

AURA SRL

Business plan

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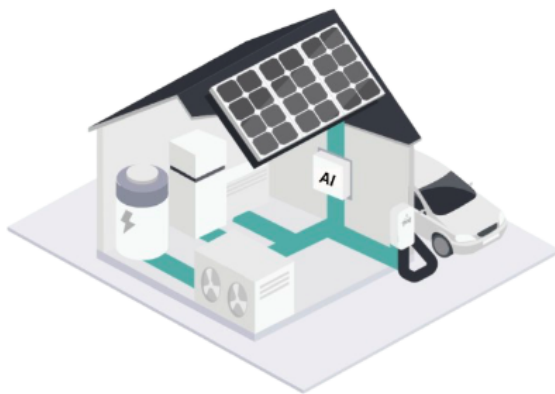
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1 Executive Summary



Optimize energy consumption using AI-solutions for hybrid energy systems



Performance assessment and monitoring from data



Interpretability and human-in-the-loop solutions for guaranteed quality improvement

Figure 1: Overview of our proposal.

Energy management is emerging as a **critical global and societal challenge**. International bodies such as the IEA and the European Commission highlight the urgency of **reducing energy waste, balancing demand and supply**, and **accelerating the integration of renewable sources**. In Italy, residential and civil buildings account for a substantial share of total energy demand, yet both households and utilities still lack **adaptive, intelligent, and transparent tools** capable of optimizing energy usage in real time. Existing systems remain **static, rule-based, and non-interpretable**, unable to cope with **dynamic conditions, user habits**, and **uncertain renewable inputs**, resulting in inefficiencies and higher operational costs.

The AURA initiative addresses this gap through a **novel, human-centered AI platform** for **adaptive, explainable, and multi-objective energy management**. The solution integrates **reinforcement learning (RL)**, **constrained optimization**, and **explainable AI (XAI)** to deliver **self-learning, interpretable control** across multiple domestic energy resources, including heating, cooling, thermal storage, photovoltaic generation, and batteries. Unlike traditional systems, AURA optimizes **multiple objectives simultaneously**—energy consumption, economic cost, user comfort, and emissions—while requiring only **minimal input from the user**. The platform adapts to **historical usage patterns, weather forecasts**, and **contextual information**, ensuring a personalized and efficient control strategy.

A key component of AURA is its **intuitive graphical interface**, designed to make advanced AI optimization accessible to non-technical users. The interface provides real-time insights, interactive preference setting, and **transparent explanations** of system decisions, enabling a genuine **human-in-the-loop** experience. A **customizable simulation environment** supports safe, cost-free testing of control strategies and enables rapid transfer of learned policies across different buildings through **digital twin** techniques.

The development roadmap begins with a **Proof of Concept** validated on the internationally recognized *CityLearn* benchmark for building energy management, followed by **real-world validation** using operational data provided by **Giordano Controls**, an industrial partner committed to supporting the spin-off through a long-term service agreement. This combination of academic benchmarking and industrial validation ensures both scientific

rigor and market relevance.

The ultimate objective is the establishment of a **university spin-off** that will commercialize AURA as a **scalable, cloud-based Software-as-a-Service (SaaS)** platform. In the initial phase, the primary target market will be the **domestic sector**, where adoption cycles are faster and the platform can be validated directly with end users. Depending on how the market evolves, the solution may later be extended to broader segments of the **Italian civil sector** and, potentially, to the **European smart energy market**, including public institutions, energy communities, and industrial facilities. By bridging the gap between **cutting-edge AI research** and **practical energy management applications**, AURA aims to deliver tangible **economic, environmental, and societal value**, contributing to national and EU sustainability goals.

2 AURA Team and Experience

2.1 AURA founders



Daniele Meli, Ph.D., is a Tenured Track Researcher in Artificial Intelligence and Robotics at the University of Verona. His research mainly focuses on robotics and AI integration. His works resulted in several publications in international conferences and top-tier journals in the field.

Potential role in the Spin-off: Chief Executive Officer (CEO)

[Personal Webpage](#) [LinkedIn Profile](#)



Luca Marzari, Ph.D., is a Postdoctoral associate at the Faculty of Informatics at TU Wien and research collaborator at the University of Verona. His research mainly focuses on developing novel methods for verifying and enhancing the explainability of AI solutions. He has been visiting researcher at Carnegie Mellon University (CMU), Pittsburgh, USA, and Imperial College London and the results of his research resulted in several publications at top-level international journals and conferences, state-of-the-art toolboxes for verification and explainability of deep neural networks, and prestigious collaborations with world-leading universities.

Potential role in the Spin-off: Chief Technology Officer (CTO)

[Personal Webpage](#) [LinkedIn Profile](#)



Alberto Castellini, Ph.D., is an associate professor at the computer science department of the University of Verona. His research interests focus on Artificial Intelligence, Machine Learning, and Data Analysis, with applications on cyber-physical systems, robotic systems, smart grids, and smart buildings. The main experience is on reinforcement learning, planning under uncertainty, predictive modeling for time series, and anomaly detection. He has participated in numerous national and international research projects about predictive and decision-making systems for energy management. His works are published in international scientific journals on artificial intelligence and intelligent systems, as well as at top-tier conferences. He participated to research projects about the integration of AI in HVAC systems, in which Giordano controls also participated, such as, Global House Thermal & Electrical Energy Management (2017-2021), POR-FESR, IoT systems for healthy and safe living environments (2020-2022), POR-FESR, and Sustainable and INnovative Energy systems for Renewables and Green HYdrogen (2024-2027), POR-FESR.

Potential role in the Spin-off: Scientific/Technical Advisor

[Personal Webpage](#) [LinkedIn Profile](#)



Alessandro Farinelli, Ph.D., Alessandro Farinelli is a Full Professor of Computer Science at the University of Verona since December 2019. Since October 2021, he is the head of the Department of Computer Science. He received his Ph.D. in Computer Engineering in 2005 from “La Sapienza” University of Rome and worked as a postdoctoral researcher at the University of Southampton (UK) from 2006 to 2008. Since 2008, he has been a faculty member in the Department of Computer Science at the University of Verona. His research focuses on developing innovative methodologies for Artificial Intelligence systems. In particular, his main research areas include machine learning, reinforcement learning, statistical data analysis for robotic systems, and coordination of multi-agent systems. He has been principal investigator for several national and international research projects focusing on application domains that include robotics, environmental monitoring, energy-efficient management, and advanced manufacturing.

Potential role in the Spin-off: Scientific Advisor

[Personal Webpage](#) [LinkedIn Profile](#)



Nicola Renoffio is the Innovation Strategist and member of the Board of Director in Giordano Controls S.P.A., with long-standing experience and several industrial patents in the field of smart energy management. He also collaborated to several research and innovation projects together with the University of Verona.

