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D2.5 ECOEMPOWER ENERGY-ICT PLATFORM VALIDATION AND ANALYSES OF THE ECOEMPOWER ENERGY COMMUNITIES – SECOND VERSION



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ABBREVIATION LIST

ABBREVIATION	DEFINITION
API	Application Programming Interface
BCR	Benefit–Cost Ratio
CBA	Cost–Benefit Analysis
CO ₂	Carbon Dioxide
CSV	Comma-Separated Values
DSO	Distribution System Operator
EV	Electric Vehicle
HVAC	Heating, Ventilation, and Air Conditioning
ICT	Information and Communication Technology
IRR	Internal Rate of Return
ISO	International Organization for Standardization
KPI	Key Performance Indicator
MAE	Mean Absolute Error
MAPE	Mean Absolute Percentage Error
MILP	Mixed-Integer Linear Programming
NPV	Net Present Value
OSS	One-Stop-Shop
PV	Photovoltaic
RE	Regional Ecosystem
RMSE	Root Mean Square Error
SARIMA	Seasonal Autoregressive Integrated Moving Average
WP	Work Package

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1 1 EXECUTIVE SUMMARY

This document constitutes Deliverable D2.5 of Work Package 2, reporting on the second validation cycle of the ECOEMPOWER ICT Platform. The first cycle (D2.4) documented the initial ICT Platform redesign, from v1 that targeted a more advanced ICT stack, including cloud native data storage and analytics with batch and stream processing through frameworks, to v2 which was data-agnostic and focused on user-driven input workflow. Whereas D2.4, demonstrated that the platform's analytical engines (Energy Forecasting, Energy Modelling, and Cost-Benefit Analysis) could produce valid results, it also revealed a fundamental gap: the pilot communities could not independently use the tools. The present deliverable documents the problems identified during that first round, the design decisions taken to address them, and the resulting another platform redesign (v3).

Three core issues emerged from the first validation round. First, the tools were too technical for their intended users: energy community managers without engineering backgrounds were confronted with raw CSV imports, column specifications, and uncontextualized numerical outputs. Second, the three tools (Energy Forecasting, Energy Modelling, and Cost-Benefit Analysis) operated as standalone applications, requiring users to manually transfer information between them. Third, the results lacked explainability: optimization schedules and financial metrics were presented without the interpretive context needed to support real-world decision-making.

These findings motivated a complete platform redesign. The new version (v3) replaces the three standalone tools with a unified, community-centric platform organized around guided workflows. A five-step setup wizard replaces raw data entry; an integrated data management layer eliminates manual transfers between tools; and every analytical output now includes before-and-after comparisons, plain-language recommendations, and actionable context. The underlying analytical engines (SARIMA-family forecasting, MILP-based optimization, and NPV/IRR/BCR analysis) remain unchanged, preserving the methodological structure established in D2.4.

Core features including community management, data upload, forecasting, and day-ahead optimization are functional and connected to backend services. No pilot-specific validation results are presented in this deliverable. The next and final validation round (D2.6) will report on results obtained from all REs.

2 Introduction

2.1 Scope of the Deliverable

The ECOEMPOWER project aims to empower regional authorities and local stakeholders to establish and manage energy communities through an integrated framework of tools and methodologies. Within this framework, Work Package 2 is responsible for the development, validation, and iterative refinement of the ICT Platform that provides energy communities with forecasting, optimization, and investment planning capabilities.

This deliverable, D2.5, results from continued work in T2.3 – Platform validation and dedicated studies for the ECOEMPOWER energy communities. Its scope is threefold: to document the validation issues identified during the first round of platform testing (reported in D2.4), to present the design decisions taken to address those issues, and to describe the resulting platform architecture. Unlike D2.4, which included tool-level validation results from specific pilot sites, D2.5 focuses on the platform-level redesign that was necessary before meaningful pilot validation could proceed.

The first validation round demonstrated that the platform’s analytical tools produced valid outputs, but also revealed that the tools were not easily usable by their intended audience. Continuing to validate tool accuracy without addressing usability would not advance the project’s objectives. The redesign documented here is therefore a prerequisite for the next and final validation cycle, which will focus on pilot deployment and community-level validation with real operational data.

2.2 Deliverable Structure

D2.5 is structured in five sections as follows:

- Section 1: Executive Summary – A concise overview of the deliverable’s contents and key findings.
- Section 2: Introduction – The scope, structure, and interdependencies of this deliverable.
- Section 3: Validation Issues from the First Round – A systematic account of the problems identified during D2.4 validation, organized by root cause.
- Section 4: Design Decisions – The architectural and methodological choices made to address each identified issue, with rationale.
- Section 5: Updated Platform Overview – A walkthrough of the redesigned platform’s capabilities, with placeholders for interface screenshots.
- Section 6: Conclusions and Next Steps – Current platform status, deployment planning, and the roadmap toward pilot validation.

2.3 Interdependencies with Other Tasks and Deliverables

D2.5 builds directly on the findings of D2.4, which documented the first validation round and the initial platform redesign from v1 to v2. The analytical methodologies described in D2.2 (platform specifications) remain the foundation for all tools; D2.5 does not alter the underlying algorithms but rather their presentation, integration, and accessibility. The next and final deliverable in this sequence, D2.6, will report on the validation results obtained once the platform is deployed and operational at pilot sites.

3 Validation Issues from the First Round

The first validation round, documented in D2.4, successfully demonstrated that the platform's three analytical engines (forecasting, optimization, and cost-benefit analysis) could produce methodologically sound results. The Energy Forecasting Tool achieved an 8.8% community MAPE over six out-of-time months using weather-agnostic SARIMA models. The Energy Modelling Tool produced valid optimization schedules with measurable improvements in self-consumption and cost reduction. The CBA Tool generated NPV, BCR, and payback analyses consistent with input assumptions.

However, these results were obtained under controlled conditions, not by the pilot communities themselves. When the tools were made publicly available, engagement was minimal. This section documents the issues that emerged, organized into three categories: accessibility barriers, architectural limitations, and explainability gaps.

3.1 Accessibility Barriers

Since the tools were technically advanced, they were designed with a technically proficient user in mind. The original project design assumed that pilot communities would have existing data infrastructure (APIs, automated meter exports etc.) that could automatically populate the platform and feed the analytical tools. In practice, no pilot had such infrastructure in place. Data was available, but only in static formats, in various formats and languages, that required significant preprocessing. For that reason, the redesigned Platform relied on CSV uploads with specific column naming conventions, timestamp formats, and unit requirements as a means for data ingestion. Users were expected to prepare their data externally and paste it into the platform in the correct format.

The intended users of the platform (energy community managers) could face issues with this process. They may have access to energy data through utility bills, smart meter exports, or inverter monitoring portals, but the translation from these heterogeneous sources to the platform's expected formats represented a significant barrier.

Furthermore, tool-specific terminology (e.g., "MILP solver", "SARIMA model", "canonical time index") appeared in labels and descriptions without explanation. Configuration parameters were exposed without defaults or contextual help. The result was a set of tools that, while analytically capable, required technical support to operate, thus defeating the purpose of a self-service platform.

3.2 Architectural Limitations

The platform consisted of three standalone tools, each developed as an independent application with its own data model, input interface, and output format. The Forecasting Tool consumed monthly generation CSVs and produced per-installation forecasts. The Modelling Tool consumed hourly load, generation, and tariff data and produced optimization schedules. The CBA Tool consumed aggregated cost and generation assumptions and produced financial metrics. No data flowed between the tools automatically.

