



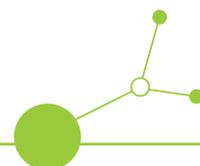
JETforCE

JUST ENERGY TRANSITION FOR CENTRAL EUROPE

D.2.3.1 Final report of Transnational Pilot 2 - STAGE 1

D.2.4.1 Final report of Transnational Pilot 2 - STAGE 2

O.2.2. Technology evaluation through a Just Energy
Transition lens pilot- JETforCE software for
technology evaluation



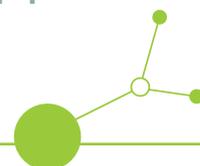
Final version

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D.2.3.1 Final report of Transnational Pilot 2 - STAGE 1



Final version
3/2025





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Introduction

After the successful finalisation of the JETforCE Transnational Pilot 1, in the fourth project period, JETforCE project partners have officially launched the implementation of the second JETforCE Transnational Pilot action “Evaluating and deploying Just Energy Transition responsive technologies”. The second pilot action is divided into two stages, and in this report, it will be described the work done in the “STAGE 1 - Testing the tool for technology evaluation”. The Transnational Pilot 2 presents the backbone of the JETforCE piloting phase and is crucial in fostering the JETforCE’s approach to using digital technologies in enabling a Just Energy Transition in Central Europe (CE). The goal is to make the most of investments in technologies for energy efficiency and renewable (i.e., green energy technologies), while guaranteeing social equality. Within the JETforCE Transnational Pilot 2, the focus is on the Technology Evaluation Tool. The tool presents brand-new software that is co-created to analyse the cost/benefits of existing and proposed technologies for green energy production, distribution, and use.

The Stage 1 of the Transnational Pilot 2 was focused on testing the Technology Evaluation Tool (D.1.4.1) in partner areas, analysing different technologies and proposing ones to address challenges identified in the Transnational Pilot 1. For the purpose of this report, project partners were invited to prepare and deliver inputs to the WP2 leader-IRENA and in this report will be included their contributions and findings.



1. Transnational Pilot 2 - Evaluating and deploying Just Energy Transition responsive technologies - STAGE 1

The piloting process started in the period four by providing inputs to the D.1.4.1 JETforCE Technology Evaluation Tool developer, PP2-Elfi-Tech. Project partners have worked together with Elfi-Tech on defining the tools features and how it can be used in the scope of the JETforCE project, which focuses on addressing the need for energy transition in Central Europe (CE), without disproportionate negative socio-economic impacts on certain vulnerable territories or demographics.

At the fourth project meeting in Ptuj (SI) which was held on 12-13 June, 2024, Elfi-Tech has presented the tool and first tests have started. By the fifth project meeting which was held in Weiz (AT) from 3-4th of December, project partners have worked on testing the tool on 3 investments which were already implemented in the 2017-2022 period. At the meeting, partners have presented the outcomes of the testing process, and the improvements were suggested to the tool developer - Elfi-Tech and WP2 leader, IRENA. At the beginning of 2025, Elfi-Tech has put significant effort in improving the tool and has made remarkable improvement in order to launch second phase of the testing where project partners were invited to test the tool with three technologies/investments which could be used to address challenges identified in the Transnational Pilot 1.

1.1 Meetings and events at project, regional or level

In order to test the Technology Evaluation Tool, on the project level, several online coordination workshops were organised (18/7/2024, 7/11/2024, 26/2/2025) mainly to discuss needed improvements and exchange of testing achievements. The meetings were organised and led by Elfi-Tech with active participation of all project partners.

1.2 Technology Evaluation Tool - testing at the local level

In this section, it will be described how project partners have organised the testing process at their local or regional, who was involved (JETA, other stakeholders, members of staff, etc...), what type of technologies they have tested and what were the initial findings. For the purpose of this report, PPs were invited to prepare and deliver inputs to the WP2 leader-IRENA and in this and following sections, their answers will be presented.

LP-BORA94 in their report has informed that for the testing of the first 3 technologies, 1 staff member was involved in the process on the 27th of November 2024, who is responsible for energy planning and managing ERDF funded energy renovation projects mainly for local municipalities. The staff member also attended the 5th project meeting in Weiz, Austria 02-04.12.2024) where the partnership had a very deep and lengthy debate



and discussion on how the tool should be upgraded. The internal testing then was repeated with the same colleague the 21st of March 2025, when the technology evaluation tool has gone under a major improvement, thanks to the many online and personal discussions

PP4-Città Metropolitana di Bologna (CMBO), in their area has conducted a practical test of the Technology Evaluation Tool, focusing on renewable energy technologies. In their report they state that the tool proved valuable for evaluating the project, though they have identified areas for improvement. Feedback from their team highlighted that the tool enabled a detailed assessment, but certain refinements could enhance usability and the depth of impact analysis.

In Slovenia, **PP6-LEASP** in the first phase of testing the technology assessment tool has analysed three technologies which were implemented between 2017 and 2022, focusing on examples of good practices in local municipalities where they have been directly or indirectly involved in planning investments in energy efficiency and renewable energy sources in the past.

The selected technologies by PP6 were:

- Reducing heat loss by increasing energy efficiency: Implementation of thermal insulation on the facade.
- Replacing fossil fuels with renewable energy sources: Installation of a heat pump.
- Production and storage of renewable energy: Implementation of a photovoltaic system.

