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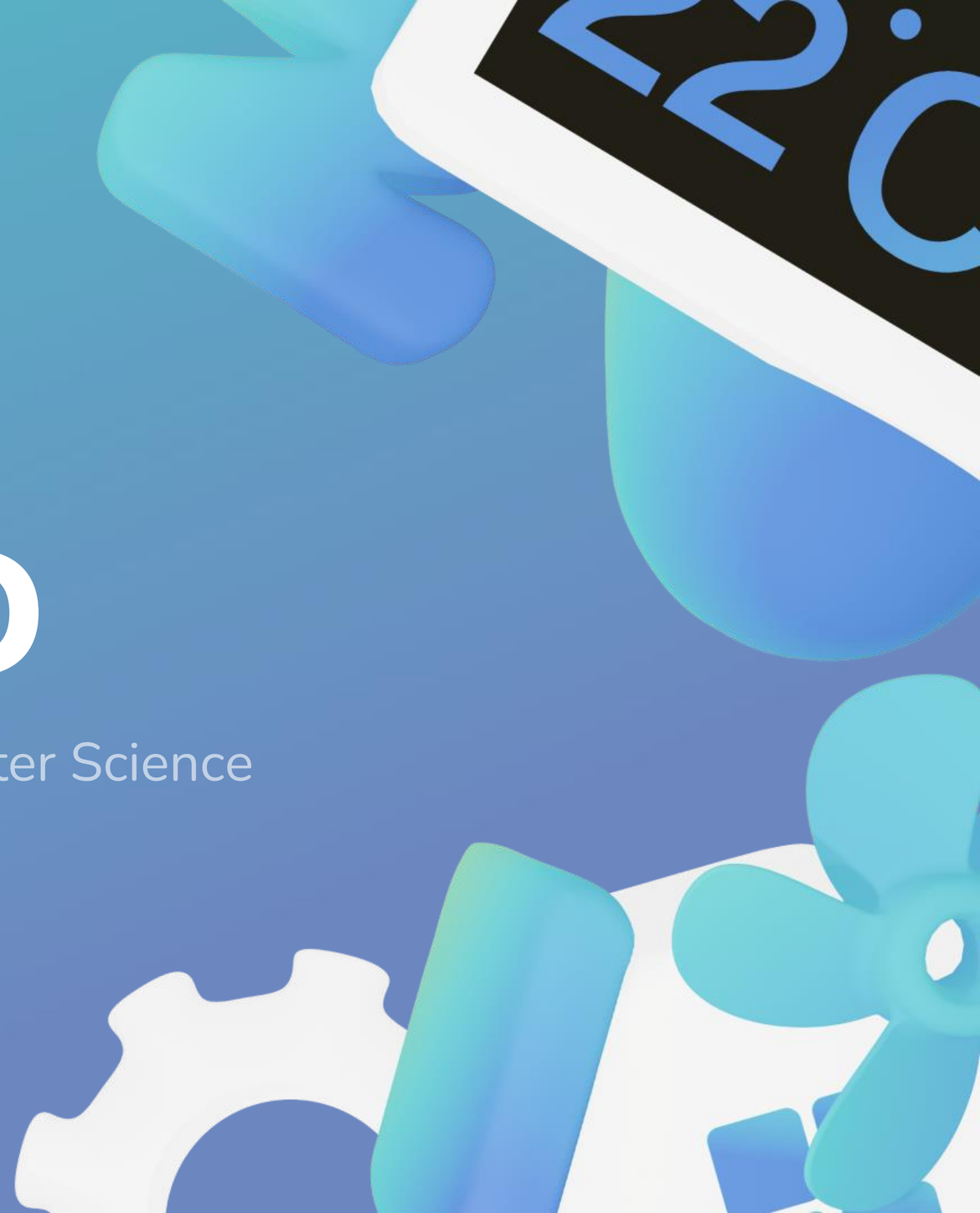
META BUILD