This standalone architecture was an intentional design choice, aligned with the Use Cases defined in D2.1. The rationale was that different communities, depending on their maturity and priorities, might benefit from only a subset of the available tools. In practice, however, this modularity created several challenges. The tools could not exchange data automatically as outputs from one tool had to be manually reformatted and re-imported to serve as inputs for another. The result was that while each tool functioned correctly in isolation, the effort required to use them in combination was high for non-technical users.

3.3 Explainability Gaps

The tools produced technically correct outputs but provided insufficient context for interpretation. Analytical results were presented as raw numbers and charts without the explanatory layer needed to translate them into operational or investment decisions. There was no information available to show what the optimization contextually improved, no plain-language summary of what a particular forecast implied for community planning, and no guidance on how to weigh one scenario against another.

The cumulative effect was a disconnect between what the tools produced and what their users needed. The outputs, as they were intended for more technical users, did not speak to the practical questions that energy community managers face: whether to invest in shared PV, how to size a community battery, what evidence to present to a municipal board for funding approval, or which scenario best balances financial return against environmental impact. Bridging this gap required not only better visualisation but a fundamentally different approach to how results are structured and communicated.

4 Design Decisions

This section describes the design decisions taken to address the issues identified in Section 3. The overarching principle was to preserve the analytical backend validated in D2.4 while fundamentally restructuring how users interact with them through its frontend interface.

4.1 Unified Tools

The most significant architectural decision was the unification of the three standalone tools into a single platform with a shared data model. The new architecture is organized around three navigation levels:

1. A Dashboard providing an overview of all communities
2. A per-community workspace containing all management and analytical tools
3. A Long-Term Planning module for cross-cutting scenario analysis

Within each community workspace, users access a structured sidebar with sections for Overview (community dashboard with KPIs), Energy Tools (forecasting, optimization), and Management (buildings, community assets, data management and past results). This structure ensures that all data entered in the management section is automatically available to the analytical tools, eliminating manual data transfers.

A critical integration point is the connection between forecasting and optimization. The previous architecture required users to export forecast results and manually import them as optimization inputs. In the new version, completed forecasts are automatically available to the optimizer, which displays a forecast readiness checklist before execution. Users can also trigger forecasting directly from the optimization setup page when forecasts are missing or outdated.

4.2 Guided Workflows and Community-Centric Design

The second major decision was the introduction of guided workflows that replace raw data entry with structured, step-by-step processes. The most visible example is the community setup wizard, which guides users through five sequential steps: community information (name, location, energy market type), location and tariff settings (timezone, currency, grid connection, tariff structure), buildings and building-level assets, community-wide shared assets, and a review-and-confirm summary.

Each step includes contextual help text, sensible defaults populated from earlier inputs (e.g., currency auto-populated from country selection), and clear indicators of which fields are required versus optional. The wizard concludes with a “What happens next?” section that explains how to proceed with data upload and tool usage.

The data management interface similarly introduces a similar structure where datasets are typed (load profile, PV generation profile, tariff data, weather data) with explicit format requirements shown during upload. Each dataset displays its date range, temporal resolution, row count, and validation status. Users can see immediately what data is available for their community and what is still needed to enable specific analytical tools.

4.3 Explainability and Decision Support

The third design decision was to embed interpretive context into every analytical output. For the Energy Modelling & Optimization Tool, this takes the form of a before-and-after comparison panel that shows baseline values (without optimization) alongside optimized values, with percentage improvements for each KPI.

The same principle applies to the restructured Long-Term Planning module, which replaces the previous standalone CBA Tool. Users create what-if scenarios through a four-step wizard (scenario information, community selection, parameter configuration, review) and receive results that include scenario comparison cards (e.g., “No Intervention” vs “Community PV Only” vs “PV + Battery”), each displaying NPV, BCR, payback period, annual savings, and CO₂ avoided. A recommendation summary explains which scenario offers the best financial return and which offers the best environmental impact, with explicit identification of key risk factors.

Environmental metrics are presented in more tangible terms. For example, lifetime CO₂ avoided is supplemented with an equivalent-trees-planted conversion, providing a communicative metric for non-technical stakeholders. Sensitivity analysis is presented alongside main results rather than in a separate view, making it immediately clear how the conclusions change as the assumptions change.

4.4 Agnostic Architecture Preserved

A key constraint on the redesign was the preservation of the agnostic architecture established in the previous deliverables. The platform must operate without external API dependencies, without DSO integration, and without real-time data streams. This constraint, originally adopted to address pilot data limitations, proved to be a design strength as it ensures that any energy community with basic historical data (consumption, generation, tariffs) can use the platform regardless of their technical infrastructure. Replicators also benefit from this process, as it would not require any technical onboarding after the end of the project.

The analytical engines (backend) themselves were not modified. Forecasting continues to use SARIMA-family models trained on historical production data. Optimization continues to use MILP formulations with the same three objective functions (minimize cost, maximize self-consumption, maximize self-sufficiency) and the same flexible load models (EV chargers, heat pumps, central HVAC). Cost-benefit analysis continues to compute NPV, BCR, and discounted payback with sensitivity sweeps. What changed is exclusively how users configure, execute, and interpret these engines.

5 Updated Platform Overview

This section provides a walkthrough of the redesigned platform's major capability areas.

5.1 Platform Dashboard and Community Management

The platform's entry point is a dashboard that displays all configured energy communities with their current status (Active or In Setup). Summary cards show the total number of communities and their activity status. Quick-action cards provide shortcuts to create a new community, manage existing ones, or access documentation. This replaces the previous tool-selection landing page, which offered no community context.

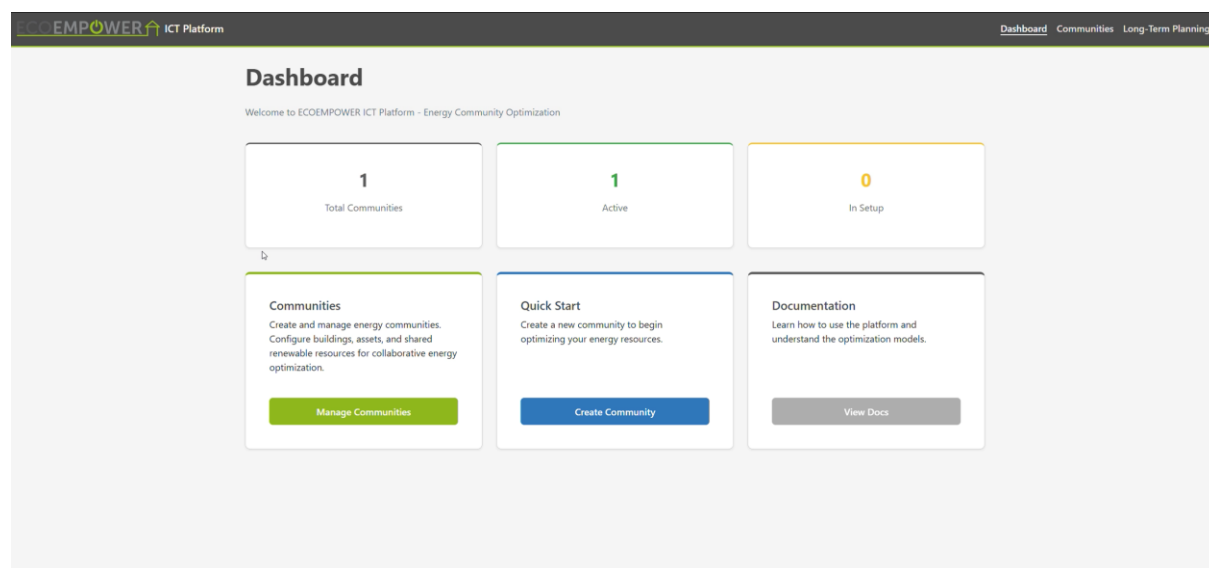


Figure 1 Platform dashboard showing community overview, quick-start actions, and documentation access

Each community is represented as a card displaying its name, description, country, and status. Selecting a community opens its dedicated workspace, where all management and analytical functions are accessible through a structured sidebar navigation.