In the report provided by PP6, they state that their contribution to the projects was on providing part of the documentation involved developing local energy concepts and/or conducting energy audits. The Technology Evaluation Tool testing process at PP6 local level was based on collecting, analyzing, and utilizing existing documentation of identified good practices as input data for the technology assessment tool. Some of the documentation came from their own archives, as they have participated in certain phases as preparers, while the rest was provided by the partner municipalities that served as project investors. In their report they state that all three technologies are continuing to serve their purpose successfully today, delivering positive social, economic, and environmental impacts. The testing results were satisfactory and confirmed the usefulness of the Technology Evaluation Tool. The process demonstrated that the selected technologies are both effective and sustainable, reinforcing their value for the community and the environment.

In the second phase, PP6 decided to include the municipality where they are based, the City of Ptuj, as well as the Municipality of Dornava, an associated partner in the JETforCE project, in the testing process. They aimed to focus on technologies that municipalities have already implemented, plan to implement in the near future, and for which subsidies are available. Such investments can only be realized with the support of incentives, enabling municipalities to align with the climate energy program as part of a fair green transition. The selected technologies by PP6 were:



- Installation of solar power plants on the roofs of public buildings in the City of Ptuj.
- Replacing fossil fuels with renewable energy sources: Installation of a heat pump for the municipal building and cultural hall in Dornava.
- Upgrading lighting efficiency: Replacement of existing lighting with LED lighting at Dornava Elementary School.

In their report PP6 states that they focused on implementing technologies that support the energy transition, which means shifting toward more sustainable and efficient ways of producing and using energy. The focus was on testing a technology assessment tool to measure the effectiveness and impact of technological solutions at the local level. They evaluated the selected technologies based on their economic, environmental, and social benefits, as well as their potential to support regional sustainability goals. The primary focus of the economic benefit assessment was cost reduction, the environmental benefit assessment focused on emission reduction, and the social benefit assessment aimed at improving quality of life.

At the end, PP6 in their report states that the tool has proven to be effective in evaluating investments in renewable energy sources, as it provides meaningful insights into their economic, environmental, and social impacts. By using this approach to assess technologies with the tool, PP6 states that they have gained a better understanding of the impacts of individual technologies at different levels.

In Croatia, **PP7-IRENA** has worked on testing the Technology Evaluation Tool mostly among its staff members and members of Local JETA. The first months of testing were mainly dedicated to finding the issues in the tool, reporting the suggestions to the tool developer-Elfi-Tech. After the meeting in Weiz, IRENA staff members started working on collecting the ideas for 2nd piloting phase and trying to test most appropriate technologies which will be used for addressing challenges identified in Transnational Pilot 1.

In Czech Republic, **PP8-EAV** in their report informed that after the introductory online session organized on 18th July 2024 by Elfi-Tech, the Technology Evaluation Tool was tested by EAV at the internal level. Subsequently, the tool was introduced to local JETA members during the meeting on 22nd October 2024. During the 5th project meeting in Weiz, held on 3rd-4th December, project partners provided their feedback to the responsible partner, and an updated version of the tool was introduced. Following this, EAV presented the updated version to local JETA members again on 7th February 2025 and conducted a test using three completed investments from the period 2017-2022. Based on these tests, EAV evaluated three ideas/outputs from Transnational Pilot 1, focusing on the challenges identified during the testing phase of the first pilot.

PP9-SIEA, in their report stated that in Slovakia, communication between the members of the Technology Evaluation Tool testing team and with the members of the Slovak JET Alliance took place exclusively online. Due to time and personnel reasons, PP9 intends to organize a hybrid meeting of the Slovak JET Alliance in the second half of April 2025, where they will discuss the results of the Slovak testing and also the results that will be summarized in a joint report of their project team.



In the first phase of testing the Technology Evaluation Tool application in preparation for the PM5 meeting in Weiz, only SIEA project managers involved in the JETforCE project - Andrej Slančík, Lucia Bogdányová and Zuzana Palugová - participated in the testing. They have implemented several test entries into the application, all focused exclusively on the issues of energy performance of buildings. The received outputs they consulted with our energy department. Given the quality of the data entered and the reliability of the outputs received, we presented two technology tests at the meeting in Weiz: 1. solar panels; and 2. replacing a gas boiler with a biomass boiler.

As a part of the events organized by PP9-SIEA in 2024, the Technology Evaluation Tool application was presented to a total of approximately 130 participants, including representatives of the Slovak JET Alliance. At a joint event of the REC4EU and JETforCE projects in February 2025, approximately 30 more participants were introduced to the application, with several of them showing serious interest in participating in the activities of the Slovak JET Alliance.

The second phase of testing process in Slovakia took place from the end of February 2025 to mid-March 2025. The SIEA project team tested 2 technologies from the period 2017 - 2022 in the application, those for which the outputs from the application were presented at PM5 in Weiz: 1. solar panels; and 2. replacing a gas boiler with a biomass boiler. The test result for solar panels technology is documented in Chapter 3 of this report. To test whether the application is sufficiently intuitive and interesting even for users with limited expertise in the energy sector, they asked two members of the Slovak JET Alliance, whose priority field of activity is the IT sector, to test it. They described the application as insufficiently understandable and found it too difficult to successfully enter data without detailed instructions. Given that the challenges collected so far in the Challenges Mapping Tool application mainly relate to the energy efficiency of buildings, three new technologies, the test results of which are also summarized in Chapter 3, also relate to this topic.

In Austria, **PP12-WEIZ** reported that the tool was tested internally two times. The first testing internally was done in winter 2024 but there were still a lot of problems and needed improvement. Within the partner meeting in Weiz, a hands-on workshop was held focusing on the tool's improvement and a new version was available in January 2025. Then a second internal testing with the already implemented technologies was done. Afterwards another testing with technologies identified in the global challenge mapping tool was carried out. The results were shared with the transnational project team. Additionally, the tool was introduced to the JETA Members in Weiz within another event. The tool was demonstrated and a technology that had already been evaluated was again presented to the JETAs as a showcase example. The JETA Member were highly interested in the tool and the results. In the internal Testing of the tool the project team in Weiz was involved (Andrea Dornhofer, Katharina Halper, Günther Maier and Tanja Frieß) and everyone tried it for themselves and then exchanged the experiences. This was done in the first and in the second testing. In the second testing additionally an employee of the energy agency was asked for the feedback.



