ECOsystems EMPOWERing at regional and local scale supporting energy communities

April 2025

D2.3 ECOEMPOWER ENERGY-ICT PLATFORM

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Contributing Beneficiaries	-
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ABSTRACT

This document contains the functional views of the ICT Platform of ECOEMPOWER.

KEYWORD LIST

ICT Platform, Energy Forecasting, Energy Modelling, CBA

DISCLAIMER

EXECUTIVE SUMMARY

Deliverable 2.3 focuses on the ICT Platform containing the functionalities and frontend views of the system.

An ICT Platform has been developed that enables Energy Communities to enhance their degree of independence, optimize local energy use and improve decision making. The platform includes functionalities that allow the user to utilize the three Energy Tools developed, the Energy Forecasting, Energy Modelling and Cost-Benefit Analysis (CBA), and detailed in D2.2.

This text shows some screenshots and the main functionalities of the platform. The means of verification for this deliverable is the actual platform.

CONTENTS

1 Introduction

Energy Communities play a vital role in achieving the European Union's energy and climate objectives, offering decentralized, citizen-driven solutions for a greener future. Recognizing the critical need for advanced decision-support systems, the ECOEMPOWER project has designed a suite of ICT-based Energy Tools aimed at improving the operational, financial, and strategic capabilities of Energy Communities across Europe.

As part of this effort, ECOEMPOWER has developed the Energy Forecasting Tool, the Energy Modelling and Scheduling Tool, and the Cost Benefit Analysis and Decision-Making Tool. These three complementary solutions were designed to help community managers, aggregators, and local stakeholders better predict renewable generation, optimize energy consumption and resource use, and assess the financial viability of investments, ensuring sustainable and effective community energy management. The platform's frontend has been carefully developed to provide intuitive navigation, interactive dashboards, and seamless access to the functionalities of each tool.

In this deliverable, we present the initial version of the user interface and visual components, along with an overview of the main features and interactions available through the Energy Tools frontend.

1.1 How to read this document

This deliverable is the direct continuation of D2.2 - ECOEMPOWER Energy-ICT platform development, which presents in detail the algorithmic methodologies and analytic capabilities of the tools. The work presented here is the means of verification of the visual outputs of the ICT Platform.

2 ECOEMPOWER ICT Platform

A first version of the ECOEMPOWER ICT Platform has been developed and presented in M18 (February 2025). The current version of the Platform is fully developed and operational in a local deployment environment. The process of migrating to a publicly accessible version is underway, and the link to the final online platform will be provided as soon as deployment is completed in M21 (May). The basic functionalities and will be updated constantly during the whole project duration, after the end of each validation phase in M24, M30 and M33.

The main functionalities of the Platform lie in the dedicated pages of the 3 Energy Tools:

- Energy Forecasting Tool
- Energy Modelling and Scheduling Tool
- Cost-Benefit Analysis (CBA) Tool

All pages are presented in English, but future versions will also be developed in the native languages of the ECOEMPOWER Energy Communities (Italian, French, German, Czech and Greek).

2.1 Energy Forecasting Tool

In this section there is the main page for the Energy Forecasting Tool. The user is able to view some KPIs related to their forecasts along with some useful visualizations that presents the results of the tool.

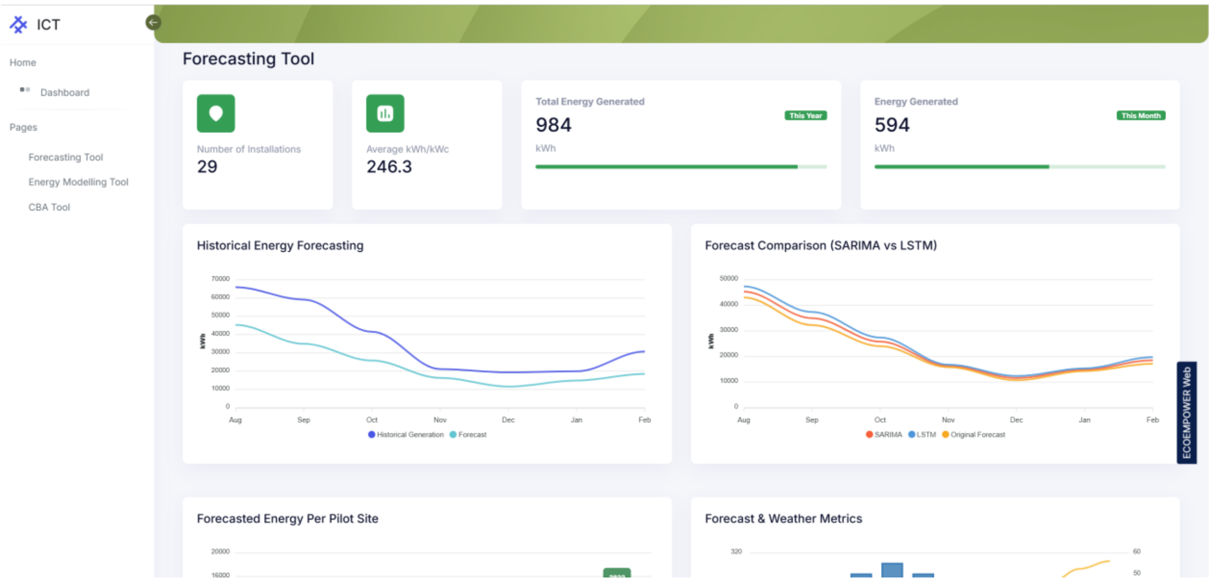


Figure 1 - Energy Forecasting Tool main page

The results of the Energy Forecasting include comparisons between historical forecasts and actual PV generation, model performance comparisons across multiple algorithms, and site-specific future energy production forecasts. Additional views display relevant weather metrics used in the forecasting process, along with evaluation metrics such as Mean Absolute Percentage Error (MAPE), which allow users to assess the accuracy of each model. Together, these visuals demonstrate the tool's capability to support both short- and long-term planning across different installations on the French RE.