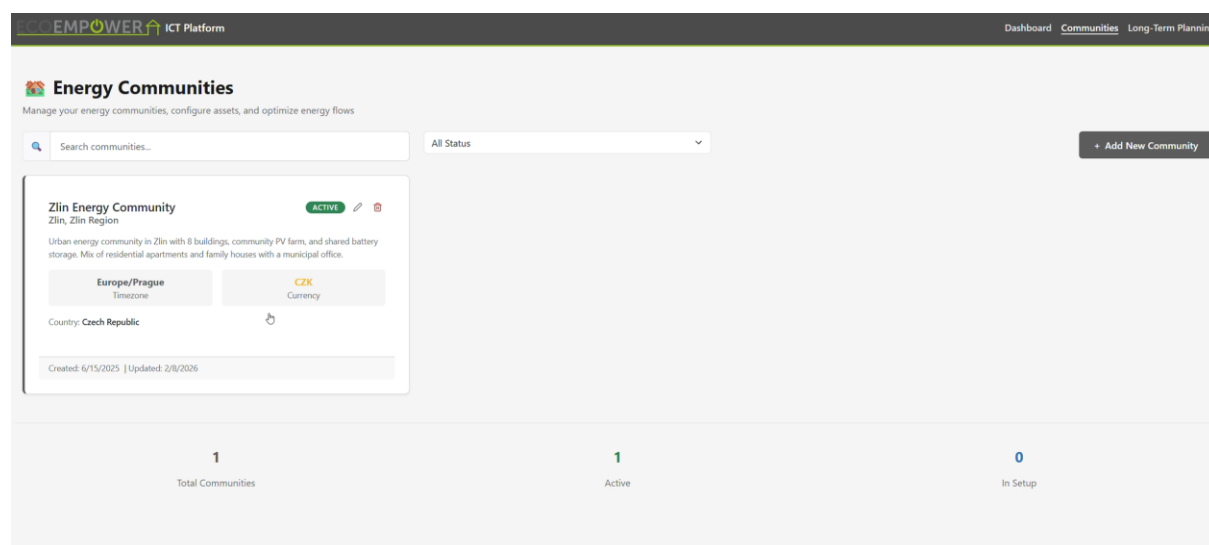
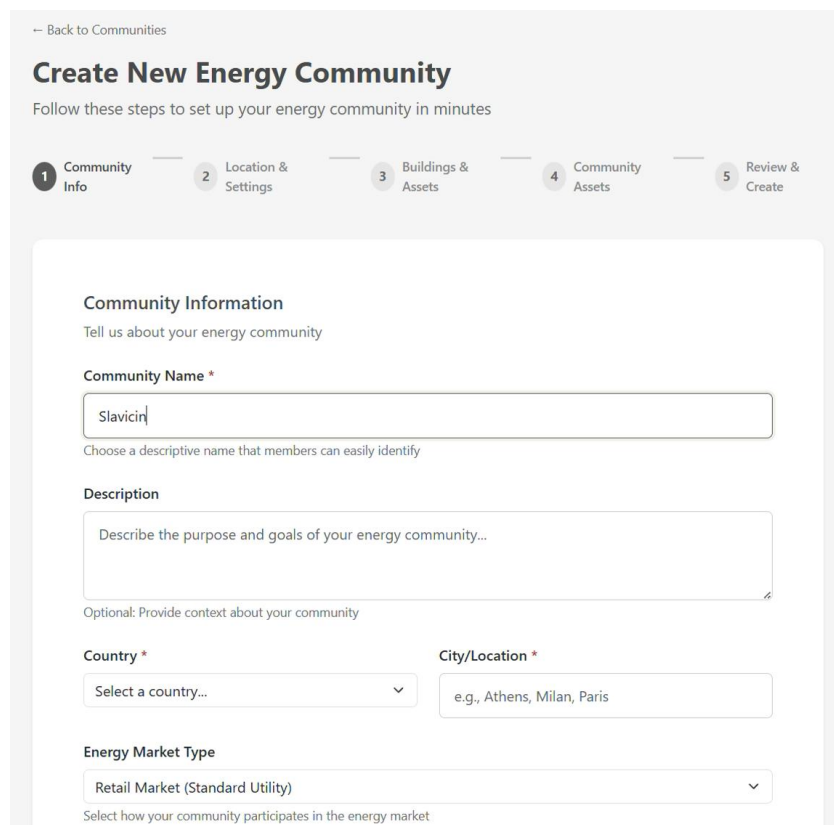


Figure 2 Manage Energy Communities view, currently populated with available Energy Communities for the Czech RE

5.2 Community Setup Wizard

New communities are created through a five-step guided wizard. Step 1 collects basic information (name, description, country, energy market type). Step 2 configures location-dependent settings (timezone, currency, grid connection type, tariff structure). Step 3 defines buildings with their physical characteristics (type, floor area, units, estimated consumption) and building-level assets (rooftop PV with capacity and efficiency specifications). Step 4 optionally adds community-wide shared assets (solar farms, wind turbines, community batteries). Step 5 presents a complete summary for review before creation.



← Back to Communities

Create New Energy Community

Follow these steps to set up your energy community in minutes

- 1 Community Info
- 2 Location & Settings
- 3 Buildings & Assets
- 4 Community Assets
- 5 Review & Create

Community Information

Tell us about your energy community

Community Name *

Choose a descriptive name that members can easily identify

Description

Optional: Provide context about your community

Country *

Select a country...

City/Location *

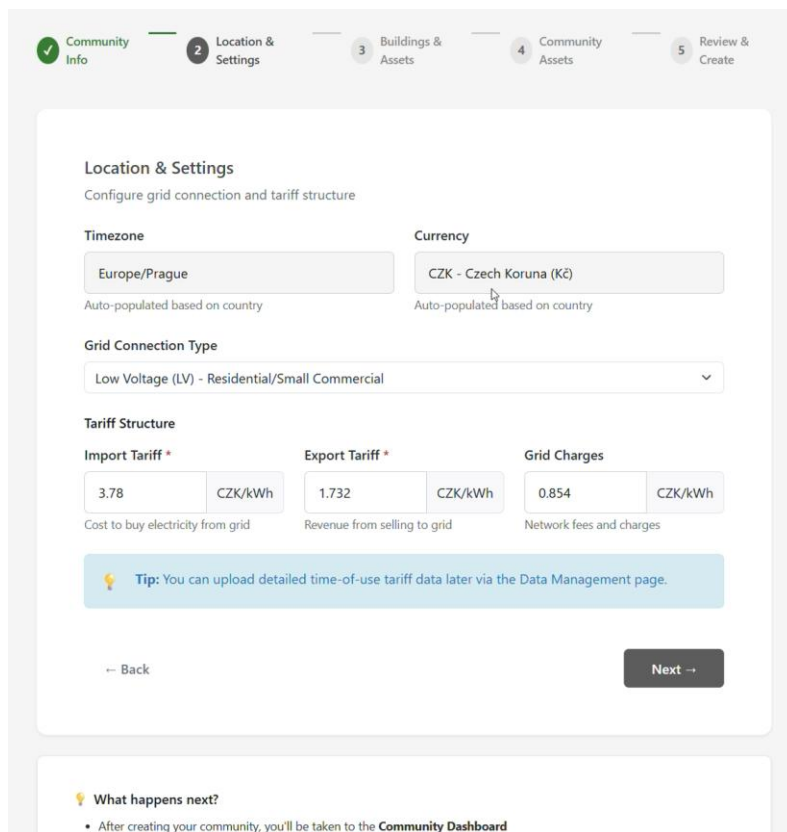
e.g., Athens, Milan, Paris

Energy Market Type

Retail Market (Standard Utility)

