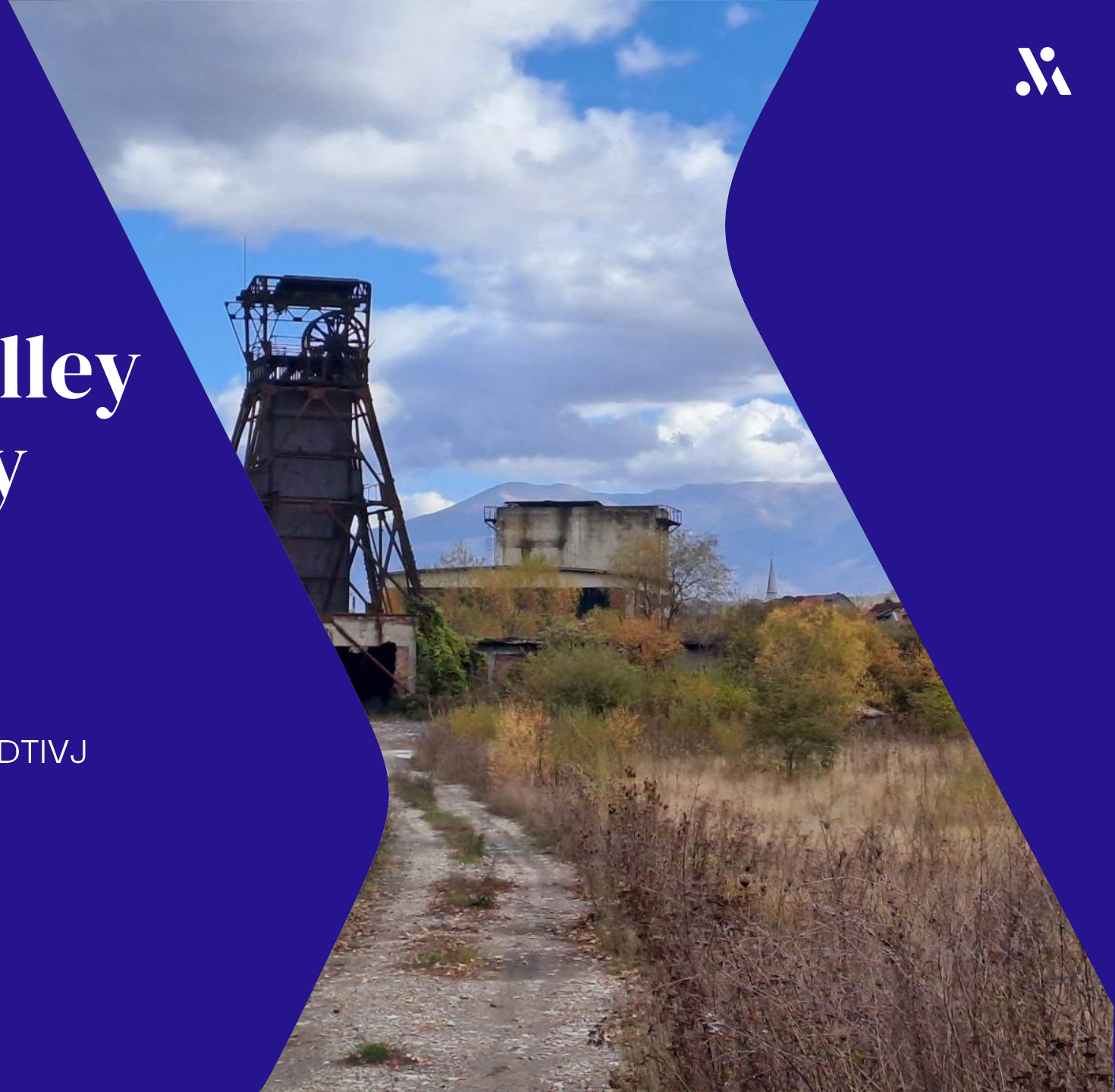
Guide to the Jiu Valley Energy Community financial model