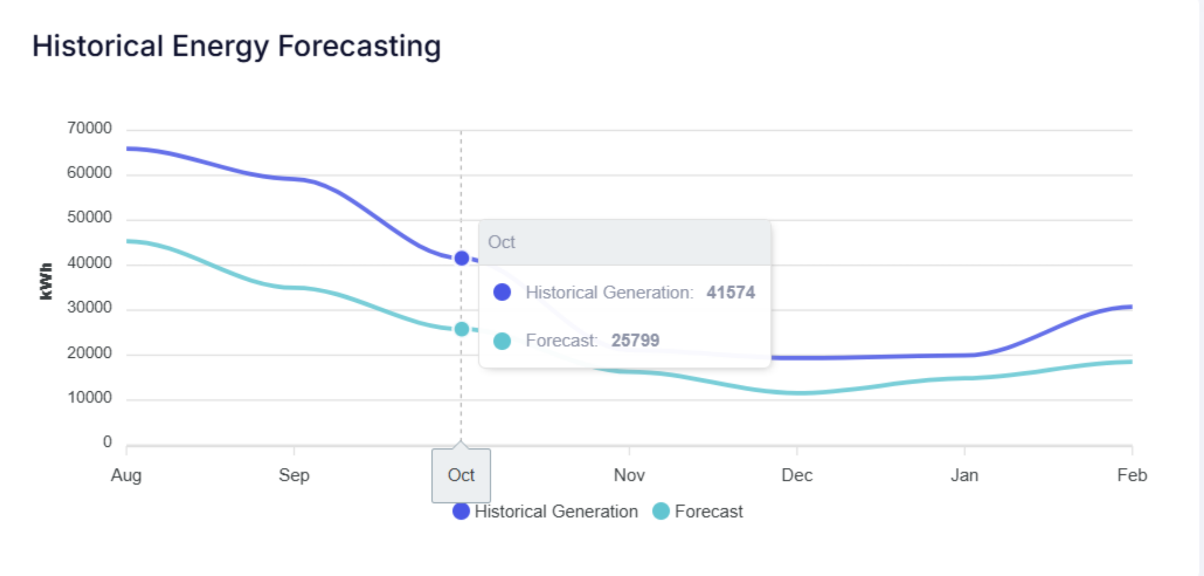


Figure 2 - Historical Energy Forecasting, showing the comparison of the Forecasts and the real generation of all installations of the French RE

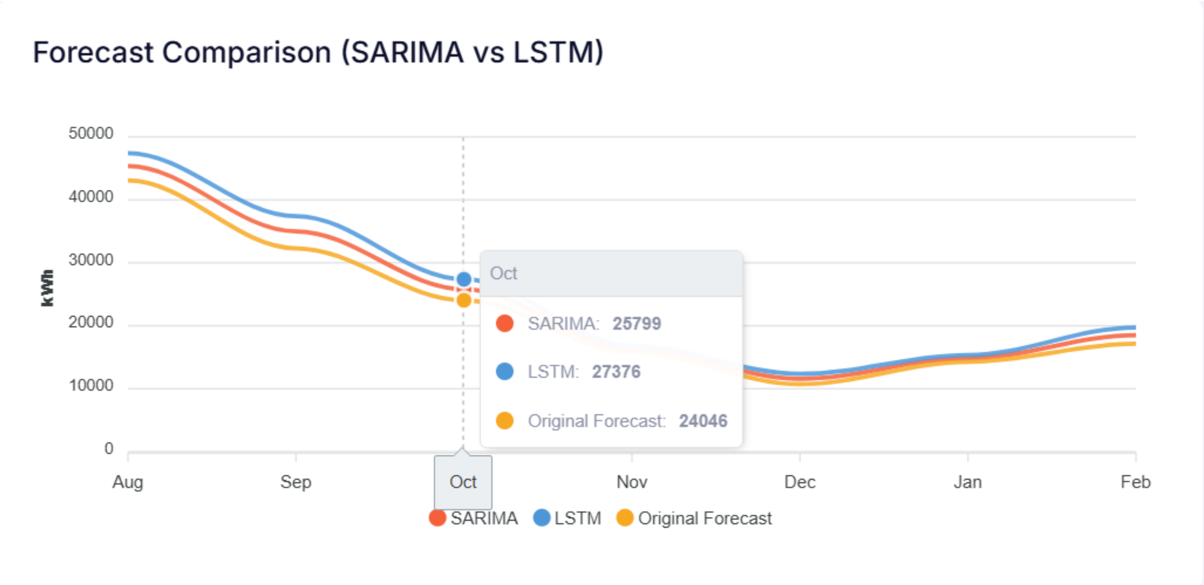


Figure 3 - Comparison of the different Forecast Models utilized to produce the results

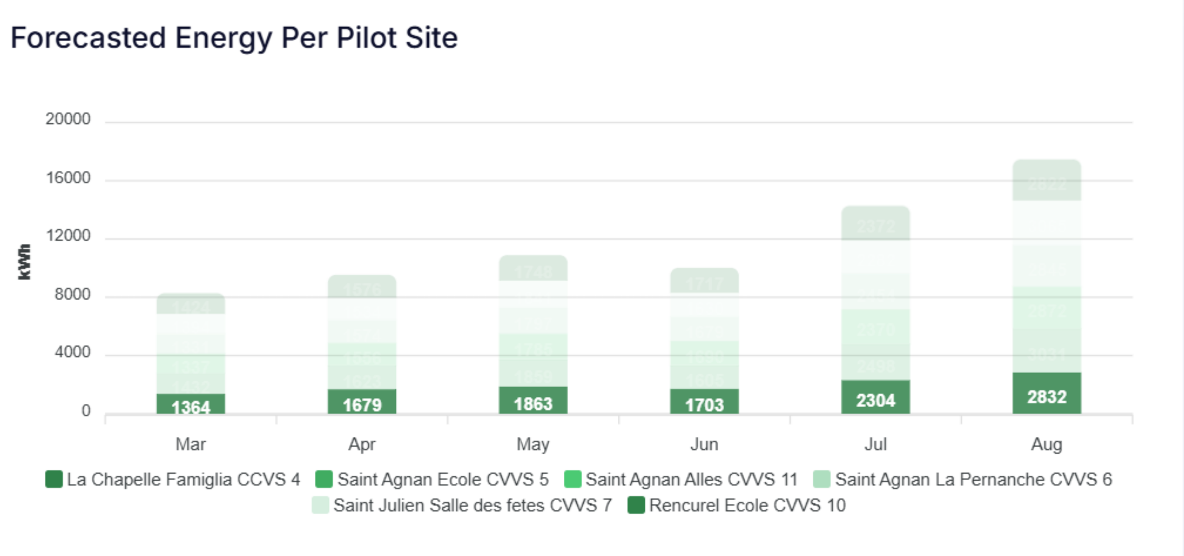


Figure 4 - Forecasted generation for the different installations for the next 6 months