Select how your community participates in the energy market

Figure 3 Community setup wizard showing the first of the five-step process: community info



Community Info **2 Location & Settings** **3 Buildings & Assets** **4 Community Assets** **5 Review & Create**

Location & Settings

Configure grid connection and tariff structure

Timezone
Europe/Prague
Auto-populated based on country

Currency
CZK - Czech Koruna (Kč)
Auto-populated based on country

Grid Connection Type
Low Voltage (LV) - Residential/Small Commercial

Tariff Structure

Import Tariff *	Export Tariff *	Grid Charges
3.78 CZK/kWh	1.732 CZK/kWh	0.854 CZK/kWh
<small>Cost to buy electricity from grid</small>	<small>Revenue from selling to grid</small>	<small>Network fees and charges</small>

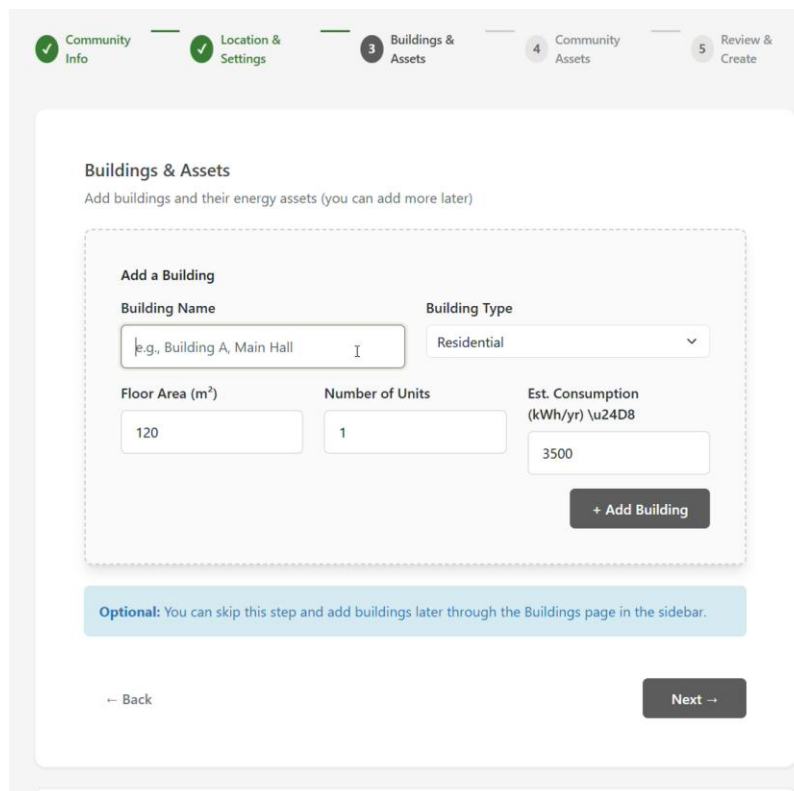
Tip: You can upload detailed time-of-use tariff data later via the Data Management page.

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What happens next?

- After creating your community, you'll be taken to the **Community Dashboard**

Figure 4 Community setup wizard showing the second of the five-step process: location & settings



Community Info **Location & Settings** **3 Buildings & Assets** **4 Community Assets** **5 Review & Create**

Buildings & Assets

Add buildings and their energy assets (you can add more later)

Add a Building

Building Name
e.g., Building A, Main Hall

Building Type
Residential

Floor Area (m²)
120

Number of Units
1

Est. Consumption (kWh/yr) \u0024D8
3500

[+ Add Building](#)

Optional: You can skip this step and add buildings later through the Buildings page in the sidebar.

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Figure 5 Community setup wizard showing the third of the five-step process: buildings & assets

Community Assets
Add shared community-wide energy assets (solar farms, shared batteries)

Add a Community Asset

Asset Type
 Solar PV Panels

Community-level assets are shared across the entire community

Capacity (kWp)
200

Efficiency (%)
70

+ Add Community Asset

Optional: You can skip this step and add community assets later through the Assets page in the sidebar.

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Figure 6 Community setup wizard showing the fourth of the five-step process: community assets

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Create New Energy Community

Follow these steps to set up your energy community in minutes

 Community Info
  Location & Settings
  Buildings & Assets
  Community Assets
  **5 Review & Create**

Review & Create
Review your community configuration before creating

Community Information

Name: Slavacin

Location: Slavacin, Czech Republic

Timezone: Europe/Prague

Description: Slavacin Energy Community ECOEMPOWER

Market Type: Retail Market (Standard Utility)

Grid Connection: LV

Currency: CZK

Tariff Structure

Import Tariff	Export Tariff	Grid Charges
3.780 CZK/kWh	1.732 CZK/kWh	0.854 CZK/kWh

Figure 7 Community setup wizard showing the final of the five-step process: review & create

Upon creation, the platform generates the community dashboard and data management pages with appropriate empty-state guidance. Where no data has been uploaded yet, the dashboard displays placeholder KPIs with clear calls to action ("Upload energy consumption data to see charts, KPIs, and enable forecasting and optimization

tools”). This approach ensures that users always understand what the next step is, even when the community is newly created and has no data.

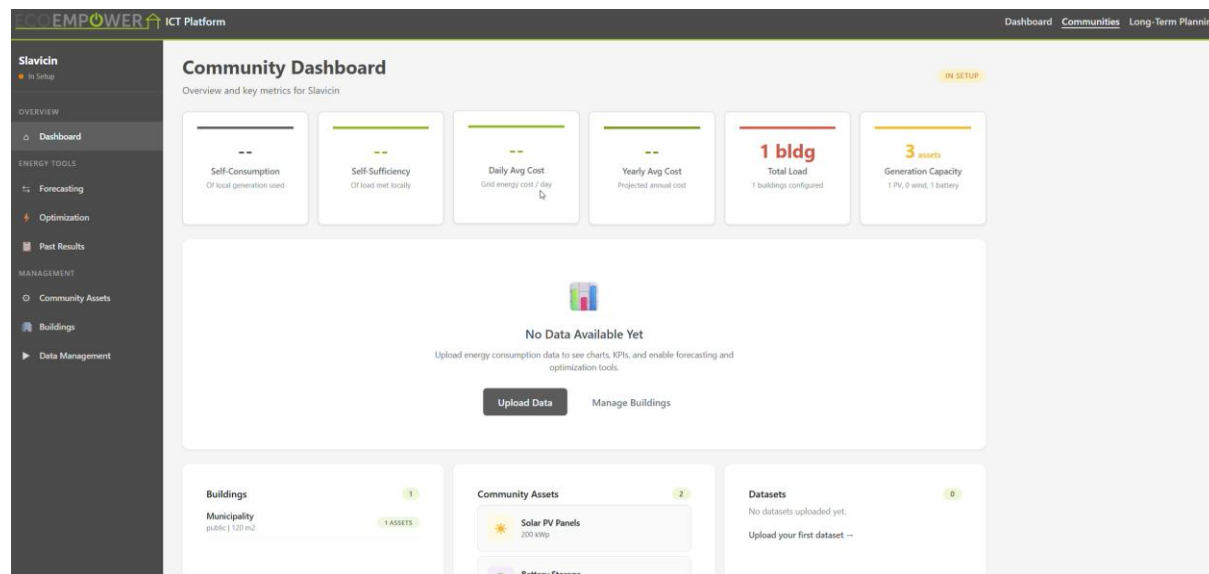


Figure 8 Community Dashboard from a newly introduced community with no data

5.3 Community Dashboard

The community dashboard provides a real-time overview of the community’s energy performance through six colour-coded KPI cards: Self-Consumption, Self-Sufficiency, Daily Average Cost, Yearly Average Cost, Total Load, and Generation Capacity. Below the KPI cards, an Energy Balance chart shows the last 24 hours of load, generation, grid interaction, and battery activity as a stacked area chart. A Tariff Profile chart displays the next 24 hours of import and export pricing.