ICCS - Institute of Communication & Computer Science
Presenter Name



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Content

Project Summary

Coordinator

ICCS

Insitute of Communications and Computer Systems

Powering the METAmorphosis of BUILDings towards a decarbonised and sustainable energy system

Title

HORIZON EUROPE, RIA – Research and Innovation Action

Funding

38

Participants

HORIZON-CL5-2023-D4-01

Call / Grant

Lifetime

48 Months

01 Jan 2024 ⟶ 31 Dec 2028

Who We Are

38
Participants

13
Countries

6
Pilots
Front Runners

7
Replication
Multipliers

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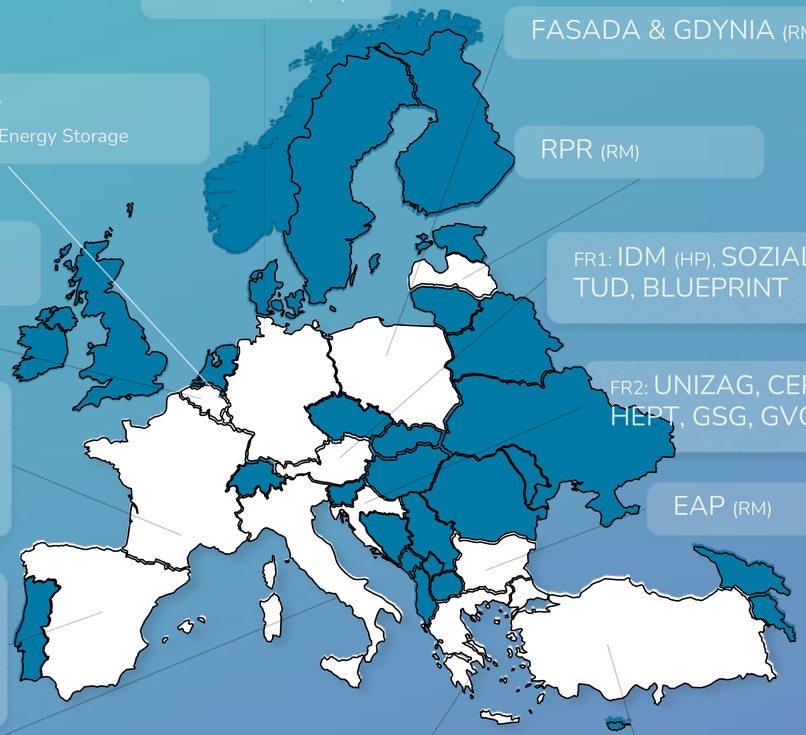

UNIPassau (RM)

FASADA & GDYNIA (RM)

ED Interoperability
CIRCULI-ION Energy Storage

RPR (RM)

EHPA & RAP
Networking & Policy Support

FR1: IDM (HP), SOZIALBAU, TUD, BLUEPRINT

ARTELYS Scalability
INETUM Exploitation
FR3: EDF, SAUTER, KMØ & ENOV, CAMPUS, HELEXIA (RM)

FR2: UNIZAG, CER (HP) HEPT, GSG, GVG

EAP (RM)

CARTIF Building Experts
FR6: TECNALIA (HP) VEOLIA (RM)
ENDEF (PVT)
ENETUM ES affiliated entity

ARCELIK HP in FR3

EURAC Scientific Coordinator
FR5: INNOVA (HP) & ANIMA

ICCS Project Coordinator
FR4: HOL, ZENITH, KLIMA THESS (RM)

Natural gas is responsible for 42% of heating & cooling needs of EU buildings sector

Decarbonisation of heating & cooling needs through elctrification

Need to implement Energy Efficiency first principle and employ smart control technologies

High dependency in fossil fuel for heating and cooling

01

Background

Natural gas is responsible for 42% of heating & cooling needs of EU buildings sector

Decarbonisation of heating & cooling needs through elctrification

Need to implement Energy Efficiency first principle and employ smart control technologies

Low integration of localised renewable energy sources

02

Background

Natural gas is responsible for 42% of heating & cooling needs of EU buildings sector