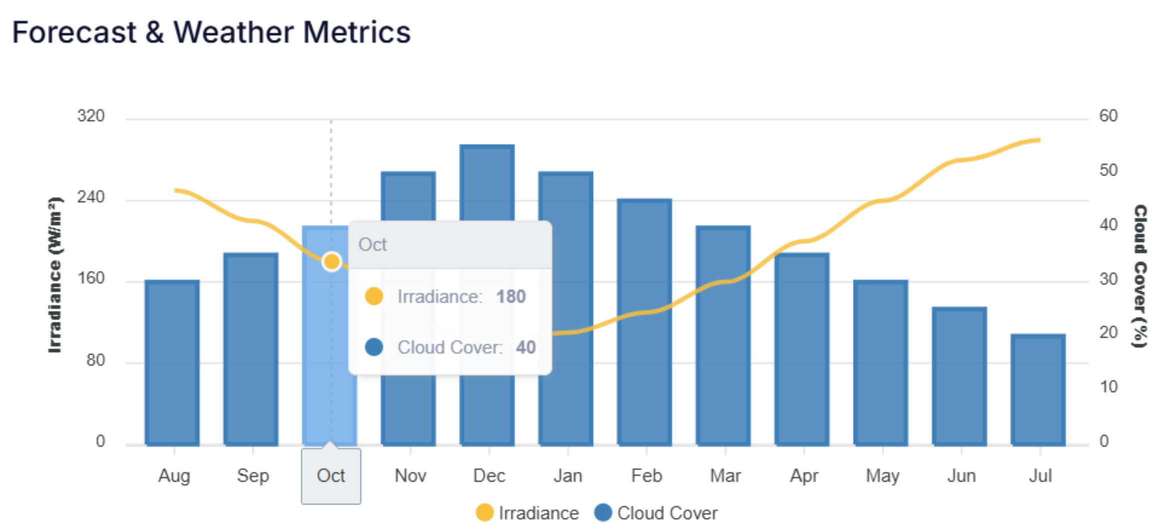


Figure 5 - Irradiance and Cloud cover metrics that influence the forecasts

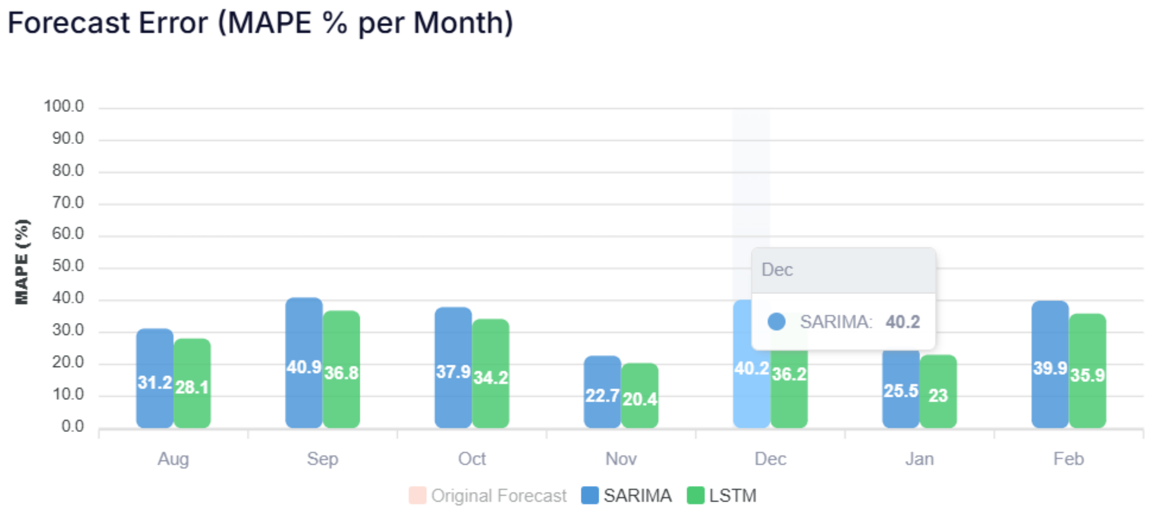


Figure 6 - MAPE (Mean Absolut Percentage Error) Comparisons of the different models and forecasts

2.2 Energy Modelling and Scheduling Tool

In this section there is the main page for the Energy Modelling and Scheduling Tool. The user is able to see some basic KPIs along with some useful visualizations that depict the main functionalities of the tool.