2. Monitoring and evaluation

2.1 Monitoring of the pilot action implementation

The pilot activities were monitored by the Monitoring Committee established according to the D.2.1.1.¹ Methodology. Each project partner has assigned one member and regarding the Transnational Pilot 2 - Stage 1, one Monitoring Committee session (the third one) was organised in the scope of the 5th project meeting in Weiz, Austria. The meeting in Weiz was essential to evaluate the first phase of the Transnational Pilot 2 progress, and during the Monitoring Committee session, partners have provided valuable inputs to the WP2 and PA2 leaders in order to improve the tool and prepare it for the additional testing. As the conclusion from the 3rd Transnational Monitoring Committee meeting, project partners have agreed that there is a need to improve the tool if the final results will be with high level quality.

In this chapter, all the partner contributions related how the pilot process went on the local level will be presented. Each PP had the task to prepare their report related to the implementation of the Transnational Pilot 2 - Stage 1 in their area, and in this document all their contributions were included.

In Hungary, **LP-BORA94** stated that the pilot action on local level was implemented as planned; in October and November they had a chance to test the tool internally with 1 staff member and with 3 of their JETA members, out of which 1 is their Digital Ambassador. After that, they have further tested the tool with the same staff member on the 21st of March 2025, and they also plan to carry out further tests with the final tool, with their JETA members as well as experts/decision-makers, who are willing to participate in the process.

In Italy, **PP4-MCBO** reported that the pilot action was successfully implemented at the local level, following the planned framework and objectives. The initiative was executed in collaboration with key stakeholders, ensuring alignment with local needs and project goals. The engagement of relevant partners and participants contributed to the smooth operation and effectiveness of the pilot activities.

In Slovenia, **PP6-LEASP** reported that the pilot action was successfully implemented at the local level, following the planned framework and objectives. Management and organization were efficient, with structured timelines and no major delays. The testing of the Technology Evaluation Tool proceeded as planned, supported by strong stakeholder involvement, including municipalities such as Ptuj and Dornava. PP6 reported that some challenges arose in data collection due to variations in documentation across municipalities, which were addressed by standardizing procedures and improving coordination. Despite these, the implementation remained on track,

¹ This M&E methodology defines the general approach to the monitoring, and evaluation process and the procedures to be followed by the partners for effective assessment of quantitative and qualitative components of the JETforCE pilot actions.



and the tool proved effective in evaluating the economic, environmental, and social impacts of energy investments.

In Croatia, **PP7-IRENA** reported that the piloting phase was successfully implemented at local level, despite initial difficulties with tool's functionalities. IRENA staff members have tested the tool with different inputs, aiming to understand how the tool works and how the results can be further used.

PP8-EAV in its report informed that the implementation of the pilot action at the local level followed a structured process. After the initial testing of the first version of the JETforCE Technology Evaluation Tool by individual project partners, feedback was gathered, leading to an updated version of the tool.

Subsequently, employees of EAV, in collaboration with local JETA members, conducted another round of testing. This phase focused on three completed investments from the period 2017-2022. The aim was to assess the effectiveness of the tool in evaluating past projects and ensuring that it can provide relevant insights for future investments. The management and organization of pilot activities in Czech Republic were efficient, with testing and evaluation proceeding as planned. The timeline of the pilot action was adhered to, and no significant delays were reported. The update of the tool based on initial partner feedback was a necessary step to improve its functionality and usability. This corrective measure contributed to a more refined and practical evaluation process during local-level testing.

PP9-SIEA in its report stated that during the first phase of testing before the project meeting in Weiz, given that the application was still under development, they have decided to test responsive technologies from the 2017 - 2022 period only within the SIEA project team, without the participation of Slovak JET Alliance members. During the second phase of testing, due to the quite tight timeline during February 2025 and the workload of other activities, they have decided to prefer an online form of communication with Slovak JET Alliance partners during the second phase of testing.

PP10-Lodzkie in their report stated that the first testing was a bit complicated as there was no rating system for the answers and the results were not clear. They have reported that also the type of questions at the beginning was a bit confusing. These problems were mainly fixed in the later stage of the testing process.

2.2 Risk management protocol

As regarding the risk management protocol, in its report, **PP4** stated that risk management was an integral part of the pilot action implementation, aiming to ensure continuity and minimize disruptions. Potential risks were identified early, assessed for their impact, and addressed through pre-emptive measures. A flexible approach allowed for quick adaptation to emerging challenges, while ongoing monitoring ensured that any new risks were promptly mitigated. Effective communication with stakeholders and a structured problem-solving strategy played a crucial role in maintaining stability and achieving the project's objectives.



In its report, PP6 stated that several potential risks were identified and addressed through proactive measures. Challenges in securing timely confirmations from stakeholders were managed through early and continuous communication. The Technology Evaluation Tool had some limitations, particularly in its analytical capabilities, which were mitigated by incorporating additional qualitative insights. Delays in obtaining necessary documents for testing certain technologies were resolved through close collaboration with local authorities. A flexible and adaptive approach allowed for quick responses to emerging risks, while continuous monitoring ensured the stability and effectiveness of the project.

