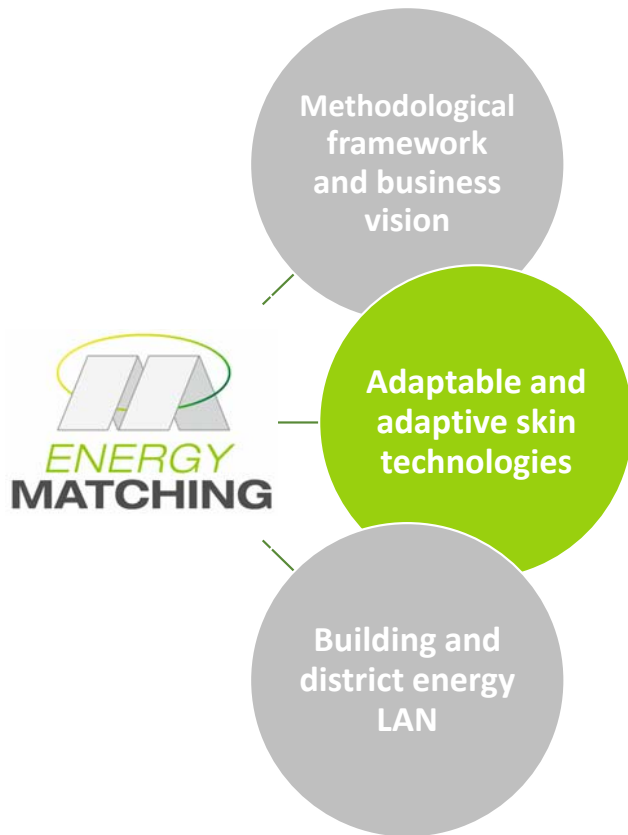
R3

R3: VERSATILE CLICK&GO SUBSTRUCTURE

- Aesthetically appealing
- Reduced installation time
- Adaptable to different envelope typologies
- Easy maintenance