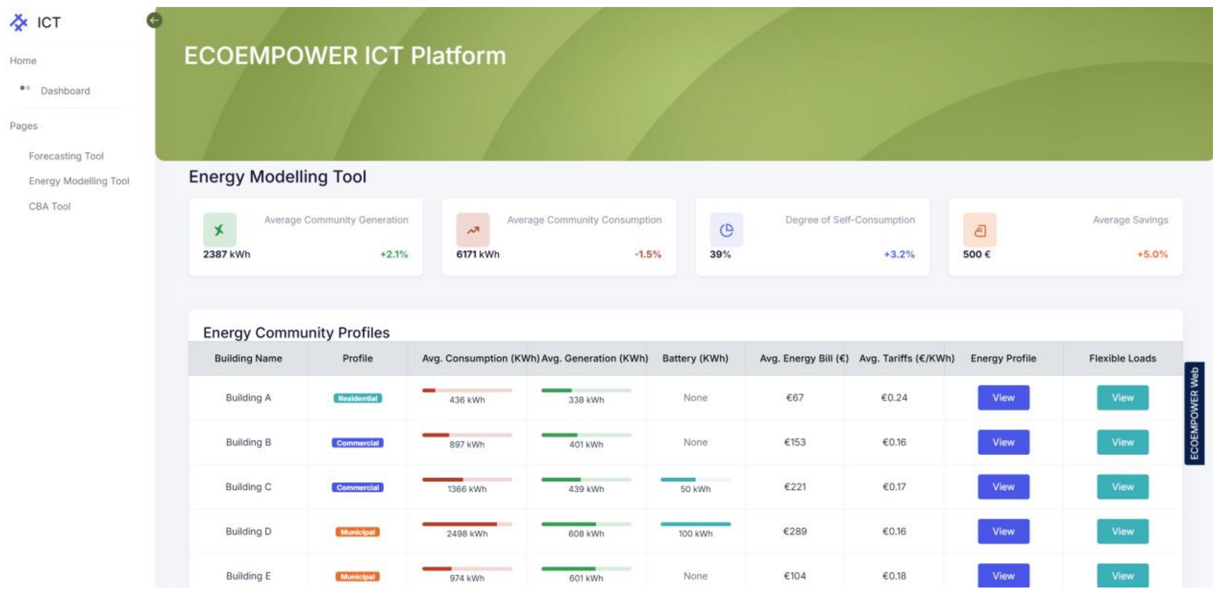
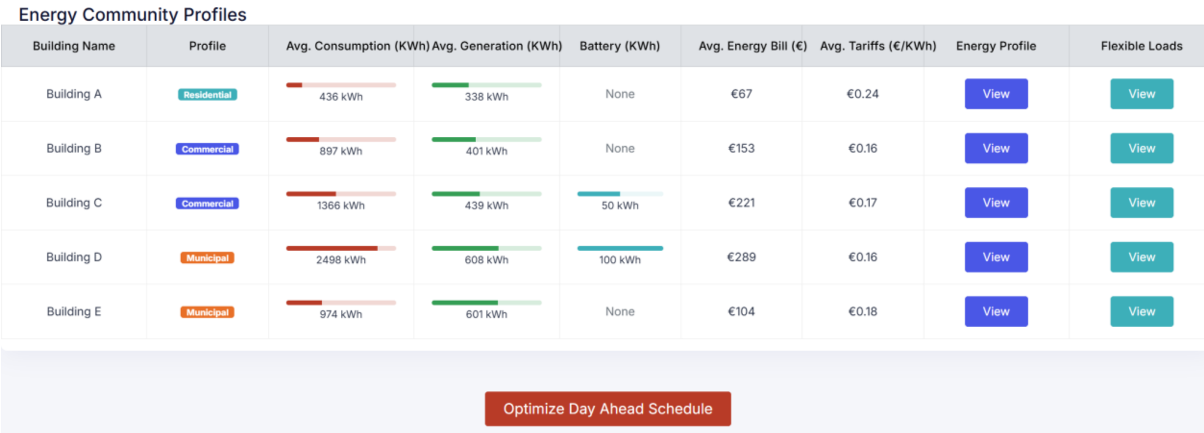


Figure 7 - Main view of the Energy Modelling Tool Page

The following screenshots illustrate the key functionalities of the Energy Modelling and Scheduling Tool, showcasing how it supports energy communities in optimizing local energy use. Visual outputs include building-level consumption and generation profiles, battery storage behavior, and tariff structures used in the optimization process. Scenario results display optimized day-ahead consumption schedules, highlighting improvements in self-consumption and cost savings. Users can also explore alternative configurations through scenario planning, with comparative charts and KPIs offering insights into the impact of different strategies.

These outputs demonstrate the tool's ability to support informed decision-making at both building and community levels.

To demonstrate the full functionality of the tool, these examples are currently based on synthetic datasets derived from aggregated inputs across all pilot sites. As soon as comprehensive data becomes available from each individual pilot, the tool will be populated with site-specific profiles, enabling targeted validations and tailored results.


Energy Community Profiles

Building Name	Profile	Avg. Consumption (KWh)	Avg. Generation (KWh)	Battery (KWh)	Avg. Energy Bill (€)	Avg. Tariffs (€/KWh)	Energy Profile	Flexible Loads
Building A	Residential	436 kWh	338 kWh	None	€67	€0.24	View	View
Building B	Commercial	897 kWh	401 kWh	None	€153	€0.16	View	View
Building C	Commercial	1366 kWh	439 kWh	50 kWh	€221	€0.17	View	View
Building D	Municipal	2498 kWh	608 kWh	100 kWh	€289	€0.16	View	View
Building E	Municipal	974 kWh	601 kWh	None	€104	€0.18	View	View

Optimize Day Ahead Schedule

Figure 8 - Aggregated Energy Community Profiles, depicting key information on all Community buildings involved