C4T GROUNDWORK - Technical assistance to ADTIVJ



Seven sections from model overview to interpreting results

1. **About the project**
   Jiu Valley Energy Community -- context, sites and components
2. **Objective of the model**
   What it covers, what it does, who it is for
3. **Model structure**
   How the workbook is organised - sheets, flow, colour codes
4. **Key inputs**
   What you fill in the model and where
5. **Calculations and KPIs**
   How NPV, IRR and viability gap come together
6. **Financing scenarios and balance sheet**
   Switching between equity, bank loan and grants
7. **Cockpit and results**
   Reading the output - what to look for and how to assess viability

1. About the project

Jiu Valley Energy Community - context, sites and components

Background and context

Jiu Valley — a region moving beyond coal

WHERE WE ARE

One of the regions supported under C4T-groundwork is Jiu Valley, located in southwestern Romania. Jui Valley is at a pivotal moment in its transition from a century-long coal-mining economy to a diversified, low-carbon future.
The shift away from coal raises both an opportunity and an urgency: how to build a regional energy system that is clean, local and inclusive.

Energy poverty and social vulnerability remain high, but political will and technical readiness are now in place to test community-led models.

POLICY ANCHORING

GEO 163/2022 transposes RED II and recognizes Renewable Energy Communities. ERDF, URBAN UP (2025–2029) and the Just Transition Fund provide dedicated capital for PV.

WHAT IS ALREADY IN PLACE

Six sites are in scope: Petroșani, Petrila, Vulcan, Lupeni, Uricani and Aninoasa.

THE AMBITION

ADTIVJ is consolidating the six investments into one flagship Jiu Valley Energy Community — combining decentralised generation, shared ownership and democratic governance, with surplus revenue reinvested locally.



Background and context

Background for model and user guide

This financial model is developed by Viegand Maagoe as part of the technical assistance provided to **ADTIVJ under the European Commission's C4T programme.**

It models the economics of the Jui Valley Energy Community to illustrate and **test financial viability of the energy community** including operation of the six municipal solar PV sites, bringing together energy production parameters, cost drivers, financing assumptions and revenue structures.

The purpose of the model: **to show whether the energy community is financially viable, and under what conditions.**

This includes testing how much the electricity tariff can be reduced for vulnerable households, while keeping the project financially sustainable, and how sensitive the results are to changes in costs, tariffs or financing structure.

It feeds directly into the project fiché, which presents the consolidated business case in a format ready for external funding applications.

This guide walks through the **model structure, the key inputs you control, the financing flexibility built in, and how to read the results.**

- 6 PV sites delivering electricity of 222.567 MWh
- Electricity savings for 27mEUR
- 20-year operational horizon
- Multiple financing scenarios

Six sites under one umbrella

A consolidated multi-site PV portfolio coordinated by ADTIVJ

PETROSANI	VULCAN	PETRILA
6.373 MWh/yr | €3.6M CAPEX Phase 1 (2027)	2.997 MWh/yr | €2.1M CAPEX Phase 1 (2027)	1.037 MWh/yr | €0.7M CAPEX Phase 1 (2027)
LUPENI	**URICANI**	**ANINOASA**
553 MWh/yr | €0.35M CAPEX Phase 3 (2029)	457 MWh/yr | €0.25M CAPEX Phase 2 (2028)	281 MWh/yr | €0.17M CAPEX Phase 2 (2028)

The model models the economics of the Jui Valley Energy Community including the investment and operation of the six sites. The model evaluates the financial viability of the energy community as an economic entity and not the business case of the individual sites.

Source: Pre-feasibility studies, PLANET S.A. (EIB-financed), 2023-2024 / ADTIVJ project concept, 2026

2. Objective of the model

What it covers, what it does, who it is for

The financial model serves three purposes

What it covers

Establishment and operation of an energy community including investment and operation of six individual solar PV sites

Covers electricity production, own-consumption, sale to grid, investment, operational costs and revenue streams.

What it does

Forecasts energy production, revenues and CO2 savings over a 20-year operating period.

Calculates CAPEX, OPEX and cashflows. Derives NPV, IRR, payback, prices (cost, sales and break-even)

Estimate cashflow and KPIs before and after grants and before and after full financing allowing for different combinations of financing

Who it is for

ADTIVJ and the participating municipalities as primary users.

Project preparing applications for funding

External advisors and funders needing a transparent view of viability.

Other regions replicating or getting inspired of the energy community model.