2.3 Evaluation of the impact of the pilot action

According to the PA 2 indicators set in the D.2.1.1 Transnational Pilot monitoring methodology, table 1 presents achieved indicators on the overall project level:



Table 1: Pilot action 2 key performance indicators

No	Name of the indicator	Measurement unit	Value achieved	Target
1.	PA2 STAGE 1 - Testing the tool for technology evaluation	Number of test launches at the local level	9 1HU, 1IT, 1DE, 1SI, 1CZ, 1SK, 1PL 1AT, 1HR	1 per partner
2.	Analysis of 2017-2022 technologies	Number of tested investments/technologies from the 2017-2022 period	27 3HU, 3IT, 3DE, 3SI, 3CZ, 3SK, 3,PL 3AT, 3HR	3 per partner
3.	Technologies to address challenges identified in Transnational Pilot 1	Number of technologies selected to address challenges identified by users of the Challenge Mapping Tool in PA1	27 3HU, 3IT, 3DE, 3SI, 3CZ, 3SK, 3,PL 3AT, 3HR	3 per partner



3. Testing the tool for technology-evaluation

As anticipated in the previous chapters, the testing process was divided in two phases. In the Phase 1, project partners were invited to test three technologies already implemented in the period 2017-2022, while in the Phase 2, project partners had to test three new technologies or investments with which they could address challenges identified in the Transnational Pilot 1.

3.1 Phase 1 - Application of the software to test 2017-2022 investments

In this section, it will be described the analysis of the tool based on the 2017-2022 investments. Each partner was invited to describe in the report one of three selected technologies - investments.

3.1.1 LP - BORA 94

Name of the technology/investment: **Energetic modernization of municipal buildings in Aszaló**



Before

After

Type of technology/investment: Renewable energy generation: photovoltaic systems

Duration of the implementation: 01.06.2019. - 28.06.2022.

Brief description of the investment:

The improvement concerned the primary school.

- The facade was insulated with 16 cm of insulation and the attic slab with 25 cm.
- All the windows and doors have also been replaced.
- The 14 solar panels of 345 Wp are powered by a 5kW inverter.
- A 45kW condensing gas boiler was installed, and the heat exchangers were replaced.
- The building is barrier-free.
- Reduction of fossil energy consumption: 1.612,53 GJ/year
- Reduction of greenhouse gas (GHS) emissions: 110,59 tons CO₂/year



Economic Metrics

Total implementation costs	164.601.179 HUF (cca. 403.000 EUR)
Potential savings in energy costs	3 388 566 HUF (cca. 8.300 EUR/year)
Number of jobs created	0
Number of employees involved in the implementation	22

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	110,59 tons CO2/ year
Reduction of electricity usage	5 584 kWh/year
Reduction of waste generation	15,16 GJ/year

Social Metrics

Public consultations and feedback	5
Accessibility of the technology/investment to marginalised groups	YES
Addressing inequality using the technology/investment	YES
Educating stakeholders about the new technology/investment	YES

Evaluation by the Technology-evaluation tool in % and general comment from the PP

Overall score: 75%

The high score shows that this particular investment (photovoltaic technology) is suitable for the targeted public building energetic renovations and provides great benefit to the next generation (school children) by reducing greenhouse gas emission, electricity usage and also for the municipality by saving on energy costs.

3.1.2 PP4 - Metropolitan City of Bologna

Name of the technology: Superbonus 110%

Type of technology/investment: Tax Incentive for Energy Efficiency in Buildings (focused on Emilia-Romagna)

Duration of the implementation: Initially introduced in July 2020, with extensions granted through 2023 and beyond, depending on legislative updates.

Brief description of the investment: The Superbonus 110% is a government-backed tax incentive program in Italy aimed at improving energy efficiency in residential buildings. It provides a 110% tax deduction for expenses



related to energy efficiency upgrades, seismic risk reduction, and the installation of renewable energy systems such as solar panels and heat pumps. The incentive applies to both individual homeowners and condominiums, encouraging sustainable building practices. The program has played a significant role in reducing energy consumption, lowering CO₂ emissions, and stimulating the construction sector in regions like Emilia-Romagna.

Economic Metrics

Total implementation costs	€11,627,429,915.85 (total investment, including non-eligible amounts)
Potential savings in energy costs	5.650 GWh/year (national level)
Number of jobs created	Estimated 153,000 new jobs in the construction and renewable energy sectors (national level)
Return on Investment (ROI)	Expected ROI period between 5-10 years for energy savings alone.
Incremental revenue growth	Significant growth in small- and medium-sized enterprises (SMEs) specializing in energy-efficient technologies.
Other	Tax Benefits Accrued: €12,052,858,330.68 (indicative of state-level savings and economic benefits)

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	Approximately 900,000 tons of CO ₂ annually.
Reduction of electricity usage	Reduced consumption by up to 30% in retrofitted households.
Reduction of waste generation	Managed through material recycling protocols in demolition and retrofitting processes.
Reduction of water usage	Minimal relevance, though some water-saving technologies were integrated.



Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	High involvement due to financial attractiveness and mandatory stakeholder consultation.
Public consultations and feedback	Conducted widely at municipal levels to align retrofitting projects with local needs.
Accessibility of the technology/investment to marginalised groups	Partial success; some low-income households struggled with upfront requirements for access.
Addressing inequality using the technology/investment	Focused on enabling energy savings in residential buildings across all economic strata, though some regional disparities remained.
Fair distribution of the benefits/risks among all stakeholders	The Superbonus 110% initiative posed risks for citizens due to tight deadlines and the inconvenience of construction disrupting daily life. For SMEs, challenges included volatile returns and uncertainty regarding project completion timelines
Educating stakeholders about the new technology/investment	Several workshops and training sessions for contractors and engineers were conducted

Evaluation by the Technology-evaluation tool in % and general comment from the PP

Overall score: 67%

The Superbonus 110% program offers significant socio-economic benefits by improving building safety, reducing energy costs, and promoting sustainability. It creates jobs, supports local businesses, and empowers vulnerable communities through energy savings and better living conditions. The high score reflects the program's positive impact on long-term economic development, job creation, and environmental sustainability. Overall, it provides both immediate and lasting benefits, particularly for disadvantaged groups.