Decarbonisation of heating & cooling needs through elctrification

Need to implement Energy Efficiency first principle and employ smart control technologies

Lack of cost-effective digital tools in building energy performance

03

Background

Natural gas is responsible for 42% of heating & cooling needs of EU buildings sector

Decarbonisation of heating & cooling needs through elctrification

Need to implement Energy Efficiency first principle and employ smart control technologies

Low electrification solutions adoption in building sector

04

Background

Vision

- Integrate Renewable Energy Sources in building sector
- Electrify building thermal energy using Heat Pumps
- Optimise building energy systems performance
- Decarbonisation pathway of the building sector
- Enhance building digitalisation and intelligence

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Objectives

Develop solutions minimising life-cycle environmental impact and improve circularity

Develop and demonstrate innovative and integrated solutions for electrification of the thermal energy demand of buildings

Facilitate decarbonisation growth strategies for buildings transformation, building capacity, guidance and recommendations delivery, and align with REPowerEU and Fit-for-55 in dissemination and communication activities to promote the solutions and support their replication and exploitation

Provide solutions combining EE measures, RES production on-site, and electrochemical storage, while offering energy flexibility contributing to power stability

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Ensure high replicability for new construction and renovation of buildings (especially residentials) for the direct replacement of fossil-fuels boilers

Develop smart control techniques optimising indoor thermal comfort, heating/cooling systems performance, based on interoperable interfaces allowing to collect and store information and communicate with other building systems (BEMS)

Demonstrate META BUILD solutions in 6 real-life new construction and renovation projects

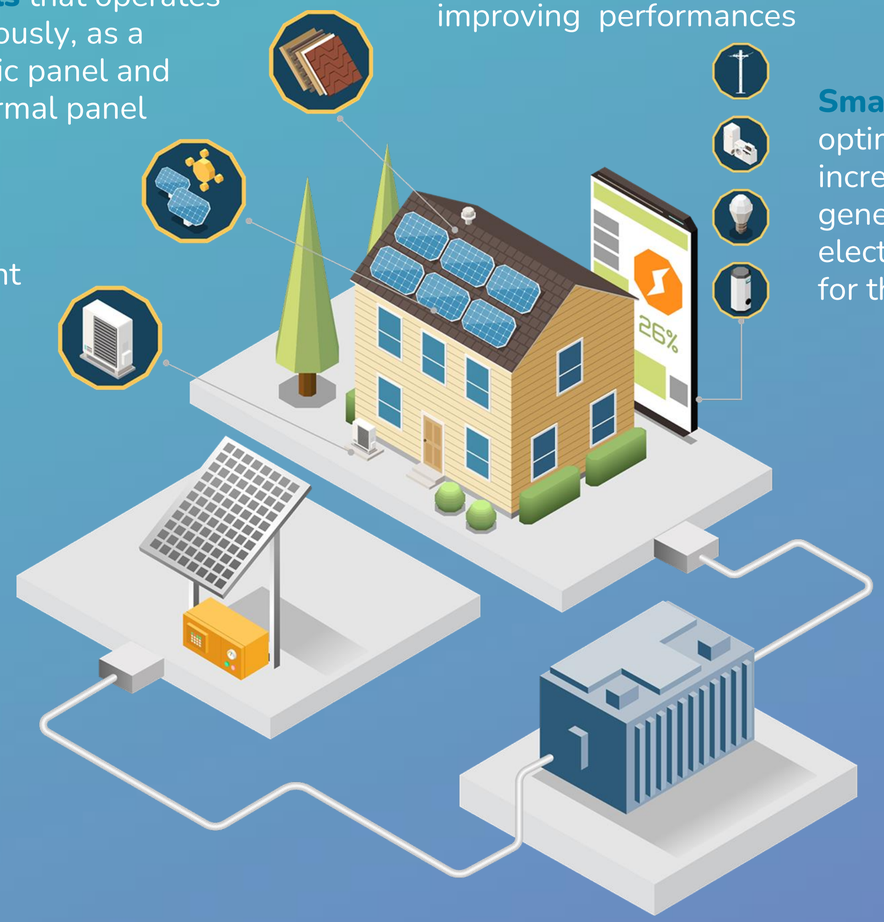
Methodology

PVT Panels that operates stimultaneously, as a photovoltaic panel and a solar thermal panel