Potential role in the Spin-off: Industrial and Commercial Partner

[Personal Webpage](#) [LinkedIn Profile](#)

Managerial and business competencies. While the founding team has a predominantly technical background, the spin-off will compensate for this through structured managerial support. A key asset in this regard is the involvement of *Giordano Controls S.p.A.* as a partner and industrial shareholder: the company contributes not only financial stability but also its extensive *business know-how* in the energy management sector, providing practical guidance on market needs, customer acquisition, and commercial strategy. In addition, the team will be assisted by external advisors with experience in energy startups, business development, and technology transfer. Collaboration with the University’s Technology Transfer Office and local incubators will further support strategic planning, fundraising, and operational management. This combination ensures that the technical excellence of the team is complemented by solid entrepreneurial and managerial expertise.

2.2 Experience and Patents

Experience The team participated in several international and national research projects exploring the application of artificial intelligence to various scenarios. The full list of projects is reported below. Projects GHOTEM, RL-HEAT, COREWOOD, SAFE PLACE and SINERGHY,

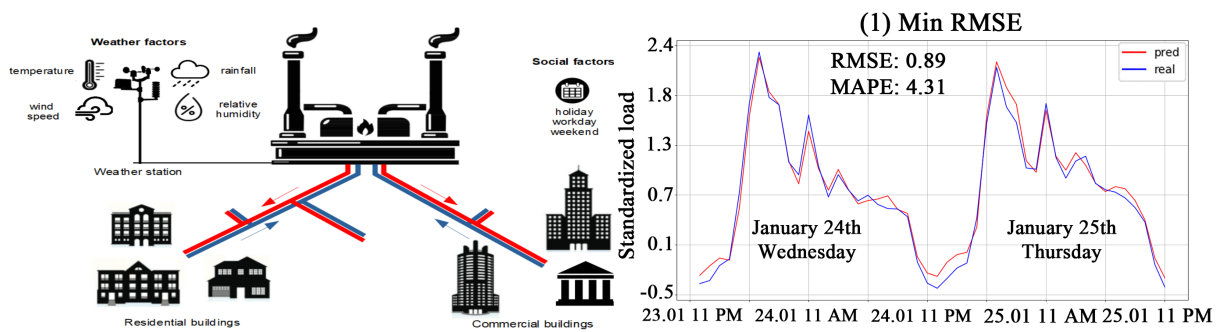


Figure 2: Heat load forecasting from the Gothem project.

specifically focus on energy and comfort management in smart buildings. This multi-year experience in managing projects aligned with the spin-off's objectives provides a solid foundation for its success.

Projects related to AI for energy and comfort management in smart buildings:

- GHOTEM - Global House Thermal & Electrical Energy Management: POR/FESR European Regional Development Fund 2014-2020 (<https://www.di.univr.it/?ent=progetto&id=5233&lang=it>) (10/2018 - 12/2020): the project aims at promoting the acceleration of technological innovation to support the energy transition, taking up some important challenges relating to the energy sector, such as the massive use of renewables, technological development in energy efficiency, innovation for heating/cost-effective and zero-emission cooling, the development of efficient batteries and storage systems, and the integration of control and management from the perspective of smart grids. Our role involved implementing an AI-based module for heating load forecasting in district heating networks. We evaluated several approaches, from linear regression to neural networks and developed a multi-equation linear model with good performance and interpretability. Results were published also in conference and journal papers.
- COREWOOD - Riposizionamento competitivo della filiera del legno: POR/FESR European Regional Development Fund 2014-2020 (<https://www.di.univr.it/?ent=progetto&id=5232&lang=it>) (10/2018 - 12/2020). The project aimed to address a strategic issue in the wood supply chain, specifically its competitive repositioning in a changing international context. Our role was related to the implementation of a module for adaptive control of the temperature and the optimization of thermal comfort and energy consumption in wooden housing structures.
- RL-HEAT: Intelligent Heating Control based on Reinforcement Learning Techniques. Joint project (<https://www.di.univr.it/?ent=progetto&id=5643>) (10/2020 - 09/2021). The goal of the project was to apply Safe Reinforcement Learning to perform adaptive control for an intelligent boiler. We modelled the control problem for the intelligent boiler and applied novel Safe RL techniques tackling the challenge of inserting a-priori knowledge inside the model by leveraging on ad-hoc solutions already applied by the industrial partner to perform adaptive control.
- SAFE PLACE - Sistemi IoT per ambienti di vita salubri e sicuri: POR/FESR European Regional Development Fund 2014-2020 (<https://www.di.univr.it/?ent=progetto&id=5741>)

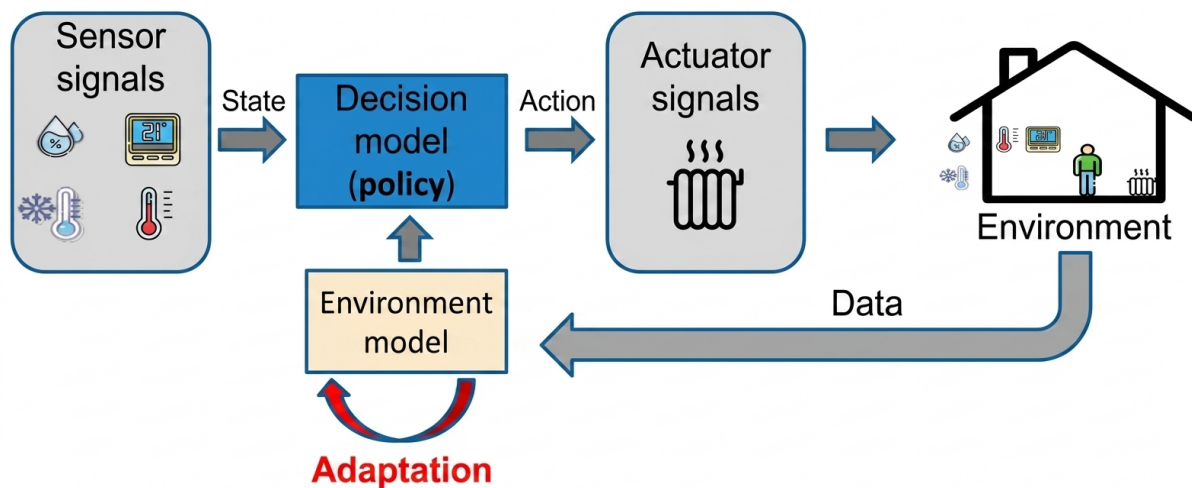


Figure 3: Planning architecture developed in the SafePlace project.

(10/2020 - 02/2023). The project aimed at systematically addressing problems relating to the Covid-19 health emergency through the integration of AI technologies for monitoring the flow of people, controlling air conditioning, and controlling light in systems based on IoT. Our role involved developing a module for safe air conditioning control. In particular, we employed automatic planning approaches to control air climatization systems, ensuring safety and maximizing comfort and energy savings. A software for planning based on Monte Carlo Tree Search was released. Results were published in conference papers.