Expected Results



R4

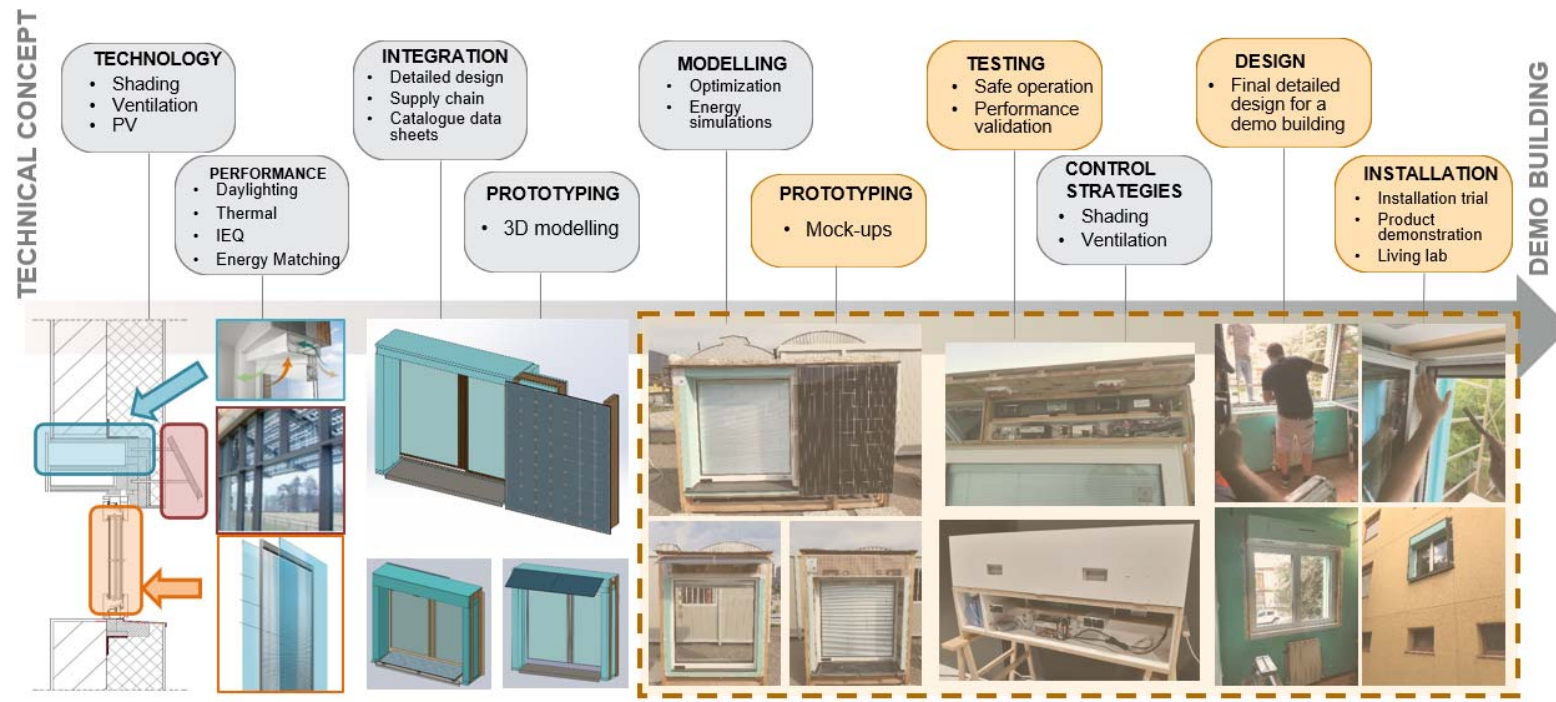
R4: SOLAR WINDOW BLOCK

Multifunctional prefabricated insulated system that integrates photovoltaic modules, dynamic and automated shading systems and decentralized ventilation units with the aim of maximizing indoor comfort and building energy performance without adding electrical loads to the building.



Window block mock-up developed in EnergyMatching

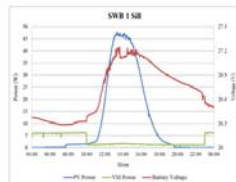
R4 solar window block



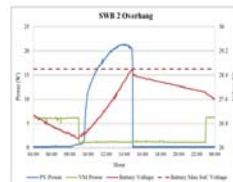
R4 solar window block

SOLAR WINDOW BLOCK	SWB 1 – BIPV SILL	SWB 2 – BIPV OVERHANG	SWB 3 – VERTICAL BIPV
			
	SILL	OVERHANG	VERTICAL
PV INTEGRATION	SILL	OVERHANG	VERTICAL
PV MODULE	Crystalline silicon (c-Si) 56 Wp	Amorphous silicon (a-Si) 31 Wp	Crystalline silicon (c-Si) 291 Wp

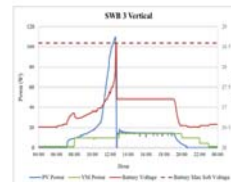
* VM Working Rate: 100% (94.2% simulated)



* VM Working Rate: 92% (86% simulated)



* VM Working Rate: 100% (99% simulated)