Figure 9 - Consumption and Generation per building view

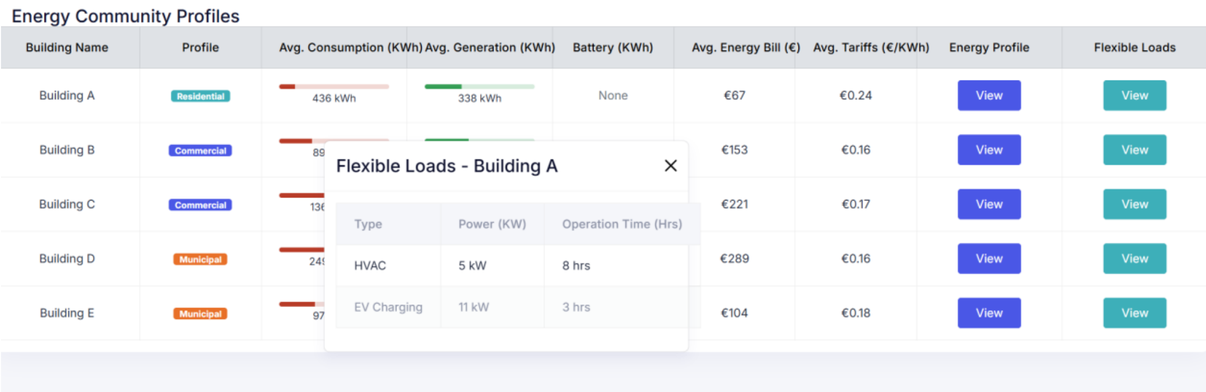


Figure 10 - Flexible Loads per building view

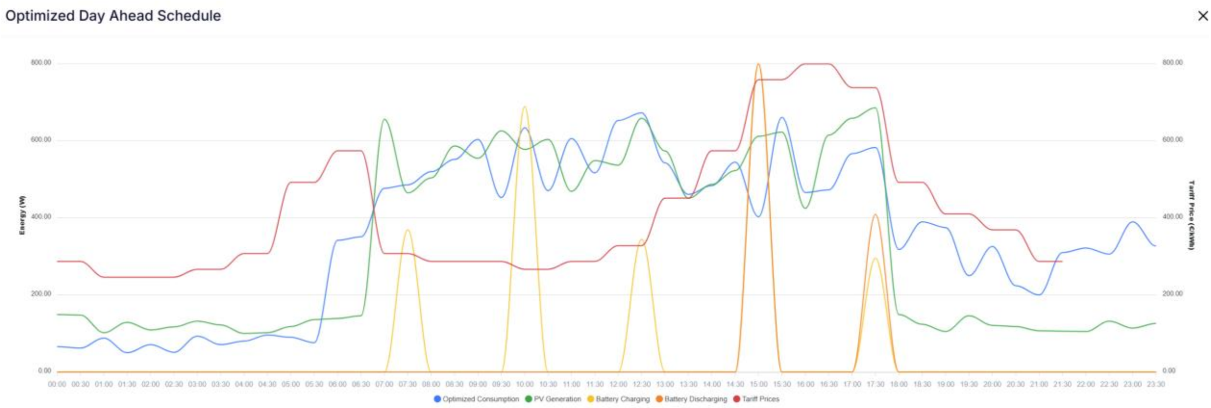


Figure 11 - Optimized Day-Ahead Consumption Scheduled for the Community

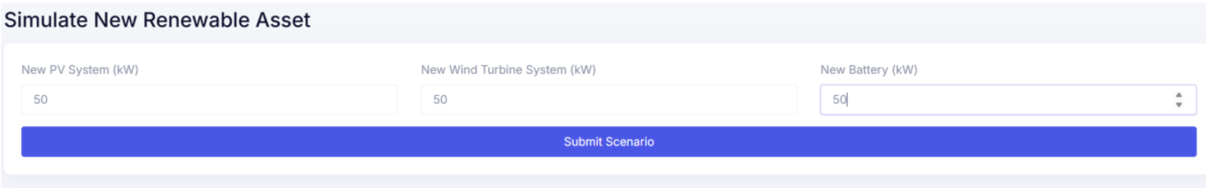


Figure 12 - Form for creating new Renewable Asset Scenario

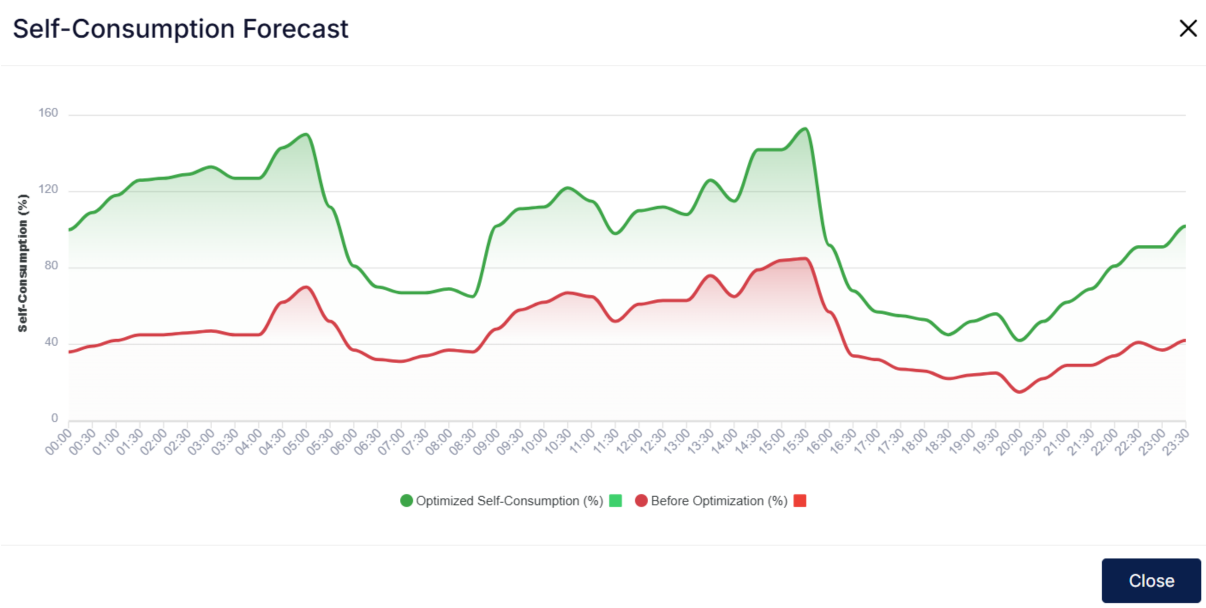
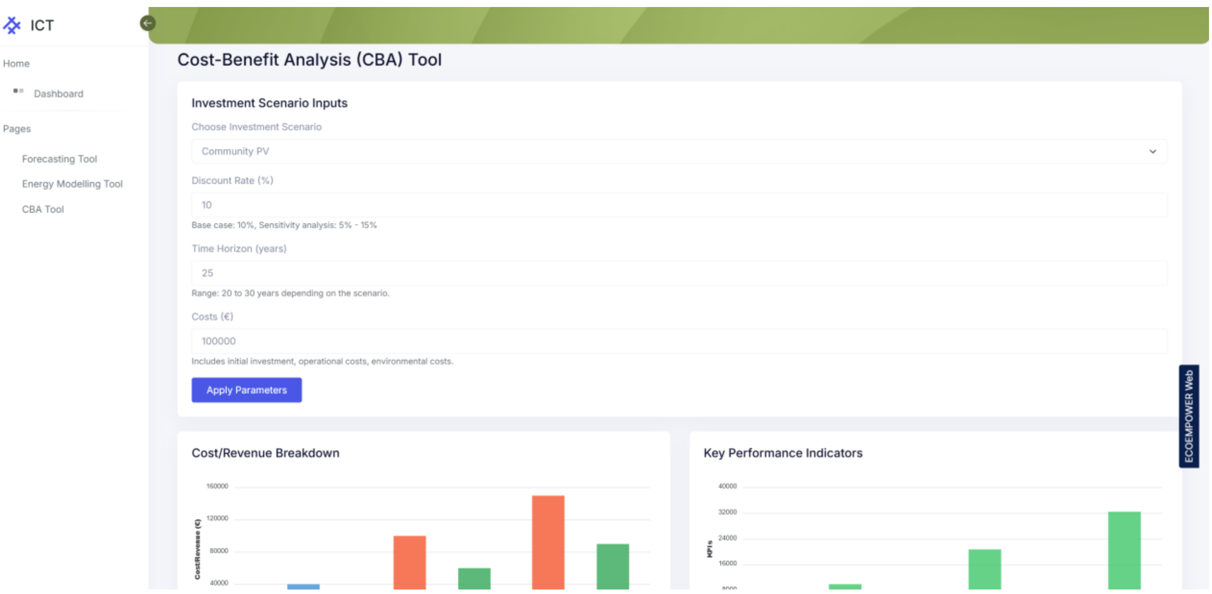