3.1.3 PP5 - Bautzen Innovation Centre

Name of the technology: Big Battery Lausitz

Type of technology/investment: Energy storage system

Duration of the implementation: 2019-2020 (for construction; planning since ~2016)



Brief description of the investment: Big Battery Lausitz is an early example of the type of energy storage systems that will become increasingly common in Europe and the world as the energy transition moves forward. It was constructed by a company traditionally involved in lignite mining and burning, which is now working to realign their operations.

Economic Metrics

Total implementation costs	25 M EUR
Number of jobs created	10
Number of employees involved in the implementation	100
Return on Investment (ROI)	10-20 years (from 2020)

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	1.100 metric tons of CO2/year
Reduction of fuel consumption and/or change in the type of fuel used	1.400 metric tons of coal/year

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	N/A - It's not a project with a large area footprint and was built on land already belonging to the company that realized it (LEAG) and is situated in an industrial area, away from any residential zones. No specific records of community engagement exist, nor would this be a prerequisite for a project like this.
Public consultations and feedback	N/A - Same as above
Accessibility of the technology/investment to marginalised groups	Private individuals are able to access it indirectly during periods of low sustainable energy output, but not directly.
Addressing inequality using the technology/investment	This investment will contribute to stabilizing energy prices on the spot market, which will become more directly relevant to people as smart meters and live energy contracts (with prices based on spot market rates) become more common. It also contributes to the diversification of a traditionally coal mining and burning energy company (LEAG).



Fair distribution of the benefits/risks among all stakeholders	N/A - stakeholders in this case are a private company and the state (through a funding programme), not members of the general public.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	As this was in many ways a large pilot project, a number of new partnerships was made and/or intensified, including to specialist firms in the energy storage sector and companies from abroad with prior experience.

Evaluation by the Technology-evaluation tool in % and general comment from the PP

54%

The score is generally fair, since the evaluated investment is effectively a pilot project co-financed by private and public funds that has no direct community involvement. It will benefit the people in this area, but mainly in indirect ways. Given the focus of the Pilot 2, the score is reasonable.

3.1.4 PP6 - Local energy agency Spodnje Podravje

Name of the technology: Solar Power Plant and Energy Storage

Type of technology/investment: Production and Storage of Electricity from Renewable Sources

Duration of the implementation: 2020-2022

Brief description of the investment: Installation of a photovoltaic (PV) system for electricity production and a battery storage system powered by renewable sources (solar energy), integrated with a smart grid at a public facility - Vrtec Destrnik.

Economic Metrics

Total implementation costs	The total implementation costs (own resources + other resources (EU, EKO found Republic of Slovenia) were worth 65.724 EUR (own resources 33.968 EUR, other resources 31.756 EUR).
Potential savings in energy costs	Estimated energy cost savings are 2.6%.
Return on Investment (ROI)	Return on Investment (ROI) was 99.5%, which means that the investment generated almost twice as many savings as the funds invested in technology. The return period of the investment (amortization) was 63 months, i.e. 5,2 years.



Incremental revenue growth	The investment doesn't bring additional revenue. It's an reduction of expenses (reducing costs of primary electricity) - 2,6% on annual basis.
Other	The investment in technology on this facility increased the share of renewable energy sources (RES) in the municipality of Destrnik from 21% to 24% (4.6 MWh of additional electricity obtained from RES on yearly basis). It is about meeting the goals from the commitment that the share of RES in municipality of Destrnik will be 43% by 2030.

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	<p>An investment whose technology includes the transition to a renewable energy source reduces greenhouse gas emissions (GHG), which is the key to slowing down climate change and reducing environmental and health impacts.</p> <p>This system estimated yearly saving 9.100 kg carbon dioxide (CO₂). The estimated percentage reduction in CO₂ emissions resulting from the implementation of this technology is 3%.</p>
Reduction of electricity usage	<p>The photovoltaic (PV) system and battery storage reduce the consumption of primary (fossil) electricity from the grid by producing renewable electricity.</p> <p>The 24kWh PV system and the 20kWh battery storage system generate approximately 46MWh (26.000kWh + 20.600kWh) of renewable electricity.</p>

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	<p>The comprehensive involvement of the community in the energy investment enables a better understanding of the social context, strengthens cooperation and ensures that the project reflects the values and goals of the community, thus increasing the likelihood of long-term success.</p> <p>The organization of community cooperation focuses on identification (residents, local companies,</p>
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	<p>municipal authorities, youth groups), understanding (internal communication channels, support networks), inclusion (public consultations, workshops, coaching) and needs (social and economic; e.g. community solar farms) of the community into the planning process.</p> <p>Technology promotes community empowerment, which is crucial for sustainable development.</p>
Public consultations and feedback	<p>The importance of combining different sources and the role of RES (renewable energy sources) in the were the subject of public consultations with energy experts (energy agencies, energy institutes) and non-energy experts (mayors, local civic initiatives, general public).</p> <p>Through the Q&A (questions and answers) the participants discussed the obstacles they face in similar investments. Conclusion: the biggest obstacle is still the high costs.</p>
Accessibility of the technology/investment to marginalised groups	<p>This transition to renewable energy sources gives a fairer benefit to marginal groups. Striving for energy independence (by reducing reliance on external energy sources and increasing the stability and reliability of energy supply) helps protect vulnerable groups from energy price fluctuations.</p>
Addressing inequality using the technology/investment	<p>This type of investment is one of many energy projects that can contribute to local development in the future by increasing the number of similar projects. This can be reflected in employment opportunities and strengthening the economic resilience of community (new jobs created through/after projects and maintenance).</p>
Fair distribution of the benefits/risks among all stakeholders	<p>This energy transition shows a fairer benefit to all citizens as stakeholders. Public facility whose generated electricity is publicly available for charging electric vehicles at a local charging station. This type of project is the first step in changing the behaviour of citizens in the direction of taking responsibility for network load.</p>