EuroSun2020

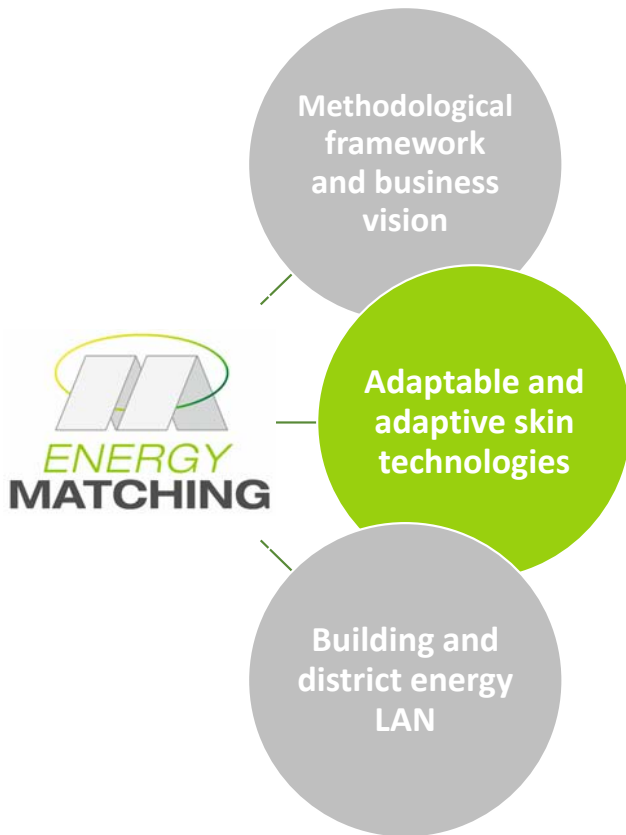


Expected Results

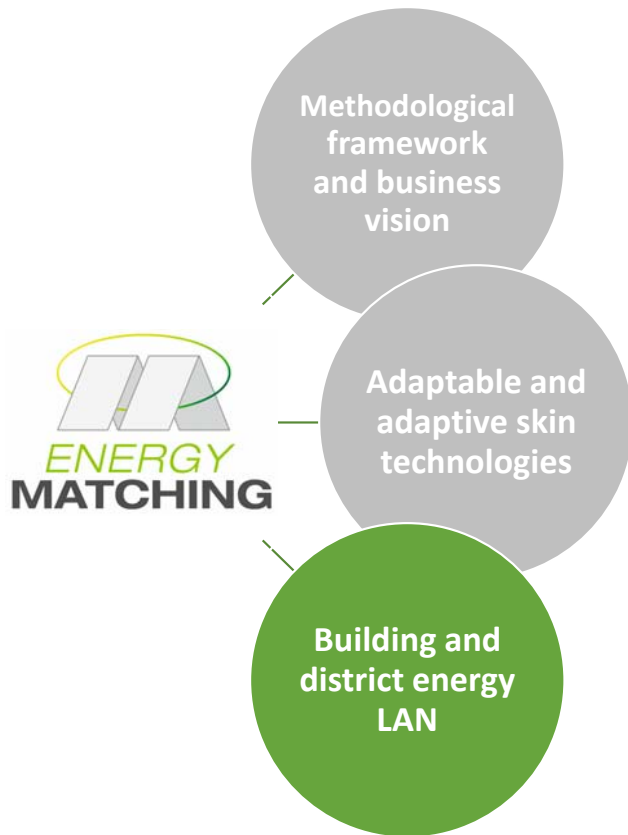
R5

BIPV CLICK&GO SYSTEM

- Integrated with the click&go substructure
- Aesthetically advanced
- Flexible (material, shape, size, colour)
- Multifunctionality (PV production, building energy demand, internal comfort, etc.)
- Lightweight and colored solutions



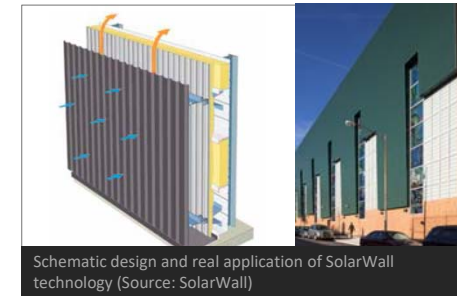
Expected Results



R6

Renewable harvesting package to heat and ventilate

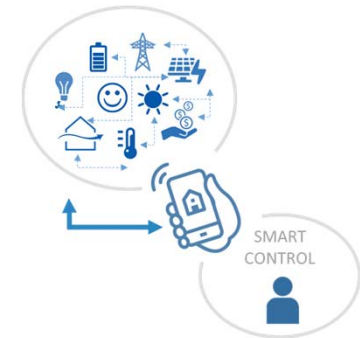
- Dual-source electrically-driven heat pump for heating, DHW and cooling
- SolarWall for pre-heating
- Natural ventilation strategies
- Heat recovery ventilation unit
- Smart control



