COSMIC

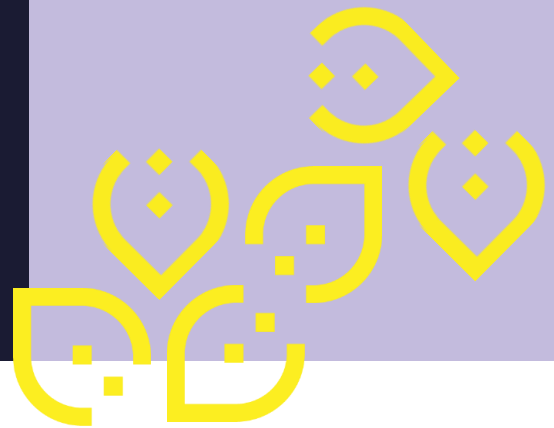
First Open Call

INFO DAY

26 June 2025
Online

COSMIC

AI-POWERED
ENERGY OPTIMISATION



WELCOME!

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AGENDA

10:00–10:10 **Welcome & introduction**

- Project overview (INETUM)
- Objectives of the Info Day (FundingBox)

10:10–10:50 **Core Technical Facilitators (CTFs)** (CIMNE, INETUM, Cenaero, CETASOL, InescTec, USeville)

- What are CTFs? (CIMNE)
- Presentation of each CTF: technical features, adaptation to pilots, SDKs/APIs, and interoperability
- How CTFs enable rapid integration and exploitation (Cenaero)

10:50–11:30 **Pilots & challenges overview**

- Overview of pilot locations: Spain, Belgium, Portugal, France, Finland, and EU-wide (INETUM)
- Challenges for the first Open Call (CIMNE, INETUM, Cenaero, CETASOL, InescTec, USeville)

11:30–11:40 **Open Call & evaluation process** (FundingBox)

- How to apply
- Eligibility & award criteria
- Timeline & milestones

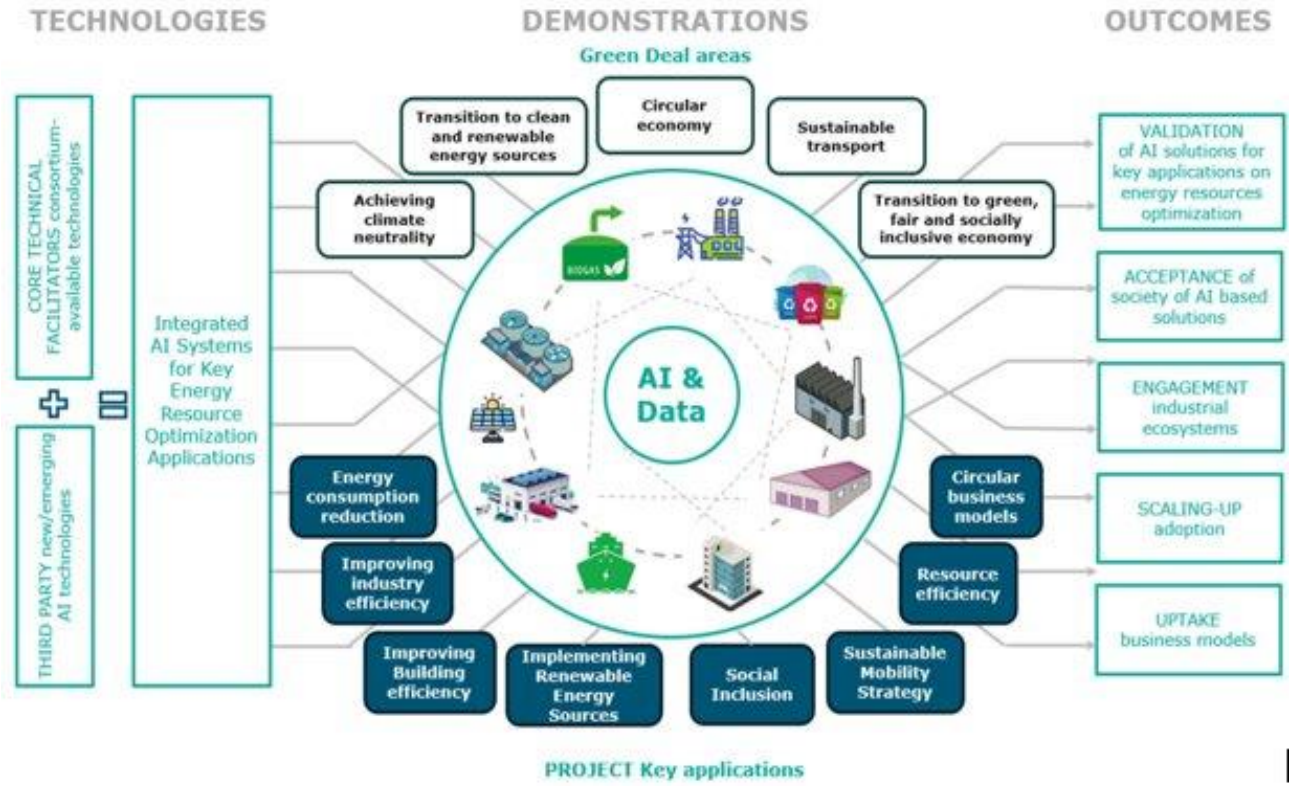
11:40–12:00 **Live Q&A and closing remarks**

Funded by
the European Union

ABOUT COSMIC

COSMIC is a European project funded by the Horizon Europe programme.

It aims to demonstrate how Artificial Intelligence (AI) and Big Data technologies can drive the optimization of energy resources across industrial, urban, and residential sectors, in alignment with the goals of the European Green Deal.



ABOUT COSMIC

Objectives

- **Optimize energy resources** through Big Data and AI by integrating innovative SME solutions into technological platforms (CTFs) to create scalable Integrated AI Systems (IAIS).
- **Implement 15 large-scale pilots** across key sectors to enhance resource efficiency, in alignment with the Green Deal.
- **Develop European scaling strategies** for industrial ecosystems, facilitating IAIS replication and strengthening the competitiveness of Europe's AI and data-driven industries.

Main Activities

- **Open calls** for SME participation, targeting innovative AI-based solutions.
- **Implementation of large-scale pilots** with access to extensive historical and real-time datasets.
- **Development of training materials** to support AI adoption in European industry.

ABOUT COSMIC

Selecting innovations through Open Calls

We fund innovative AI & data-driven solutions from startups and SMEs and apply them to sustainability projects across different industries.

→

Testing and integration in pilots

Selected innovations are deployed alongside existing core technologies in our 15 pilots, optimising energy and resource efficiency in real-world conditions.

→

Scaling up for long-term impact

We ensure solutions are scalable and replicable, sharing results with industries, policymakers, and communities to drive widespread adoption.

ABOUT COSMIC

Expected Results:

- Significant reduction in energy consumption and associated costs.
- Creation of new industrial ecosystems that can be replicated across Europe.
- Strengthening of European leadership in AI and data technology.

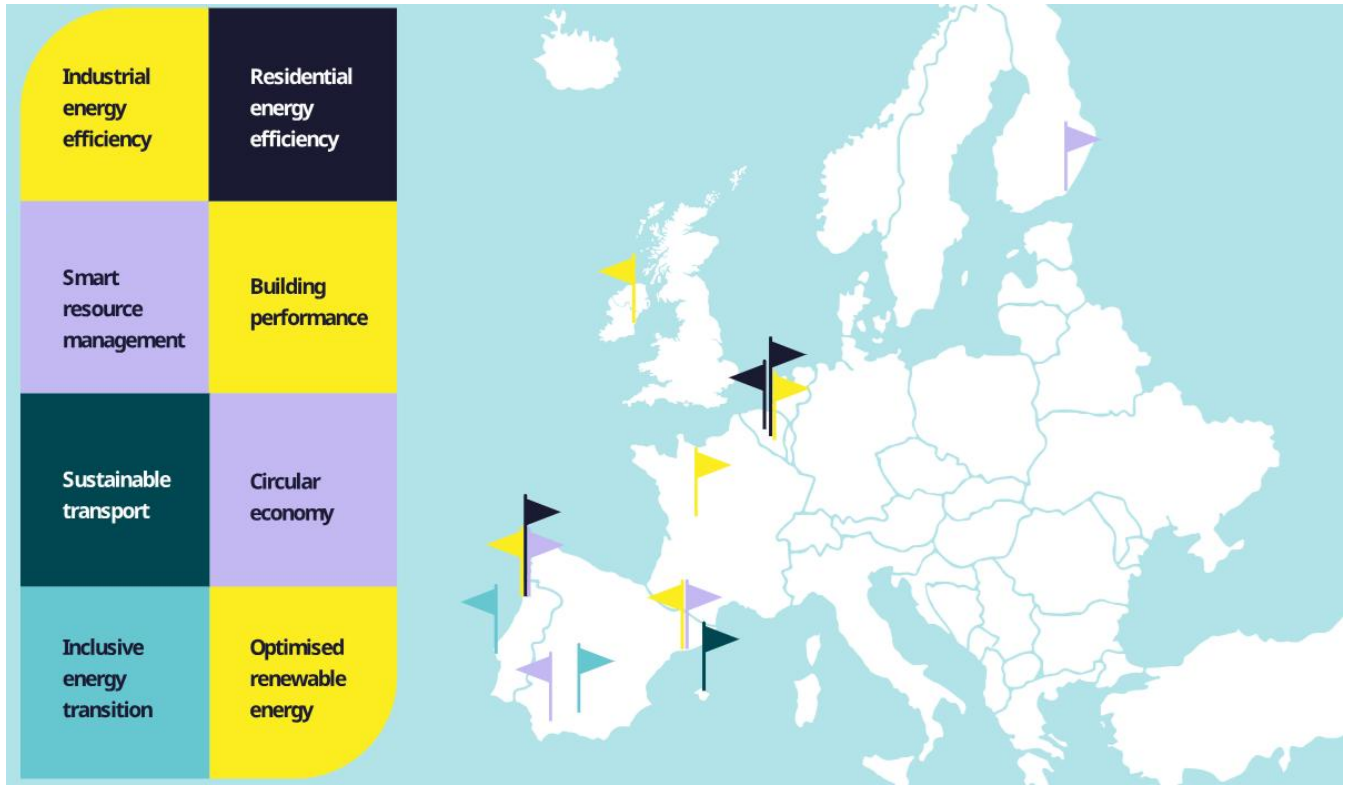
Societal Impact:

- Reduction of residential energy costs by more than 10%.
- Reduction of energy poverty by up to 20%.
- Improvement in resilience by over 20%.
- Democratization of the AI market: lowering barriers to deploy innovative solutions.

PROJECT OVERVIEW

COSMIC in numbers:

- Partners: 21
- Budget: 10 801 484.46€
- EU contribution: 9 999 846.75€
- HORIZON Innovation Action
- Countries: 9
- GA N°: 101189676
- Duration: 36 Months
- Start: 01/12/2024
- End: 31/11/2027



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Core Technical Facilitators Presentation

By CIMNE, INETUM, Cenaero, CETASOL, InescTec, USeville

Info Day OC1, 26 June 2025

Funded by the European Union

What are Core Technical Facilitators (CTFs)

(Stoyan Danov – CIMNE)

Core Technical Facilitators (CTFs)

- **Core Technical Facilitators (CTFs)** are transversal, AI/data-driven platforms and modules that serve as the common infrastructure supporting third-party solutions across pilots.

- The CTFs serve as the foundational technical environment where these third-party innovations can be **embedded, tested, and validated.**

- They are represented by **technical partners** involved in the COSMIC project who are responsible for providing technical solutions that apply across various sectors or applications.

Core Technical Facilitators (CTFs)

The key word is **“facilitator”**. The CTFs are meant to help to **speed up the increase of the TRL** of the TP solution and to **facilitate its deployment** at the pilot by e.g.:

- Prepare the data from the pilot and make it ready to use by the TP.
- Provide a link to the pilot infrastructures or an environment for execution of the solution
- Provide additional solutions that need to be integrated with the TP solution in order to implement the use case of the pilot demonstration.

➢ The TPs will be accompanied by mentors and provided with technical support by part of the CTF providers.

Core Technical Facilitators (CTFs)

- CTF1 - Data standardisation and data preparation modules. (CIMNE)
- CTF2 - Big data analytics framework. (CIMNE)
- CTF3 - Big data microservice platform for district energy optimization (Inetum)
- CTF4 – TPEE Data-driven web platform for optimal energy management for multi-storey buildings (Cenaero)
- CTF5 - HEMS Home Energy Management System (InescTec)
- CTF6 – RECreation platform for managing Renewable Energy Communities (InescTec)
- CTF7 - Sizing tool of multi-energy communities (InescTec + Cenaero)
- CTF8 – iHELM, digital twin platform for sustainable and operational efficient maritime industry (Cetasol)
- CTF9 - HPC based multi-fidelity and physics design of resilient built environment (Cenaero + USevilla)
- CTF10 – Intraverse, VR/AR platform (Inetum)

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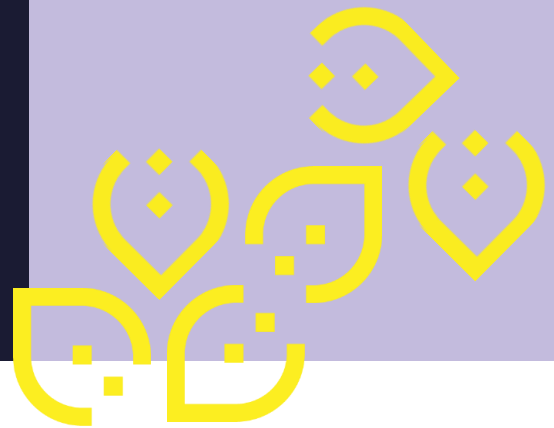


CTF1 - Data standardisation and data preparation modules (CIMNE)

CTF1 - Data standardisation and data preparation modules

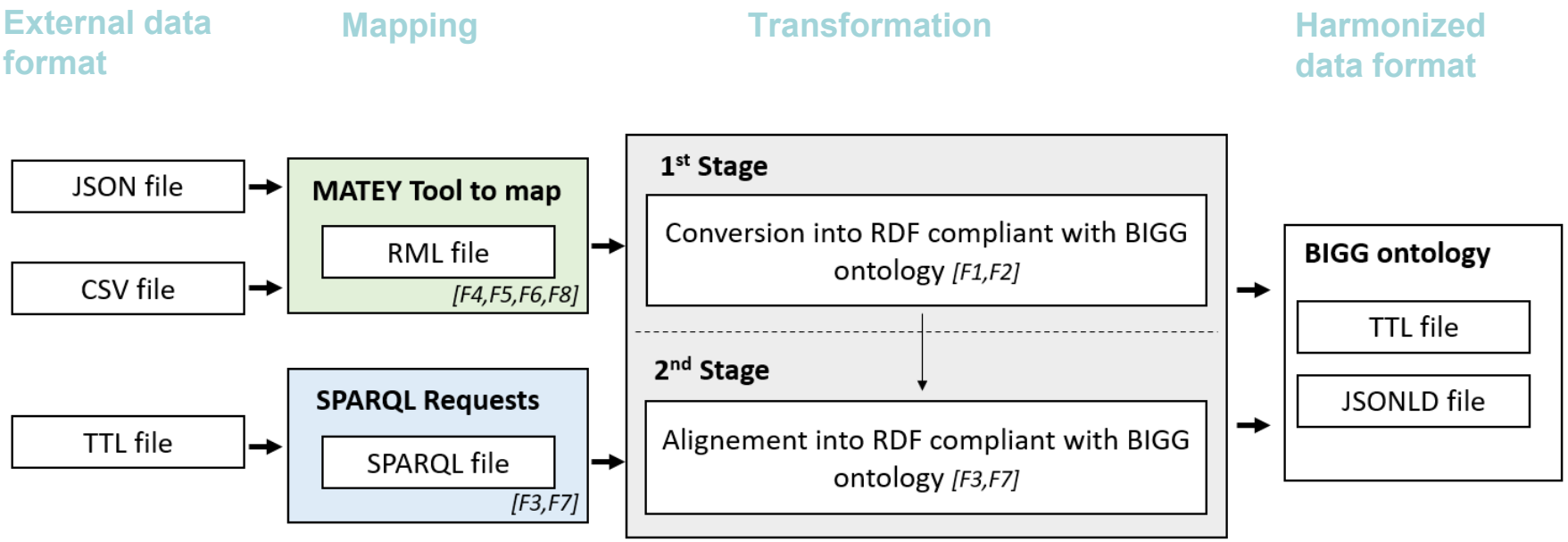
An open-source framework facilitating the alignment and harmonization of data from various sources to support AI technologies.

- The BIGG ontology based on SAREF and other standards covering spatially distributed energy resources and energy efficiency investments & Mapping and data transformation tools
- Software library and utilities for "low code" construction of analytics pipelines (biggr package), reducing data preparation efforts and improving data quality for all types of time series data.

