

FUSION

An AI-Driven IoT Platform for Residential Energy Efficiency



Smart **ONE**

The Global Challenge & The Opportunity

- **Key Stat:** Buildings account for **37% of global energy-related** carbon emissions
- **The Problem:** The residential sector lags in adopting smart Building Energy Management Systems (BEMS) due to fragmentation, cost, and complexity.
- **The Solution:** The FUSION Project – A transatlantic initiative to create an integrated IoT and AI platform for smart, efficient residential communities

What is the FUSION Project?

- **Vision:** To create a unified **IoT platform** that seamlessly integrates facility management services with **AI-driven energy optimization**.
- **Key Partners:** INTELIGG (AI/ML expertise) + SmartONE (Smart Community platform).
- **Core Innovation:** A Generative AI/Machine Learning SaaS tool specifically for HVAC and lighting systems in residential buildings.
- **Alignment:** Directly supports EU Green Deal, UN SDGs (7, 11, 13),

Market Need: A Fragmented Landscape

- **Global BEMS Market:** Projected to grow from €34B (2024) to €88B by 2032.
- **Regional Focus:**
 - EU: 97% of buildings need efficiency upgrades
 - Greece: Fragmented market with many SMEs
 - Canada: Fast-growing BEMS sector, with strong regulatory push for net-zero.
- **The Gap:** Existing solutions are often complex, costly, and not designed for the unique needs of residential communities.

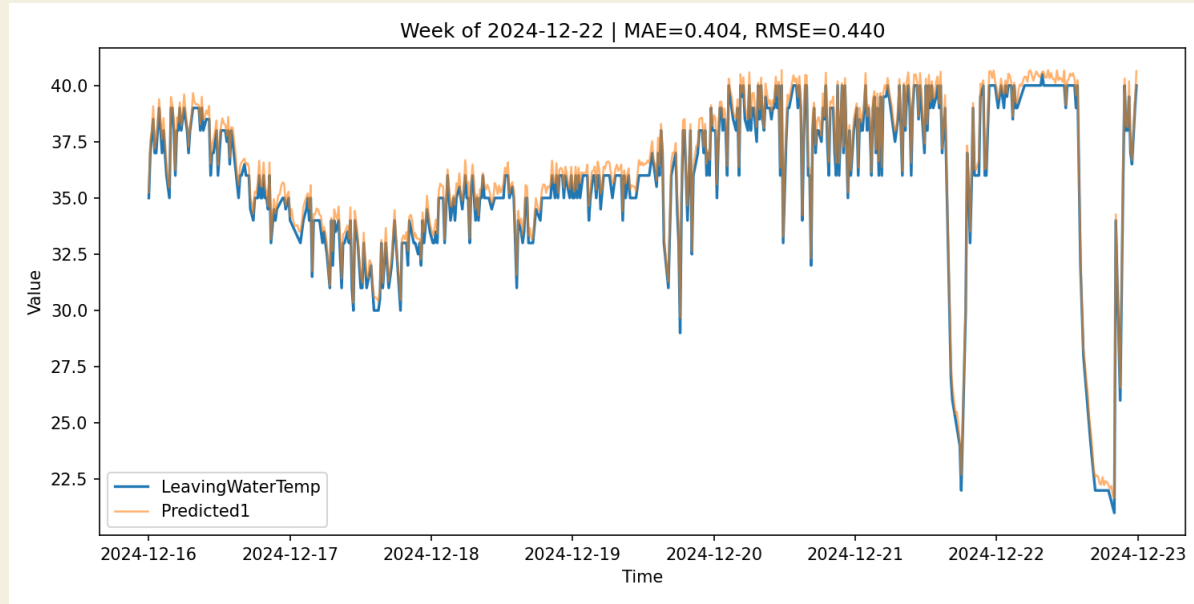
The FUSION Technical Solution: An Integrated Ecosystem

- **Hardware :**
 - **In-suite devices:** Wall Pads, Smart Switches, Sensors
 - **Community-level infrastructure:** Alert systems, Charging stations
 - **Central server equipment**
- **Software & AI (Cloud/Edge):** INTELIGG's c-BEMS SaaS Platform.
- **Key Feature:** Interoperability through standards like Matter, Zigbee, LoRaWAN, and open APIs.

The AI Engine: From Data to Intelligent Control

- **The Process:**
 - **Data Ingestion:** Collect sensor data (temperature, humidity, setpoints) from HVAC systems.
 - **Data Cleaning & Processing:** Robust pipeline to handle missing data and outliers, creating a reliable dataset.
 - **Predictive Modeling:** Machine learning models forecast key HVAC parameters.
- **Modeling Goal:** Predict system behavior (e.g., Leaving Water/ Discharge Air Temperature) to enable proactive, optimized

Results: Validating the AI Approach



- **Key Results:** High accuracy in predicting complex HVAC dynamics.
- **Takeaway:** This provides a solid, trustworthy foundation for implementing advanced Model Predictive Control (MPC) to

Impact and Sustainability Contributions

- Target up to **60% reduction in energy consumption** for HVAC/lighting.
- Target up to **56% reduction in CO₂ emissions**.
- For Residents: Enhanced comfort, lower costs, integrated services.
- For Facility Managers: Predictive maintenance, operational efficiency.
- For Policymakers: A scalable tool to meet climate and sustainability targets (SDG 7, 11, 13).

Conclusion & Next Steps

- **Summary:** FUSION delivers a practical, interoperable platform that merges everyday facility services with cutting-edge AI for tangible energy and emissions reductions.
- **Key Message:** We are bridging the gap between complex BEMS and the residential sector.
- **Next Steps:**
 - Model Advancement
 - Scaling

Thank you!

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