	<p>The development of "smart" municipalities transfers the energy transition to other municipalities, which significantly contributes to the achievement of climate goals (the long-term decarbonization strategy).</p>
<p>Educating stakeholders about the new technology/investment</p>	<p>Through education (social aspect), support was created for local communities for this and similar investments in potential local projects.</p> <p>Several public consultations were held in the form of workshops as knowledge transfer for local policy makers for energy efficiency improvements. Municipalities benefit from inter-municipal exchanges, good networks, support in finding optimal solutions and further training.</p> <p>Events:</p> <ul style="list-style-type: none">- Organization of training for the municipalities of Spodnje Podravje for smart energy communities (energy planning, smart solutions).- Presentation of the Destrnik kindergarten demonstration project.- Guided tour of the Destrnik kindergarten demonstration project.- Round table in the municipality of Dornava on the possible implementation of district heating using wood biomass with a heat storage tank.- Discussion in the Municipality of Markovci about the implementation of communal PV installations in municipal public facilities. Discussion followed on the necessary steps, obtaining permits, project documentation and investment costs.- Discussion in the Municipality of Ormož about the implementation of two major PV installations at municipal public facilities. Discussion followed on the necessary steps, obtaining permits, project documentation and investment costs.- Discussion in the Municipality of Zavrč about the implementation of PV installations in municipal public facilities. Discussion followed on the necessary



	steps, obtaining permits, project documentation and investment costs.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	<p>Throughout the entire period of the project, created bonds of cooperation between different stakeholders (investor, local authorities, technical contractors and other interested groups) to unify their interests, roles and capabilities for easier coordination of goals.</p> <p>This made it easier to determine the responsibilities of individual partners, which increased transparency and trust between them, as well as mutual benefit and reciprocity (financial return, environmental impact - access to renewable energy sources).</p> <p>By maintaining relationships throughout the entire project period, the goal of the strategic partnership was to ensure replication of the project at another potential facility in the municipality or a partner municipality in Spodnje Podravje.</p>

Evaluation by the Technology-evaluation tool in % and general comment from the PP

General Comment on the Assessed Technology

The overall assessment score is 82%, indicating a high level of relevance and efficiency of the technology. The project is deemed feasible and beneficial, offering significant advantages for the environment, economy, and social well-being, while also presenting certain challenges. To maximize efficiency, further optimization and support from regulatory and financial mechanisms are recommended.

This technology plays a crucial role in reducing greenhouse gas (CO₂) emissions, contributing to the fight against climate change. Lower emissions lead to improved air quality and public health.

The use of renewable energy sources (RES) reduces reliance on fossil fuels, enhancing energy security, which is particularly beneficial for vulnerable groups. Local energy production also increases resilience to electricity price fluctuations.

By lowering electricity costs in public facilities, this technology frees up financial resources for other public services, ultimately improving the quality of life for residents. Affordable energy in public institutions (such as kindergartens, schools, and municipal buildings) strengthens their financial sustainability.

Moreover, engaging the local community in project planning and implementation fosters a sense of belonging and cooperation, while also enhancing energy literacy.



Challenges

The initial and ongoing costs of the technology are relatively high; however, the long-term benefits outweigh the investment. Subsidies and tax incentives have played a crucial role in the decision-making and approval process, significantly reducing investment costs.

A key long-term challenge is the recycling of photovoltaic modules and battery materials, which is essential to prevent re-pollution. The recycling process itself can be energy-intensive, potentially contributing to carbon dioxide emissions and negative environmental impacts, thereby complicating the green transition. Additionally, these materials are often difficult to separate during recycling, with some components being toxic. Strict handling procedures are necessary to prevent environmental contamination, which increases recycling costs, making the process expensive.

To effectively address these challenges, cooperation between governments, industry, and the scientific community is essential.

3.1.5 PP7 - IRENA - Istrian Regional Energy Agency

Type of technology/investment: Renewable energy generation: photovoltaic systems on the roof of elementary school Čepić

Duration of the implementation: 2014.

Brief description of the investment: The investment has represented one of the first installed small PV power plants on the public buildings in the Istrian County. The powerplant consists of 24 PV modules (250WP) which results with 6 kWp installed capacity in total. Equipment consists also of Sunny Tripower STP 6000TL -20 inverter, two -way electricity exchanger - Sunny Island 2224 and batteries (2x12vdc/230Ah) which provide autonomy of approximately 5kVAh reserve energy.

Economic Metrics

Total implementation costs	23,380.24 EUR
Potential savings in energy costs	1.200,00 EUR/year
Number of employees involved in the implementation	2 IRENA staff members

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	1,76 tons CO2/ year
Reduction of electricity usage	7.500 kWh/year

Social Metrics

Accessibility of the technology/investment to marginalised groups	YES
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Addressing inequality using the technology/investment	YES
Educating stakeholders about the new technology/investment	YES

Evaluation by the Technology-evaluation tool in % and general comment from the PP

Overall score: 71%

The high score shows that this particular investment (photovoltaic technology) is suitable for the targeted public building and provides great benefit to the next generation (school children) by reducing greenhouse gas emission, electricity usage and also for the municipality by saving on energy costs.