➢ The framework will be used for preparing the data for the TPs to facilitate their implementation (pilot 2.1, pilot 5.2)

CTF1 - Data standardisation and data preparation modules

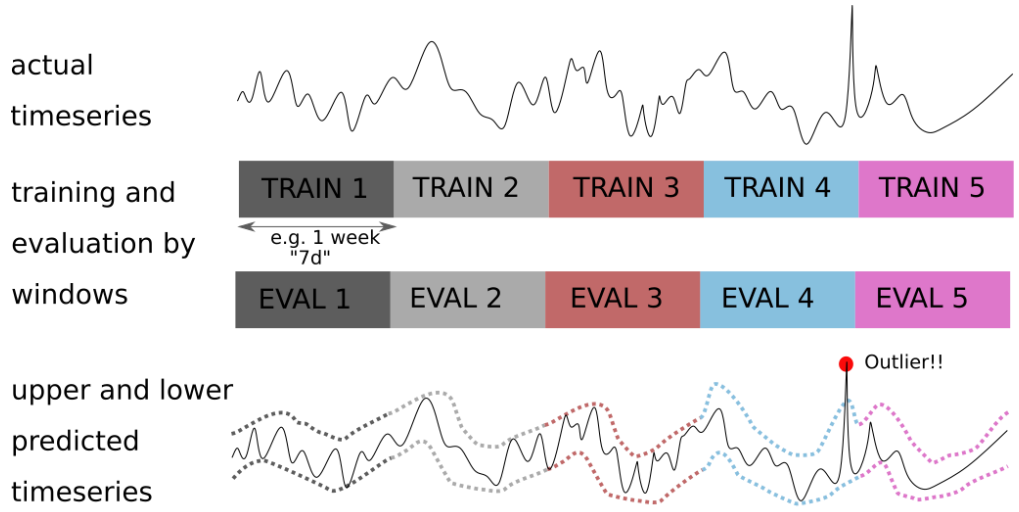
Data harmonization tools



CTF1 - Data standardisation and data preparation modules

Data preparation tools for timeseries (biggr)

- timeseries data upscaling and alignment
- detection of outliers, cleaning
- detection of disruptive periods
- analytics library



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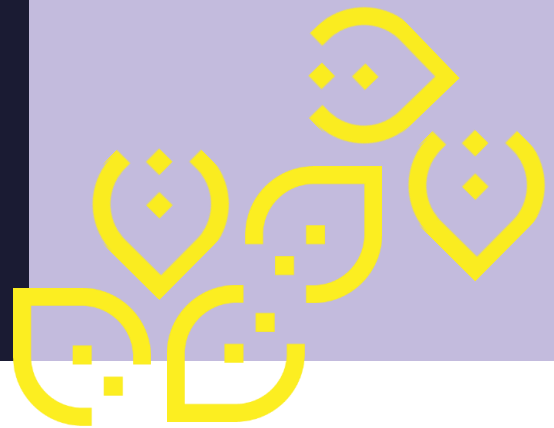
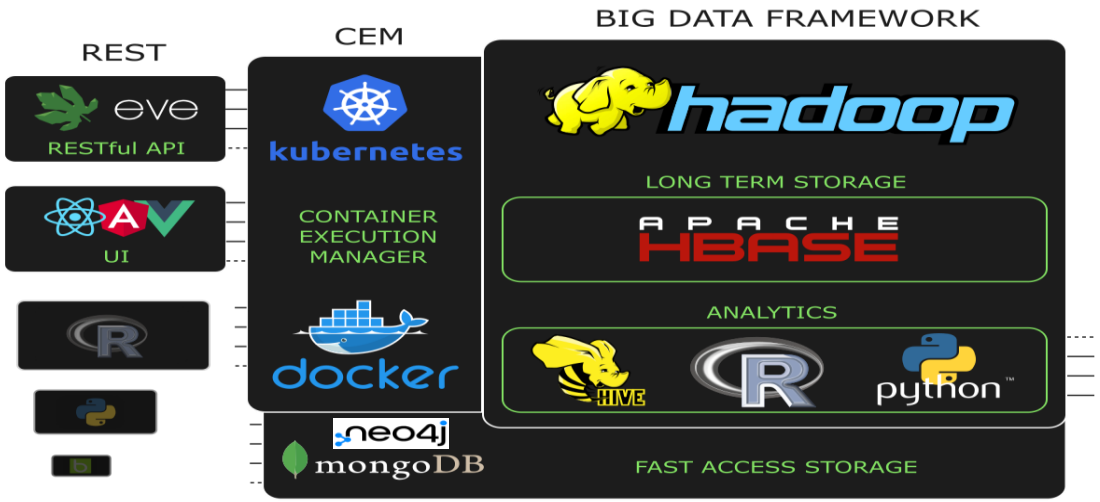


CTF2 - Big data analytics framework (CIMNE)

CTF2 - Big data analytics framework

A platform deployed by CIMNE for providing data analytics services. Enables big data interoperability, pre-processing, analytics, ML, AI services

- several databases: raw data storage, harmonized data database and results storage in Neo4J and MongoDB
- modular Analytics Toolbox and service orchestrator.



- The platform will provide an adaptable environment for accommodation of TP developed AI services.
- Mentoring and support will be provided by CIMNE.

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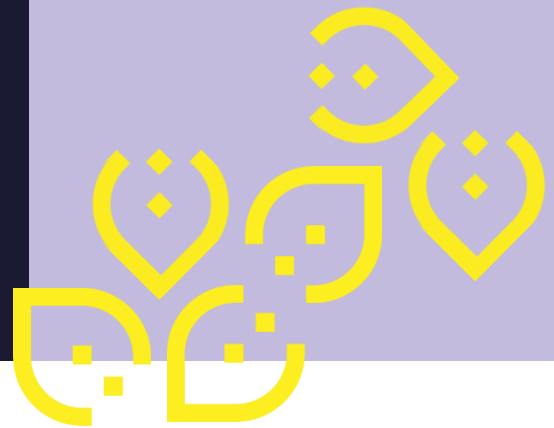
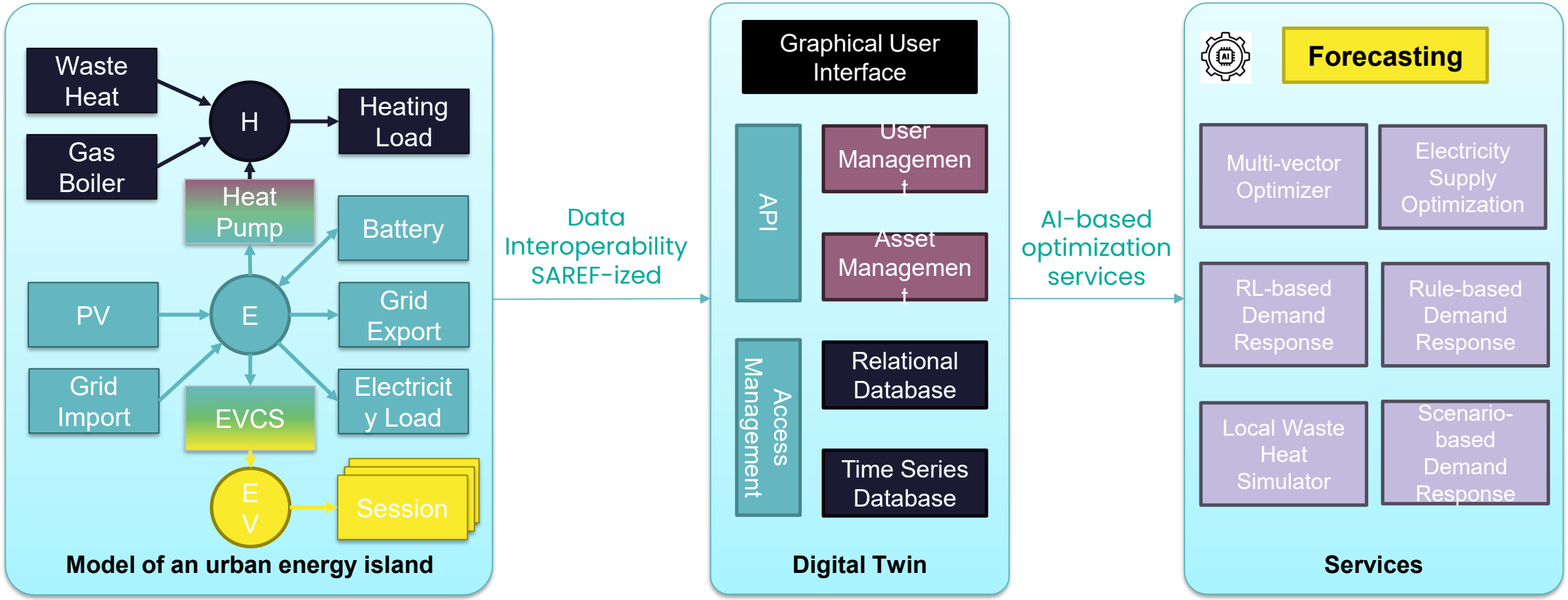


CTF3 - Big data microservice platform for district energy optimization
(Inetum)

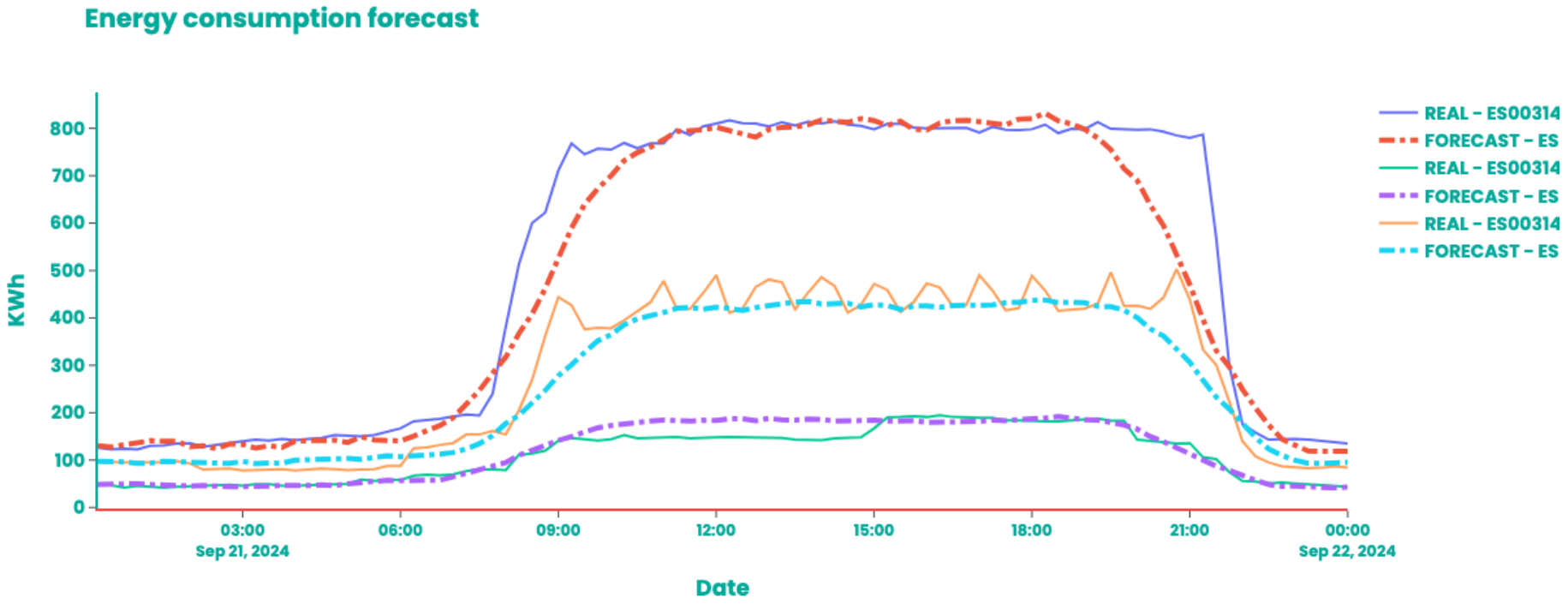
CTF3 – RENergetic

- The RENergetic System was developed as a part of the EU RENergetic Project and it serves as an Database, interface for energy components management.
- It included forecasting and optimization based on the availability of renewable assets.
- A basic system of communication was stablished

Energy Forecasting and Optimization



AI Forecast – Demo Results

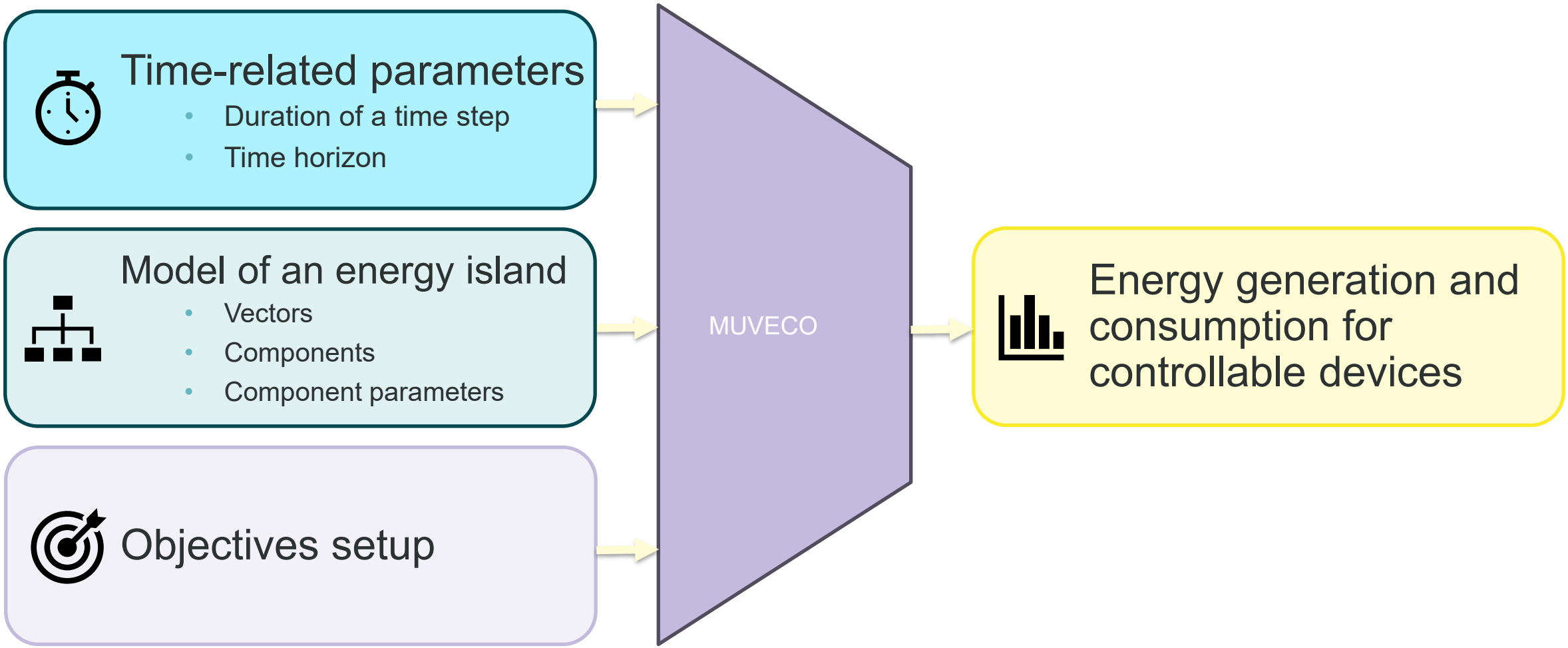


FAST Implementation

A replicable way to incorporate new processing and forecasting algorithms.

This was embeded into the pipelines for training and forecasting which allowed for quick implementation of new methodologies

Quick Overview of MUVECO



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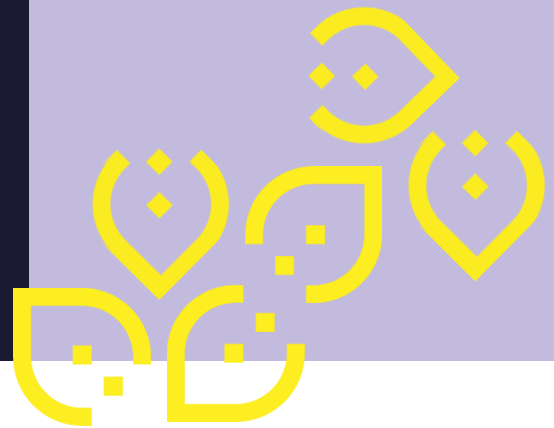
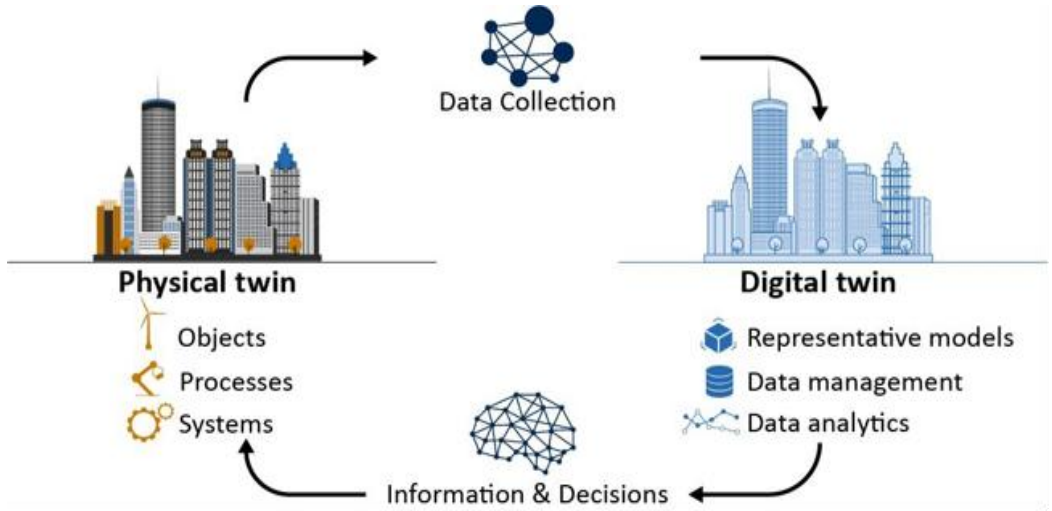
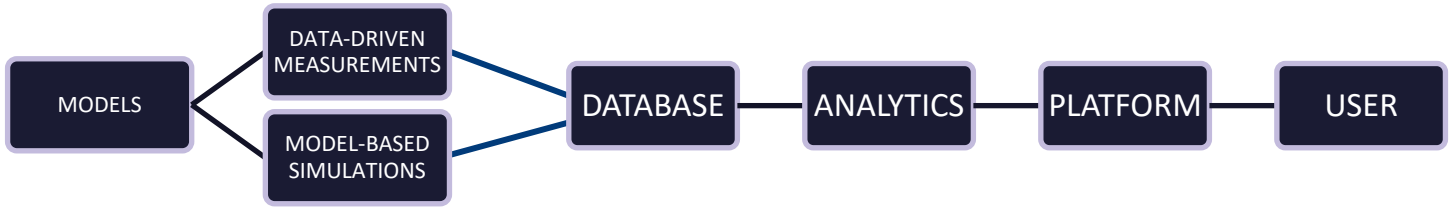


CTF4 – Data-driven web platform for optimal energy management for multi-storey buildings (Cenaero)

CTF4-TPEE web platform designed for energy management in multi-story buildings

- We provide web platform based on two approaches
  - Data-driven-based
  - Model-based