R7

Building and district energy harvesting management system

- The energy harvesting technologies and plants are interconnected: power/information exchange between buildings/energy systems
- Monitoring data and forecasts, and user information (smart control)
- Flexibility between energy production/distribution/consumption optimization



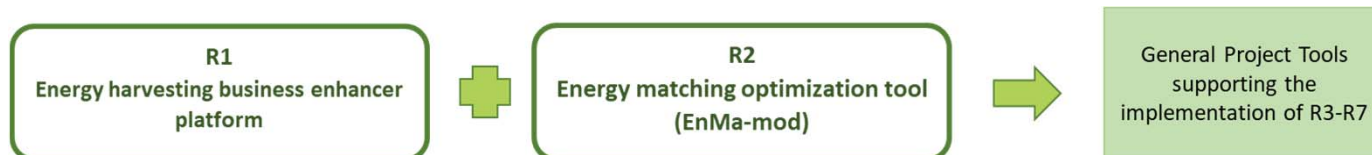
R7 Building and district energy harvesting system

MS5

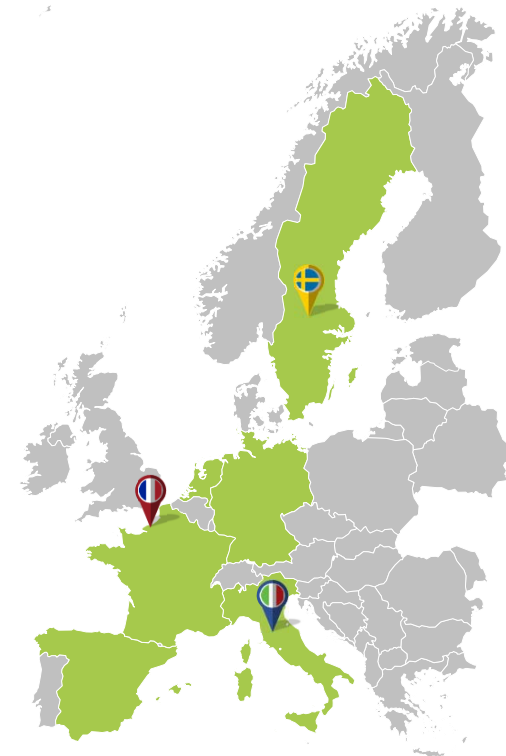
Software and hardware of building and district energy systems ready to be tested