Key input data - what drives the model

Six input categories that determine the entire business case

01 Generation

Installed capacity per site, maximum inverter power, annual decrease, electricity services

02 CAPEX

Main equipment, auxiliary equipment, installations, other costs, grid connection, 20% contingency

03 OPEX

Site maintenance (1% of CAPEX), connection, installations, operation of energy community (personnel, office, security etc.)

04 Prices

Electricity tariff, CO2 emission factor, production cost, weighted sales price

05 Financing

Grant, loan and equity shares, interest rate, debt service and grace period

06 Households

Vulnerable share, reduced tariff as % of normal

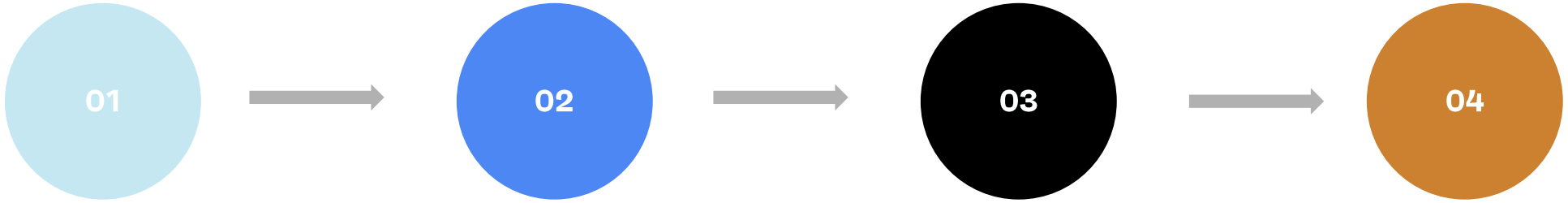
Have ready before you start (enter only in the Cockpit, real prices): installed capacity & annual yield per site; CAPEX per equipment category; OPEX (% of CAPEX and operating costs); electricity tariff, sales price & CO_2 factor; grant/loan/equity shares, interest rate, debt tenor & grace period; vulnerable household share & reduced tariff.

3. Model structure

How the workbook is organised -- sheets, flow and colour codes

Linear calculation flow

From inputs to investment decision



INPUTS

Input: e.g. generation, CAPEX, OPEX, prices, financing terms

CALCULATIONS

Financing and calculations: E.g. energy, costs, revenues, year-by-year cashflow, financing-probabilities

RESULTS

Cashflow, balance-sheet and sensitivity: e.g. NPV, IRR, payback, break-even, HH split, balance-sheet

COCKPIT

Cockpit: E.g. key results, overview and figures

Each block is fully linked - change one input and the whole model recalculates instantly.

Description of sheets and colour codes – and how to use them

Sheet structure

Colour code sheets

Input sheets
Calculations
Results
Cockpit
Sensitivity
Lists

Colour code cells

Input
User input
Formula
Link

Sheet category	Functionality	Colour
Results - Balance sheet	Summarises the financial statement of the Energy Community covering income statement, cashflow statement and balance sheet (assets, liabilities, equity). Shows cash availability to cover debt service and financial viability of the energy community. **How to use**: No changes required, this sheet calculate automatically based on cockpit and input parameters.	
- Cashflow	Projected annual cashflow for the energy community over the 20-year operation period covering investment, financing costs, operational costs and revenue. Further, key KPIs are calculated based on the cashflow. **How to use:** No changes required, this sheet calculate automatically based on cockpit and input parameters.	
Calculations - Calculations	Contains the main calculations: energy production per site, CAPEX and OPEX, revenue from electricity sale, and production cost per MWh. **How to use:** No changes required, this sheet calculate automatically based on cockpit and input parameters.	
- Financing	Models the financing schedule and financing costs based on the funding sources entered by the user in the Cockpit (i.e. share of grant, equity and loan and specific loan conditions). **How to use:** No changes required, this sheet calculate automatically based on cockpit and input parameters.	
Input	The technical data foundation. Holds site-specific data from the pre-feasibility studies: PV capacity, year 1 production, performance degradation, internal consumption, CAPEX per site, OPEX per site, electricity purchase prices per site, CO2 emission factor and price index. **How to use:** Only update if the underlying project site data changes. Standard scenario testing happens in the Cockpit.	
Cockpit	The cockpit is the model's primary control panel. It holds all the key parameters a user typically wants to test and adjust; WACC, financing sources(grant, loan and equity shares), and assumptions on energy users (share of vulnerable households and differentiated elctricity tariffs). It also displays all key results, financial viability, funding overview, social sustainability and impact, plus charts for sensitivity, cashflow, consumer mix and price comparison. **How to use:** Adjust the inputs here to test scenarios. Results update instantly.	
Sensitivity	Analysis of financial robustness and impact on key results (NPV, IRR, payback) of changes in CAPEX, OPEX and revenue of ±10%. Indicates how robust the business case is to adverse conditions. **How to use:** No changes required, this sheet calculate automatically based on cockpit and input parameters.	
Lists	Holds reference lists, name definitions and dropdown values used elsewhere in the model. **How to use**: No user action required.	