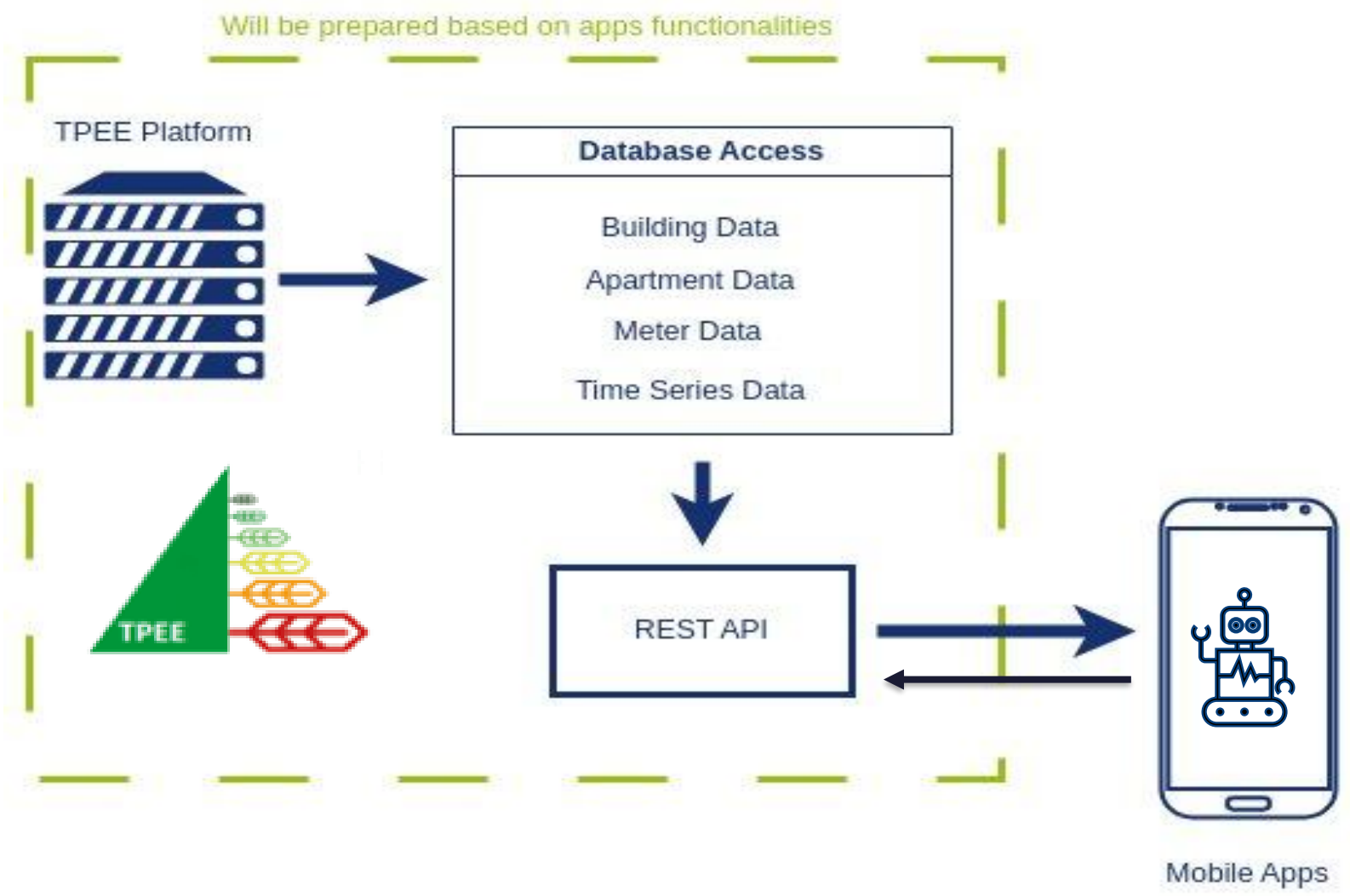




It delivers...

- HVAC alerts & deviations
- Online consumption & sensors data follow-up
- Splitted billing
- Consumption benchmarking
- Multi-asset management

TP collaboration to expand the TPEE platform functionalities in AI and portability



How it will be adapted to pilots & challenges

- Forecast short-term residential energy use using weather, historical, and simulation data (ma
- Trigger alerts and recommendations when usage exceeds expected levels
- Build a mobile app to show energy use and forecasts with simple, actionable tips
- Add gamification to increase user engagement and encourage energy savings
- Create a secure, scalable API to connect app and backend in real time
- Use computer vision to read meter types, serial numbers, and values from phone images
- Develop a mobile tool for commissioning teams to help automate meter setup

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CTF5 - HEMS Home Energy Management System (Inestec)

CTF5 – HEMS Home Energy Management System (Inestec)

Introduction

- Developed by InescTec, HEMS is a household-level energy management system.
- Provides services for consumers, retailers, DSOs, and aggregators.
- Services run remotely on InescTec servers, with some local modules.

Key Features

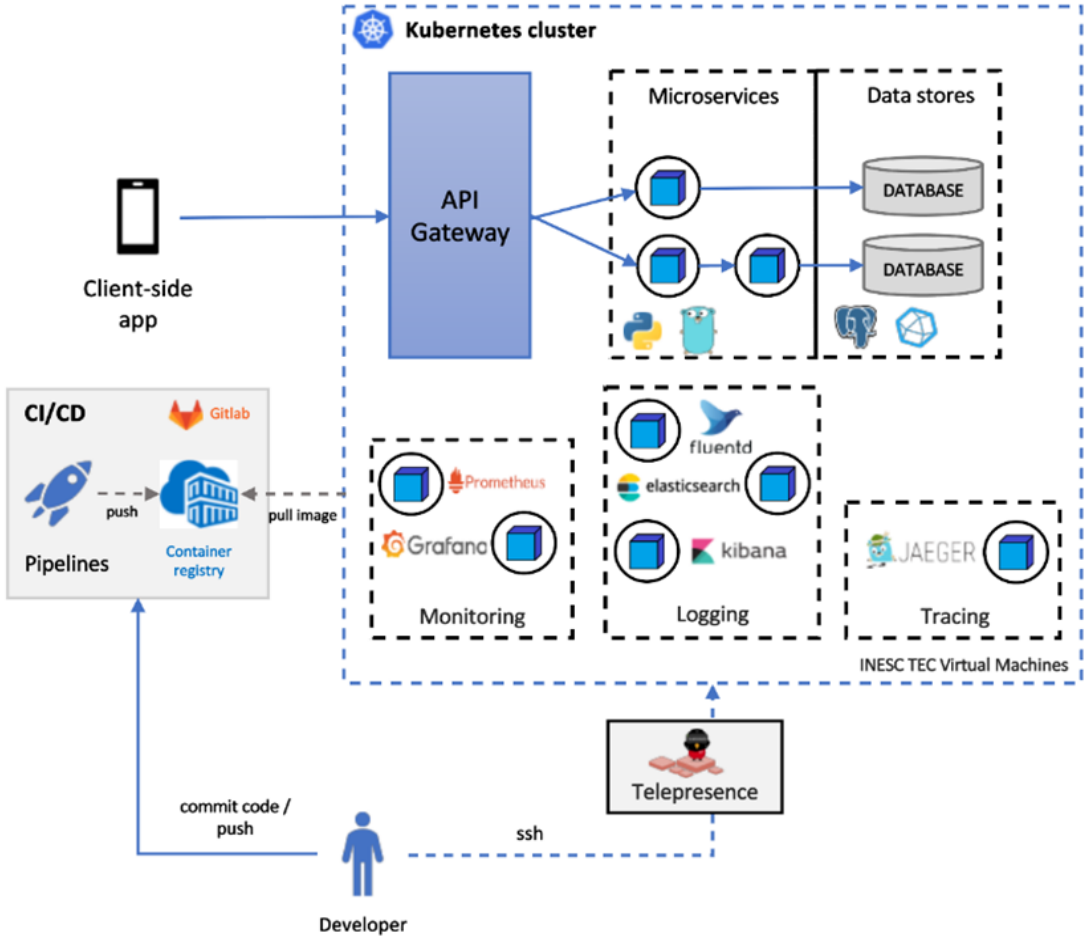
- Modular system that evolves with new services.
- Includes a mobile app, HEMS Connect, for consumers to:
  - **Monitor energy consumption.**
  - **Manage household loads.**
  - **Optimize energy usage.**

CTF5 – HEMS Home Energy Management System (Inestec)

Introduction

- HEMS is a modular, scalable microservice event-driven solution.

- Uses Kubernetes to orchestrate:
  - **Services**
  - **Databases (Relational & IoT)**
  - **Centralized logs**
  - **Monitoring tools**
  - **Backups**
  - **API Gateway**
  - **Service Mesh**



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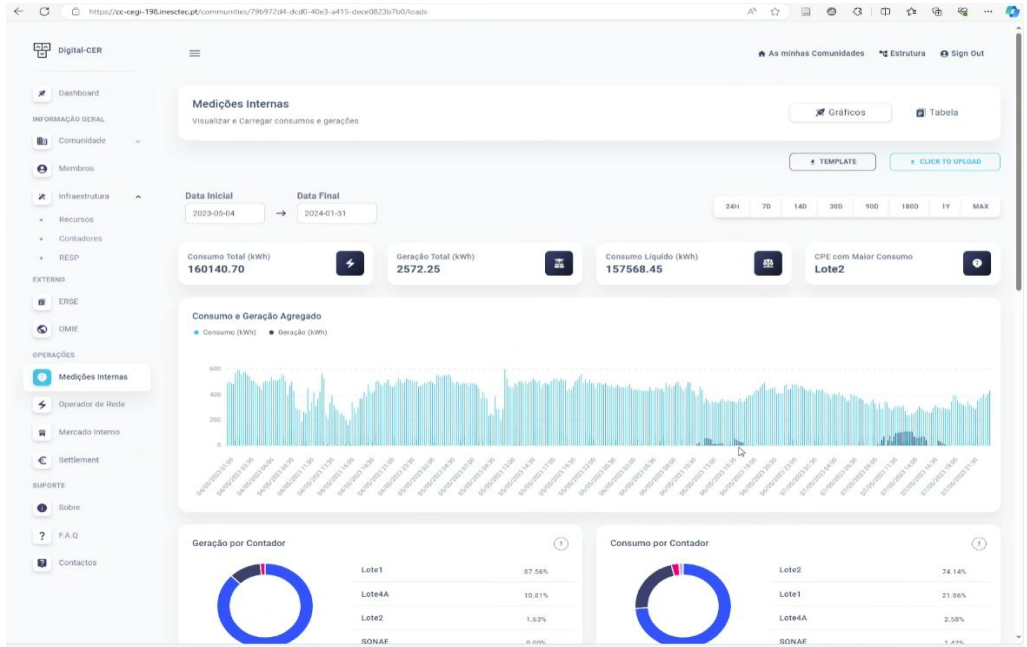
CTF6 – RECreation platform for managing Renewable Energy Communities (Inestec)

CTF6 – RECreation platform for managing Renewable Energy Communities (Inestec)

Introduction

- RECreation stands for Residential, Industrial, and Agricultural Communities for Energy Management and Sharing.
  - A digital platform developed by InescTec to manage Renewable Energy Communities (REC).
  - Focuses on self-consumption and energy trading within a Local Energy Market (LEM).



Key Features

- Modular microservice architecture
- Energy transactions service
- Settlement service for energy allocation and compensation
- Resource sizing service

CTF6 – RECreation platform for managing Renewable Energy Communities (Inestec)

Summary

- Highly Modular – Uses microservices for flexibility and scalability.
- Secure Energy Transactions – Ensures transparency and fairness in energy trading.
- Dynamic Allocation – Adapts to real-time data for efficient energy management.
- User-Friendly Interface – Simplifies the management of Renewable Energy Communities.
- Pilot-Ready – Already tested in key projects for practical implementation.

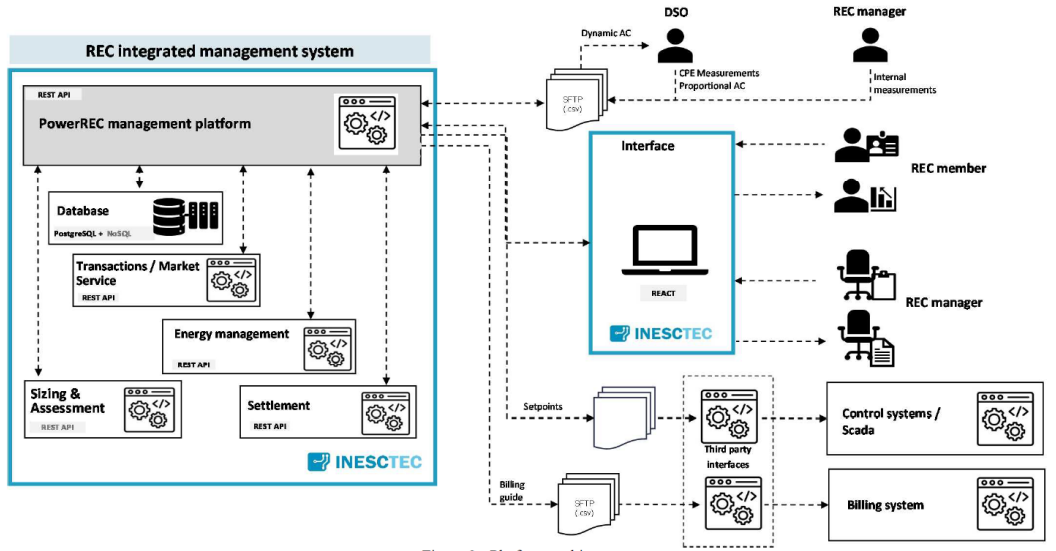
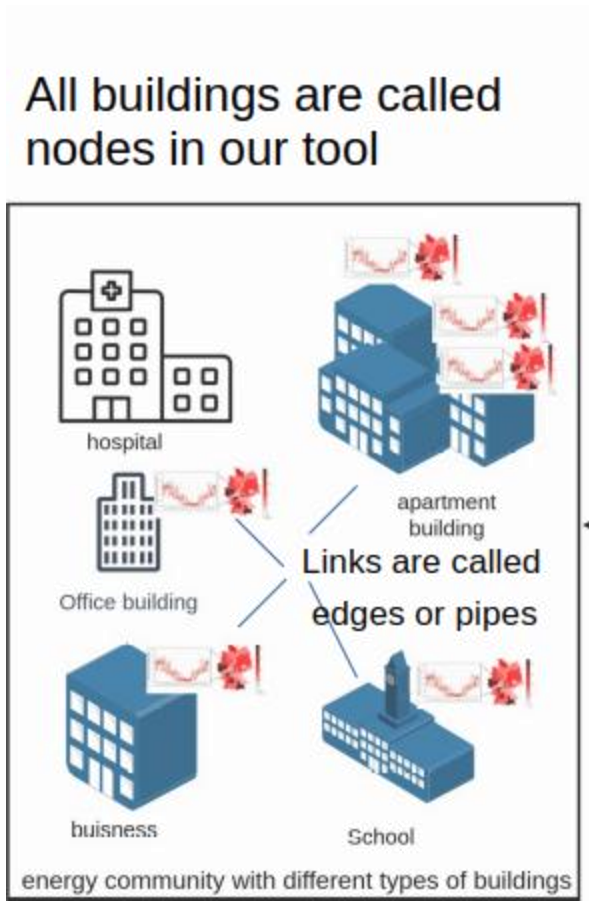


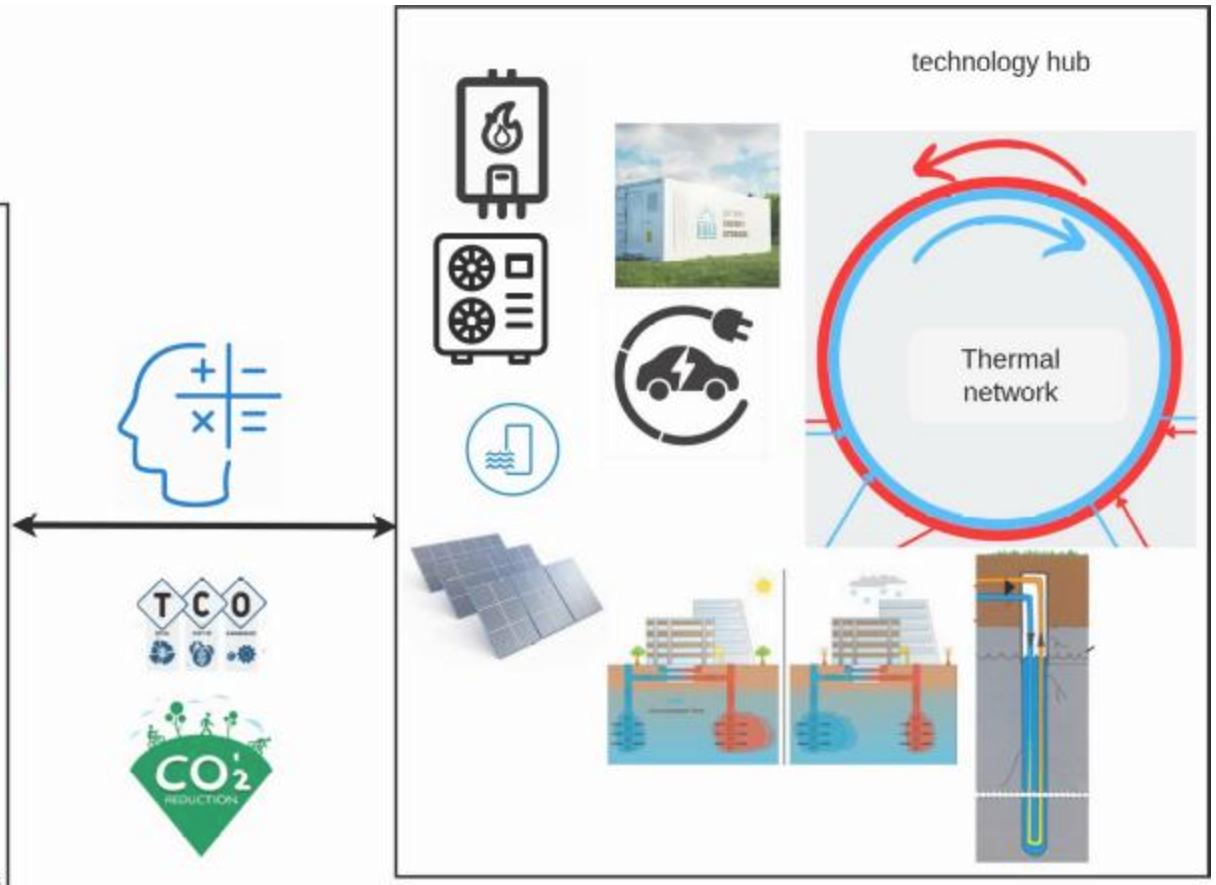
Figure 2: Platform architecture.