Figure 13 - Self Consumption Forecast for the simulated new asset

2.3 Cost-Benefit Analysis (CBA) Tool

In this section there is the main page for the CBA Tool. The user is able to input key parameters to financial assess a new investment along with some useful visualizations that depict the main functionalities of the tool.



The following screenshots provide an overview of the core features of the Cost Benefit Analysis and Decision-Making Tool, designed to help energy communities assess the financial viability of different investment scenarios. The tool supports scenario-based analysis of renewable energy projects, energy storage integration, and demand-side interventions by evaluating capital and operational costs, projected savings, and return on investment (ROI). Users can also perform long-term planning through lifecycle projections and sensitivity analyses, allowing them to test how economic variables such as discount rates or energy prices affect financial performance.

The current implementation uses key regulatory and financial parameters drawn from the Greek pilot case to reflect a realistic environment. As further financial, contractual, and investment-specific data becomes available from other pilot sites, the tool will be adapted to enable customized assessments tailored to specific cases.

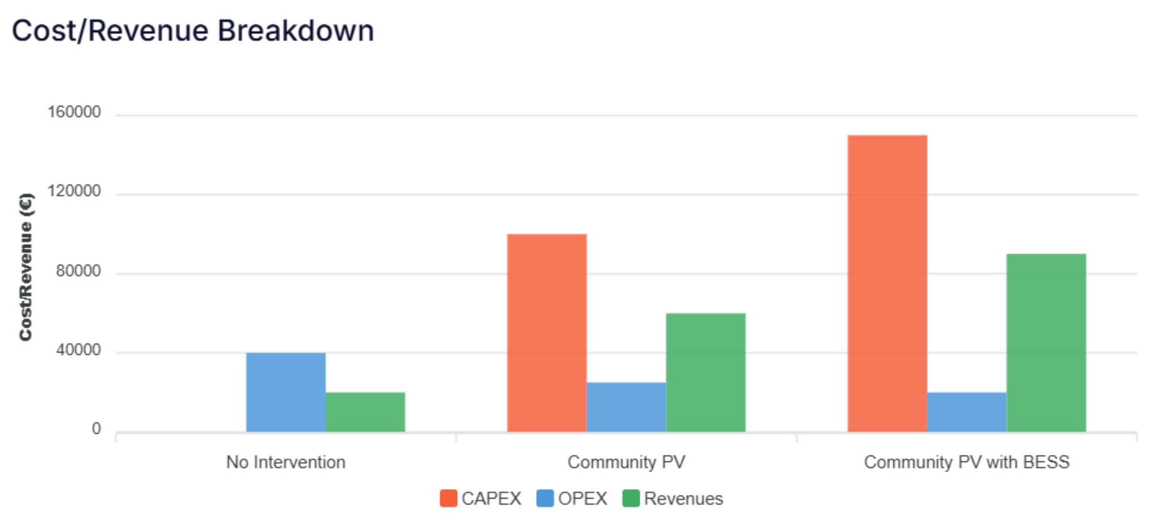


Figure 14 - Cost/Benefit breakdowns for the 2 different scenarios assessed by the tool