4. Key inputs in detail

Sheet by sheet - what goes in and where

How to use the model — two ways in

Key steps when starting out

FOR THE CASE REVIEWER

Light path — everything happens in the Cockpit, all inputs are given. Results update instantly. 6 steps.

1. **Open the Cockpit.** This is the model's control panel and the only sheet you need. The Input, Calculation, Financing, Cashflow and Balance sheet tabs are filled and calculate automatically — leave them untouched.
2. **Set the financing mix.** Under 'Sources of funds (sum to 100%)', set the share of grant, share of loan and share of equity. Default is 35% / 45% / 20%. The model rebuilds the loan schedule and depreciation automatically.
3. **Set the household assumptions.** Set the share of vulnerable households (default 20%), the reduced tariff as % of normal (default 10%) and the energy price (default €132/MWh). This drives the weighted sales price.
4. **Read the key results.** The Cockpit shows NPV, IRR and simple payback (before and after grant), the funding overview, LCOE and break-even price, margin per MWh and the max vulnerable share at break-even.
5. **Check social impact & sensitivity.** Review total CO_2 avoidance, electricity savings for municipalities, and the ±10% sensitivity of NPV, IRR and payback to CAPEX, OPEX and revenue.
6. **Iterate towards viability.** If the case does not hold, adjust the Cockpit levers — energy price, grant share, vulnerable share or financing mix — one at a time until the viability indicators turn green.

FOR THE TECHNICAL USER

Full path — start in the Input sheet, then check the economics, then run scenarios in the Cockpit. 6 steps.

1. **Review the technical inputs.** In the Input sheet, check the site data from the pre-feasibility studies for all six sites: PV capacity, year-1 production, performance degradation and internal consumption. Update only if site data changes.
2. **Review the cost inputs.** Still in the Input sheet, check CAPEX and OPEX per site, electricity purchase prices, the CO_2 emission factor and the price index. These feed the cost price per MWh.
3. **Set the financial assumptions.** In the Cockpit, set WACC (default 4%) and the loan conditions: interest rate (default 4.08%), debt tenor (10 years) and grace period (1 year).
4. **Set the financing mix.** Enter the grant, loan and equity shares (sum to 100%). The Financing sheet derives the repayment schedule, interest payments and depreciation automatically.
5. **Set the household model.** Define the vulnerable share, the reduced tariff (% of normal) and the energy price. Calculation derives the weighted sales price and the consumer mix.
6. **Read results & iterate.** Review NPV, IRR, payback, LCOE, break-even price and the sensitivity analysis. Adjust the Cockpit levers one at a time until the case is viable.

Cockpit — general and financial assumptions

The parameters that frame the entire model

FINANCIAL ASSUMPTIONS & LOAN CONDITIONS

- WACC
- Interest rate
- Debt tenor
- Grace period

→ *These parameters frame the entire model*

FINANCING MIX

- Grant share
- Bank loan share
- Equity share

→ *The model automatically calculates the loan installment, repayment schedule and depreciation based on these shares*

HOUSEHOLD ASSUMPTIONS

- Share of vulnerable households
- reduced tariff as a percentage of the normal tariff

→ *Determines the weighted sales price, break-even and how much social ambition the model can absorb*