- **SINERGHY** - Sustainable and INnovative Energy systems for Renewables and Green HYdrogen, POR/FESR European Regional Development Fund 2021-2027 (<https://www.di.univr.it/?ent=progetto&id=6183>) (10/2024 - Present). The project focuses on the development of an integrated and innovative energy system, combining advanced technologies for the production, storage, and management of energy from renewable sources. It aims to develop advanced and integrated technological solutions to enhance energy efficiency and promote environmental sustainability. Our role involves developing methods based on reinforcement learning for optimal control of multi-source heating and cooling systems. The goal is, in particular, to maximize the use of renewable energies and minimize emissions and costs while ensuring high comfort levels in smart buildings. We aim in this project to use Deep Reinforcement Learning methods to generate policies for energy management control in smart buildings, since neural network can scale better than planning methods like Monte Carlo Tree Search and they can also better adapt to environmental changes. In the current state of the project, we have reviewed the literature and identified CityLearn as the best tool for evaluating control techniques for Building Energy Management. The simulator includes functionalities for representing various elements — from the thermodynamics of the building to energy production through solar panels, from the storage of electrical energy in batteries to the management of heating and cooling via HVAC systems. From the reinforcement learning perspective, state-of-the-art algorithms based on neural networks, such as SAC and PPO, as well as some

model-based algorithms, have been evaluated. More advanced techniques will be explored in the continuation of the project.

Projects related to other AI applications:

- **INTCATCH** - Development and application of Novel, Integrated Tools for monitoring and managing Catchments: EU 2020 project (<https://www.di.univr.it/?ent=progetto&id=4833> (06/2016 - 02/2020)) The project focuses on developing efficient, user-friendly water monitoring strategies and systems based on innovative technologies that will provide real time data for important parameters, moving towards SMART Rivers. Specifically, the project developed a fleet of autonomous surface vehicles that can provide real time data for key water quality parameters.
- **iNEST** - Interconnected Nord-Est Innovation Ecosystem, Spoke 6, Tourism, Cultural Industries and Urban Manufacturing: PNRR, mission 4, component 2, NextGenerationEU, European Union and the Ministry of Business and Made in Italy (01/2023 - Present). The project aims to develop new technologies for tourism, culture and creative industries. Our role involves the development of Autonomous Surface Vehicles (ASVs) based on AI methods (e.g., reinforcement learning) for collecting data on water quality in tourism-affected environments.
- **BEHAVE** - Learning Safe Behaviours for human-robot cooperation, MUR - Ministero dell'Università e della Ricerca, Spoke 5 (02/2024 - Present). The project aims to develop new AI methodologies for assessing and certifying the quality of decisions in intelligent robotic systems. BEHAVE focuses, in particular, on planning and cooperation between humans and robots, addressing issues related to the formal verification of Deep Neural Networks trained using Deep Reinforcement Learning approaches to certify the behaviors of robots interacting with humans. Our role involves developing AI methods at the intersection of AI, formal verification, deep learning, and control for safe robotic control.

Patents At present, we do not have any existing intellectual property pending, nor granted patents nor trademarks. However, we are actively working toward developing IP for a comprehensive framework for an advanced autonomous AI-based solution for energy management. Our vision is to establish a pipeline that enables customers to specify their requirements and desired autonomy levels through an intuitive and interactive interface. This latter will integrate with our GUI to load the provided specifications and use them to guide advanced AI-based solutions, personalized to meet the customers' specific goals and operational needs. The IP strategy will focus not on the software itself but on the innovative pipeline for achieving advanced autonomy using AURA's framework. This approach will ensure that our framework's modular and customizable nature becomes a key competitive advantage while safeguarding our proprietary methodologies.

Research outputs contributing to the spin-off. Several research activities conducted by the founding team directly support the technological foundation of AURA. These include: (i) reinforcement learning algorithms and related code bases for constrained control of hybrid energy systems, developed within national projects; (ii) simulation environments and digital-twin prototypes for safe policy testing and scenario generation; (iii) explainability frameworks for human-in-the-loop decision support; and (iv) data processing pipelines

for real-time energy monitoring and anomaly detection. These outputs provide validated methodological components, prototype implementations, and domain-specific know-how that will be further developed and industrialized within the spin-off.

2.3 Legal structure

The company to be established will be an Innovative Limited Liability Company (LLC) with the status of a University Spin-Off. The reasons for this choice are multiple:

- The liability of the shareholders is limited, meaning their personal assets are not affected. It offers broad statutory flexibility, a low share capital requirement (but not less than €10,000), and simpler company management;
- The “Innovative” status allows for a charter with a favorable tax regime for both the company and investors, including:
 - lower incorporation costs;
 - carry-forward of operating losses;
 - possibility to issue financial instruments;
 - remuneration through financial instruments (e.g., stock options);
 - simplified employment relationships and access to R&D tax credits;
 - investment incentives;
 - the ability to raise venture capital through online platforms;
 - support for internationalization;
 - exemption from bankruptcy procedures;
- Being accredited as a university spin-off makes it possible to work closely with the academic environment, to access spaces and services at discounted rates for five years, and to rely on a network of highly qualified potential employees.

The project can primarily be developed at the Incubator facilities of the Department of Computer Science, Cà Vignal 2, University of Verona. This will allow us to separate academic activities from business operations. While our current Intelligent Systems Lab (AURA) office provides basic hardware for initial software development and data analysis, additional resources will be needed to complete all work packages effectively. Specifically, we will require new workstations with dedicated hardware for training and a data store.

2.4 Hypothetical Share Table

Shareholder	Hypothetical Role	Quotas
Daniele Meli	CEO	30%
Luca Marzari	CTO	20%
Alberto Castellini	Scientific Advisor	15%
Alessandro Farinelli	Scientific Advisor	5%

Giordano Controls S.p.a.	Investor and Commercial Partner	30%
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Table 1: Hypothetical shares.

The equity share allocation is not final and may be adjusted during the spin-off’s definition phase. The collaboration with Giordano Controls S.p.A. is envisioned as an initial client partnership, aimed at leveraging their network and market presence to accelerate the commercialization of the solutions we develop.

3 Market Analysis and AURA Solution

To position our AI-based solution for energy management within the current technological and commercial landscape, we conducted a brief market analysis focusing on both the Italian and European territories. The objective of this analysis is to identify existing competitors, understand the characteristics of their products, and examine the market segments they target. This assessment provides a solid foundation for highlighting the innovative and potentially groundbreaking nature of our proposed solution, as well as its capacity to address unmet needs and emerging opportunities in the energy management sector.

3.1 Competitors (Italy)

Country	Competitors (?)	Products	Target
IT	eVISO https://eviso.ai	Remote monitoring of supply points, consumption, and bills; supplier selection support. Focus on data monitoring, no AI-based control or optimisation.	businesses + domestic
IT	Revelis www.revelis.eu	Forecasting and anomaly detection for energy use and costs. Mentions explainability and deep learning, but no control functions.	businesses
IT	Enersem enersem.eu	Energy management system with forecasting and anomaly detection. Lacks advanced automation or control.	businesses + domestic
IT	Enel X enelx.com	Consumption prediction and monitoring tools. No optimisation or control.	businesses
IT	EON https://www.eon-energia.com/	AI-based load and cost simulator with chatbot support; focus on energy communities and photovoltaic systems. Provides simulation and prediction, not optimisation.	businesses + domestic
IT	Alperia www.alperia.eu/	AI-driven monitoring and reactive control of air-conditioning systems (e.g., Venice airport). Specific use case, lacks scalability and explainability.	civil

Table 2: **Light grey** : energy dispatchers; **Light green** : large European industrial players that also offer auxiliary energy services.