Conventional energy efficiency measures that reduces the building energy use, improving performances

Heat pumps can cut the buildings' carbon footprint by 75%, contributing potentially to reach net zero with a fully decarbonised grid

Smart energy management optimises indoor comfort, increases the use of locally generated renewable electricity, while offers benefits for the maintenance



PV panels for solar powered buildings that can generate renewable electricity

Second life battery storage retains electricity capture by solar panels maximizing the use of the generated electricity and providing flexibility services

Phase 1
Engineering

i) Requirement Analysis
ii) Packaged Services Development
iii) Feasibility Assessment
iv) Prototype Development

Phase 2
Transition

Front Runners: Demonstrations in reallife pilots (Implementation of six pilots)

Phase 3
Adoption

Widespread Acceptance

Phase 4
Replication

Decarbonization as a Service

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Framework

WP1 - Project Management & Coordination

WP2 - Electrified thermal energy demand integrated solutions & demonstration strategy

KPIs, LCA & Decarbonisation as a service

WP3 - Technologies enabling electrification

Heat pumps, PVTs & second life batteries

Requirements & specification

Novel market structures & business models
Optimised packaged services

Conceptual design

Building as a whole
Building as an active node
Building electrification ecosystem
Digital Twins

WP4 - Open modular energy management services

Value-added data-driven services

WP7 - Dissemination, communication & awareness creation

WP5 - Deployment & demonstration in real cases

WP6 - Solutions adoption, replication, scalability & exploitation

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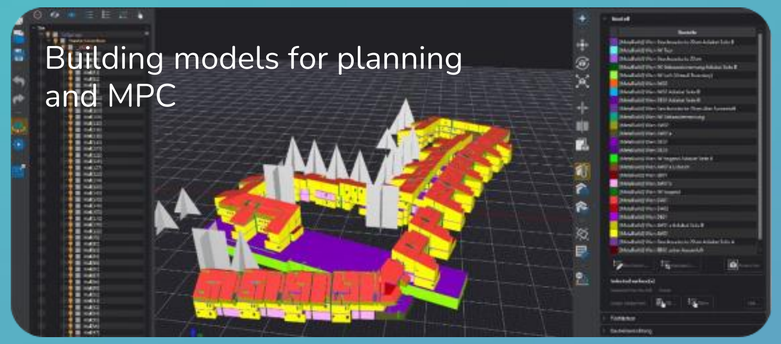
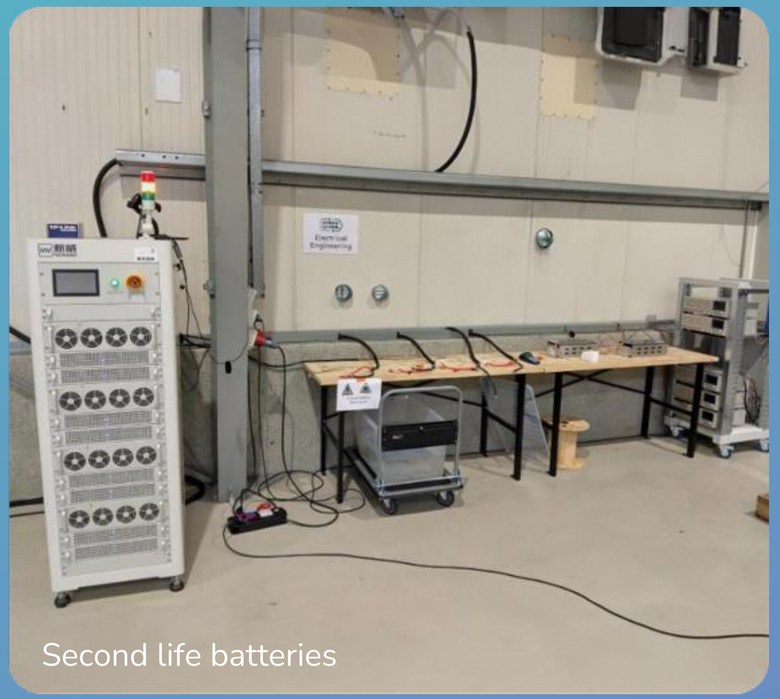
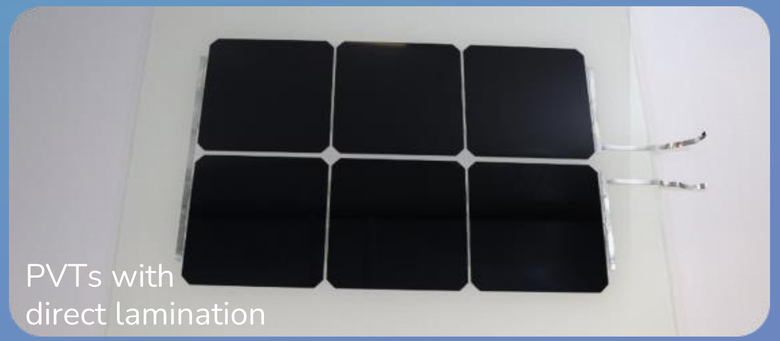
Technology Framework