From the cockpit sheet

Key Inputs

Financial assumptions	Unit	Value	
WACC	%	4%	
Loan conditions			
Interest rate	%	4%	
Debt tenor	years	10	
Grace period	years	1	
Sources of funds		**Share**	**Total (EUR)**
Total funds	%	100%	8.692.374
Share of grant	%	98%	8.518.527
Share of loan	%	0%	0
Share of equity	%	2%	173.847
Household and price assumptions			
Share of vulnerable households	%	50%	
Reduction in tariff for vulnerable house	%	20%	
Electricity price	EUR/MWh	132	
Electricity price for vulnerable	EUR/MWh	106	
Weighted average electricity price	EUR/MWh	119	

Input — site production and CAPEX

The one-off cost of building the system

INSTALLED CAPACITY AND YEAR 1 PRODUCTION

- Each site has its own capacity and start year. Remember the start year under general assumptions must be before or equal to the implementation year for the first park

PERFORMANCE DEGRADATION AND INTERNAL CONSUMPTION

- Annual production declines at 0.3%/year across all sites
- A small share (0.6–2.3%) is consumed internally by the PV system and subtracted from net production

CAPEX PER SITE

- Broken down into main equipment, auxiliary equipment, installations, other costs and grid connection

CAPEX FOR THE ENERGY COMMUNITY

- The consolidated CAPEX covers all six sites combined plus a budget for establishing the energy community as a legal entity covering entity registration, smart meter platform and surveillance
- 20% contingency is applied

From the Input sheet

Production

Vulcan site			
Production year	Vulcan	Year	2028
Electricity production year 1	Vulcan	MWh	2.997
Installed power in panels	Vulcan	kWp	2.539
Maximum inverter power	Vulcan	kW	2.310
Specific production	Vulcan	kWh/kWp	1.180
Surface	Vulcan	Ha	4
Annual performance decrease	Vulcan	%	-0,3%
Internal electicity services	Vulcan	%	-2,3%

Investment and procurement

Vulcan site			
First year of investment	Vulcan	Year	2027
Main Equipment	Vulcan	EUR	834.362,82
Auxiliary equipment	Vulcan	EUR	547.157,53

CAPEX for Energy Community			
Establishing the energy community as an entity	Energy comm	EUR	50.000,0
Cost for smart meter platform/supplier registerati	Energy comm	EUR	25.000,0
Surveilance	Energy comm	EUR	25.000,0
Main Equipment	Energy comm	EUR	2.507.808
Auxiliary equipment	Energy comm	EUR	1.644.567
Installations	Energy comm	EUR	658.807
Other costs	Energy comm	EUR	1.246.203
Connection	Energy comm	EUR	415.000
Total CEF investment	**Energy comm**	**EUR**	**6.472.385**
Contingency		%	20%

Input — OPEX and electricity prices

Annual operational costs

SITE MAINTENANCE (1% OF CAPEX/YEAR)

- Annual O&M cost per site. Covers inspections, inverter servicing, cleaning and minor repairs

PERSONNEL

- On-site staffing of the Energy Community (manager, accountant, operators)

ENERGY COMMUNITY OVERHEAD

- Shared costs: 2 management staff, 1 staff per site, office rent, transport and administration.

CO_2 EMISSION FACTOR

- 226 gCO_2e/kWh (EEA, Romanian grid). Used to calculate total emission avoidance over the project lifetime.

From the input sheet

Operation and maintenance			
Vulcan site			
Electricity grid maintenance	Vulcan	EUR/year	1%
Number of people	Vulcan	Persons	5,00
Average monthly expenses	Vulcan	EUR/pers/month	1.700,00
Personnel expenses	Vulcan	EUR/year	102.000,00
Total operation costs	**Vulcan**	**EUR/year**	**123.403**
Energy community	Energy community		
Electricity grid maintenance	Energy comm	EUR/year	72.436
Average monthly expenses personnel	Energy comm	EUR/pers/year	20.400
Management staff, administation	Energy comm	EUR/year	40.800
Other staff for site	Energy comm	EUR/year	61.200
Office	Energy comm	EUR/year	13.200,0
Other	Energy comm	EUR/year	4.000,0
Transport	Energy comm	EUR/km	0,3
Transport	Energy comm	EUR/year	600,0
Total	**Energy comm**	**EUR/year**	**192.236**

Cockpit/calculation — household parameters

The social dimension — can the electricity price be differentiated and by how much