Demonstration of Project Technologies

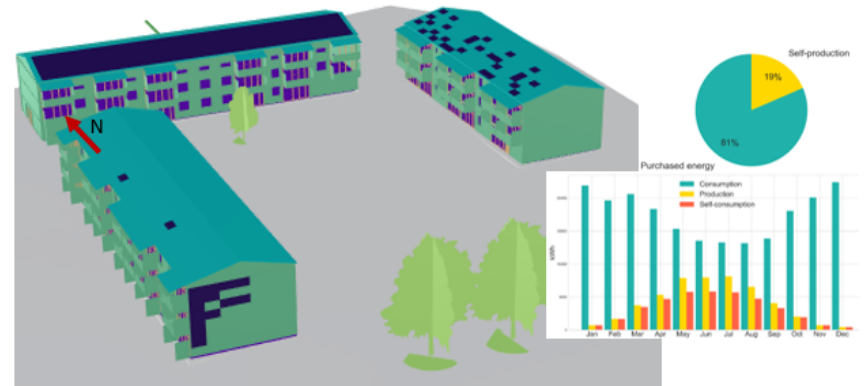
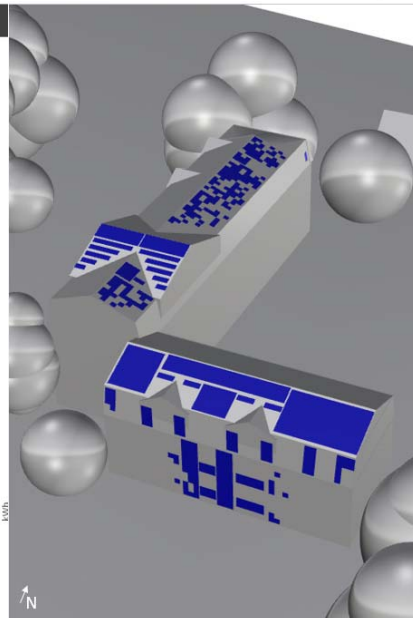
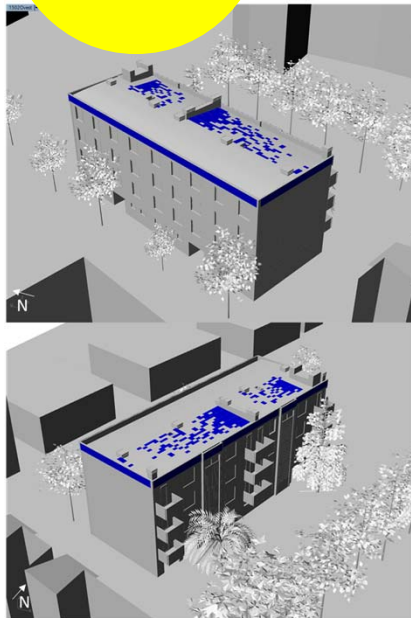


	R3 Versatile Click&Go	R4 Solar Window Package	R5 Modular Appealing BIPV	R6 Renewable Harvesting Package to Heat and Ventilate	R7 Building and District energy Harvesting mgmt. system
 Résidence Emile Hauduc (France)		✓	✓	✓	
 Comune di Campi Besenzio (Italy)	✓	✓	✓	✓	
 Ludvika (Sweden)	✓		✓	✓	✓



Demonstration of Project Technologies

EnergyMatching
TOOL supporting
demo design



Demo-cases

Solutions will be demonstrated in three demo cases, which have a **large replication potential** in terms of climatic conditions, legislation and regulation framework, type of ownership, buildings' architectural features and social-cultural environment.



Demo I
Résidence Emile Hauduc
Saint Aubin Sur Scie, France

Multifamily dwelling unit built in 1969 and extended (above the existing building) in 1988. The building includes 22 residential units over 1 basement plus 7 stories combining the first construction and the extension (3 in building A + 4 in building B).

- Lot size: 1643 m²
- Façade area: 2146 m²
- Roof area: 528 m²
- Estimated Energy Consumption: 265 kWh/m²/year



Demo II
Comune di Campi Besenzio
Comune di Campi Bisenzio, Italy

Multifamily dwelling unit built in 1984. The building includes 12 residential units over four floors, plus common areas.

- Lot size: 2800 m²
- Façade area: 1100 m²
- Roof area: 360 m²
- Estimated Energy Consumption: 146-175 kWh/m²/year



Demo III
Ludvika
Ludvika, Sweden

Multifamily dwelling made of three buildings in 1973. The complex includes 53 apartments over 2 floors and a basement.

- Lot size: 4488 m²
- Façade area: 2146 m²
- Roof area: 1750 m²
- Estimated Energy Consumption: 170 kWh/m²/year

EM solutions implementation

MS7 Start of the EnergyMatching solutions implementation (July 2020)

IT demo: Comune di Campi Besenno, Italy





Get Involved

Project Coordinator Contact Details

Laura Maturi:

laura.maturi@eurac.edu

Sara Giona:

sara.giona@eurac.edu

EnergyMatching Website



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Project video [here](#)



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