Technologies



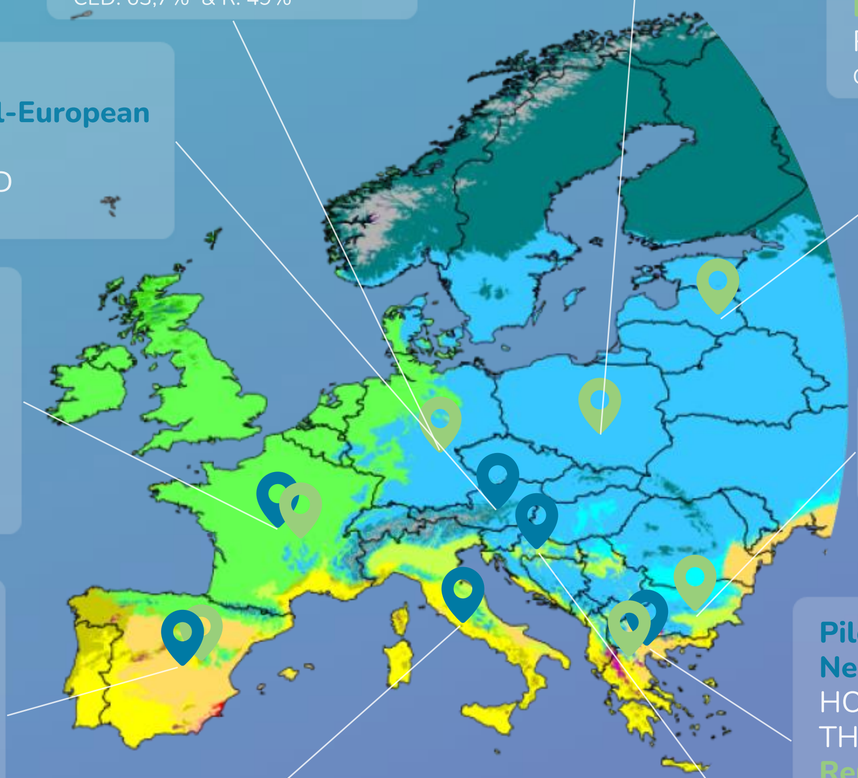


Demonstration Sites

- Arid, desert, hot (BWh)
- Arid, desert, cold (BSk)
- Arid, steppe, hot (BSh)
- Arid, steppe, hot (BSk)
- Temperate, dry summer, hot summer (Csa)
- Temperate, dry summer, warm summer (Csb)
- Temperate, dry summer, cold summer (Csc)
- Temperate, no dry season, hot summer (Cfa)
- Temperate, no dry season, warm summer (Cfb)
- Temperate, no dry season, cold summer (Cfc)
- Cold, dry season, hot summer (Dsa)
- Cold, dry season, warm summer (Dsb)
- Cold, dry season, warm summer (Dsc)
- Cold, no dry season, hot summer (Dfa)
- Cold, no dry season, warm summer (Dfb)
- Cold, no dry season, cold summer (Dfc)
- Polar, tundra (ET)
- Polar, frost (EF)

CED (Country Energy Dependence) & R (Share of gas supply from Russia) in 2021

Source: Eurostat, eia, Statista (2022)



Pilot 1 (FR)
Retrofitting a Central-European residential building
IDM, SOZIALBAU, TUD
CED: 58,3% & R:86%

Pilot 2 (Front Runner)
Retrofitting residential buildings connected to the local district heating network
UNIZAG, CER, HEPT, GSG, GVG
CED: 53,6% & R: 16%

Pilot 3 (Front Runner)
Retrofitting of an office complex in a former historic peri urban area
EDF, SAUTER, KMØ, ENOV CAMPUS
Replication Multipliers
HELEXIA
CED: 44,5% & R: 15%

Pilot 4 (Front Runner)
New single home
HOLISTIC, ZENITH, KLIMA, THES, ARCELIK
Replication Multipliers
THESS
CED: 81,4% & R: 64%

Pilot 5 (Front Runner)
A complete renovation of a multifamily building
INNOVA, ASSOCLIMA
CED: 73,5% & R: 38%

Pilot 6 (Front Runner)
New extension of TECNALIA's headquarters
TECNALIA
Replication Multipliers
VEOLIA
CED: 67,9% & R: -

Replication Multipliers
FASADA & GDYNIA
CED: 42,8% & R: 50%

Replication Multipliers
UNIPASSAU
CED: 63,7% & R: 49%

Replication Multipliers