3.1.6 PP8 - Energy Agency Vysičiny

Name of the technology: Energy retrofitting of medical center

Type of technology/investment:

- **Building Energy Efficiency:**
 - o Energy refurbishment of building envelope
- **Heating and Cooling Innovations:**
 - o Heat pumps

Duration of the implementation: 8/2017 - 3/2020 including grant agreement and receiving subsidy

Brief description of the investment: Energy retrofitting of medical center building (including insulation of building envelope and exchange of windows) with replacement of heating source (gas heat pump).

Economic Metrics

Total implementation costs	119 450 €
Potential savings in energy costs	3 788 €
Number of employees involved in the implementation	5
Return on Investment (ROI)	-35,27% without subsidy, 19,1% with subsidy in 20 years horizon

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	20,3 t CO2 per year
Reduction of fuel consumption and/or change in the type of fuel used	118,21 MWh per year



Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Design and implementation were led by municipality - mayor and other members of council
Public consultations and feedback	No public consultations
Accessibility of the technology/investment to marginalised groups	Better quality of indoor climate for visitors of medical center.
Addressing inequality using the technology/investment	Not part of the project
Educating stakeholders about the new technology/investment	2 people (employees of medical center)
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	Design (Project documentation) was created by project office.

Evaluation by the Technology-evaluation tool in % and general comment from the PP

The energy retrofitting of the medical center received an overall score of **53%** according to the JETforCE Technology Evaluation Tool. The score reflects moderate socio-economic benefits, particularly in energy efficiency and emission reductions. However, the economic return without subsidies remains negative, which highlights the need for financial support mechanisms in similar projects. While the project positively impacts indoor climate quality, its broader social benefits, such as community engagement and public participation, were limited. Future projects of this kind may benefit from increased public involvement and awareness-building efforts.

3.1.7 PP9 - Slovak Innovation and Energy Agency

Name of the technology: **Installation of Solar Panels**

Type of technology/investment: Solar panels

Duration of the implementation: 3 months

Brief description of the investment: Installation of Solar Panels on 50 buildings.

Economic Metrics

Total implementation costs	718 200 eur
Potential savings in energy costs	469 275 eur
Number of jobs created	4



Number of employees involved in the implementation	7-8
Return on Investment (ROI)	17,8 years
Incremental revenue growth	2,18 %

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	158,33 tonnes
Reduction of fuel consumption and/or change in the type of fuel used	23 749 500 kWh

Evaluation by the Technology-evaluation tool

91 %

3.1.8 PP10 - Lodzkie Region

Name of the technology: COMPREHENSIVE THERMAL MODERNIZATION OF PUBLIC BUILDINGS IN THE DOBROŃ COMMUNE

Type of technology/investment: Low-emission economy - Thermal modernization of buildings

Duration of the implementation: 2016-08-30 - 2018-12-31

Brief description of the investment: Implementation of the project entitled "Comprehensive thermal modernization of public buildings in the commune Dobroń" aims to counteract the problems occurring in the commune. Thermal modernization of buildings will contribute to achieving thermal insulation requirements and energy savings in accordance with the parameters imposed by law and, consequently, will improve air quality through liquidation exceeding the permissible concentration of pollutants in the Pabianice powiat and Dobroń commune. The project is implemented in the Lodzkie Region, Pabianice County, Dobroń Commune. Its scope includes thermal modernization of 12 buildings: 6 residential buildings, 4 educational buildings, 1 building serving as a health center and kindergarten and the Commune Office building.

The main objective of the project is: Improving energy efficiency in the public sector and in the sector housing construction through thermal modernization of educational buildings, administration and buildings housing in the Dobroń commune.

Economic Metrics

Total implementation costs	20 011 882,45 PLN
Potential savings in energy costs	1 532 106,97 PLN
Incremental revenue growth	1 532 106,97 PLN



Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	129,70 tons CO ₂ / year
Reduction of electricity usage	602,48 MWh/year
Reduction of fuel consumption and/or change in the type of fuel used	YES, in 21 households

Evaluation by the Technology-evaluation tool

Total Score: 93%

Due to its scope, the project does not show many social indicators, but it has a significant impact on the environment by reducing CO₂ levels and improving the quality of life of residents of thermally modernized buildings. It seems that the application correctly assessed the analyzed project, despite some indicators not being met.

3.1.9 PP12 - Weizer Energy and Innovation Centre

Name of the technology: SoWeitConnected

Type of technology/investment: Direct Line System

Duration of the implementation: 3 years

Brief description of the investment: In the municipality of Thannhausen, a Direct Line System was installed to connect the households to the Municipality with the big PV-System and to share the generated electricity directly and without any grid-costs with the households.

Economic Metrics

Total implementation costs	160.000 EUR
Potential savings in energy costs	20.000 EUR per year
Number of jobs created	2
Number of employees involved in the implementation	6
Return on Investment (ROI)	8 Years (best case depending on electricity price)
Incremental revenue growth	20.000 EUR savings per year

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	7710 kg/year
Reduction of electricity usage	36.750 kWh per Year



Social Metrics	
Community engagement and participation in the design and implementation of the technology/investment	Yes Cocreation workshops
Public consultations and feedback	Yes
Accessibility of the technology/investment to marginalised groups	Yes
Addressing inequality using the technology/investment	Yes
Fair distribution of the benefits/risks among all stakeholders	Yes
Educating stakeholders about the new technology/investment	Yes
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	Yes

3.2 Phase 2 - Testing the software on technologies to address PA1 challenges

In this section, it will be described the analysis of the tool based on three types of technologies which can be used for addressing challenges identified in Transnational Pilot 1.