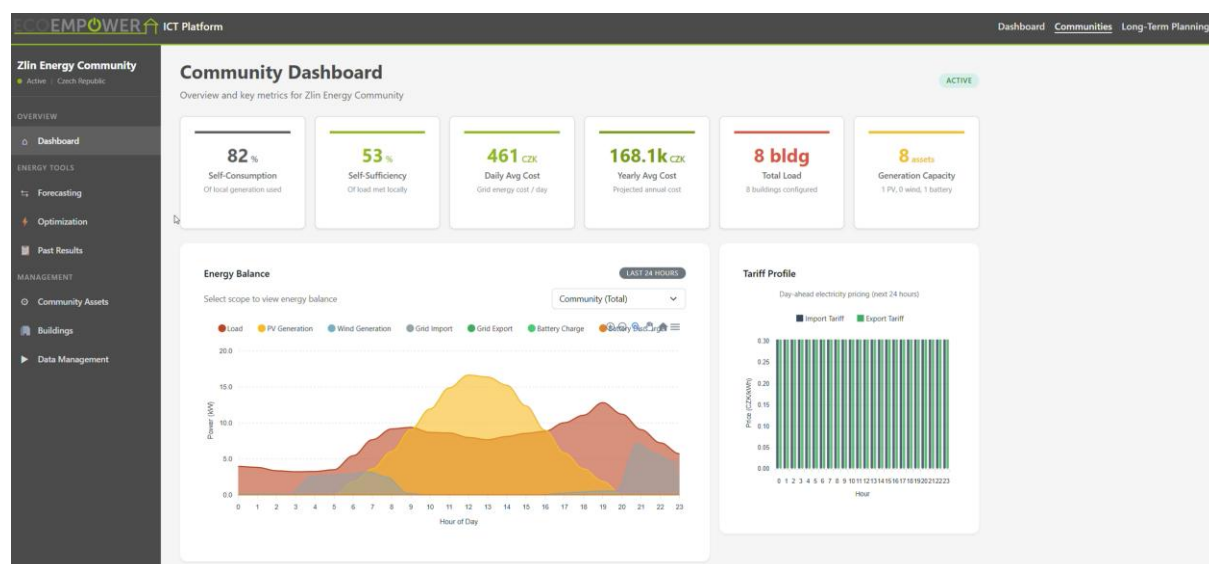


Figure 9 Community dashboard with KPI cards, energy balance chart, and tariff profile

Lower sections of the dashboard provide at-a-glance summaries of the community’s buildings, assets, and datasets, with direct navigation links to management pages. The dashboard scope can be toggled between the

entire community and individual buildings, allowing users to drill down into specific sites without leaving the overview context.

5.4 Data Management

The data management interface provides a structured view of all datasets associated with a community, separated into community-level datasets (PV generation profiles, tariff data, weather data) and building-level datasets (load profiles). Each dataset displays its type, date range, temporal resolution, row count, and validation status.

Data Management
Manage time-series datasets for "Zlin Energy Community"

Community Datasets (+ Upload Community Dataset)

Name	Type	Date Range	Resolution	Rows	Status	Actions
Community PV Generation 2025	PV GENERATION PROFILE	1/1/2025 - 12/31/2025	HOURLY	8,760	ACTIVE	Delete
Import Tariff ERU 2025	ENERGY TARIFF DATA	1/1/2025 - 12/31/2025	HOURLY	8,760	ACTIVE	Delete
Export Tariff OTE 2025	FEED IN TARIFF DATA	1/1/2025 - 12/31/2025	HOURLY	8,760	ACTIVE	Delete
Solar Irradiance Zlin 2025	WEATHER SOLAR	1/1/2025 - 12/31/2025	HOURLY	8,760	ACTIVE	Delete

Building Datasets (+ Upload Building Dataset)

Panelak A RESIDENTIAL

Name	Type	Date Range	Resolution	Rows	Status	Actions
Panelak A Load 2025	BUILDING LOAD PROFILE	1/1/2025 - 12/31/2025	HOURLY	8,760	ACTIVE	Delete

Figure 10 Data management interface showing community and building datasets with upload modal

The upload workflow guides users through dataset type selection, displays the required column format (e.g., TIMESTAMP and GENERATION_KW for PV generation data), specifies the expected format (CSV with hourly resolution, timestamps in ISO format), and provides a drag-and-drop upload area. Upon upload, the platform validates the data against the declared type and reports any formatting or completeness issues.

Community Assets Setup
Configure assets for "Zlin Energy Community"

1 Solar PV Farm, 0 Wind Turbine, 1 Community Battery Storage

Solar PV Farm (+ Add Solar PV Farm)

Name	Owner Scope	Specifications	Actions
Community Solar Farm	COMMUNITY	capacity kw: 30 efficiency: 19 tilt angle: 35	Edit Delete

Community Battery Storage (+ Add Community Battery Storage)

Name	Owner Scope	Specifications	Actions
Community Battery (LFP)	COMMUNITY	capacity kwh: 50 p charge kw: 25 p discharge kw: 25	Edit Delete