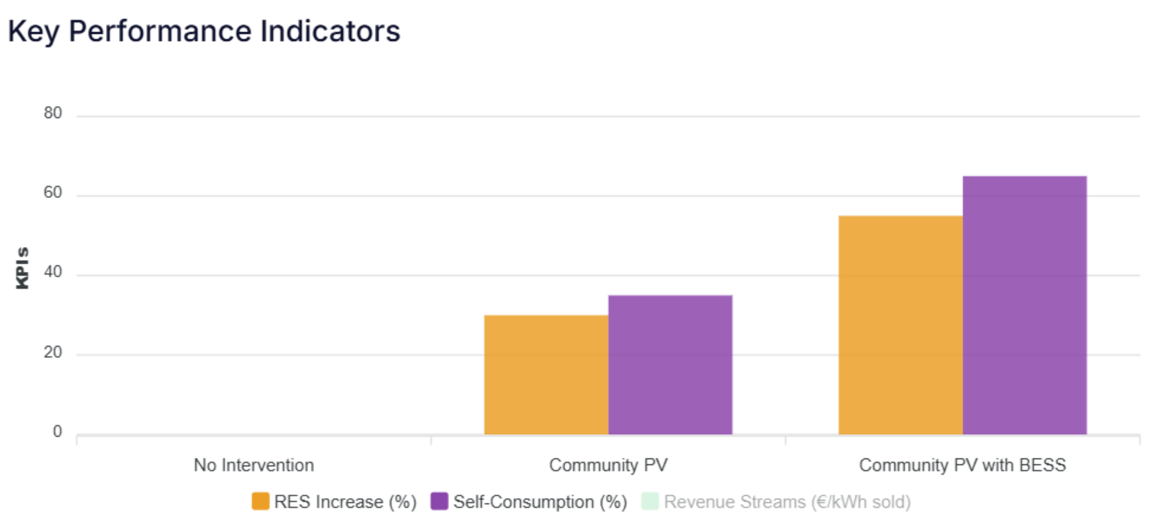


Figure 15 - Operational KPIs for the scenarios

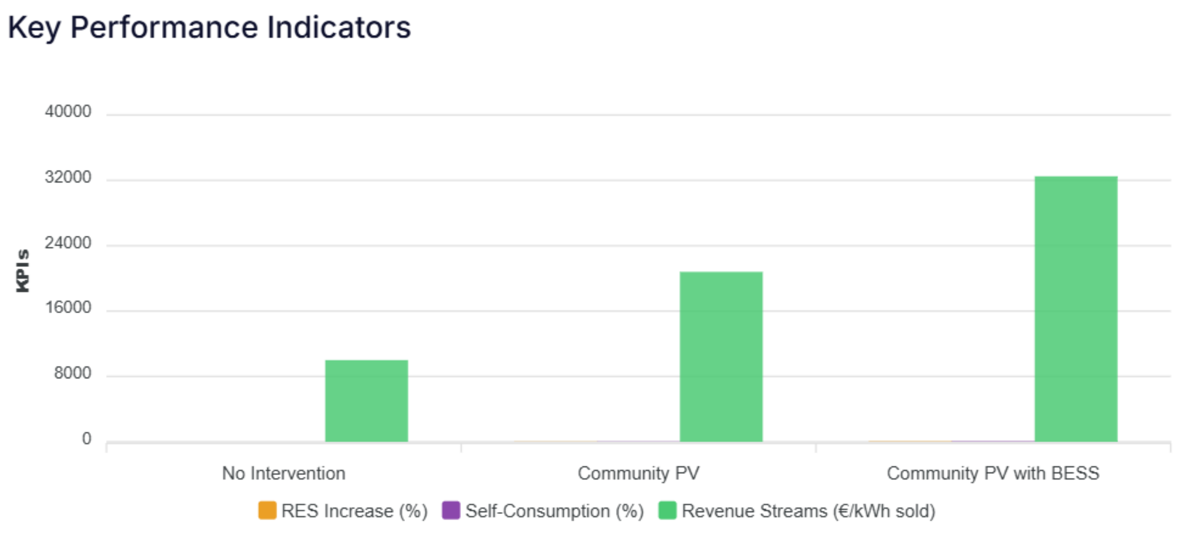


Figure 16 - Financial KPIs explored for the 2 scenarios

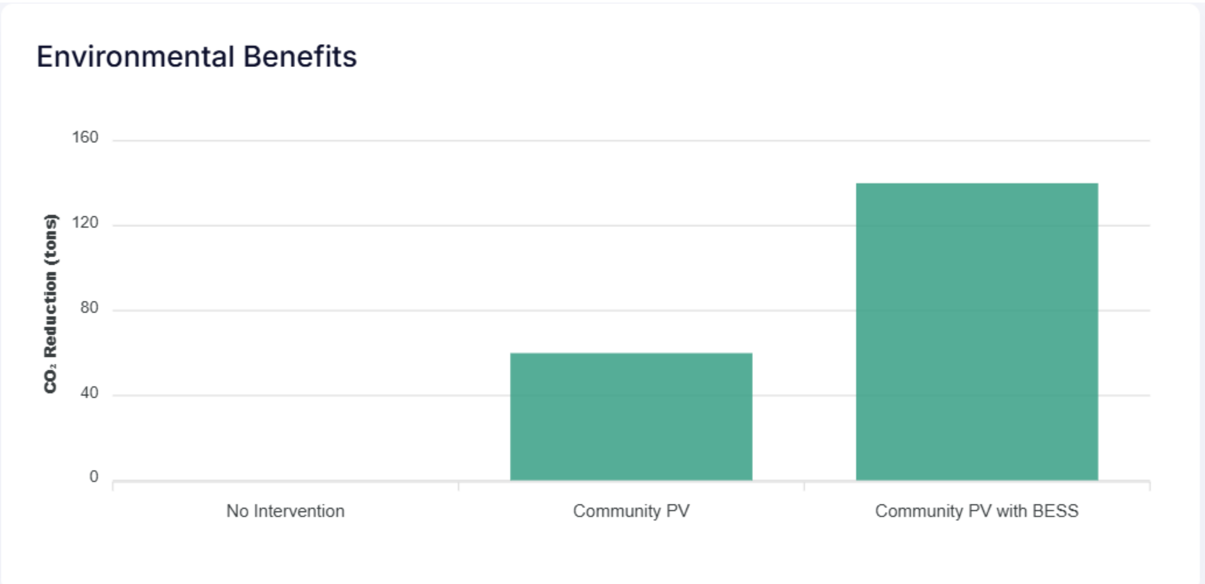


Figure 17 - Environmental KPIs explored for the 2 scenarios

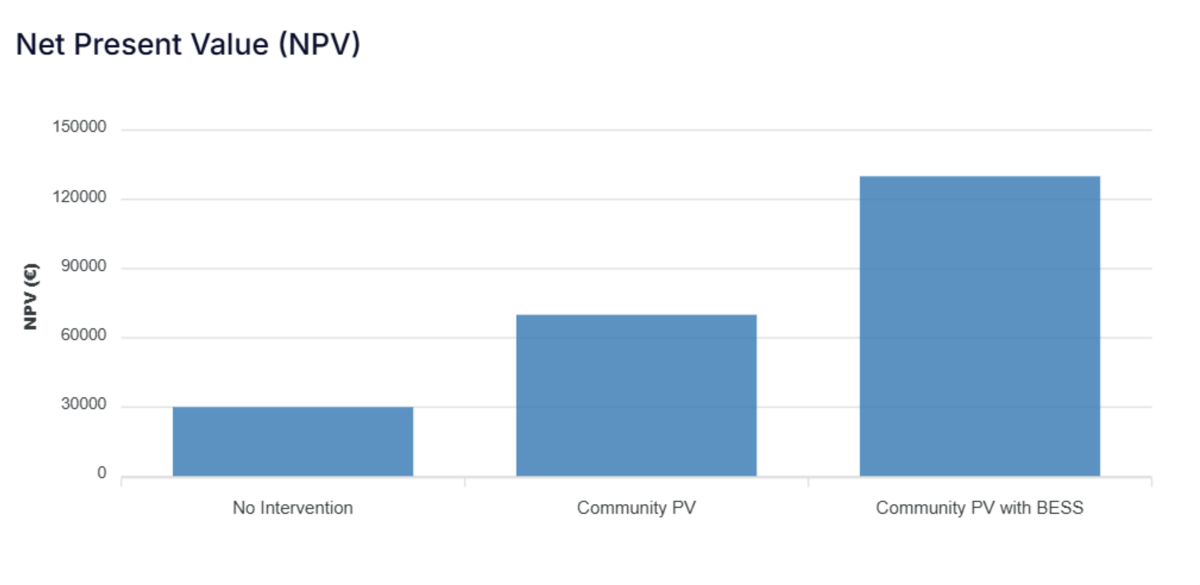