CTF7 - Sizing tool of multi-energy communities (Cenaero + Inestec)

CTF 7 is a sizing tool for multi-energy communities that optimizes system design to lower costs and GHG emissions

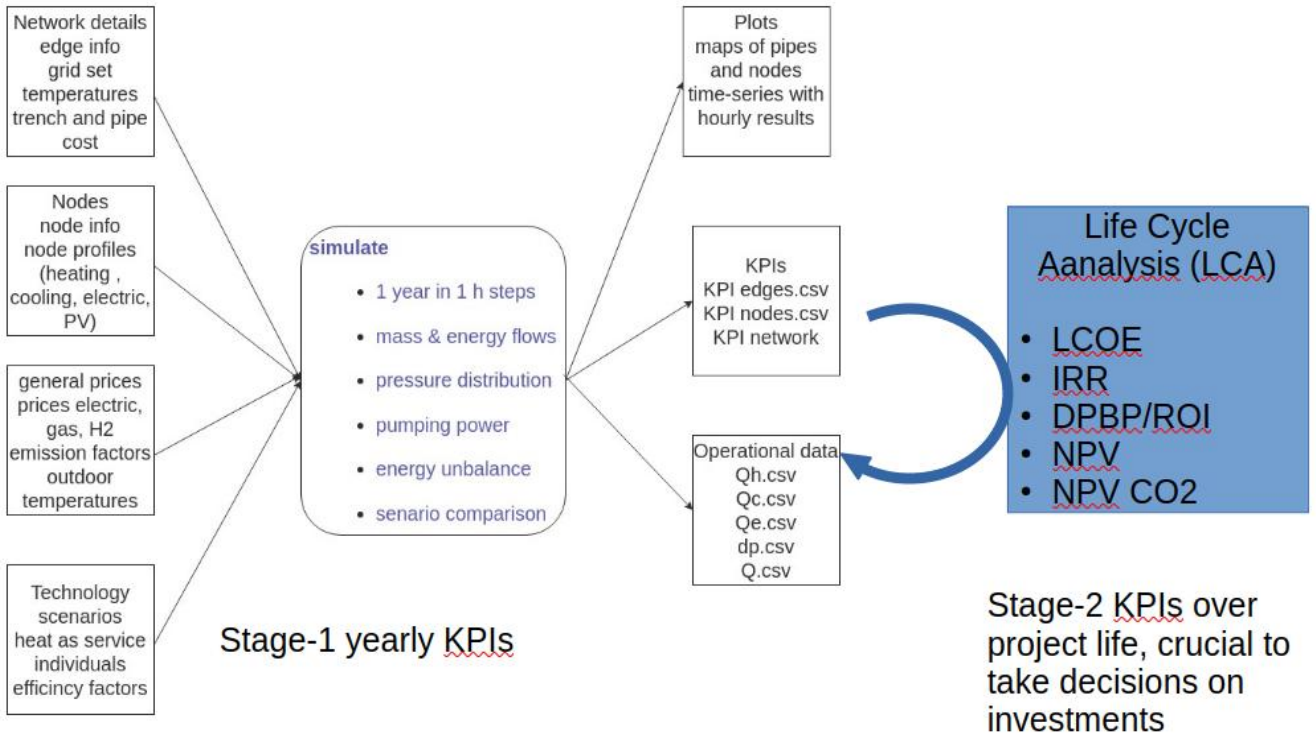


buildings and small neighborhood

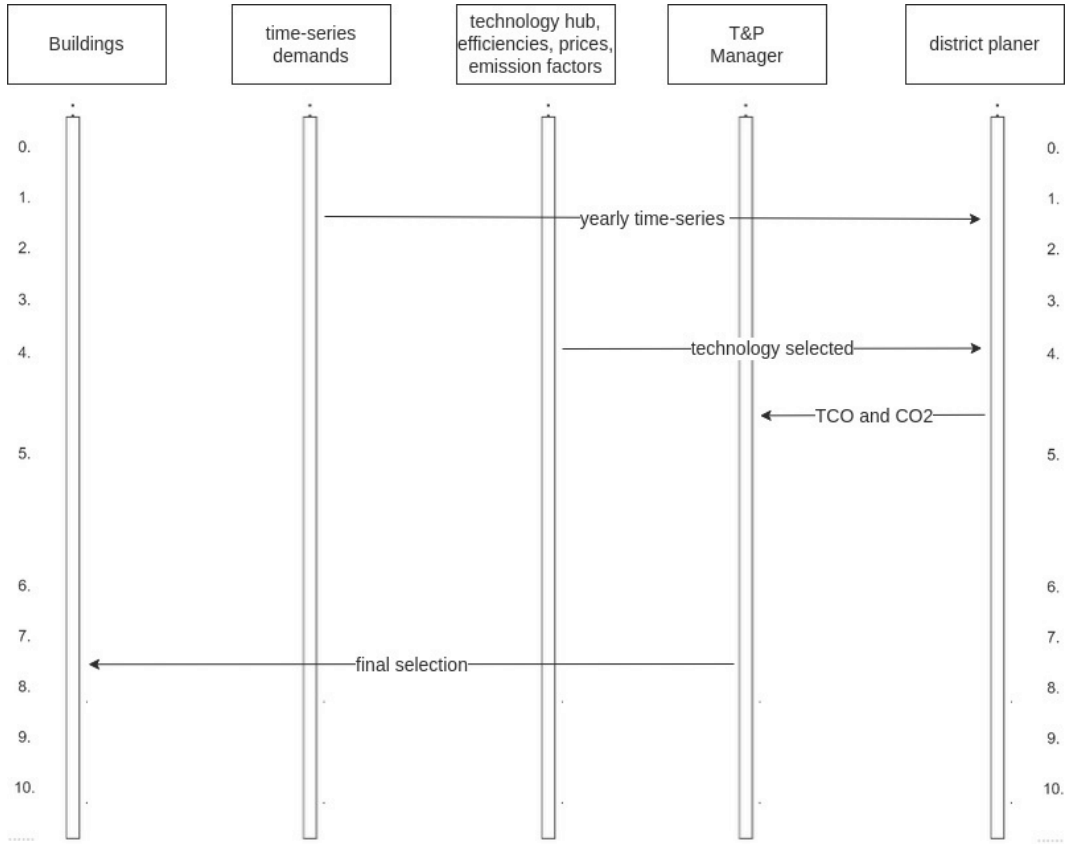


Technology mix for multiple energy scenarios

District Planner computes TCO, CO_2 reduction, and key financial KPIs to give stakeholders a complete view based on community energy needs



District planner framework



Decision flow diagram

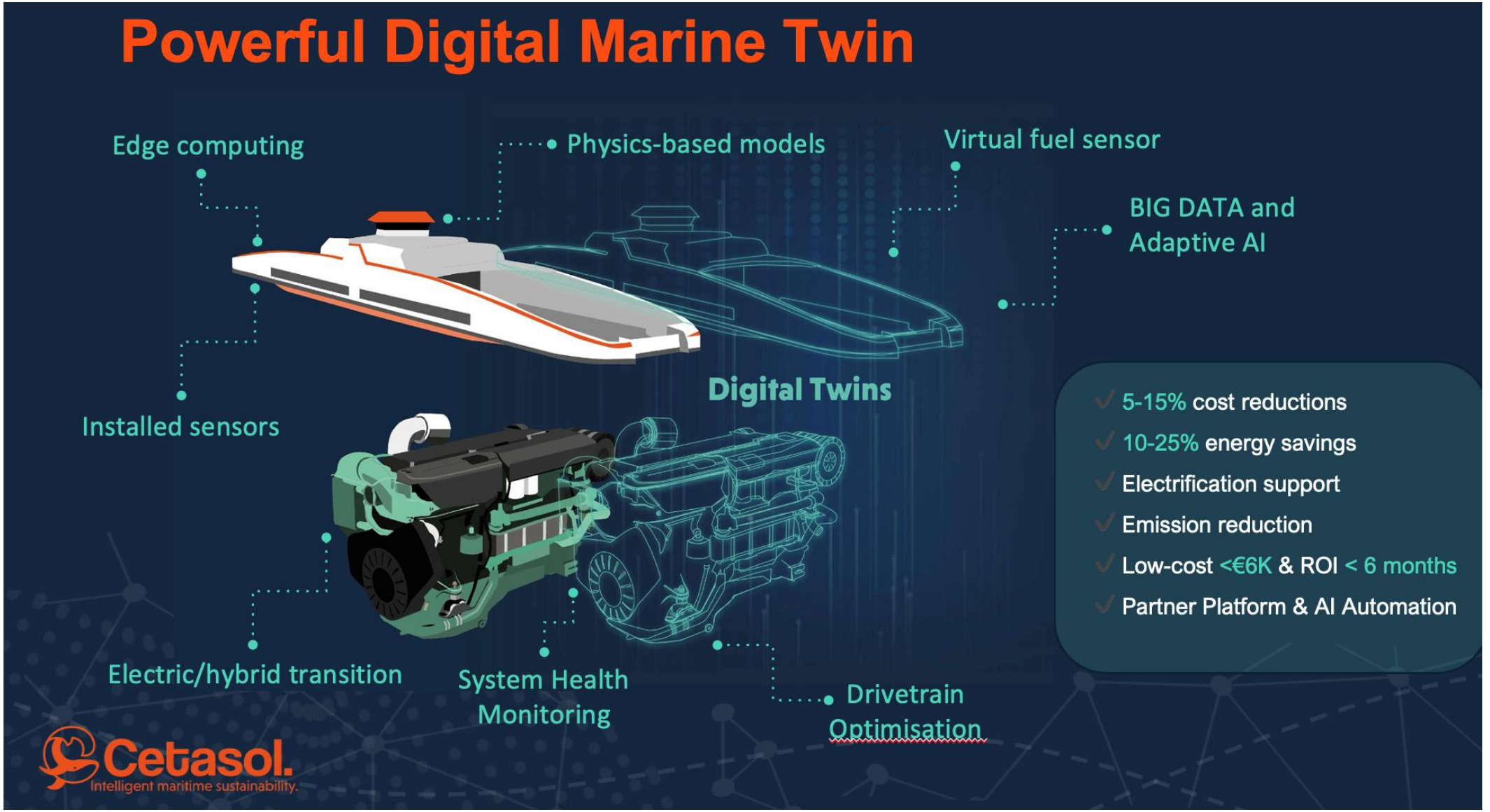
CTF8 – iHELM, digital twin platform for sustainable and operational efficient maritime industry (Cetasol)

Cetasol - iHelm

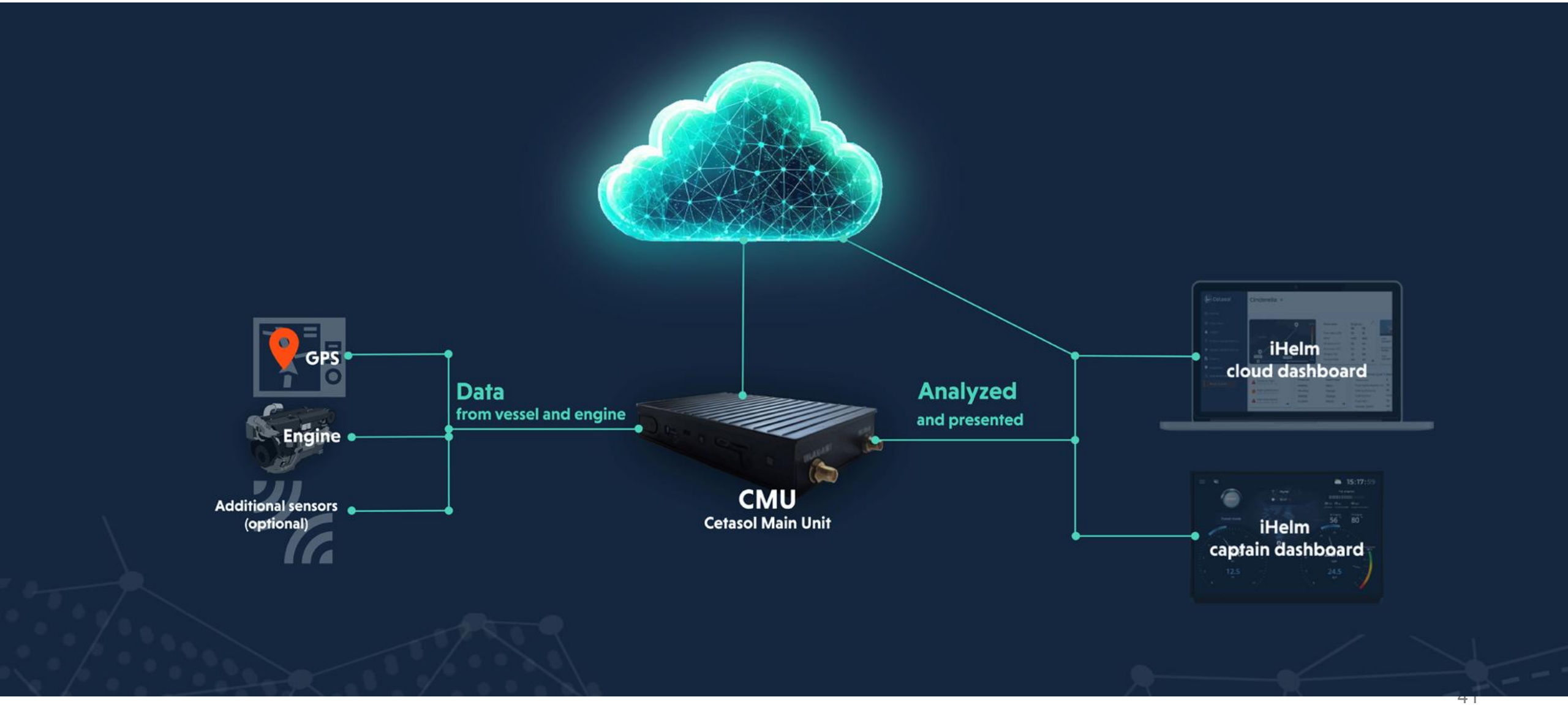
iHelm

intelligent decision support

Cetasol - iHelm



Cetasol - iHelm



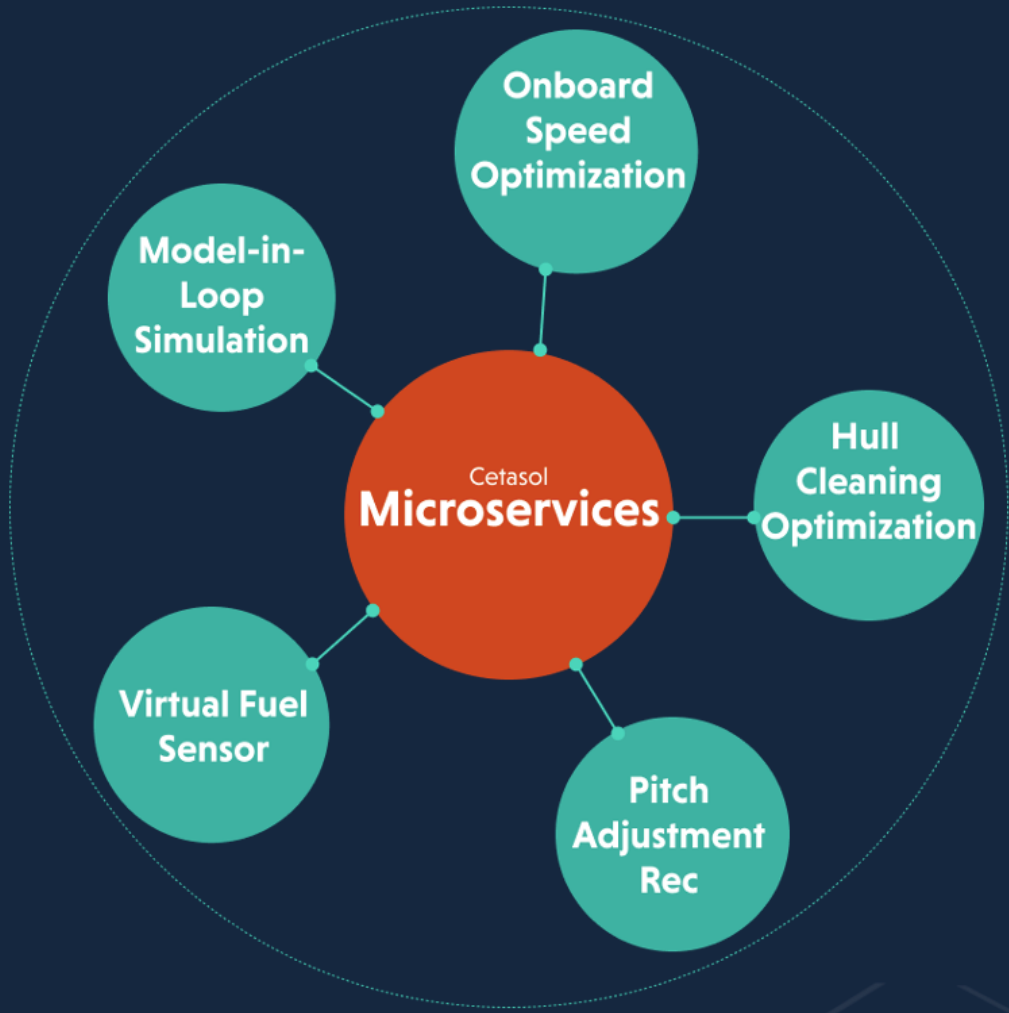
Cetasol - iHelm

Micro services

Cetasol digital twin enable a series of microservices.

- Customers can optimize their operations digitally

Many interesting new microservices to be developed using data from digital twin!