3.2 Competitors (Europe)

Country	Competitors (?)	Products	Target
UK / RO	Ogre.AI https://ogre.ai/en	AI for prediction and anomaly detection in renewable production plants (photovoltaic and wind). Only prediction and anomaly detection.	energy producers
SW	DecarbAI decarb.ai	EU-funded startup focused on prediction and optimization for plants and networks using digital twins. Likely limited to prediction, not active control , oriented toward large infrastructures.	all (?)
PT	Cleanwatts cleanwatts.energy	Management of local energy networks and communities, with hybrid-source comparison and user preference-based optimization.	business + domestic
SW	Emulate Energy emulate.energy	Monitoring and optimization of residential batteries and energy points using virtual models. Optimization appears rule-based.	domestic
DE	Reonic reonic.com	Simulation and fast prototyping of photovoltaic systems. Not focused on active control or anomaly detection.	energy system producers
DE	Suena suena.energy	Prediction tools for energy and battery trading. Limited to market optimization, not operational control.	producers / sellers
NO	Vind AI vind.ai	AI-based simulation for wind farm installation and prediction. No adaptive control capabilities.	wind energy producers
DE	Climatiq climatiq.io	Prediction and data integration for carbon footprint assessment. Not a direct competitor.	companies

ES	Quixotic quixotic.energy	AI-based prediction and chatbot-driven advisory tools for local energy communities. No adaptive control or explainability.	civil and community users
BE	Companion com- panion.energy	End-to-end energy monitoring and prediction platform with planning tools. No advanced control layer.	companies
UK	EPT Global eptglobal.com	Energy performance analytics for commercial and hotel portfolios. Provides centralized dashboards and benchmarking for efficiency optimization. Lacks reinforcement learning, explainability, or adaptive control; focused on static performance KPIs.	businesses (hotels, large buildings)
FR	Schneider Electric Ecostruxure	Integrated monitoring platform for energy consumption. Limited to monitoring and basic automation, no personalized adaptive control.	companies
DE	Siemens SICAM	IoT-based prediction and monitoring for energy stations and smart grids. Lacks explainable or human-centered features.	energy producers and suppliers
CH	ABB Ability Energy Management System	Energy monitoring and prediction. Focus on industrial automation, not user-level adaptability or explainability.	companies

Table 3: **Light green** : large European industrial players; **Light gray** : energy service providers.

3.3 Competitive Comparison Matrix

To complement the qualitative market analysis presented in Sections 3.1 and 3.2, we introduce a concise competitive comparison matrix. This table highlights the main functional gaps in existing solutions and clarifies AURA's positioning relative to representative Italian and European competitors.

Competitor	Adapt. Ctrl	Multi-Obj Opt	Explainability	Sim/Digital Twin
eVISO (IT)	–	–	–	–
Revelis (IT)	–	–	✓	–
Enersem (IT)	–	–	–	–
Cleanwatts (PT)	✓	✓	–	–
Emulate Energy (SW)	✓	–	–	✓
Schneider Electric (FR)	–	–	–	–
Siemens (DE)	–	–	–	–
AURA (proposed)	✓	✓	✓	✓

Table 4: Competitive comparison matrix highlighting functional gaps in existing solutions.

The matrix confirms the trends identified in the previous subsections: most competitors focus on monitoring, prediction, or rule-based automation, with limited support for adaptive control, multi-objective optimization, or explainability. Only a few platforms offer partial optimization capabilities, and none provide a unified framework combining reinforcement learning, transparent decision-making, and digital-twin simulation. AURA therefore occupies a distinct position in the market, addressing unmet needs with a self-learning, explainable, and human-centered control solution.

3.4 Key Takeaways and Market Gap

In summary, we have identified the following key takeaways:

- **Temporal prediction is a common feature** offered by most competitors, with an exclusive focus on forecasting aggregate energy consumption and generation.
- **Energy and consumption control are often ignored.** Only a few competitors mention automatic control, mostly in vague terms. Introducing *true intelligent autonomous control* could represent a real breakthrough in the market, both offering an effective assistance to optimize the energy system, both for users and energy managers.
- **Adaptive control**, refined on real-time data and interactive feedback from users, is particularly important to improve the efficiency of energy management and the overall service offered to users. Current competitors often require frequent manual modifications to specific parameters (e.g., device-specific settings). This reduces usability and does not actually translate the needs of the user into an optimal strategy for energy management.
- **Explainability** remains largely overlooked in existing solutions. Integrating transparent, interpretable decision mechanisms—paired with a *user-friendly interface* (e.g.,

automatic report generation in spreadsheets or textual logs, chatbot-based interaction) would provide a clear competitive advantage and meet a growing market demand.

- The **Italian market appears less explored** than the broader European one, suggesting a **promising entry point**.
- Similarly, **the industrial sector seems largely untapped**, representing a high-risk, but also high-gain area for our solution.

3.5 AURA Solution Overview

Building on this market analysis, it is clear that AURA addresses a concrete and persistent gap in the current landscape. While most competitors focus on prediction, monitoring, or static rule-based automation, none provide a **fully adaptive, multi-objective control system** capable of jointly optimizing energy consumption, economic cost, user comfort, and emissions across **multiple domestic energy resources**. In its initial phase, AURA is designed primarily for domestic environments, where rapid adoption cycles allow for effective validation and refinement. AURA introduces a new paradigm: a **self-learning, explainable, and user-centered** control framework that adapts to real usage patterns, weather forecasts, and contextual information with minimal user intervention.

Our solution integrates **reinforcement learning, constrained optimization**, and **explainable AI** within a modular architecture that supports hybrid energy systems (HVAC, thermal storage, PV, batteries). The platform includes a **customizable simulation environment** for safe prototyping and rapid transfer of learned policies, and a **user-friendly interface** that makes advanced AI optimization accessible to non-technical users. Through transparent explanations, interactive dashboards, and human-in-the-loop mechanisms, AURA empowers users to understand and influence the optimization process without dealing with technical complexity. As the market evolves, the same architecture may be extended to more complex organizational settings, offering a pathway for future B2B applications if conditions prove favourable.

4 AURA Product Description and Development

AURA will deliver a **modular, user-friendly software platform** for intelligent and transparent energy management in civil and commercial buildings. The system is designed to optimize **multiple domestic energy resources**—including heating, cooling, ventilation, photovoltaic generation, thermal storage, and battery systems—through **multi-objective optimization** that simultaneously balances:

- energy consumption,
- operational costs,
- user comfort,
- environmental impact and emissions.

A key design principle is **minimal user burden**. AURA adapts to the user's habits, historical preferences, and contextual information (e.g., weather forecasts, occupancy patterns), requiring only high-level preference inputs. The system autonomously refines its control strategy over time, ensuring both efficiency and usability.