Figure 11 Community Asset view

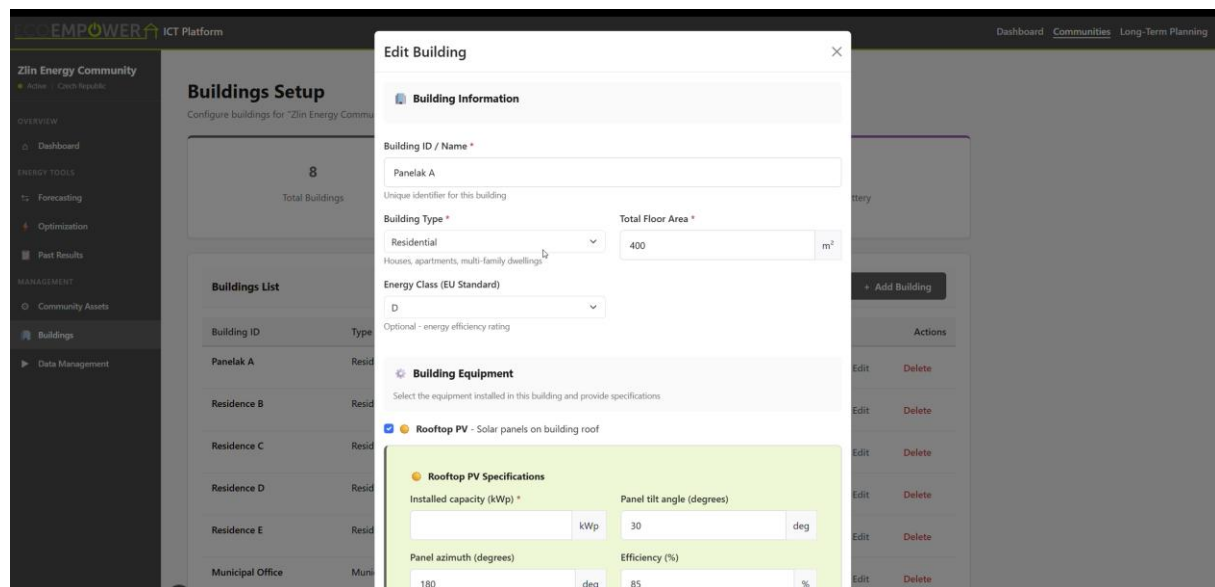


Figure 12 Buildings view with editing capabilities

5.5 Energy Forecasting

The forecasting interface is organized into two tabs: Short-Term (Day-Ahead) and Long-Term (Monthly). For short-term forecasting, users select a forecast type (load or generation), target date, and scope (entire community or specific buildings). Results display as a time-series chart with upper and lower confidence bounds, accompanied by KPI cards (peak demand, total energy, average demand, MAPE).

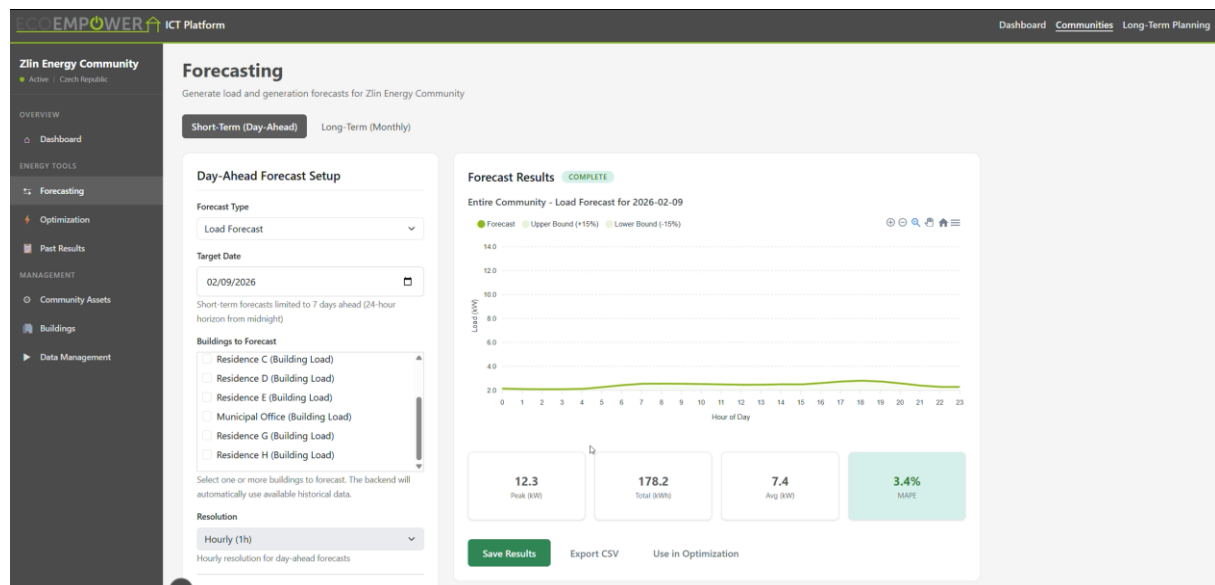


Figure 13 5 Short-term day-ahead load forecasts with confidence bounds and accuracy KPIs

For long-term forecasting, users select a forecast horizon (up to six months) and the historical dataset to use as training data. The platform notes that long-term forecasting uses SARIMA models and requires at least six months of historical data for reliable predictions. Results display as a monthly bar chart with forecast values, lower and upper bounds, and accuracy metrics (MAPE, RMSE, MAE).

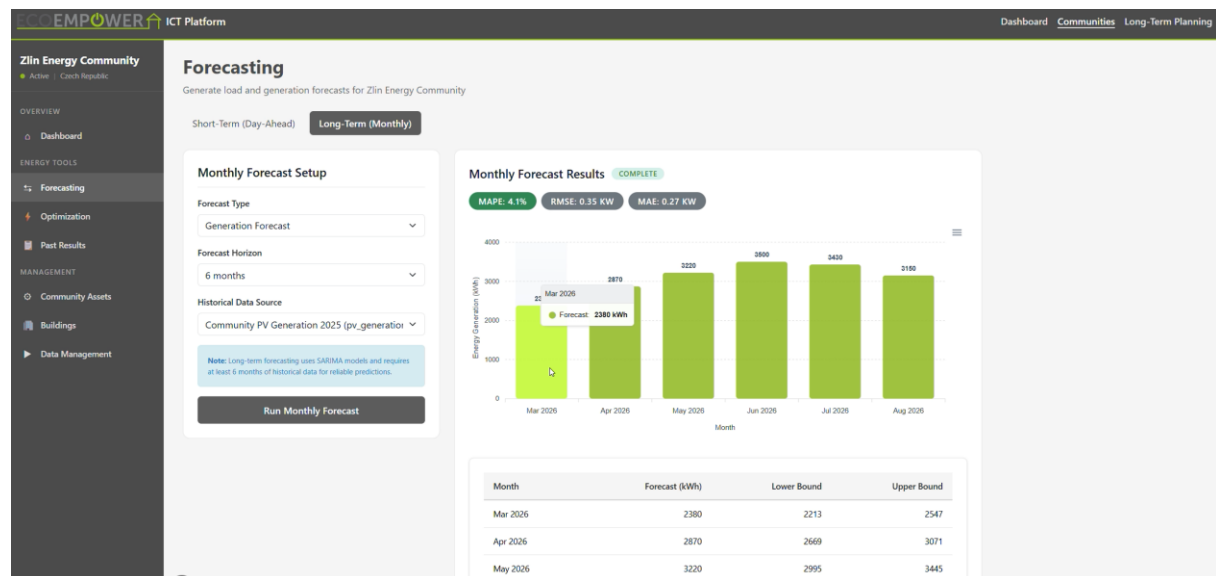


Figure 14 6 Long-term six-month generation forecast with monthly projections and accuracy metrics

A key integration feature is the “Save Results” and “Use in Optimization” actions available on every forecast result. Saved forecasts appear in the Past Results section and are automatically available as inputs to the optimization engine, eliminating the manual data transfer that characterized the previous architecture.

5.6 Day-Ahead Optimization

The optimization interface begins with a setup panel where users select the optimization date (always computed for the next day), choose an optimization objective (Minimize Cost, Maximize Self-Sufficiency, or Maximize Self-Consumption), and review a forecast readiness checklist that shows the status of all required input forecasts. If forecasts are missing, the platform displays a warning and offers to use fallback estimates with reduced accuracy.