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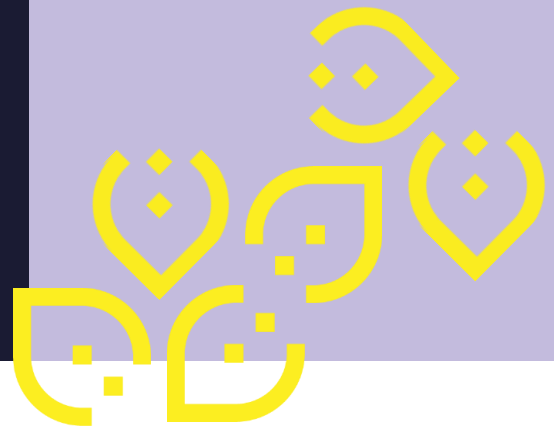
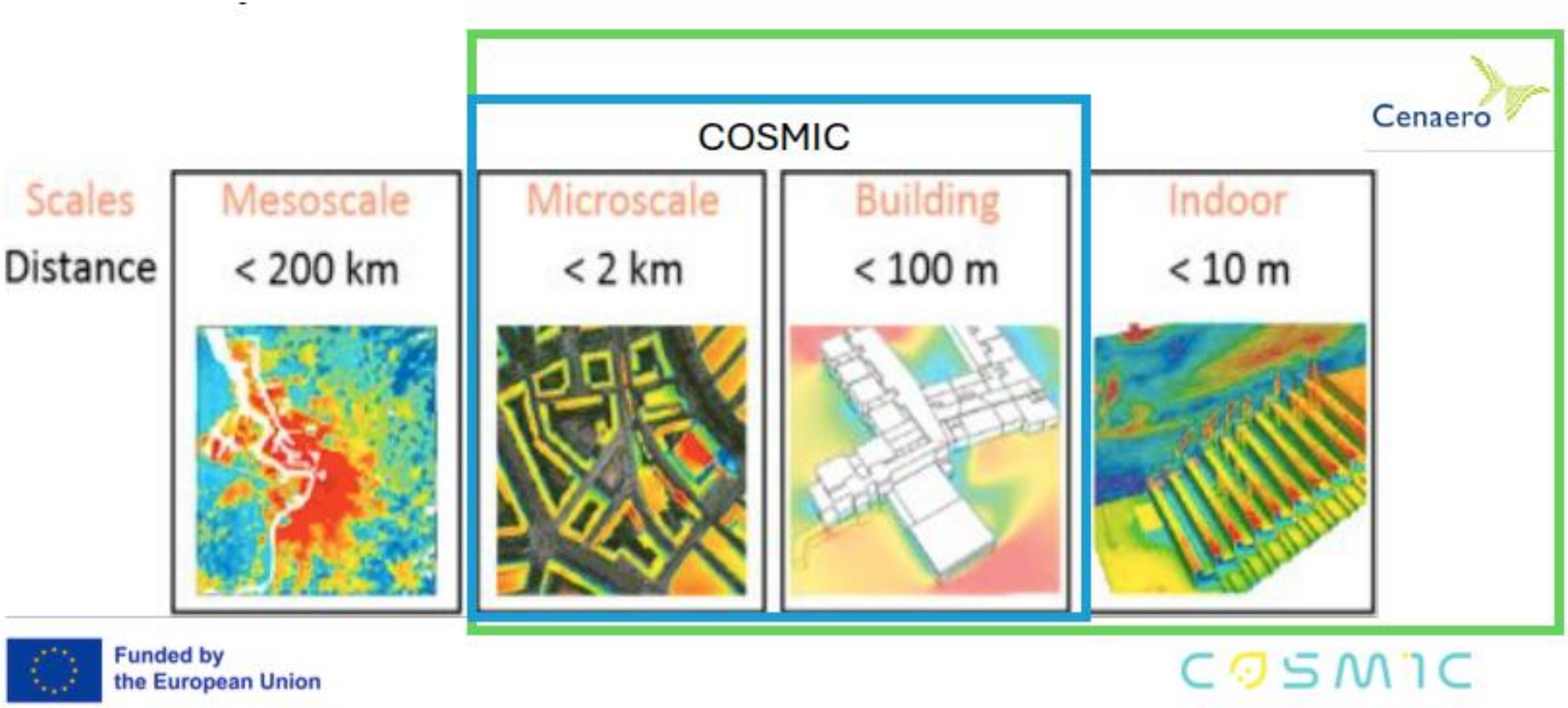
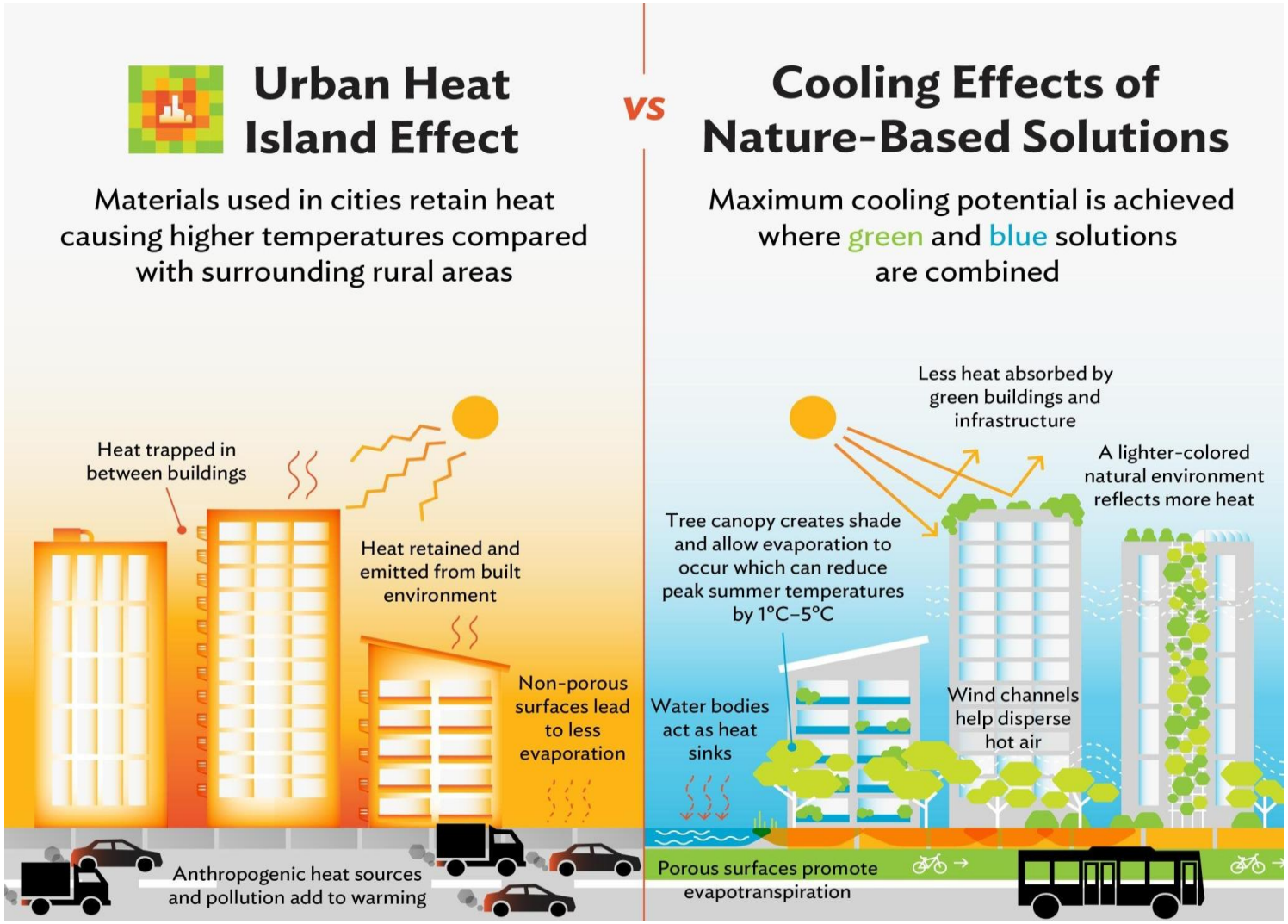


CTF9 - HPC based multi-fidelity and physics design of resilient built environment (Cenaero + USeville)

Based on CFD simulations, we solve for energy, velocity, pressure, and humidity, which requires appropriate boundary conditions



Next generation of early design tool based on 3D microclimate simulations to design/build future-proof, climate-resilient built environment



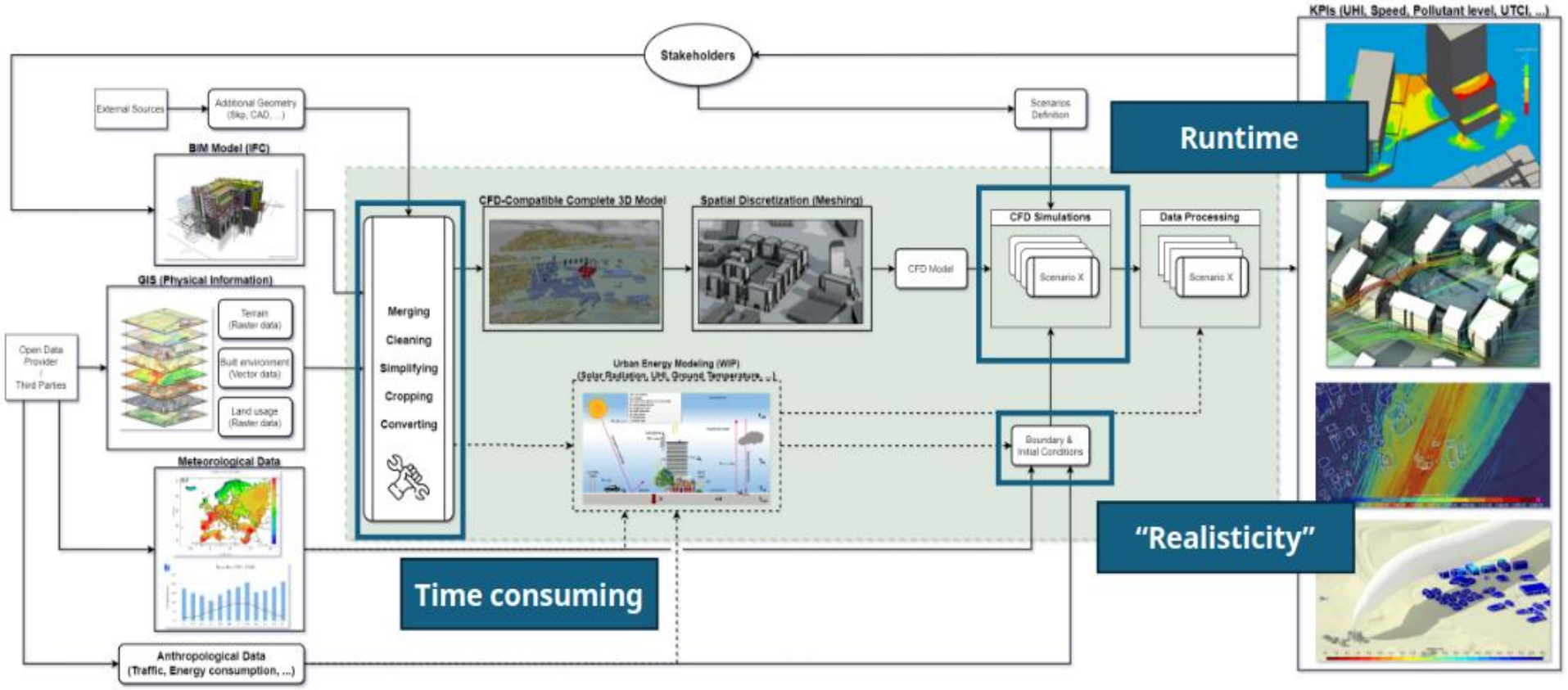
Source: Celina Garcia and Nathan Sarcia

Pilots

CTF9

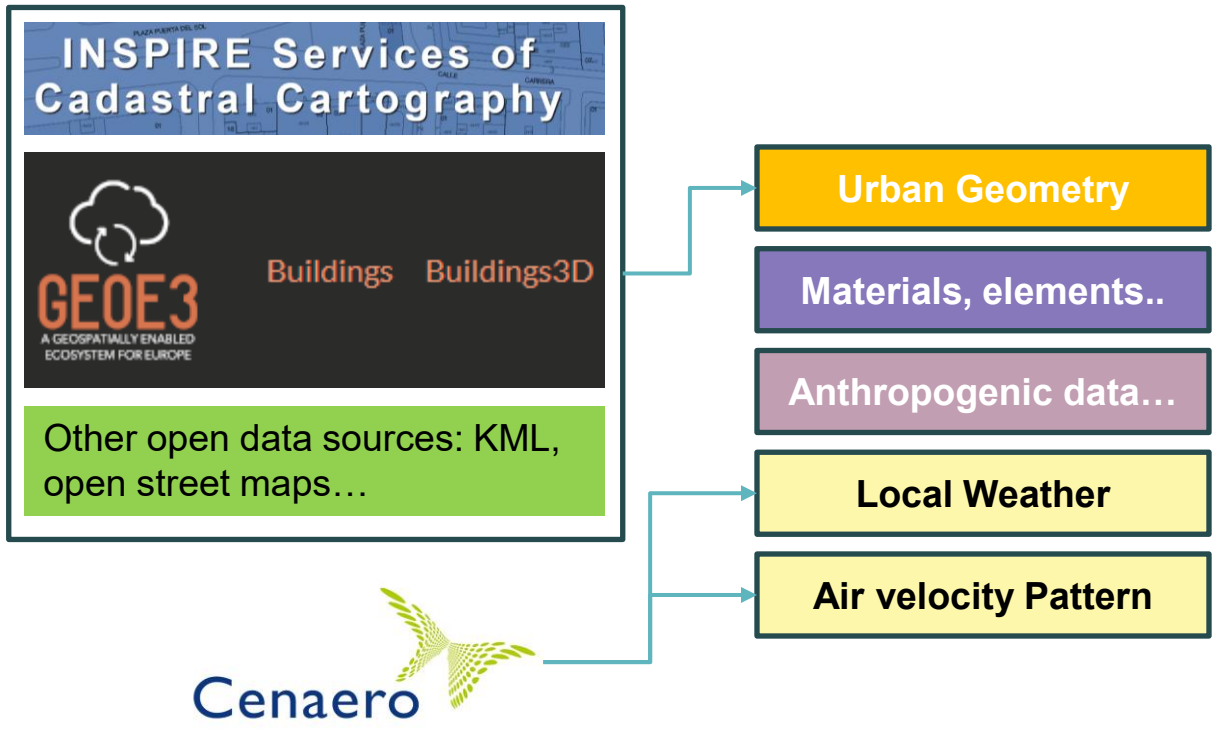
Cenaero’s urban microclimate simulation framework delivers high-quality, high-resolution 3D results across various scenarios, generated using its proprietary CFD-based toolchain

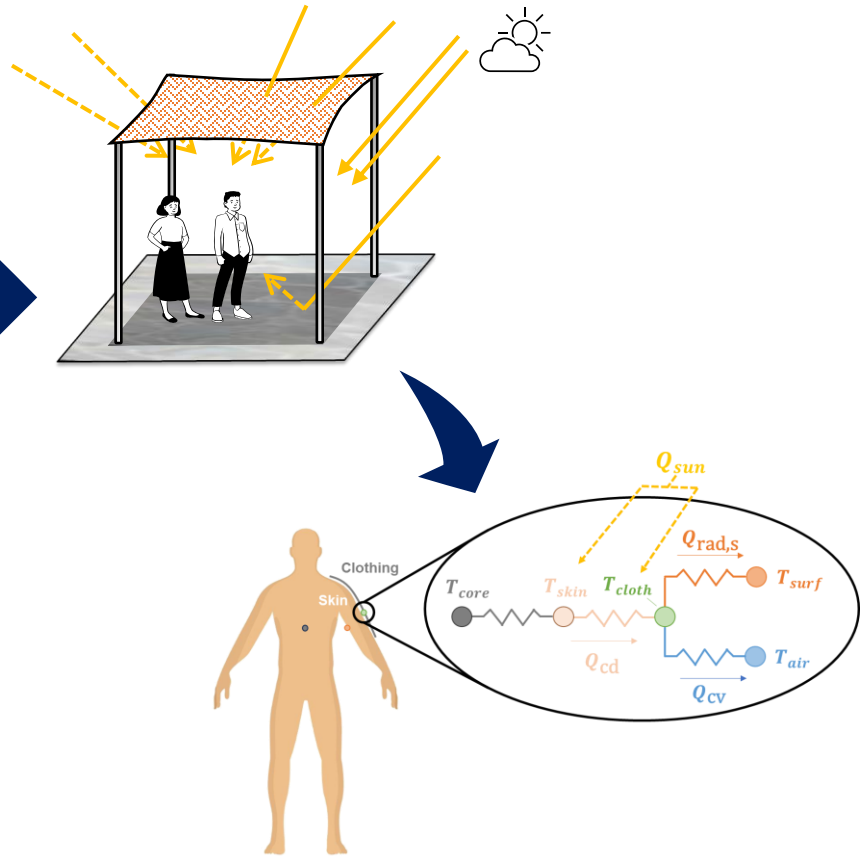
- Acceleration technology for CFD simulations
- Model reduction (CFD) for fast prototyping & decision-making
- Reduced models for more realistic boundary conditions (weather, buildings, vegetation, ...)
- GIS/BIM automatic data processing (cleaning, classification, ...)



Cenaero's urban micro-climate simulation framework with some limitations

Modelling Occupant Thermal Stress

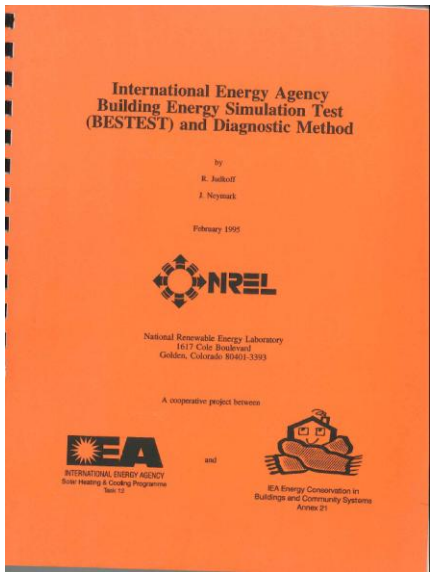




The simulation algorithm for occupants' thermal stress is an add-on that can be easily compiled as an exe or a DLL.