4.1 System Architecture

- **Core Engine:** Novel Reinforcement Learning (RL) and constrained optimization models continuously regulate energy flows across heterogeneous sources. The engine supports multi-objective reward shaping and integrates regulatory, comfort, and safety constraints.
- **Explainability Layer:** AURA embeds interpretable mechanisms—feature attribution, causal analysis, and textual/visual rationales—to make each optimization step transparent. This transforms the system into a trustworthy, human-centered decision-support tool.
- **Customizable Simulation Environment:** A virtual environment models the customer's building topology, devices, and consumption patterns. It supports:
 - *safe, cost-free testing* of control strategies,
 - *digital twin-based optimization*,
 - *zero-shot adaptation* to new buildings,
 - *data-driven learning* of building dynamics.
- **User Interface:** A clean, intuitive dashboard and conversational interface allow non-technical users to adjust preferences, inspect system behavior, and receive explainable summaries of decisions.
- **Integration API:** A flexible API enables communication with IoT devices, sensors, HVAC systems, and external management software.

The product will initially be validated through realistic benchmark datasets and controlled pilot installations (thanks to Giordano Controls as a Partner), then scaled into a **cloud-based Software-as-a-Service (SaaS)** model for broad commercial deployment.

4.2 Added Value and Impact

AURA introduces four key innovations to the energy management market:

1. **Autonomous Adaptive Intelligence:** Unlike static rule-based systems, AURA learns optimal strategies under evolving conditions, user habits, and weather forecasts, reducing manual intervention and improving efficiency.
2. **Explainable Decision-Making:** The system provides transparent rationales for its actions, enabling adoption in public, institutional, and safety-critical contexts.
3. **Human-Centered Multi-Objective Control:** AURA optimizes energy consumption, costs, comfort, and emissions simultaneously, while requiring only minimal user input.
4. **Virtual Testing and Data-Driven Adaptation:** The simulation environment enables

experimentation with custom scenarios and supports rapid transfer of learned policies across buildings.

The expected impacts include:

- **Energy savings:** 10–20% reduction in building energy use, consistent with IEA (2023), SRI (2022), and RL-based control studies.
- **Environmental impact:** Reduced CO₂ emissions and improved integration of renewables.
- **Economic impact:** Lower operational costs and enhanced demand-response capabilities.
- **Social impact:** Increased transparency, trust, and user engagement in sustainable practices.

4.3 Demonstration and Proof of Concept

To validate the AURA platform in a controlled yet realistic setting, we propose a structured Proof of Concept (PoC) spanning **nine months** (M1–M9). The PoC is designed to progressively integrate simulation-based development, multi-objective optimization, user interaction, explainability, and final validation on real industrial data. In parallel, early feedback from domestic users will support the refinement of usability and preference-setting mechanisms, ensuring alignment with the initial B2C focus. The activities are organized into five tasks, aligned with the timeline reported in Table 5.

Task	M1	M2	M3	M4	M5	M6	M7	M8	M9
T1: Simulation Customization & Prototyping									
T2: Constrained RL for Multi-Objective KPIs									
T3: GUI Development									
T4: Explainability & Human-in-the-Loop									
T5: Validation on Giordano Controls Data									

Table 5: Gantt chart of the proposed activity.

T1: Simulation Customization & Prototyping (M1–M4). The first phase focuses on adapting the CityLearn environment to the specific requirements of AURA’s multi-source energy management framework. This includes:

- customizing the simulation to represent hybrid domestic energy systems (HVAC, thermal storage, PV, batteries);
- defining multi-objective performance indicators (energy consumption, cost, comfort, emissions);
- prototyping baseline RL agents to establish reference performance;
- preparing the environment for constrained and multi-objective optimization in later tasks.

This phase provides the foundational infrastructure for rapid experimentation and safe testing before real-world deployment.

T2: Constrained Multi-Objective RL for KPI Optimization (M2–M5). Building on the customized simulation, this task develops and evaluates advanced RL algorithms capable of handling multiple objectives and operational constraints. The work includes:

- implementing constrained RL methods to enforce comfort, safety, and cost limits;
- integrating multi-objective reward shaping to balance user comfort, energy efficiency, and emissions;
- testing algorithmic robustness under variable weather forecasts and consumption patterns;
- extending the simulation to support hybrid control strategies across multiple domestic energy resources.

This task delivers the core intelligence of the AURA platform.

T3: GUI Development (M3–M7). This task focuses on creating a user-friendly interface that enables non-technical users to interact with the system. The GUI will:

- provide real-time visualization of energy flows, KPIs, and optimization outcomes;
- allow users to specify high-level preferences (comfort ranges, cost priorities, emission sensitivity);
- support adaptive control by collecting user feedback and preference updates;
- integrate seamlessly with the explainability layer developed in T4.

The interface is designed to minimize user burden while maximizing transparency and usability.

T4: Explainability & Human-in-the-Loop (M4–M8). This task implements the explainability and human-centered components of the AURA platform. The work includes:

- developing interpretable summaries of RL decisions (e.g., feature importance, causal drivers, scenario comparisons);
- enabling human-in-the-loop adaptation, where user feedback dynamically influences the optimization strategy;
- processing logged data to highlight the impact of weather, tariffs, and user habits on system behavior;
- integrating explainability outputs directly into the GUI for intuitive interpretation.

This phase ensures that AURA remains transparent, trustworthy, and aligned with user expectations.

T5: Validation on Giordano Controls Data (M6–M9). The final phase validates the AURA platform using real operational data provided by Giordano Controls, collected from installed multi-source domestic energy systems (e.g., air conditioners, splitters, heaters, thermal storage). This validation assesses:

- the transferability of learned policies from simulation to real-world conditions;

- the adaptability of the system to user habits, historical consumption patterns, and device-specific constraints;
- performance under real weather forecasts and tariff structures;
- the effectiveness of multi-objective optimization in practical scenarios.

This step provides essential technical validation for future extensions of the platform, including the possibility of exploring B2B applications if market conditions evolve favourably.

4.4 Expected Costs

The PoC requires a focused and cost-efficient investment to support the technical development of the AURA platform, the explainability and user-interface components, and the early foundation of the spin-off. The spin-off establishment is planned at the beginning of the PoC (M1), enabling immediate access to administrative and infrastructural resources. Thanks to the partnership with Giordano Controls, real-world data for T5 will be provided at no cost, significantly reducing the overall budget.

Table 6 summarizes the expected costs associated with each task and with the initial establishment of the spin-off. The total investment remains within the target range of approximately €60,000.

Cost Item	Estimated Cost (EUR)
Spin-off foundation (legal, administrative, notary fees, initial accounting setup)	6,000–8,000
Dedicated server for data storage and user-specific model adaptation	3,000–4,000
Cluster node for RL training and constrained multi-objective optimization	6,000–8,000
Research Fellow 1 (T1–T2): Simulation customization, prototyping, advanced RL	16,000–20,000
Research Fellow 2 (T3–T4): GUI development, explainability, human-in-the-loop	16,000–20,000
Miscellaneous operational costs (cloud services, software licenses, travel)	3,000–4,000
Total Estimated Cost	50,000–60,000

Table 6: Expected costs for the PoC and spin-off foundation.