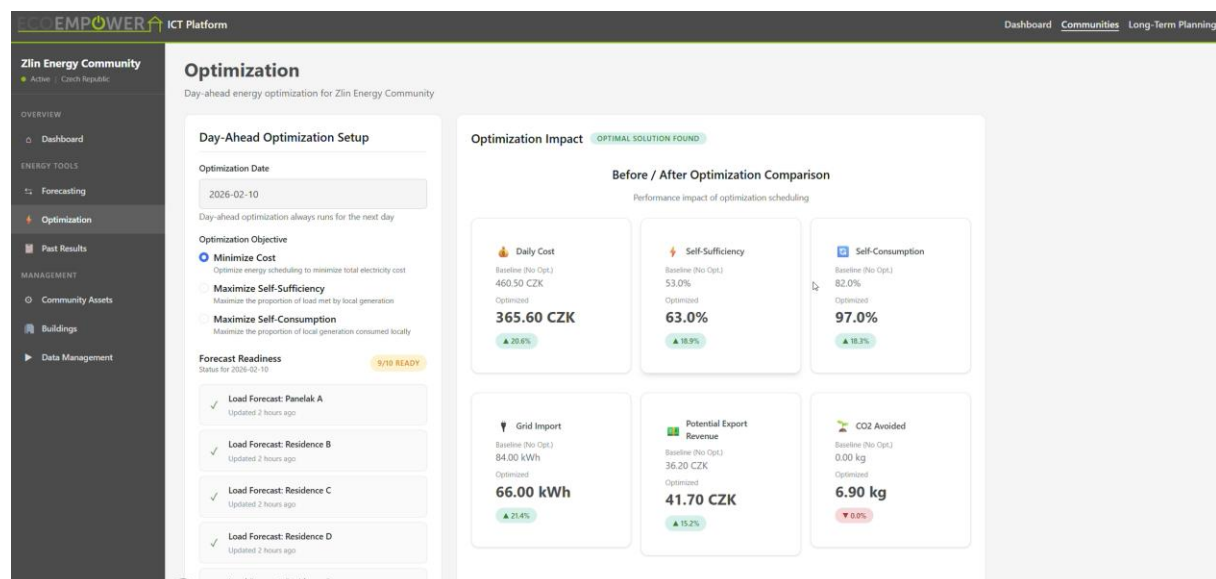


Figure 15 Optimization setup panel with objective selection, forecast readiness checklist, and before/after KPI comparison

Upon execution, the results are presented in a before-and-after format that immediately communicates the optimization’s impact. Six KPI cards show baseline values alongside optimized values with percentage

improvements: daily cost, self-sufficiency, self-consumption, grid import, potential export revenue, and CO₂ avoided. Below the KPIs, detailed charts show the optimized energy balance, battery charge/discharge schedules with state-of-charge, flexible load scheduling as a 24-hour Gantt chart, and per-asset consumption profiles with relevant overlays (e.g., indoor temperature for heat pumps).

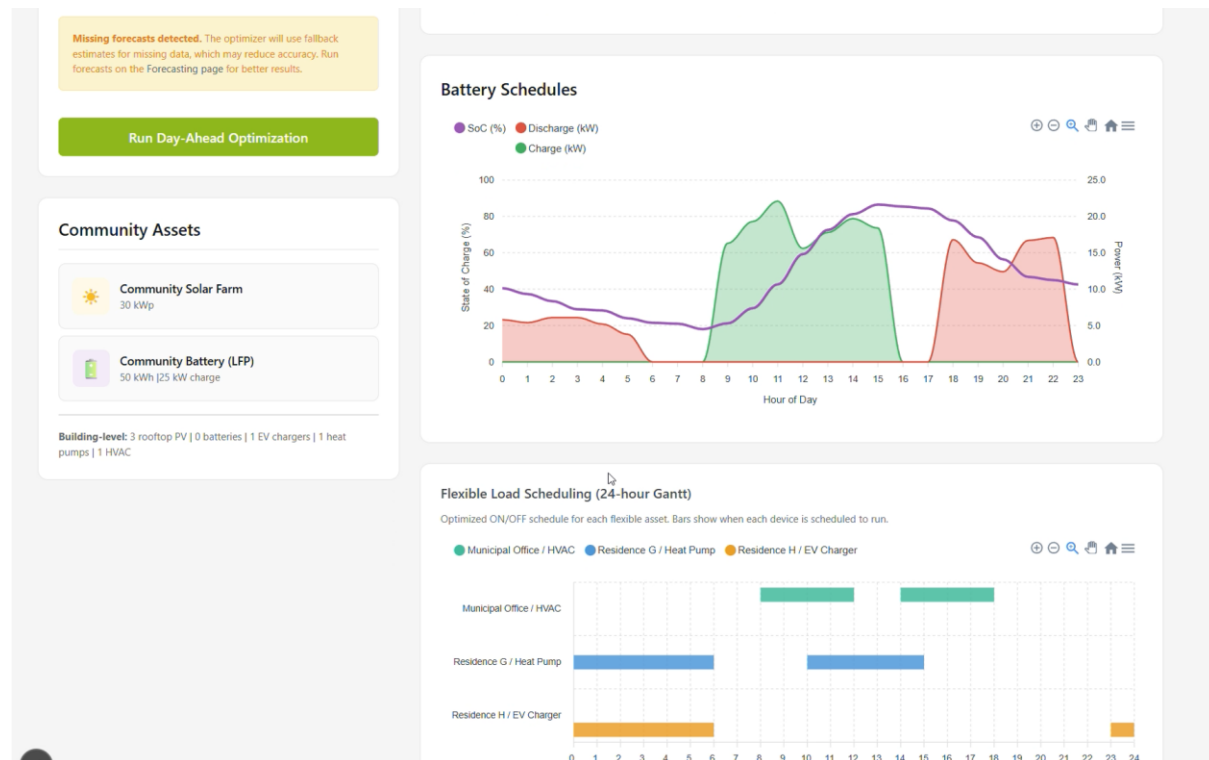


Figure 16 Optimization results: battery scheduling, flexible load Gantt chart, and energy balance

5.7 Long-Term Planning and Cost–Benefit Analysis

The Long-Term Planning module replaces the previous standalone CBA Tool with a scenario-based planning engine accessed through a four-step wizard. Users define a scenario (name, description, analysis type), select a target community, configure what-if parameters (new PV or battery capacity, investment costs, load growth, tariff change projections), and review before execution.

Three analysis types are available. Day-Ahead Optimization produces operational schedules and KPIs for a specific day under modified assumptions. Cost-Benefit Analysis computes NPV, IRR, BCR, payback period, and sensitivity analysis over a configurable horizon (up to 20 years). Long-Term Energy Benefits produces multi-year KPI projections, cumulative savings, and asset utilization metrics.

Create New What-If Scenario

Set up a new what-if planning scenario for your energy community

✓ Scenario Info
✓ Select Community
3 What-If Parameters
4 Review & Confirm

What-If Parameters

Configure financial parameters for cost-benefit analysis.

Community Data: 8 buildings • 30 kWp PV • 50 kWh Battery • 420 MWh/yr Load

Scenario Definition

Define what you want to analyze: new capacity to add and analysis period

New PV Capacity to Add

0 kWp 200 kWp

New Battery Capacity to Add

0 kWh 500 kWh

Analysis Period

20 years

Study horizon for NPV

Investment Costs

Capital and operational expenditure for PV and battery systems

PV System	Battery System
<p>Installed cost</p> <p><input type="text" value="1000"/></p> <p>CZK/kWp</p>	<p>Annual maintenance</p> <p><input type="text" value="15"/></p> <p>CZK/kWp/yr</p>
<p>Annual degradation</p> <p><input type="text" value="0.5"/></p> <p>% per year</p>	

Figure 17 What-if scenario wizard showing parameter configuration with sliders for capacity, costs, and growth assumptions

CBA results are presented as side-by-side scenario comparison cards, each showing the key financial and environmental metrics. A cumulative cash flow chart visualizes break-even points across scenarios. Sensitivity analysis shows how NPV responds to discount rate variation. An annual cost breakdown chart decomposes costs and values over the analysis horizon. A recommendation summary provides plain-language guidance identifying the scenario with the best financial return, the scenario with the best environmental impact, and the key risk factors to consider.