Modelling Indoor Environment

The development of BEM software started in 1995



Spanish Official Tools

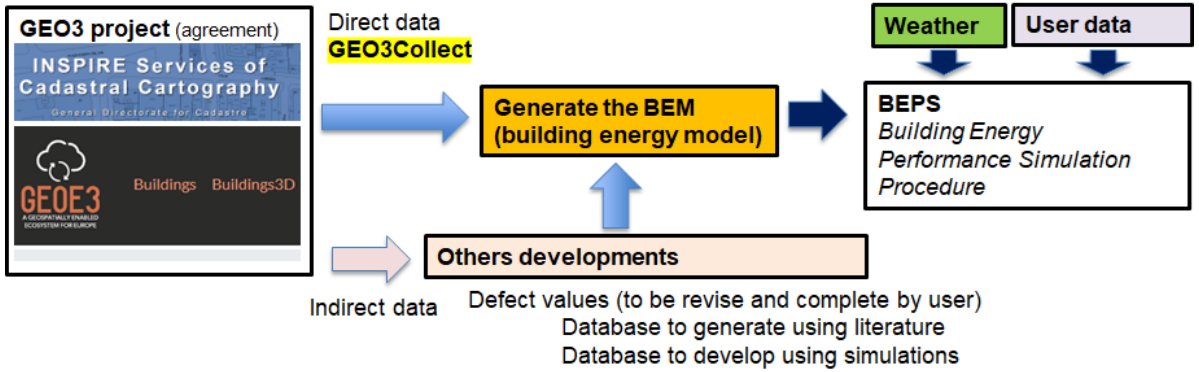
HULC
HERRAMIENTA UNIFICADA
LIDER + CALENER

CTE CÓDIGO TÉCNICO DE LA EDIFICACIÓN
LIDER DOCUMENTO BÁSICO HE AHORRO DE ENERGÍA
HE1: LIMITACIÓN DE DEMANDA ENERGÉTICA

CALENER GT CALIFICACIÓN ENERGÉTICA DE EDIFICIOS
CALENER VYP CALIFICACIÓN ENERGÉTICA DE EDIFICIOS

Calificación Energética de Edificios Existentes

Since 2002 the USeville has been the developer of the official BEM software for Building Energy Classification.



Generating a BEM based on cadastral data is a possibility through the combination of geometrical data and the BEM tools' capabilities.

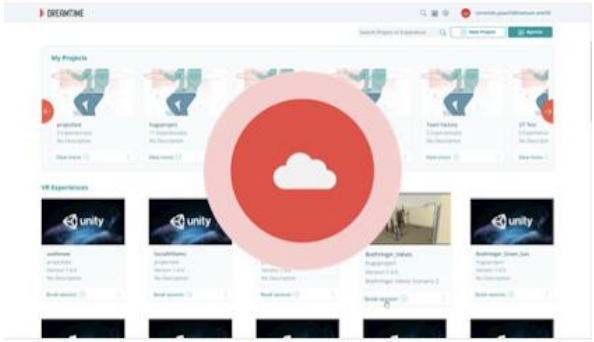
CTF10 – Intraverse, VR/AR platform (Inetum)

CTF10 – INTRAVERSE AR/VR PLATFORM

- VR / AR to create immersive worlds that can be powerful tools to disseminate the virtue of other products
- Use also a control pannel for projects.
- Integration with other uses.

DEPLOY YOUR CONTENTS WITH **INTRAVERSE**

INTRAVERSE
PLATFORM



Deploy immersive experiences
Manage access rights, content catalog
Create virtual world

UMI3D

An open-source application that allows you to immerse yourself in the virtual world

- PC
- Meta Quest
- PICO 4
- HTC Vive
- OpenXR

INTRAVERSE Sketcher

Create immersive experiences without being a developer.

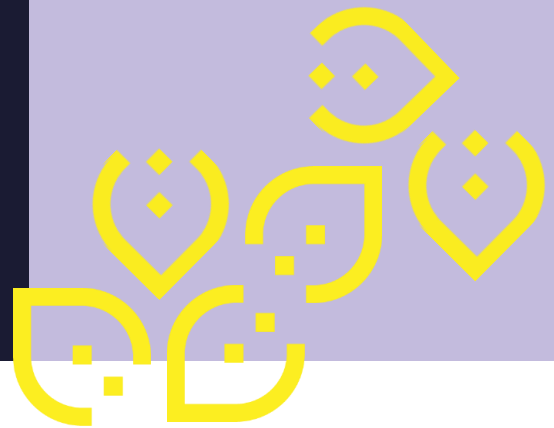
KEY FEATURES

Collaborative Mixed AR

Advanced AI Integration

Immersion in worlds

COSMIC
AI-POWERED
ENERGY OPTIMISATION



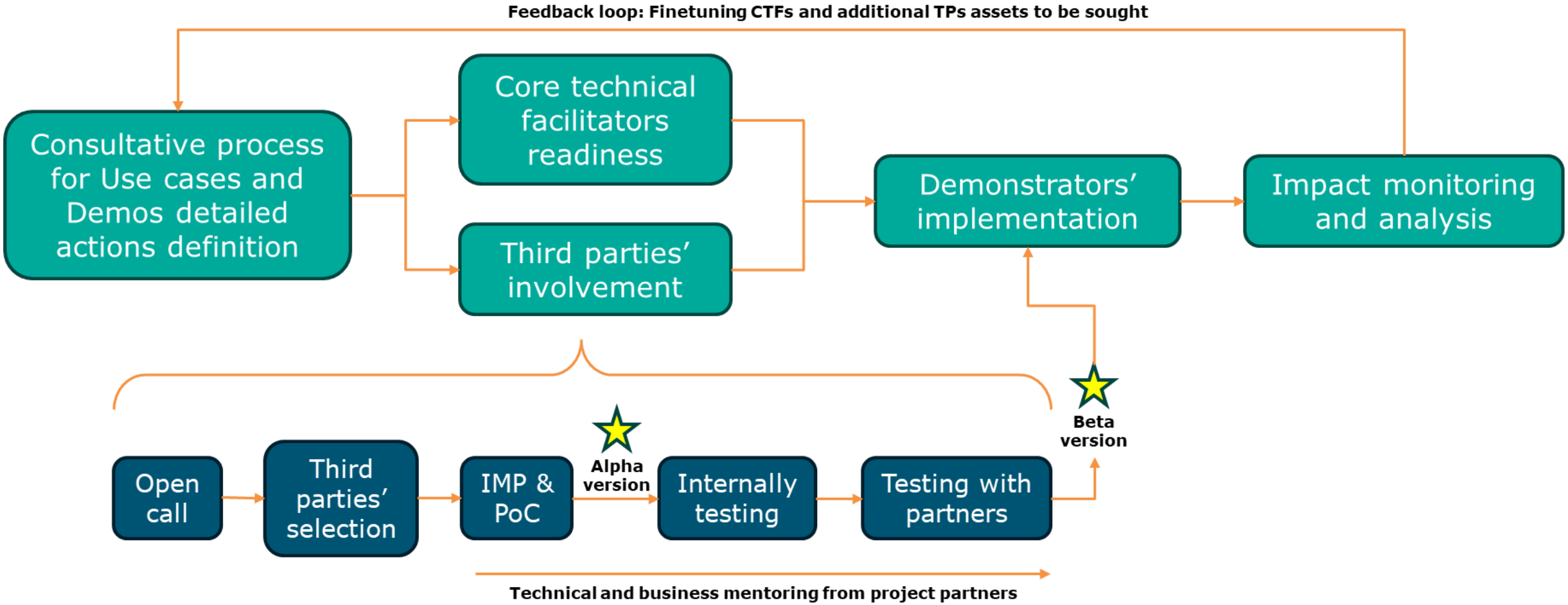
How CTFs enable rapid integration and exploitation

(Afraz Chaudhry – CENAERO)

The challenges require the integrated efforts of both CTFs and TPs to be accomplished within a limited timeframe

CTFs / Key Applic. (KA)	Pilots	Contributions from the Third Parties	CTF1	CTF2	CTF3	CTF4	CTF5	CTF6.	CTF7	CTF8	CTF9	CTF10
KA1 – Reduction of energy consumption	1.1. T&P (Belgium) – Multi-story buildings 1.2. Porto Energy Agency (Portugal) – REC 1.3. Daikin (EU) - Efficient usage of the heat pumps	Materials resilience models and performance DB; BIM&GIS-based DT; Mobile app; Smart charging algorithms & GUI; Assets monitoring and HEMS back-end integration; Generative AI & GUI; HEMS existing SSA; Energy mgt control strategies.	■	■	■	■	■					■
KA2 - Improving industry efficiency	2.1. Granollers Mercat (Spain) - Industrial energy communities	Digital twins for industrial processes, Multi-criteria optimisation solutions, Predictive control solutions, Smart contract management solutions, DR mgt.	■	■					■			
KA3 – Improving Building efficiency	3.1. OHLA (Ireland) - Tertiary use Building 3.2. T&P (Belgium) - Housing buildings	Materials resilience models and performance DB; Climate risk valuation methodology; BIM&GIS-based Digital Twin; Monitoring-diagnostic imagery solutions; Low-energy cooling solution models; Vegetation resilience models	■		■	■			■		■	■
KA4 – Implementing RES	4.1. PHOTOM (France) – PV plant predictive maintenance 4.2. Porto Energy Agency (Portugal) – REC Optimal operation	Monitoring-diagnostic imagery solutions; Local solar irradiance models; PV materials performance database. Total cost for maintenance or interruption times, Resilience/independence factor	■		■				■			■
KA5 - Resource efficiency	5.1. EMASESA, Seville (Spain) - Watercool 5.2. Consorci Besos-Tordera (Spain) - WWTP energy optimisation and decarbonisation 5.3. Pilot by LRP Energiaverkot Oy (Finland) – Wood chips powered-District Heating pipe leak	Materials resilience models; Urban elements, nature-based and biodiversity solutions models for simulations; Climate-risk valuation methods for buildings; Vegetation resilience models; Irrigation models. Digital twin for energy management, Data-driven forecasting models, Effluent water quality models, Multi-parameter energy optimisation solutions, Predictive control.	■	■	■			■			■	■
KA6 - Circular business models	6.1. Porto Energy Agency (Portugal) - Energy sustainability indicators from waste separation process	Waste separation forecast and analytics; Asset predictive maintenance and financial performance services.						■				
KA7 - Sustainable and Smart Mobility	7.1. Autoridad Portuaria de Baleares (Spain) - Decision support system for onshore power outlets	Data-driven energy demand calculation in ports based on the movement of vessels inside the port. Energy demand forecast based on (a) ML-based port traffic forecast (b) energy demand forecast.			■					■		
KA8 - Social Inclusion	8.1. AVRA (Spain) – Social Housing 8.2 Fidelidade (Portugal) - Vulnerability flooding events	Monitoring-diagnostic imagery solutions; Materials resilience models and performance DB; Flooding models (sea level); Climate-risk valuation methods	■		■						■	■

CTFs and TPs are integrated to support 15 pilot projects across the EU within the COSMIC ecosystem



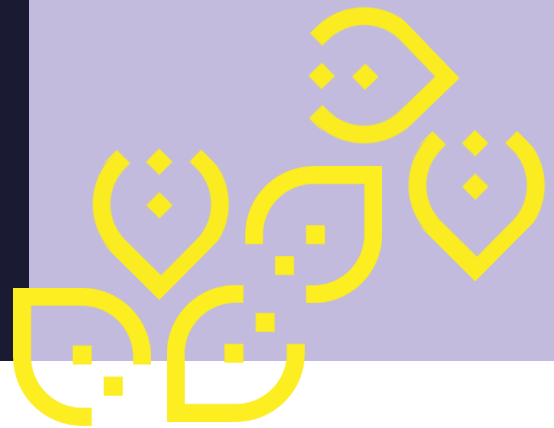
CTFs offer APIs and SDKs to support third-party development and integration within the COSMIC ecosystem

CTFs-1~10

TPs

17 Challenges are identified currently at 15 Pilots

COSMIC
AI-POWERED
ENERGY OPTIMISATION



PILOTS AND CHALLENGES OVERVIEW

Pilots overview

🌱 Climate Neutrality

- **Private housing in multi-family buildings** – Belgium
  👉 *Thomas & Piron Bâtiment*
- **Renewable Energy Community (REC)** – Portugal
  👉 *Porto Energy Agency*
- **Efficient use of heat pumps** – European Union
  👉 *Daikin*

⚡ Transition to Clean and Renewable Sources

- **Industrial energy communities** – Spain
  👉 *Granollers Mercat*
- **Tertiary-use buildings (schools)** – Ireland
  👉 *OHLA (Spain)*
- **Sustainable residential buildings** – Belgium
  👉 *Thomas & Piron Bâtiment*
- **Predictive maintenance of photovoltaic plants** – France
  👉 *PHOTOM*
- **Sustainable management of a REC** – Portugal
  👉 *Porto Energy Agency*

🔄 Circular Economy

- **Urban cooling system using rainwater** – Spain
  👉 *University of Seville*
- **Energy optimization and decarbonization of wastewater treatment plants** – Spain
  👉 *Consorci Besòs-Tordera*
- **Leak detection in biomass district heating** – Finland
  👉 *LRP Energiaverkot Oy*
- **Energy sustainability indicators based on waste** – Portugal
  👉 *Porto Energy Agency*

🚢 Sustainable Transport

- **Support system for electrical supply in ports** – Spain
  👉 *Balearic Port Authority*

🤝 Just and Inclusive Transition

- **Fighting energy poverty in social housing** – Spain
  👉 *AVRA (Housing and Rehabilitation Agency of Andalusia)*
- **Flood risk mapping for fair insurance** – Portugal
  👉 *FID R&D*

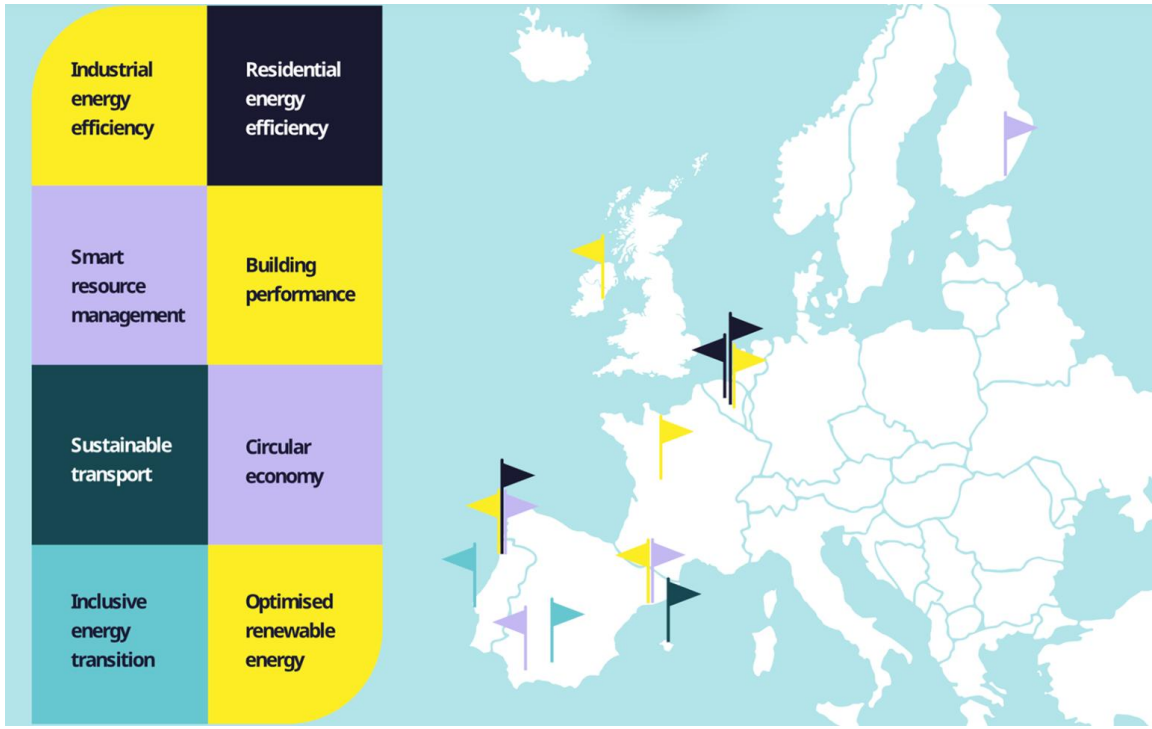
Key pilot applications

Key Applications in the Pilots

- Buildings, Districts, Ports, Industrial Sites
- Energy efficiency and optimization
- Smart heating, cooling, electrification

Data & End-User Integration

- Real-time + historical data
- Testing environments
- User engagement: social validation & feedback loops
- Datasets made available to SMEs/startups



Expected Impact

Business Impact: New markets, solutions tested in real-world settings

Social Impact: Lower energy costs, inclusive access, improved resilience

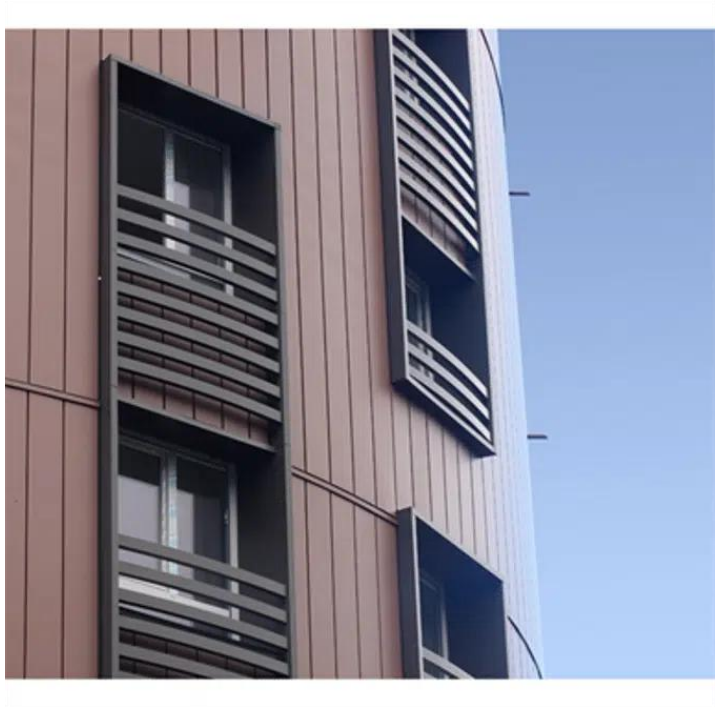
Environmental Impact: Aligned with Green Deal KPIs

Challenges Overview
[INETUM]

CH OC1	PILOT	CHALLENGE Name
CH1	OHLA (Spain) - Tertiary use Building	Construction Material and Facade Simulation

General context:

- Aesthetics and initial costs are often the only important issue while designing a façade.
- Manual process, lacking AI support



Expected technology:

- AI-powered generative design engine to create diverse façade configurations
- Automated thermal simulation and scoring for each alternative
- Seamless integration with BIM workflows and flexible material database sources.

Impact:

- Enable AI powered sustainable and automated desing
- For SMEs: Provide a competitive edge with a specialized façade simulation and optimization tool.