5 Business Model

5.1 Potential Customers

In the first two years of activity, AURA will focus primarily on the **Business-to-Consumer (B2C)** segment. This choice reflects the current maturity of the domestic smart energy market and the opportunity to validate the platform through rapid adoption cycles, direct user feedback, and low-friction deployment. Private households represent an accessible and scalable entry point for refining usability, explainability, and adaptive control features.

Within the **B2C** segment, our initial target customers are:

- **Private citizens** interested in intelligent, transparent, and easy-to-use systems for improving domestic energy efficiency and comfort.

This early focus allows the company to consolidate the core product, validate the value proposition, and build a stable user base before considering more complex market segments.

Starting from Year 3, AURA may explore an expansion toward the **Business-to-Business (B2B)** domain. This evolution is not assumed as a fixed trajectory but will depend on market conditions, regulatory incentives, and the maturity of the platform. Potential B2B opportunities could include:

- **Energy Service Companies (ESCOs)** interested in integrating adaptive AI into their service offerings;
- **Facility and real estate managers** seeking scalable optimization tools for building portfolios;
- **Public institutions** aligned with national and EU energy efficiency directives.

The involvement of **Giordano Controls S.p.A.** as an industrial shareholder provides an optional pathway for future B2B validation. While not part of the initial commercial strategy, their operational data and domain expertise offer a valuable resource should the company decide to expand toward organizational customers.

This phased and market-responsive approach ensures that AURA remains flexible, focusing first on consumer adoption while keeping open the possibility of future scaling into B2B scenarios if and when the market context proves favourable.

5.2 Marketing Strategy

AURA will adopt a phased and market-responsive marketing strategy, with a clear focus on the **Business-to-Consumer (B2C)** segment during the first two years. This approach enables rapid validation cycles, direct interaction with end users, and a lower barrier to adoption compared to organizational settings.

Stage 1 (Years 1–2): B2C-focused market entry

The initial go-to-market strategy targets private households interested in intelligent and transparent energy management solutions. Key activities include:

- **User-centric product refinement:** iterative improvement of the interface, explainability features, and adaptive control based on real user feedback;
- **Pilot deployments with early adopters:** small-scale trials with domestic users to validate usability, perceived value, and energy savings;
- **Digital marketing and community engagement:** targeted campaigns, partnerships with local energy communities, and collaborations with consumer-oriented sustainability initiatives.

This phase aims to consolidate the product’s core value proposition, build a stable user base, and gather evidence of impact in real domestic environments.

Stage 2 (from Year 3): Exploration of B2B opportunities

Starting from Year 3, AURA may explore potential extensions toward the **Business-to-Business (B2B)** domain. This evolution is not assumed as a fixed trajectory but will depend on market conditions, regulatory incentives, and the maturity of the platform. Possible avenues include:

- collaborations with **ESCOs** interested in integrating adaptive AI into their service offerings;
- partnerships with **facility managers** or real estate operators managing building portfolios;
- pilot projects with **public institutions** aligned with national and EU energy efficiency directives.

The involvement of **Giordano Controls S.p.A.** provides an optional pathway for early validation in organizational contexts, without committing the company to an immediate B2B commercial rollout.

This staged strategy ensures flexibility, allowing AURA to prioritize consumer adoption while keeping open the possibility of future scaling into B2B scenarios if and when the market context proves favourable.

5.3 Scalability Analysis

The scalability of the AURA platform is grounded in its cloud-based architecture, modular design, and ability to adapt to heterogeneous energy systems. The scalability pathway is intentionally structured to follow a **B2C-first** approach, ensuring that the platform matures through widespread domestic adoption before addressing more complex organizational environments.

Short-term scalability (Years 1–2): B2C expansion

During the initial phase, scalability is driven by:

- **low-friction onboarding** for domestic users through simple installation and configuration;
- **cloud-native deployment** enabling rapid scaling with minimal operational overhead;
- **automated data processing pipelines** supporting large numbers of small-scale installations.

This phase allows the platform to grow organically while strengthening its robustness, reliability, and user experience.

Medium-term scalability (from Year 3): Optional B2B extension

From Year 3 onward, AURA may consider expanding into the B2B domain if market conditions, regulatory incentives, and product maturity align. Potential scalability drivers include:

- integration with **building management systems** operated by ESCOs or facility managers;
- deployment across **multi-building portfolios** requiring centralized monitoring and optimization;
- participation in **public-sector energy efficiency initiatives**.

These opportunities are treated as *conditional* rather than predetermined, ensuring that the company remains agile and responsive to market evolution.

The phased scalability model ensures that AURA grows sustainably, consolidating its presence in the consumer market while retaining the flexibility to explore larger-scale applications when the ecosystem is ready.

5.4 Expected Revenue Across Market Phases

The following revenue projections reflect the typical growth patterns of early-stage European deep-tech startups operating in the energy and AI sectors. Market penetration in this domain is generally slow, with revenues increasing only after multiple early deployments and the consolidation of a stable customer base. The projections therefore prioritize realism and financial prudence over aggressive scaling assumptions, and they cover a **five-year horizon** in line with standard spin-off evaluation criteria.

A key stabilizing factor is the partnership with **Giordano Controls**, which has expressed willingness to support the spin-off through a *contratto per servizi* (service agreement). This agreement provides a recurring annual contribution of **€50,000**, functioning both as a first-customer contract and as a co-development support mechanism. This baseline revenue reduces early-stage uncertainty and supports the initial operational phase.

Phase 1 – Proof of Concept and Validation (Year 1). During the first operational year, revenues will remain modest, reflecting the focus on completing the MVP and PoC, validating the technology, and establishing the spin-off's operational structure.

- **Revenue sources:**
 - Giordano Controls service agreement: €50,000;
 - Small research grants and innovation vouchers.
- **Estimated annual revenue:** €50,000–€80,000.
- **Objective:** Achieve TRL 4–5 and demonstrate feasibility in controlled settings.

Phase 2 – Early Commercialization (Years 2–3). In this phase, the spin-off will begin offering limited early deployments to domestic users, focusing on validating usability, explainability, and energy savings in real households. Growth is expected to be gradual, as the platform stabilizes and early adopters validate the solution. Depending on market evolution, exploratory discussions with organizational stakeholders may begin toward the end of this phase, without assuming immediate B2B revenue.

- **Revenue sources:**
 - Giordano Controls service agreement: €50,000/year;
 - Early domestic deployments (€5k–€15k in aggregate);
 - Small annual service contracts (€2k–€5k per cluster of users/year).
- **Estimated annual revenue:**
 - Year 2: €100,000–€160,000;
 - Year 3: €150,000–€220,000.
- **Objective:** Consolidate early adoption and refine the platform for modular SaaS deployment.