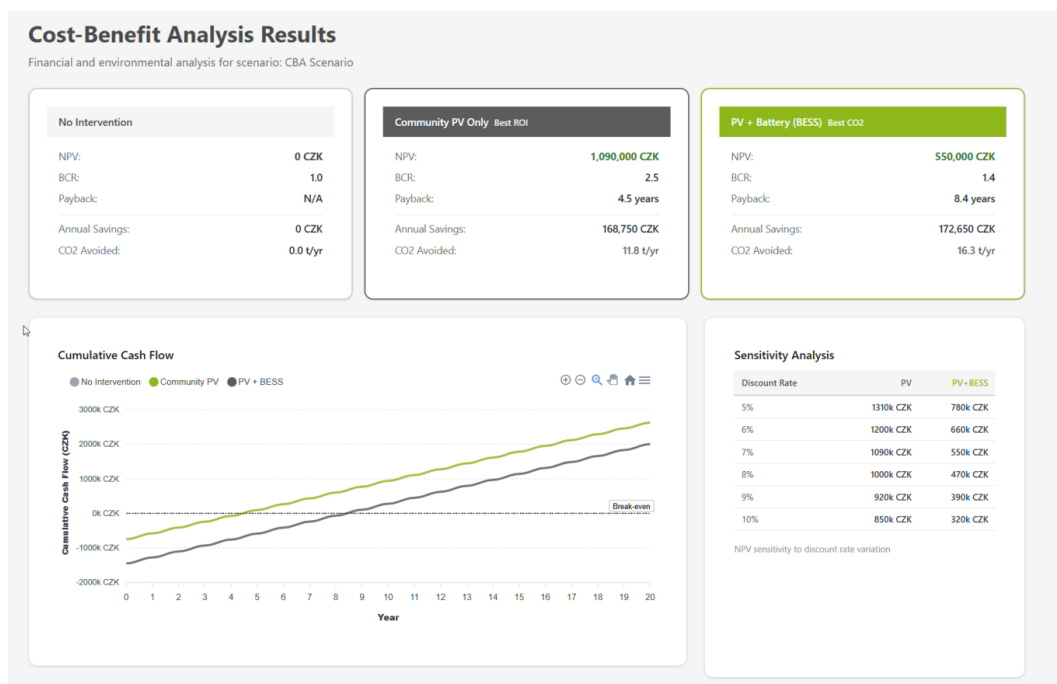


Figure 18 CBA results with scenario comparison, cumulative cash flow, sensitivity analysis, and recommendation summary

Long-Term Energy Benefits results include annual KPI projections (self-sufficiency, self-consumption, grid dependence) over the projection horizon, cumulative cost savings, and asset utilization charts showing monthly PV utilization, peak load hours, and battery cycle counts. These outputs are designed to support investment proposals and municipal board presentations.

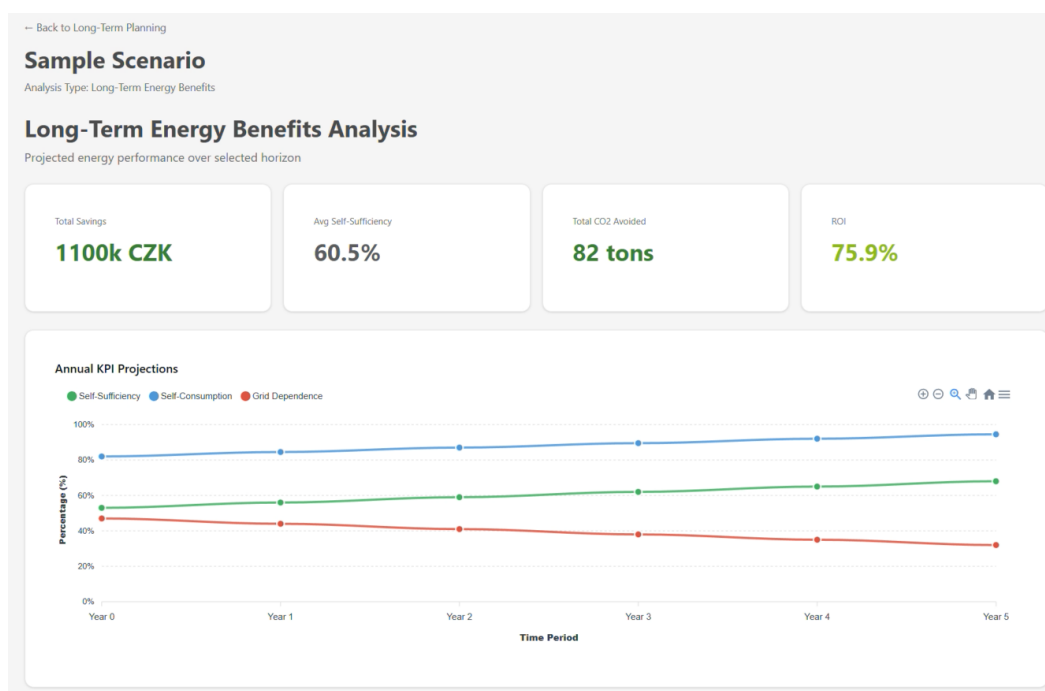


Figure 19 Long-term energy benefits: annual KPI projections, cumulative savings, and asset utilization

6 Conclusions and Next Steps

This deliverable documented the transition from the previous versions of the ECOEMPOWER ICT Platform (validated in D2.4) to the redesigned v3 platform. The first round demonstrated valid results but revealed that the tools could not be used independently by pilot communities. The three core issues, (excessive technical complexity, architectural fragmentation, and insufficient explainability) were systematically addressed through a platform redesign that preserves the validated analytical backend while fundamentally restructuring user interaction.

The new version of the ICT Platform (v3) has been deployed and is currently operational as a centrally hosted instance accessible to all project partners, with Pilot Specific users and credentials. The outstanding deployment challenge is its integration into each Regional Ecosystem (RE) on a per-pilot basis. For the platform to remain available to pilot communities beyond the end of the project, each RE needs to establish a sustainable hosting arrangement, whether through their One-Stop-Shop infrastructure, a locally procured cloud instance, or a centralized deployment under the ECOEMPOWER Website. This per-RE deployment planning is currently underway in coordination with the pilot partners, and the chosen approach for each site will be documented in D2.6.

The next and final deliverable for this work package, D2.6, will serve as the conclusive validation report for the ECOEMPOWER ICT Platform. As the closing deliverable of WP2, it carries a broader scope than its predecessors: it must demonstrate not only that the platform's analytical engines produce valid results, but that the redesigned platform has been successfully adopted across the project's pilot sites. The remaining actions include:

- **Cross-pilot validation:** presenting forecasting, optimization, and CBA results from all participating pilot sites, covering communities with different data maturities, energy mixes, regulatory environments, and operating conditions.
- **Usability and adoption assessment:** collecting structured feedback from pilot community managers on the platform's ease of use, the relevance and clarity of its outputs, and any remaining barriers to independent operation.
- **Per-RE deployment status:** documenting the deployment arrangement established for each Regional Ecosystem and the sustainability plan for post-project platform availability.

The success criterion for D2.6 will be that pilot communities across all participating sites can operate the platform independently, derive actionable insights for their energy management and investment decisions, and have a clear pathway to continued use after the project concludes.

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