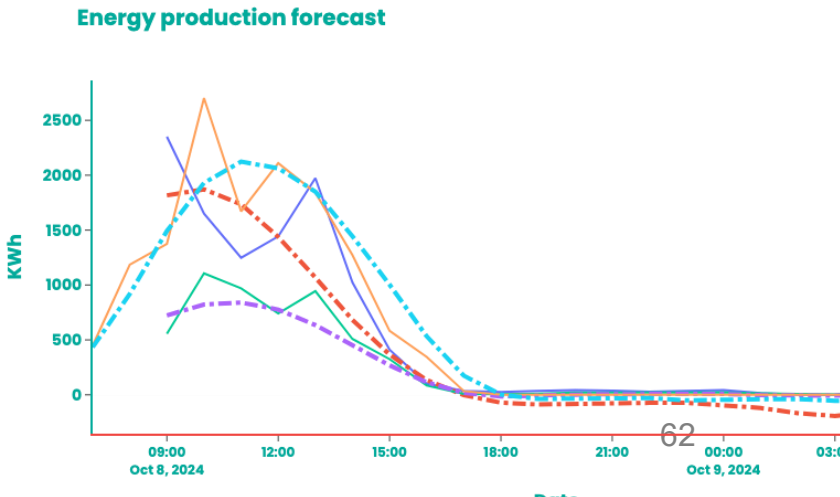
Challenges Overview
[INETUM]

CH OC1	PILOT	CHALLENGE Name
CH8	LRP Energiaverkot Oy (Finland) – Wood chips powered-District Heating pipe leak	Real-Time Resource Consumption Prediction
	Thomas & Piron – Dynamic Shortime Forecasting	

General context:
Forecasting of energy behaviour is one of the most important challenges. However it is very difficult to adapt these models to several use cases with different data.

Expected technology:
A set of algorithms to power through some of the specifications in the use case:
- short-term residential energy consumption
- heat demand predictions at the level of individual buildings

Incorporate weather info as well as other exogenous variables.
Added analysis and actions through simulations



Impact:
Development of the common Forecasting Engine

Challenges Overview
[INETUM & SEEBURG]

CH OC1	PILOT	CHALLENGE Name
CH10	Daikin (EU) - Efficient usage of the heat pumps	Apps for Consumers
	Lappeenranta	
	Porto Energy	
	AVRA	

General context:
- Disconnect between advanced AI forecasting technologies and consumer-facing solutions
- Real-time energy and resource optimization insights often remain unused without accessible communication tools
- Diverse use cases across sectors require tailored user interfaces and engagement strategies

Expected technology:
- Development of new big data and AI based mobile or web apps, or enhancement of existing in-house apps/platforms
- Integration of AI-driven recommendations for energy/resource use, personalized to user behavior and context
- User interface accelerators to simplify complex data and forecasts into clear, actionable insights
- Modular architecture to adapt features to different consumer types and use-case needs

Impact:
- Empowered consumers who make smarter, more sustainable choices in real time
- Improved energy and resource efficiency at the individual and system level
- Higher user engagement and trust in AI-supported tools
- Flexible, scalable digital solutions for diverse markets and consumer profiles
- Acceleration of demand-side response and sustainable consumption patterns

Challenges Overview
[SEEBURG]

CH OC1	PILOT	CHALLENGE Name
CH2	FID I&D (Portugal) - Exploring vulnerabilities to flooding events to create inclusive Daikin (EU) - Efficient usage of the heat pumps	Data-Driven Behaviour Modeling

General context:

- AI-based services in energy and other sectors depend on user trust, comprehension, and willingness to act
- Many promising tools underperform due to overlooked behavioural factors
- Challenge targets understanding of how diverse user groups perceive value, fairness, and usability
- Initial use cases: flood risk communication (Fidelidade) and heat pump use recommendations (Daikin)

Expected technology:

- Conduction of large-scale panel studies and AI-powered segmentation of behavioural research data
- Integration of surveys, discrete choice experiments, and interface testing
- Use of statistical and machine learning models to predict adoption patterns
- Inclusion of multilingual energy literacy content (produced in-house or subcontracted)

Impact:

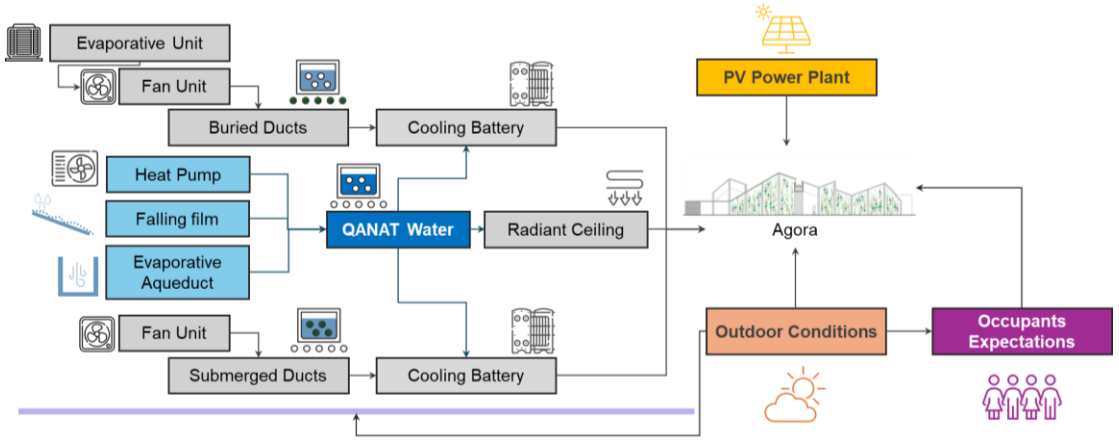
- Evidence-based support for user-centric product and service design
- Improved uptake of AI solutions through targeted behavioural insights
- Reusable research tools for SMEs/start-ups across multiple sectors
- Increased energy literacy and engagement through educational content

Challenges Overview
[USEVILLA & SEEBURG]

CH3	USeville, Seville (Spain) - Watercool	Urban Cooling System for Public Outdoor Spaces

General context:

- The operation of cooling systems in public infrastructure relies on multiple data sources, including SCADA, CMMS logs, IoT sensors, and user feedback.
- The existing control system is enterally rule-based and based on a local computer
- The Cartuja Urban Lab provides a real-world setting to study and integrate AI-based control signals in an existing BMS system.



Challenges Overview
[USEVILLA & SEEBURG]

CH3	USeville, Seville (Spain) - Watercool	Urban Cooling System for Public Outdoor Spaces

Expected technology:

- API development, integration with SCADA/BMS, real-time execution capabilities, fail-safes for public environment operation
- Model-based decision logic or reinforcement learning
- Use of weather forecasts, real-time sensor data, and occupancy indicators
- Integration with digital twins and control interfaces

Impact:

- Public infrastructure that adapts dynamically to actual user needs, considering the current and future weather
- Opportunity for SMEs to apply and develop a solution to integrate AI-based control strategies in real BMS systems
- Smart city showcase for real-world human-AI interaction in environmental control

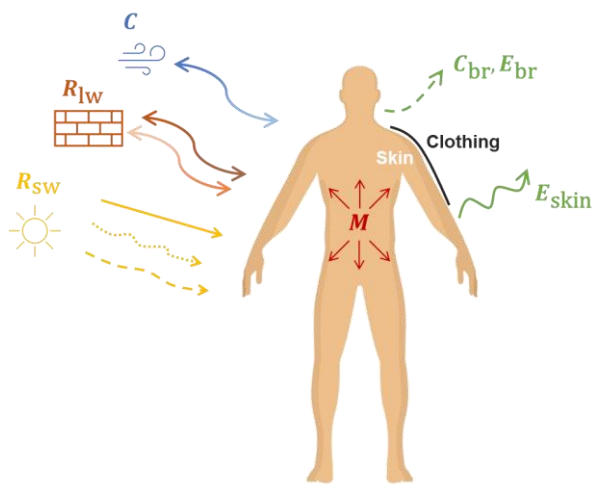
Challenges Overview
[USEVILLA & SEEBURG]

CH4	USeville, Seville (Spain) - Watercool	Sensor Calibration System for Public Outdoor Spaces

General context:

- Autonomous operation of outdoor cooling systems requires continuous, high-quality environmental data.
- Current sensor setups in public spaces are prototype-level and often require manual supervision or calibration. For scalable deployment, intelligent sensors are needed that not only measure thermal comfort variables but also integrate AI capabilities to improve data reliability, detect anomalies, and self-calibrate in complex urban conditions.

Smart Outdoor Sensor that resembles the occupant's perception



Challenges Overview
[USEVILLA & SEEBURG]

CH4	USeville, Seville (Spain) - Watercool	Sensor Calibration System for Public Outdoor Spaces

Expected technology:

- Embedded AI for sensor calibration, drift compensation, and anomaly detection;
- Data formatting and standardisation for downstream use in AI-based control systems and digital twins;
- Plug-and-play integration with urban IoT platforms.

Impact:

- Provides the data foundation for context-sensitive AI-based cooling control, improves measurement coverage, and reduces system maintenance requirements.
- Opportunity to apply AI to hardware refinement and smart calibration;
- Real-world validation of sensor-AI integration in climate resilience pilots;
- Potential to offer integrated sensing + analytics solutions for smart city markets.

Challenges Overview
[USEVILLA & SEEBURG]

CH6	USeville, Seville (Spain) - Watercool	Thermal Comfort Visual Recognition System

General context:

- Thermal comfort in public spaces is critical for climate resilience and user well-being
- Existing systems rely on physical models but often ignore real user perception and behaviour
- The Cartuja Urban Lab provides a real-world setting to study diverse user responses to cooling infrastructure
- User-centered data is needed to close the gap between sensing and adaptive system behaviour

Expected technology:

- AI-driven visual recognition of thermal comfort or discomfort using camera data
- Integration of user surveys, mobile prompts, and visual thermal comfort recognition into behavioural models
- Clustering of comfort profiles to support adaptive logic in control systems
- Real-time, human-in-the-loop adjustment of intelligent cooling systems

Impact:

- Public infrastructure that adapts dynamically to actual user needs and experiences
- Increased comfort, inclusivity, and user acceptance of AI-driven systems
- Opportunity for SMEs to apply or develop behavioural analytics and adaptive control models
- Smart city showcase for real-world human-AI interaction in environmental control

Challenges Overview
[USEVILLA & SEEBURG]

CH17	Housing and Rehabilitation Agency of Andalusia (AVRA) – Energy poverty in social housing	Digital Twin for Domestic Energy Usage

General context:

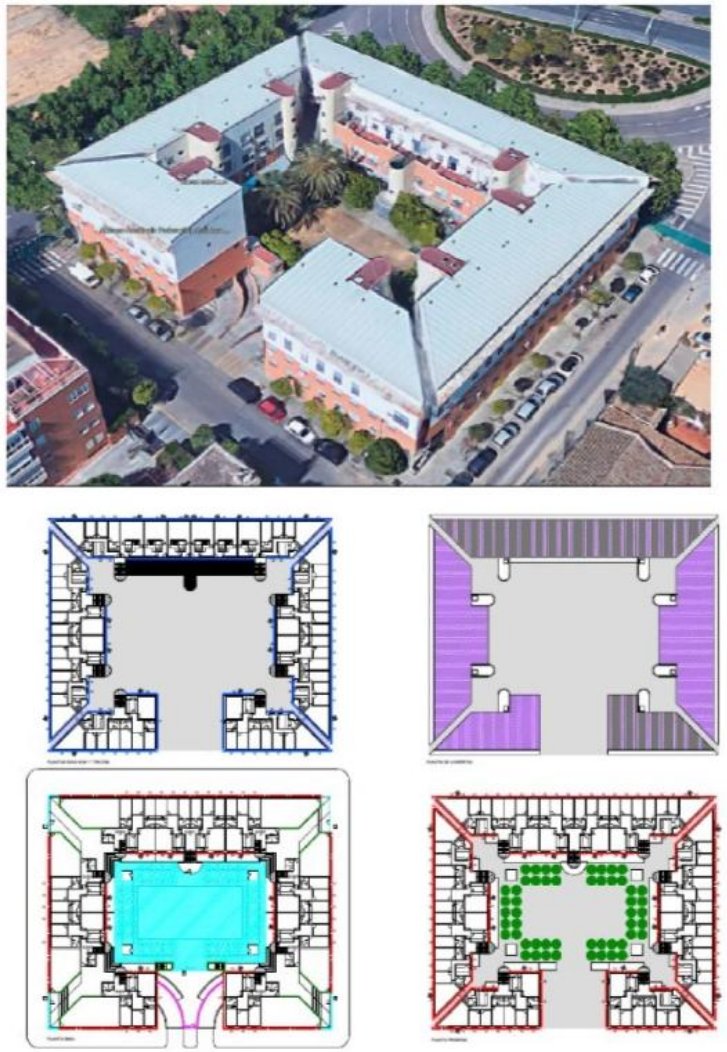
- Understanding real energy use patterns and indoor environmental conditions is crucial for tackling energy poverty; however, technical monitoring solutions often face resistance in vulnerable communities.
- Residents have previously removed sensors due to fear of surveillance.

Expected technology:

- Create digital twins of selected social housing units that collect real-time data on environmental conditions and occupant behaviour, supporting both personalised energy coaching and broader building-level analysis.
- Low-cost, minimally intrusive sensor networks; anonymised data processing respecting privacy concerns; linkage of digital twin outputs with behavioural recommendation engines.

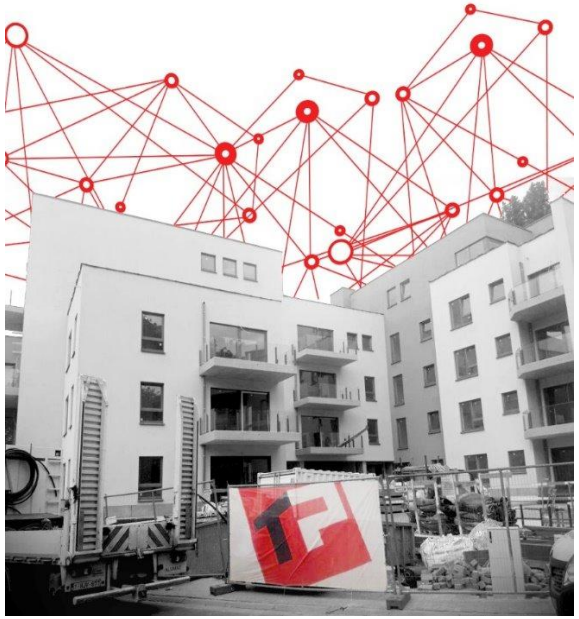
Impact:

- Improves understanding of real-world energy usage patterns, strengthens the basis for personalised advice, and helps building managers identify systemic inefficiencies for future interventions.
- Development of digital twin solutions tailored to sensitive social contexts, with a focus on privacy-aware data collection.
- Provides a testing ground for scalable, low-cost monitoring systems applicable to energy poverty mitigation across Europe.



Challenges Overview
[CENAERO]

CH OC1	PILOT	CHALLENGE NAME
CH5	Thomas & Piron Bâtiment (Belgium) – Private apartments in multi-story buildings + Housing buildings JG FID I&D (Portugal) - Exploring vulnerabilities to flooding events to create inclusive	Climate (Risk) Modelling
CH7	Thomas & Piron Bâtiment (Belgium) – Private apartments in multi-story buildings Nivelles	User-Friendly Smart App for Energy Monitoring In Multi-story Buildings (From Manager & Consumer perspectives).
CH9	Thomas & Piron Bâtiment (Belgium) – Private apartments in multi-story buildings + Housing buildings Nivelles	Large Scale Data for Model Calibration/Validation
CH16	Thomas & Piron Bâtiment (Belgium) – Private apartments in multi-story buildings + Housing buildings JG	Models for innovative blue/green solutions



Fidelidade
building portfolio

APA
flood hazard mapping

Challenges Overview [Cenaero]

02x sub-challenges

02 x pilots

1) Automation of GIS Data Preparation and Management for CFD Simulations

2) AI-powered flood risk model for EU (high priority)

CH OC1	PILOT	CHALLENGE Name
CH5	Thomas & Piron Bâtiment (Belgium) – Private apartments in multi-story buildings + Housing buildings FID I&D (Portugal) - Exploring vulnerabilities to flooding events to create inclusive	GIS AI-based data processing for climate risk modelling

General context:

1)Urban climate simulations depend on **GIS data to build geometric models for energy and airflow analysis**. However, the manual translation of this data is slow and error-prone, limiting efficiency and scalability.

2)Insurers face challenges in using real-time environmental risk data—like floods and rainfall—due to fragmented and outdated data sources. This disconnect leads to inaccurate risk assessments in pricing and underwriting.

Expected Technology

- Use AI to automatically improve/augment/check/categorize GIS data--> **geometry recognition, rule-based gap detection**
- **geospatial API or ML model to integrate flood-related variables**
- **Speed up climate resilience analysis** by removing manual simulation bottlenecks
- Enable real-time flood risk classification to support smarter insurance pricing

Impact

- More accurate and consistent data processing with less manual effort
- Faster preparation of simulation-ready models from raw spatial data
- Easier integration with insurers' internal tools and systems
- Higher % of insured assets matched with flood risk data
- Better alignment of predicted risk with actual flood claims
- Shorter data update cycles for more timely risk insights

Challenges Overview [Cenaero]
03x sub-challenges
01 x pilots

1) AI Image recognition of Meter data
2) Smart app for energy managers for Meter Calibration
3) Development and integration of user-friendly energy engagement app

CH OC1	PILOT	CHALLENGE Name
CH7	Thomas & Piron Bâtiment (Belgium) – Private apartments in multi-story buildings + Housing buildings	User-Friendly Smart App for Energy Monitoring In Multi-story Buildings (From Manager & Consumer perspectives)

General context:

1)**Automate the commissioning** process of multi-storeys buildings as manual process can cause error.
2)Energy **meter calibration** is currently a fragmented process requiring repeated manual inputs and frequent site revisits. **Mismatches** in meter identification delay commissioning and negatively affect long-term energy data integrity.
3) The residential energy sector is increasingly turning to digital tools for **behavioral energy engagement** of consumers but current platforms fall short .

Expected technology:

- Develop a **AI model that can recognize meter types,** serial numbers, and consumption indices from smartphone images
- Real-world AI for object and text recognition under variable lighting and positioning
- **Structured workflows** that combine computer vision with editable fields; instant validation of apartment-to-meter links;
- mobile app for smart building users that combines real-time energy data and forecasting with behavioral UX and gamified features.