Phase 3 – Scalable SaaS Deployment (Years 4–5). Once the platform reaches TRL 7–8 and demonstrates robustness across multiple domestic deployments, the business will gradually transition to a modular **Software as a Service (SaaS)** model. Revenue growth is expected to increase, but projections remain cautious to reflect market uncertainties and adoption variability. Potential B2B opportunities may be explored in this phase if market conditions prove favourable, but they are not assumed as a baseline revenue source.

- **Revenue sources:**
 - Giordano Controls service agreement: €50,000/year;
 - SaaS subscriptions (€5–€50/month per user depending on tier);
 - Optional analytics and consulting services (€3k–€10k per project).
- **Estimated annual revenue:**
 - Year 4: €250,000–€400,000;
 - Year 5: €400,000–€650,000.
- **Objective:** Achieve financial stability and expand to broader EU markets, with optional B2B extensions.

Phase	Year	Estimated Revenue (€)	Revenue Type
Proof of Concept	1	50,000–80,000	Grants, Giordano Controls service agreement
Early Commercialization	2	100,000–160,000	Early domestic deployments, service agreement
Early Commercialization	3	150,000–220,000	Domestic contracts, service agreement
SaaS Deployment	4	250,000–400,000	SaaS subscriptions, analytics, service agreement
SaaS Deployment	5	400,000–650,000	Recurring SaaS revenue, service agreement

Table 7: Projected Annual Revenues by Phase (5-year horizon).

5.5 Expected Expenses and Profit Across Market Phases

The expense projections have been revised to reflect a cautious and sustainable growth strategy. The financial model prioritizes essential R&D activities, lean operations, and gradual team expansion. This approach reduces financial risk during the early years and aligns with typical cost structures of early-stage European AI startups. The projections cover a **five-year horizon**, consistent with standard expectations for university spin-offs.

Phase 1 – Proof of Concept and Validation (Year 1). Expenses in the first year are kept intentionally low, focusing on the MVP and PoC, spin-off foundation, and minimal staffing.

- **Human resources:** €50,000–€60,000 for two research fellows (6–9 months), covering simulation customization, RL development, GUI prototyping, and explainability.
- **Technical infrastructure:** €8,000–€12,000 for a dedicated server and a small compute node.
- **Initial capital and operations:** €6,000–€8,000 for legal, administrative, and operational setup.

Total Estimated Annual Expenses: €65,000–€80,000.

Phase 2 – Early Commercialization (Years 2–3). As the spin-off begins early deployments with domestic users, expenses increase moderately but remain controlled. No B2B-specific costs are assumed in this phase, as potential organizational engagements will depend on market evolution.

- **Human resources:** €90,000–€140,000 per year (2–3 full-time employees).
- **Cloud and infrastructure:** €15,000–€25,000 per year.
- **Operational and marketing costs:** €10,000–€20,000 per year, primarily focused on consumer outreach and user support.

Total Estimated Annual Expenses:

- Year 2: €120,000–€180,000.
- Year 3: €150,000–€200,000.

Phase 3 – Scalable SaaS Deployment (Years 4–5). With SaaS deployment, expenses grow due to increased infrastructure and customer support needs, but remain aligned with conservative scaling. Potential B2B-related costs may be considered only if the company decides to explore organizational deployments in response to market demand.

- **Human resources:** €180,000–€280,000 per year (4–6 staff members).
- **Cloud infrastructure:** €30,000–€50,000 per year.
- **Sales and expansion:** €20,000–€35,000 per year.

Total Estimated Annual Expenses:

- Year 4: €230,000–€350,000.
- Year 5: €260,000–€400,000.

Phase	Year	Estimated Expenses (€)
Proof of Concept	1	65,000–80,000
Early Commercialization	2	120,000–180,000
Early Commercialization	3	150,000–200,000
SaaS Deployment	4	230,000–350,000
SaaS Deployment	5	260,000–400,000

Table 8: Projected Annual Expenses by Phase (5-year horizon).

Based on these projections, the spin-off is expected to reach **break-even between Years 3 and 4**, depending on the pace of domestic adoption and SaaS uptake. This trajectory is consistent with comparable European deep-tech startups transitioning from early deployments to modular SaaS recurring income.

5.6 Pricing Model

To ensure accessibility across different customer segments and to support a scalable go-to-market strategy, AURA adopts a modular **four-tier SaaS pricing model**. Each tier corresponds to a specific level of functionality, ranging from basic monitoring to full adaptive control with enterprise-grade integration. This structure aligns with the revenue projections in Section 5.4 and supports progressive adoption from early users to large-scale deployments.

Tier 1 – Free (Monitoring Only). A lightweight version designed to introduce users to the platform.

- Real-time monitoring of energy consumption and photovoltaic production;
- Basic dashboards and historical data visualization;
- Limited data retention (e.g., 7–14 days);
- No optimization or control features.

This tier supports user onboarding and broad visibility, particularly in the B2C segment.

Tier 2 – Basic (Analytics and Forecasting). A low-cost subscription for users seeking actionable insights without automation.

- All Free-tier features;

- Short-term forecasting of consumption and production;
- Anomaly detection and basic alerts;
- Monthly automated reports;
- Email support.

Indicative price: €5–€10/month per user.

Tier 3 – Pro (Adaptive Optimization). The core offering for most B2B and advanced B2C users.

- All Basic-tier features;
- Adaptive multi-objective optimization (cost, comfort, emissions);
- Reinforcement learning–based control for hybrid energy systems;
- Explainability layer with human-in-the-loop adjustments;
- Integration with smart meters and IoT devices;
- Priority support.

Indicative price: €15–€30/month per user.

Tier 4 – Enterprise (Full Integration and Customization). A high-value tier for organizations managing large infrastructures.

- All Pro-tier features;
- Multi-site and portfolio-level optimization;
- API access and integration with existing EMS/BMS systems;
- Custom dashboards and extended data retention;
- Dedicated onboarding and technical support;
- Optional consulting and predictive maintenance modules.

Indicative price: €40–€50/month per user (or custom enterprise contracts).

This tiered structure ensures a smooth transition from early adopters to large-scale deployments, supports recurring revenue generation, and enables flexible pricing across both B2B and B2C markets.

5.7 Intellectual Property Strategy

AURA's intellectual property (IP) strategy is designed to protect the core technological assets of the spin-off while ensuring freedom to operate and enabling sustainable long-term competitiveness. The strategy combines complementary protection mechanisms—patents, trade secrets, copyright, and data governance—aligned with European regulations and university spin-off policies.

Patentability assessment. While pure software is generally not patentable under EU law, several components of AURA qualify for patent protection due to their *technical character* and direct impact on physical energy systems. Potentially patentable elements include:

- novel reinforcement learning formulations for hybrid energy systems with physical constraints;
- adaptive multi-objective control methods that jointly optimize cost, comfort, and emissions;
- explainability mechanisms that translate control decisions into interpretable, human-centered feedback;
- simulation-to-reality transfer procedures enabling safe deployment of learned policies.