Base case is that everyone pays the same and how does the KPIs look based on that. Then as an add on, it is possible to do a scenario analysis, where one can play with the share of vulnerable households and tariff levels

ELECTRICY TARIFF (NON-VULNERABLE HOUSEHOLDS)

- Set in the Cockpit. The main revenue driver - cross-finances the reduced tariff for vulnerable consumers

REDUCED TARIFF (VULNERABLE HOUSEHOLDS)

- Set in the Cockpit as a percentage of the normal tariff

SHARE OF VULNERABLE HOUSEHOLDS

- Set in the Cockpit. The model calculates the maximum supportable share before the weighted sales price drops below break-even

WEIGHTED SALES PRICE AND BREAK-EVEN CHECK

- Calculated automatically and displayed in the Cockpit. The model blends the two tariffs into a weighted average sales price and compares it to the cost price and flat price in real time as base-case

Inputs set in Cockpit, calculations performed in Calculation sheet.

Scenario table - sweep vulnerable share 0% to 100%

Vulnerableshare	Weighted price (EUR/MWh)	Cost price (EUR/MWh)	Margin/MWh (EUR)	Annual margin (EUR/year)	Status
0,0%	132,00	87,41	44,59	874.865	OK
10,0%	125,40	87,41	37,99	745.367	OK
20,0%	118,80	87,41	31,39	615.869	OK
30,0%	112,20	87,41	24,79	486.371	OK
40,0%	105,60	87,41	18,19	356.873	OK
50,0%	99,00	87,41	11,59	227.375	OK
60,0%	92,40	87,41	4,99	97.877	OK
70,0%	85,80	87,41	(1,61)	(31.621)	Below
80,0%	79,20	87,41	(8,21)	(161.119)	Below
90,0%	72,60	87,41	(14,81)	(290.617)	Below
100,0%	66,00	87,41	(21,41)	(420.115)	Below

Weighted sales price vs. cost price

Cost price	EUR/MWh	87,41
Weighted sales price	EUR/MWh	112,20
Margin per MWh	EUR/MWh	24,79
Break-even for households		BREAK-EVEN OK
Annual margin × avg production	EUR/year	291.823

5. Calculations and KPIs

How the numbers come together

Calculations — Building the cashflow

From energy production to net cashflow over a 20 year project lifetime



The model builds the operating cashflow above for each year of the 20-year horizon. Financing layers are added on top.

↓ All cashflows are discounted by the WACC to give Net Present Value (NPV).

Scenario revenue logic - how the weighted price is calculated

Two consumer groups, two tariffs, one weighted average

VULNERABLE HOUSEHOLDS (20%)

Pay a reduced tariff This is the social mission of the energy community. The share and discount are set in the Cockpit.

NON-VULNERABLE HOUSEHOLDS (80%)

Pay the normal tariff. This is the main revenue driver and the base-case assumption for the whole community. The tariff is set in the Cockpit.

TWO REVENUE STREAMS, NOT ONE PRICE

The base case is a flat tariff: every household pays the normal price. The reduced tariff for vulnerable households is a scenario layer on top, not the default.

The model therefore tracks revenue as two separate streams:

- Non-vulnerable HH: X of demand × normal tariff → the main income stream.
- Vulnerable HH: X of demand × reduced tariff → the social cost.

Combining the two gives the weighted sales price. The Calculation sheet shows this weighted revenue, the flat-tariff revenue, and the difference between them, so you can read the cost of the social discount directly.

The KPIs that matter -- what to look for in the results

What funders and decision-makers will assess

NPV	**Net Present Value** Today's value of all future cashflows, discounted by the WACC. Positive = the project creates value.	**Look for: NPV > 0**
IRR	**Internal Rate of Return** The discount rate where NPV equals zero. The project's intrinsic rate of return.	**Look for: IRR > WACC**
Payback	**Payback period** Years until cumulative cashflow turns positive. A simple, intuitive viability check.	**Look for: Payback < lifetime**
Break-even price	**EUR/MWh** The minimum electricity price at which NPV = 0. Compare to your expected tariff.	**Look for: Break-even < expected tariff**
Weighted price	**Blended revenue** Average revenue per MWh accounting for vulnerable and non-vulnerable household mix.	**Look for: Weighted price > production cost**

6. Financing scenarios and balance sheet

Understanding different potential financing options

What each option means for the project and what to pay attention to

EQUITY

Capital contributed by ADTIVJ or the municipalities and requires upfront capital.