RPR
CED: 45,5% & R: 92%

Replication Multipliers
EAP
CED: 37,9% & R: 79%

DS 1: Viennese Multi-Family Row-House (2-storey)

Location: Vienna, Austria
Leading partner: IDM
Technology: R290 brine-to-water heat pump + PVs 200kW + Electric energy storage

DS 2: Residential Building, 130 apartments

Location: Velika Gorica, Croatia
Leading partner: HEPT
Technology: District-heating-connected HPs + Hybrid photovoltaic-thermal (PVT) technology + PV

DS 3: Office complex in a historic peri-urban area

Location: Mulhouse, France
Leading partner: EDF
Technology: PV + HP DHN + BMS (Digital Twin solution)

DS 4: 3-storey & 2-storey single houses

Location: Greece
Leading partner: ZENITH
Technology: HP+Rooftop PVs, IoT with DR tools

DS 5: Multifamily building, 13 apartments

Location: Bolbeno, Trento, Italy
Leading partner: INNOVA
Technology: PVs + ATW HP + PCM Thermal ES in HPs ctrl + LT Emitters + radiant panels + Fan coils + Advance Energy Management on the Hydronic Plant

DS 6: Office building, lab facilities & car parking

Location: Sebastian, Spain Donostia-San
Leading partner: TECNALIA
Technology: DSHP + PVTs + Digital Twins

Hotel, University, Multi-Apartment Complex
Madrid, Segovia, Valladolid - Spain

Kindergarten
Gdynia - Poland

Multi-Appartment Building
Riga - Latvia

Sports Center, Kindergarten, Mensa Building
Passau - Germany

4 High schools, 1 Gym
Thessaloniki - Greece

Warehouse, Storage
Saint-Priest - Lyon France

Single Family Residential Building
Plovdiv - Bulgaria

7 Multipliers Replication Sites

Email

contact@meta-build.eu

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META BUILD Newsletter

Website

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Social Media

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Thank You!