These elements constitute the basis for one or more **method patents** or **system patents** describing the interaction between algorithms, sensors, and actuators.

Trade secrets and proprietary know-how. Some components of the platform are better protected through confidentiality rather than patenting, particularly:

- hyperparameter tuning strategies and reward shaping for RL models;
- data preprocessing pipelines and feature engineering heuristics;
- internal performance metrics and benchmarking procedures;
- the structure of the simulation environment and scenario generation tools.

These elements will be safeguarded through internal documentation policies, restricted repository access, and confidentiality agreements with employees and partners.

Copyright and software protection. All source code developed within the spin-off is automatically protected under EU copyright law. This includes:

- the AURA software stack (backend, frontend, APIs);
- the simulation environment and digital-twin modules;
- the explainability interface and visualization components.

Licensing will follow a **proprietary model** for commercial deployments, with the possibility of releasing non-critical components under permissive open-source licenses to foster adoption and community engagement.

Data ownership and licensing. Data collected from pilot deployments and early customers (e.g., Giordano Controls) will remain under the ownership of the respective partners. AURA will obtain:

- usage rights for model training and performance evaluation;
- anonymized datasets for algorithmic improvement;
- the ability to publish aggregated, non-sensitive results.

Clear data governance agreements will ensure GDPR compliance and transparent handling of user information.

IP roadmap (Years 1–5). The IP strategy evolves alongside the technological maturation of the platform:

- **Year 1:** prior art search, freedom-to-operate analysis, identification of patentable

components.

- **Year 2:** filing of the first patent application (method/system patent on adaptive control).
- **Years 2–3:** consolidation of trade secrets and internal documentation; protection of simulation environment.
- **Years 3–4:** evaluation of additional patents related to explainability or multi-objective optimization.
- **Years 4–5:** extension of patents to EU/US markets depending on commercial traction.

This multi-layered IP strategy ensures robust protection of AURA’s technological assets, supports competitive differentiation, and aligns with the long-term sustainability of the spin-off.

6 Risk Analysis and Mitigation

The development and market introduction of AURA’s solution entail several risks that are typical for early-stage technology ventures. The following table and discussion summarize the main risk categories, their potential impact, and the corresponding mitigation strategies.

6.1 Technological Risks

Risk: The reinforcement learning (RL) algorithms or explainable AI components may not reach the desired level of performance or interpretability during the PoC phase.

Impact: Delays in prototype validation or reduced credibility with early adopters.

Mitigation: The development roadmap includes multiple algorithmic baselines (standard RL, constrained RL, hybrid human-machine optimization) to ensure redundancy and fall-back solutions. Early testing on public datasets (e.g., CityLearn) will minimize integration risks, together with the team’s experience.

Risk: Integration challenges with real-world energy management systems and IoT hardware.

Impact: Increased development time or compatibility barriers with industrial partners.

Mitigation: The platform architecture is designed with modular APIs and standard communication protocols (e.g., MQTT, REST, BACnet). Early discussion with energy engineers and IoT vendors, based on the strong network of the team, will ensure alignment with existing infrastructures.

6.2 Market and Customer Risks

Risk: Slow adoption by conservative energy operators or facility managers unfamiliar with AI-based systems.

Impact: Longer sales cycles and limited early revenue.

Mitigation: Focus initial deployment on research centers and public buildings, where innovation adoption is faster and risk tolerance higher. Demonstrating measurable cost and energy savings through pilot projects will build trust and market reputation.

Risk: Competition from large established players (e.g., Schneider, Siemens, ABB) once market traction is proven.

Impact: Price pressure and market share erosion.

Mitigation: AURA differentiates itself through explainability, adaptive control, and a user-centered interface — areas where incumbents are still limited. Establishing partnerships or white-label agreements with larger players can also turn competitors into distribution channels.

Risk: Limited awareness among private citizens about explainable or adaptive energy management tools.

Impact: Slower adoption in the domestic segment.

Mitigation: Leverage communication through universities, municipalities, and green tech initiatives to raise awareness. Early prototypes will include user-friendly reporting and intuitive dashboards to simplify perceived complexity.

6.3 Financial and Organizational Risks

Risk: Difficulty securing sufficient early-stage funding to support one dedicated FTE and PoC development.

Impact: Slower execution or delayed spin-off establishment.

Mitigation: Seek a mix of funding sources, including seed grants, university innovation funds, and private investors. The modular nature of the PoC allows incremental progress and demonstration of value even with limited resources.

Risk: Limited entrepreneurial experience within the founding research team.

Impact: Potential inefficiencies in operations or fundraising.

Mitigation: The team will integrate external advisors with experience in energy startups and business development. Partnerships with technology transfer offices and incubators will provide managerial support.

6.4 Regulatory and Data Risks

Risk: Evolving regulations for data privacy, smart grid management, or building automation.

Impact: Compliance costs or system redesign.

Mitigation: Adopt privacy-by-design principles and adhere to GDPR and relevant energy standards (e.g., ISO 50001). Continuous monitoring of EU and national energy directives will ensure compliance readiness.

6.5 Risk–Opportunity Outlook

While these risks represent realistic challenges, they also open opportunities for differentiation. By proactively addressing explainability, interoperability, and transparency—three areas where most competitors remain weak—AURA positions itself as a trustworthy, research-based, and market-ready player in the emerging intelligent energy management sector. Risk mitigation is therefore not only defensive, but a strategic enabler of value creation and long-term competitiveness.

7 Profitability Summary

This section provides a concise overview of the expected profitability of the AURA spin-off, summarizing the financial projections presented in the Business Model. The analysis reflects a conservative and realistic growth trajectory, consistent with early-stage European deep-tech startups operating in the energy and AI sectors.

Break-even Point

Based on the projected revenue and cost structure, AURA is expected to reach **break-even between Years 3 and 4**. This timeline is supported by the stabilizing effect of the annual service agreement with Giordano Controls and by the progressive transition from early deployments to recurring SaaS income.

Revenue Outlook

- **Year 1:** €50,000–€80,000 (service agreement + small grants).
- **Year 2:** €100,000–€160,000 (early domestic deployments and integration fees).
- **Year 3:** €150,000–€220,000 (domestic service contracts + early SaaS adoption).
- **Year 4:** €250,000–€400,000 (scalable SaaS subscriptions and analytics services).
- **Year 5:** €400,000–€650,000 (recurring SaaS revenue; optional enterprise contracts depending on market evolution).

Expense Outlook

- **Year 1:** €65,000–€80,000.
- **Year 2:** €120,000–180,000.
- **Year 3:** €150,000–€200,000.
- **Year 4:** €230,000–€350,000.
- **Year 5:** €260,000–€400,000.

Long-term Sustainability

The combination of:

- recurring SaaS revenues,
- controlled operational costs,
- the industrial partnership with Giordano Controls,
- and the potential scalability of the platform across B2C and, if market conditions allow, B2B contexts,

provides a solid foundation for long-term financial sustainability. As the customer base expands and the platform matures, operating margins are expected to improve significantly, enabling reinvestment in R&D and supporting expansion into broader EU markets.