Pay attention to:

Own contribution reduces the loan needed and therefore financing costs. Commercial projects will typically have a share of 30% equity

BANK LOAN

External debt with repayment schedule and interest

Pay attention to:

Debt service (principal + interest) reduces annual cashflow during the repayment period. Grace period delays repayment but interest still accrues.

GRANTS

Grants are (usually) non-repayable funding from JTF, URBAN UP or ERDF.

Pay attention to:

Grants directly improves NPV and shortens payback. Multiple sources can be combined. Always test a scenario without grants to understand the project's standalone viability.

BLENDED SCENARIOS

The model lets you combine all three in one scenario - e.g. 60% JTF + 30% bank loan + 10% equity.
Test different scenarios to understand the range of outcomes.

The financing mix is your biggest lever - change it and cockpit and all KPIs update instantly

Balance sheet - reading the output

Total assets must equal total liabilities plus equity every year

The model produces three linked statements — income statement (revenue, O&M, depreciation, net income), cashflow statement (operating cashflows, CAPEX, debt, cash balance) and balance sheet (assets, liabilities, equity). Read the output by tracking:

Net income turning positive

- The year when annual profit exceeds zero. In the current scenario, net income turns positive from year 2 (2028). Before that, the energy community operates at a loss — normal during early operations

Cash balance trajectory

- Tracks the cumulative cash position year by year. A negative cash balance in the early years reflects the scale of the upfront investment. The balance improves as operating surpluses accumulate over the lifetime

Debt outstanding declining

- If financed with a bank loan, the outstanding debt decreases each year and reaches zero by the end of the repayment period (year 10 at default settings).

PP&E declining through depreciation

- Asset book value decreases each year as the PV systems are depreciated over the 20-year lifetime, reaching zero at end of project

Equity growing through retained earnings

- As profits accumulate, retained earnings build up and total equity grows — reflecting the community's strengthening financial position over time

From the balance sheet

Financial statement for energy entity

Parameter	Unit	Sum			
Year			2026	2027	2028
Construction periode			1	0	0
Operation period			0	1	2
Income Statement					
Revenue	EUR			1.354.994	1.446.603
Operations & Maintenance cost	EUR		(388.343)	(532.103)	(557.505)
EBITDA	EUR		(388.343)	822.891	889.099
Depreciation	EUR		-	(434.619)	(434.619)
EBIT	EUR		(388.343)	388.273	454.480
Interest expense	EUR				
EBT (Taxable income)	EUR		(388.343)	388.273	454.480
Taxes	EUR	0%	-	-	-
Net Income	**EUR**		(388.343)	388.273	454.480
Dividends	EUR		-	-	-
Retained earnings	**EUR**		(388.343)	388.273	454.480

7. Cockpit and results

Reading the output and assessing viability

Cockpit — Key results

is the energy community is financially viable under the given conditions

FINANCIAL VIABILITY
- NPV, IRR, simple payback period, before and after grant

PRODUCTION COST
- Weighted average production cost, Levelised cost of energy and break even price before and after grant.

FUNDING OVERVIEW
- Total funding needed and distribution on funding sources (grant, loan, equity)

SOCIAL SUSTAINABILITY
- Price per household group (vulnerable vs. non-vulnerable), margin per MWh, max vulnerable share.

IMPACT
- Total CO2 emission avoidance, electricity production and electricity savings (NPV) over 20-years project lifetime

SENSITIVITY
- NPV, IRR and payback period shown across six scenarios: CAPEX, OPEX and revenue each tested at ±10%.