Impact:

- **Reducing human error** and effort in **meter identification** improves commissioning speed and long-term data quality.
- ≥25% reduction in calibration errors; positive usability feedback from field testers
- Reduction in calibration time and rework; user acceptance and efficiency; correct linkage of meter data to apartments.
- Usability, engagement, system reliability, effectiveness in promoting savings behavior. Metrics: ≥20% increase in app usage frequency/duration; max 1 min API sync delay;

Challenges Overview [Cenaero]
01x sub-challenges
01 x pilots

Low-cost large scale data collection for model calibration/validation

CH OC1	PILOT	CHALLENGE Name
CH9	Thomas & Piron Bâtiment (Belgium) – Private apartments in multi-story buildings + Housing buildings	Large Scale Data for Model Calibration/Validation

General context:

- Urban climate resilience models are advancing rapidly, often producing plausible outputs—but with limited validation.
- These models are typically **validated at lab** or small scales, which is **insufficient for training and improving models** at the urban scale.

Expected technology:

- Propose a combination of **smart hardware & software tools (e.g. smart weather station) working in network** to generate reliable large-scale data (wind speed, temperature, air quality, radiation, ...) at limited cost for model calibration/validation.
- Generate **low-cost large-scale** continuous database by using AI trained by CFD and/or measurement campaign to super-sample and correct data generated by a network of low-cost low-accuracy sensors

Impact:

- **Access to Thomas & Piron** pilot sites for technology installation and testing
- Use of Cenaero's HPC infrastructure and **partner expertise in AI/ML/Big Data**
- Access to large-scale measurement data to improve urban energy modeling for resilient planning
- Target coverage: ≥1 km area, 100 m (XY) / 10 m (Z) resolution, <30% error vs. high-quality equipment

Challenges Overview [Cenaero]
01x sub-challenges
01 x pilots

1) Sub-models for innovative blue/green solutions

CH OC1	PILOT	CHALLENGE Name
CH16	Thomas & Piron Bâtiment (Belgium) – Private apartments in multi-story buildings + Housing buildings	Models for innovative blue/green solutions

General context:

- physics-informed AI models offer a promising alternative to purely theoretical white-box approaches, enabling more accurate and practical integration of **blue/green systems AI sub-models** into urban energy modelling.

Expected technology:

- Develop sub-models to be integrated in CFD to model specific phenomena which are not yet available and/or not easily modeled by physics-based approach
- Increase the relevance of Urban Energy simulations by being able to simulate future-proof solutions.

Impact:

- The relevance of such kind of advanced simulations will be tested on Thomas&Piron pilote site.
- **At least 3 innovative blue/green solutions** on climate resilience of urban environment
- Opportunity to develop or apply AI models in urban simulation environments, addressing a growing demand in sustainable city planning.
- Increased energy literacy and engagement through educational content

Challenges Overview
[INESC TEC]

CH OC1	PILOT	CHALLENGE NAME
CH11	LRP Energiaverkot Oy (Finland) – Wood chips powered-District Heating pipe leak detection.	Predictive Maintenance for District Heating Networks.

General context: Aging district heating networks face rising energy losses and failure risks. Lappeenranta's wood chip-powered system aims to improve operational efficiency and reliability through AI-driven predictive maintenance, using digital twins, leakage detection, and demand forecasting to prioritise pipe replacement and reduce downtime.

Expected technology: The solution may use smart meters, imaging, SCADA, GIS, and a digital twin. AI techniques like supervised learning, graph neural networks, and regression models will support leak detection, demand forecasting, and maintenance planning.

Impact: For the pilot owner, the solution reduces energy losses, prevents failures, lowers maintenance costs, and improves planning. For the SME, it offers a real-world testbed, a replicable product, and a strong reference for scaling AI solutions in energy infrastructure.

Challenges Overview
[INESC TEC]

CH OC1	PILOT	CHALLENGE NAME
CH12	PHOTOM (France) - Predictive maintenance for optimal operation of energy resources	Predictive Maintenance for PV Plants
	Porto Energy Agency (Portugal) – Renewable Energy Community	

General context: As PV installations scale across urban and industrial settings, traditional maintenance falls short in preventing performance loss. This challenge targets predictive maintenance to detect faults early, reduce downtime, and maximize energy yield, applied in both a large solar plant (France) and a neighborhood-scale Renewable Energy Community (Portugal).

Expected technology: The solution will use existing SCADA, inverter data, sensors, and thermal imagery. AI techniques include supervised learning for fault prediction, digital twins for performance comparison, and anomaly detection for proactive maintenance.

Impact: For the pilots, it improves reliability, extends asset lifespan, and boosts renewable output. For the SME, it enables the development of a scalable AI tool for predictive O&M, applicable across diverse PV infrastructures.

Challenges Overview
[INESC TEC]

CH OC1	PILOT	CHALLENGE NAME
CH13	Porto Energy Agency (Portugal) - Energy sustainability indicators from waste separation	Waste Management System

General context: Increase the observability of waste management and waste recycling habits within the Asprela Renewable Energy Community by monitoring the amount of waste generated, by type, and by household.

Expected technology: Installation of different types of sensors and communication arrays in the waste collection dumpsters such as fill-level sensors, ultrasonic sensors, LoRa Antennas and other equipment that may suit the pilot. Provision of a data base with user information and data treatment such as user clusterization.

Impact: Use the data generated to promote a more sustainable behaviour among Renewable Energy Community members. This technology can also be used to explore different services such as waste management tariffs, waste collection route planning.

Challenges Overview
[CIMNE]

CH OC1	PILOT	CHALLENGE NAME
CH14	Consorci Besos-Tordera (Spain) - Waste Water Treatment Plant energy optimization	Digital Twin of an Anaerobic Digester of Waste Water Treatment Plant

General context:
The digital twin will be built over the historical and real time data available from the SCADA that includes process parameters, biogas production rates, controls, energy consumption, etc. A model will be created allowing to simulate and forecast the biogas production in function of different input parameters and considering the process constraints. The digital twin will be integrated with other process models of the WWTP in twin-in-the loop process for overall energy optimization of the plant.

Expected technology:
The implementation should be a portable, containerised solution that could be integrated with other wastewater treatment process models for overall energy optimization of the plant using twin-in-the loop approach. Simulation run times under 60 seconds are expected, with forecasting error below 15%.

Impact:
Improved predictability and control over biogas generation, enhanced energy self-sufficiency, and a reusable model for other municipal or industrial digester systems. For the SME: opportunity for real-world validation in a functioning WWTP. Competitive entry into a growing market for process digitalization.

Challenges Overview
[CIMNE]

CH OC1	PILOT	CHALLENGE NAME
CH15	Granollers Mercat (Spain) - Industrial energy communities	Industrial Energy Community Optimization and Flexibility Management

General context:
The solution aims the optimization in the context of an energy community with already allocated shares of renewable energy based on fixed consumption patterns. The optimization aims increased self-consumption for the participants in the community based on forecasting and activation of process energy consumption flexibility by using historical and real time data.

Expected technology:
Forecasting and multi-criteria optimization modules in Python or R language and a web application interacting with large databases in the CTF.

Impact:
Increased local PV self-consumption and reduced electricity costs through smarter scheduling. Behaviorual change and more active participation in energy communities through intuitive, actionable tools.
SME benefits: Development of a flexible energy scheduling engine with relevance for any industrial prosumer or energy communities tested and validated with real stakeholders from industry.

COSMIC
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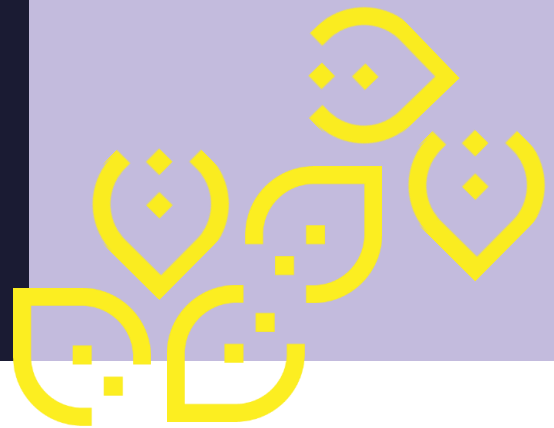
ENERGY OPTIMISATION



COSMIC 1st Open Call

Anca Marin - FundingBox

1st Open Call

COSMIC 1st Open Call – Call for AI & Data Solutions to Boost the Green Transition

Scope: develop and test AI-driven solutions for energy optimization, offering core data and AI platforms and tools as shared infrastructure.

- Up to **20 SMEs/start-ups** to be selected

Open Call Dates:

- Submission start: **18 August 2025**, 08:00 Brussels Time
- Submission deadline: **27 October 2025**, 17:00 Brussels Time

1st Open Call

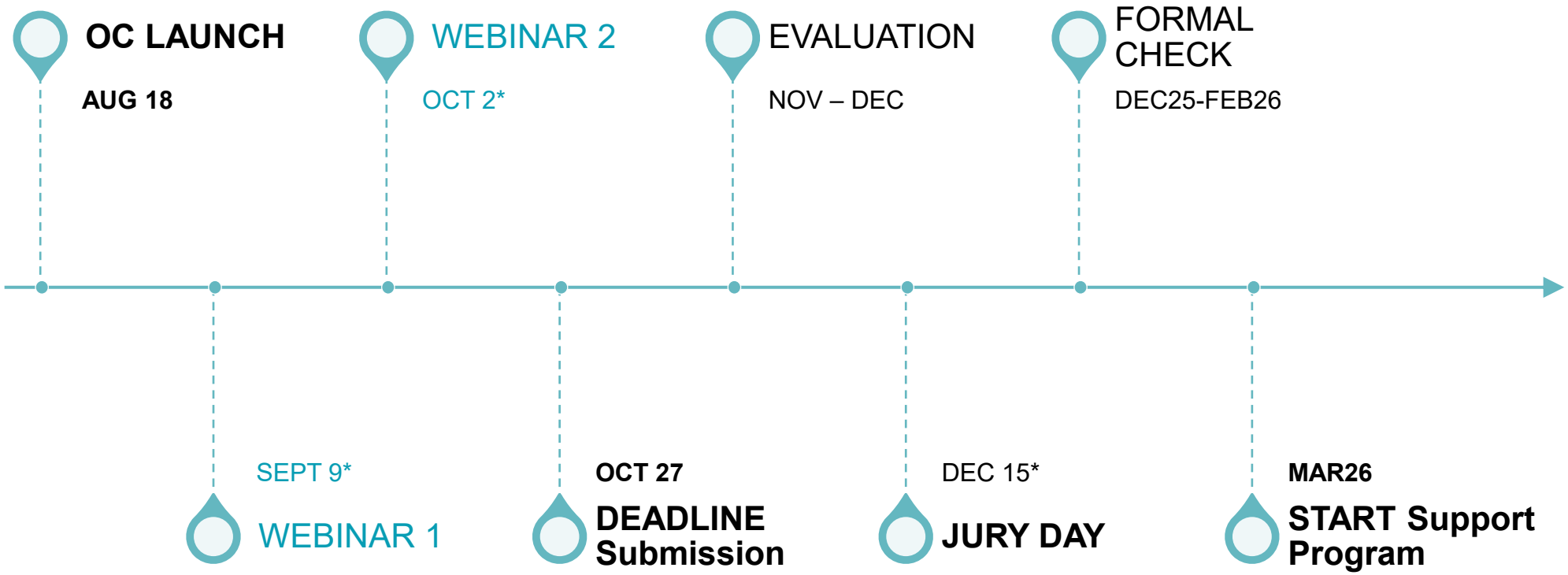
What Do Selected Projects Receive?

💶 Funding: Up to **€150,000** lump sum per project

Successful applicants will:

- Integrate their solutions into COSMIC's AI-driven platforms
- Participate in **large-scale pilots** across Spain, Belgium, Portugal, France, Ireland and Finland
- Gain real-world validation and boost market readiness

OC TIMELINE



Estimated dates

Who can apply?

Individual SMEs (including start-ups) registered in:

- EU Member States and their Overseas Countries and Territories (OCT)
- Associated Countries (AC) to Horizon Europe
- Include co-financing at least 30% of the total project budget
- Propose data- and AI-driven solutions or services aligned with COSMIC's Core Technical Facilitators (CTFs) and contributing to Green Deal Key Applications

Ideal Applicants Include:

- **Tech Developers** - SMEs with expertise in software, system integration, and innovative IT
- **AI Providers** - companies building AI tools in machine learning, computer vision, and analytics for energy optimization.
- **Data & IoT Experts** - Specialists in big data, smart platforms, and IoT integration
- **Green Tech Innovators** - Businesses focused on sustainability—carbon tracking, circular economy, and energy efficiency.

WHAT activities will be funded?

Projects must align with COSMIC's mission to optimize large-scale resource management and support the transition to a net-zero society.

🔧 **Solution Development**
AI/data-based services & tools (e.g., digital twins, smart charging, user interfaces) targeting a specific COSMIC challenge.

🔗 **Integration & Facilitation**
Interfacing new solutions with existing platforms (e.g., BIM/GIS, HEMS) to boost interoperability and data flow.

🧪 **Testing & Validation**
Large-scale pilot testing to verify performance, scalability, and user acceptance.

🚀 **Proof-of-Concept Projects**
Demonstrators showing real-world impact and industrial applicability.

Key Requirements

✅ Address **one specific challenge** from the Technical Guidelines

✅ Demonstrate a strong **European Dimension**

✅ Show **measurable benefits** for EU citizens, industries & ecosystems

✅ Support the **climate-neutral and digital transition**

✅ Target as minimum **TRL 6 Technology demonstrated in relevant environment**: proposals must build on a solution already validated at small scale (entry **minimum TRL 3 – experimental proof of concept**) and ready for testing and refinement in COSMIC's industrial pilots (TRL 6–7)

1st Open Call

10-Month Support Programme:

- **Technical mentoring**
  - Individual Mentoring Plans
  - Define initial Proof of Concept
- **Solution development**
  - Alpha version testing
  - Iterative improvement cycles
- **Pilot testing**
  - Beta solution evaluation
  - Controlled & real-world pilot environments
- **Market readiness & exploitation**
  - Tailored business support
  - Joint sessions to boost market impact

HOW the process will look like?

Evaluation Process

1. **Eligibility Check**
   After the call deadline, each proposal is reviewed to ensure it meets all eligibility and admissibility criteria. Non-eligible proposals are rejected, and applicants are notified.

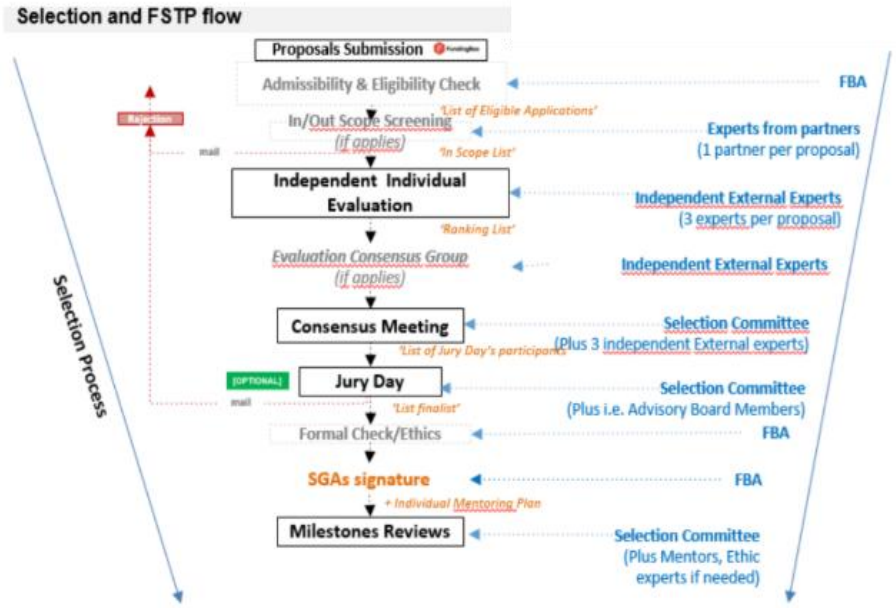
2. **In/Out of Scope Review**
   The Selection Committee assesses whether the proposal aligns with COSMIC's objectives and scope. Only eligible and relevant proposals move forward.

3. **External Evaluation**
   Three independent external experts evaluate each proposal based on excellence, impact, and implementation. A minimum score is required to proceed to the next stage.

4. **Consensus Meeting**
   The Selection Committee, together with external experts, reviews and finalizes the list of proposals invited to the *Jury Day*, based on rankings and other relevant considerations.

5. **Jury Day**
   Shortlisted applicants present their projects to a jury. The evaluation focuses on potential impact, team vision, and relevance to applicant needs. A provisional list of beneficiaries and a reserve list are created.

6. **Formal Verification & Grant Agreement (SGA)**
   Selected applicants must submit formal documentation to confirm eligibility. Upon successful verification, they sign the grant agreement and officially join the program.



Payments

Stage	Deliverable	Duration	AMOUNT	% Total grant
Stage 1: Individual Mentoring Plan & Proof of Concept	IMP & PoC	1 month	up to 15.000 €	10%
Stage 2: Innovative Solution Development	Solution Alpha version	3 months	up to 60.000 €	40%
Stage 3: Solution Testing and Validation	Solution Testing Report	3 months	up to 45.000 €	30%
Stage 4: Business Support	Exploitation Plan	3 months	up to 30.000 €	20%
	Total	**10 months**	**up to 150.000 €**	**100%**

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Thank you for joining us today!

https://cosmic-horizon.eu/

https://www.linkedin.com/company/cosmic-eu/

Join our eu.DEEPTECH community (Powered by FundingBox)

helpdesk.cosmic@fundingbox.com

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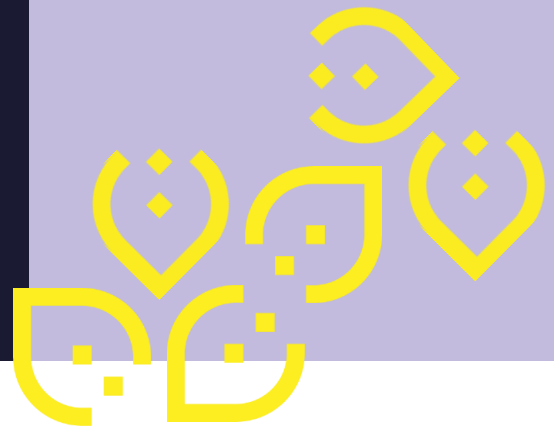

Q&A

ABOUT COSMIC

Project Partners