Figure 18 - Financial benefits depicted by the KPI Net Present Value (NPV)

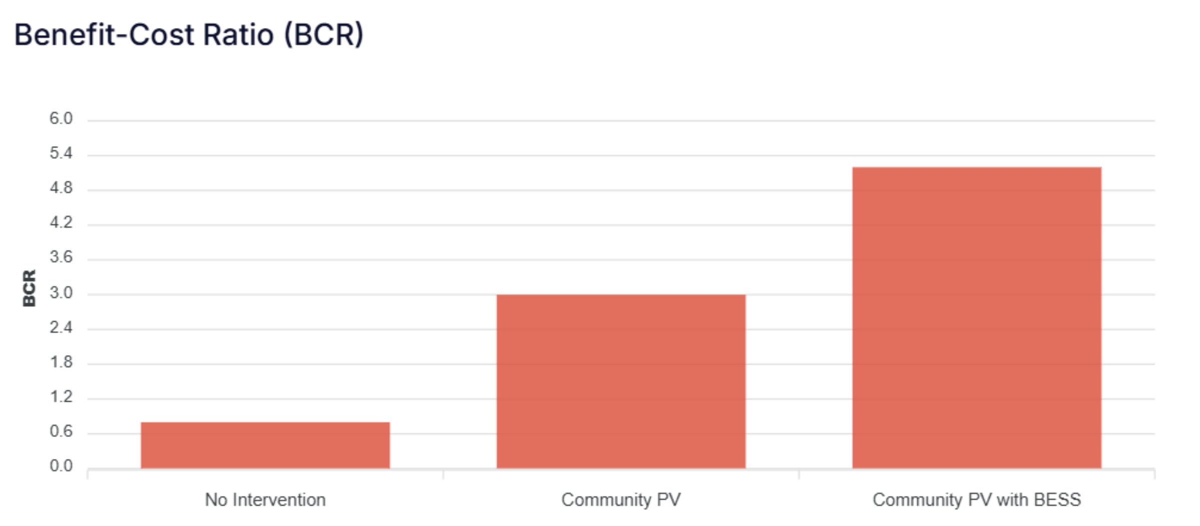


Figure 19 - Financial benefits depicted by the KPI Benefit Cost Ratio (BCR)

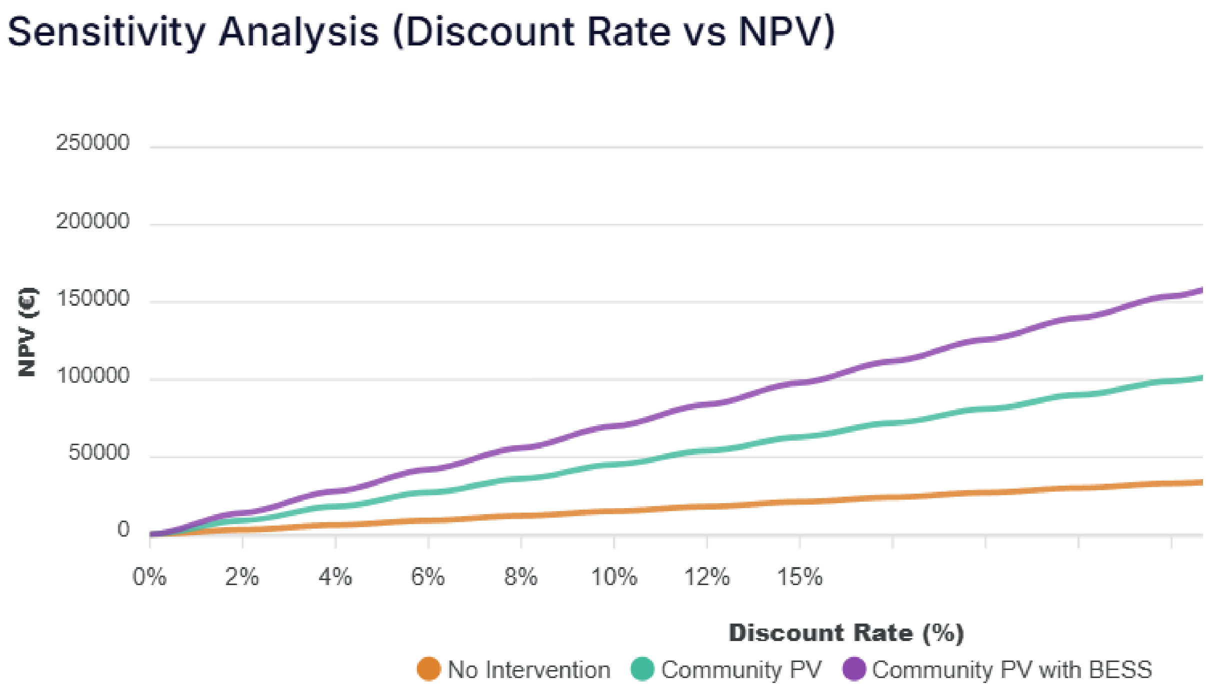


Figure 20 - Sensitivity Analysis for different parameters

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