From the Cockpit sheet

Key results

Project economics	Unit	Before grant	After grant
NPV discounted with WACC	EUR	5.991.484	14.459.996
IRR	%	11%	665%
Simple payback periode	Years	9,0	1,2
Production cost		**Before grant**	**After grant**
Weighted average production cost	EUR/MWh	79	23
Levelised cost of energy = break even	EUR/MWh	79	23
Social sustainability			
Margin per MWh	EUR/MWh	52,8	108,7
Max vulnerable share at break-even	%	51%	100%
Impact			
Total CO_2 avoidance over project lifetime	t CO2	45.235	
Total electricity produced over project life	MWh	223.168	

Cockpit — Key figures

The control panel where you set the scenario

Production cost per year vs. sales price

- Plots the cost of producing electricity against the price it is sold at, year by year. Use it to see at a glance whether revenue covers cost and how comfortable the margin is over the lifetime

Accumulated cashflow

- Shows the cumulative cash position building up over the lifetime. Use it to read the payback point → where the line crosses zero and to judge how long the project stays cash-negative after the upfront investment

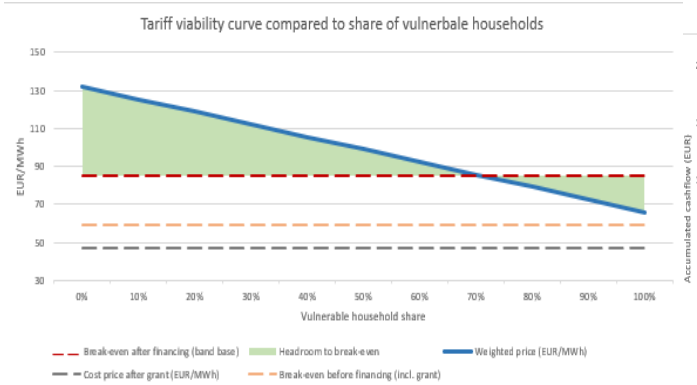
Cash flow after and before financing

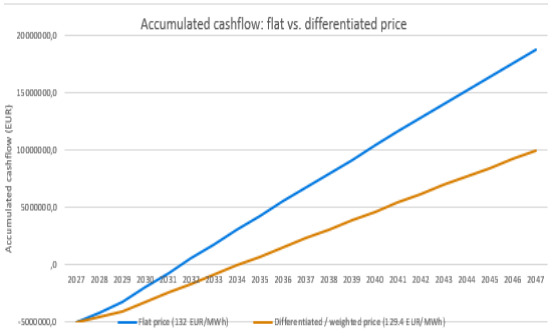
- Shows the annual net cashflow both before and once loan repayments and interest are taken out. Use it to check whether the community can service its debt each year and to see the effect of the financing structure on liquidity

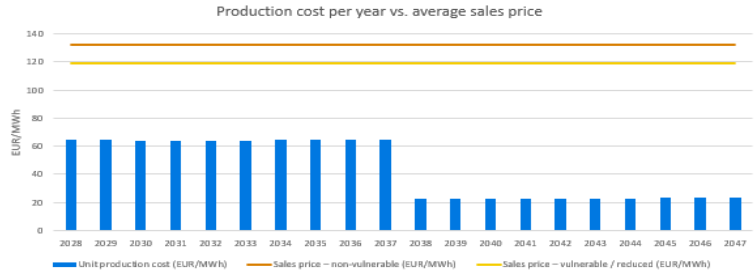
Tariff viability

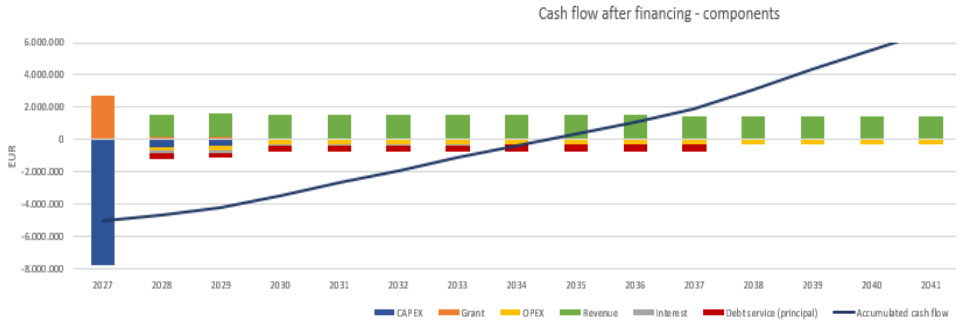
- Compares the weighted sales price with the cost price as the share of vulnerable households changes. Use it to find how large a vulnerable share the community can support while still breaking even: the social headroom of the project

From the Cockpit sheet









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