3.2.1 LP - BORA 94

Technology number: 1

Name of the technology: Energy renovation of the Mayor's Office in Monaj

Type of technology/investment: Biomass heating and photovoltaic systems

Duration of the implementation: 2 years

Brief description of the investment: The Municipality of Monaj wants to renovate the building of the Mayor's Office. The project will include the following improvements:

- Energy efficiency improvements to buildings by upgrading their external envelope (insulation of façades, plinths and attic floors, replacement of windows and doors)
- Modernisation and replacement of heat generating equipment: replacement of existing fossil-based heat generators with more modern fossil-based heat generators or installation of biomass boiler systems (heating modernisation, modernisation and replacement of heat transfer equipment)
- Construction of a small-scale maximum household power plant (MSHP) photovoltaic system
- Creating a barrier-free environment



Economic Metrics

Total implementation costs	28.890.214 HUF (cca. 72.330 EUR)
Potential savings in energy costs	134.430 HUF/year (cca. 337 EUR/year)
Return on Investment (ROI)	25 years

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	9,76 t Co2/year
Reduction of electricity usage	34,5 MWh/year

Social Metrics

Accessibility of the technology/investment to marginalised groups	YES
Addressing inequality using the technology/investment	YES
Fair distribution of the benefits/risks among all stakeholders	YES
Educating stakeholders about the new technology/investment	YES

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: By the energy efficient public building renovation, applying biomass heating- and photovoltaic systems, environmental harms can be reduced significantly.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The municipality will be able to save money on the maintenance costs of the public building, and the savings can be re-invested in local economies, local community initiatives.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Solely public (European Union ERDF) funding.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The local municipality owns the building; therefore, this question is not relevant.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The municipality has SECAP (as part of B-A-Z county), and this investment/technology is aligned with this local policy.



Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The planned investment cost is cca. 72.330 EUR, which is resulting in cca. 337 EUR/year savings. The return on the investment is more than 25 years, however it is necessary to invest in renewable energies due to environmental reasons.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: By a more energy efficient operating (e.g. reduction of CO2 emissions, primer energy use), the investment will positively impact the wellbeing of communities.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: N/R

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The energetic renovation of such important public building contributes to the long-term community empowerment since the use of renewable energy instead of fossil fuel will highly benefit not just the municipality workers but also the community members on a long run.

Overall score and brief description of the result:

52%

The intended investment has received more than 50% overall score, which means that it is worth to consider for implementation. Although the return on investment is very long (more than 25 years), but the socio-environmental impact overruns the economic aspects.

Technology number: 2

Name of the technology: Energy renovation of a Primary School in Taktaharkány

Type of technology/investment: Sustainable bioenergy: biomass heating system

Duration of the implementation: 2 years

Brief description of the investment: The Municipality of Taktaharkány would like to carry out an energy efficiency renovation of the external structures bordering the heated spaces of the primary school building and modernise the heating of the building.

After the investment, the reduced heat demand of the well-insulated building will be satisfied by the existing high efficiency condensing gas boiler, which will generate the heating medium for the hydraulic heating to be installed and will transmit it to the radiators controlled by thermostatic valves.

In the planned project, the following will be carried out:

- Energy efficiency improvements to the building by upgrading the external boundary structures (insulation of the façade and attic slabs, replacement of windows and doors)
- Modernisation and replacement of heat generating equipment: replacement of existing fossil-based heat generators with more modern fossil-based heat generators or installation of a biomass boiler system (heating modernisation, modernisation and replacement of heat emitting equipment, room-by-room temperature control)



Economic Metrics

Total implementation costs	198.915.675 HUF (cca. 498.000 EUR)
Potential savings in energy costs	3.618.452 HUF/year (cca. 9.000 EUR/year)
Number of jobs created	0
Return on Investment (ROI)	25 years

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	70,66 t Co2/year
Reduction of electricity usage	349,7 MWh/year

Social Metrics

Accessibility of the technology/investment to marginalised groups	YES
Addressing inequality using the technology/investment	YES
Fair distribution of the benefits/risks among all stakeholders	YES
Educating stakeholders about the new technology/investment	YES

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: By the energy efficient public building renovation, applying biomass heating system, environmental harms can be reduced significantly.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The municipality will be able to save money on the maintenance costs of the public building, and the savings can be re-invested in local economies, local community initiatives.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Solely public (European Union ERDF) funding.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The local municipality owns the building; therefore, this question is not relevant.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The municipality has SECAP (as part of B-A-Z county), and this investment/technology is aligned with this local policy.



Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The planned investment cost is cca. 498.000 EUR, which is resulting in cca. 9.000 EUR/year savings. The return on the investment is more than 25 years, however it is necessary to invest in renewable energies due to environmental reasons.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: By a more energy efficient operating (e.g. reduction of CO2 emissions, primer energy use), the investment will positively impact the wellbeing of communities.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: N/R

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The energy renovation of such important public building contributes to the long-term community empowerment since the use of renewable energy instead of fossil fuel will highly benefit not just the municipality workers but also the community members on a long run.

Overall score and brief description of the result: 50%

The intended investment has received 50% overall score, which means that it is worth to consider for implementation. Although the return on investment is very long (more than 25 years), but the socio-environmental impact overruns the economic aspects.

Technology number: 3

Name of the technology: Energy renovation of the Municipal House in the Municipality of Kesznyéten

Type of technology/investment: Biomass heating and photovoltaic systems

Duration of the implementation: 2 years

Brief description of the investment:

The Municipality of Kesznyéten wants to renovate the building of the Mayor's Office. The project will include the following improvements:

- Energy efficiency improvements to buildings by upgrading their external envelope (insulation of façades, plinths and attic floors, replacement of windows and doors)
- Modernisation and replacement of heat generating equipment: replacement of existing fossil-based heat generators with more modern fossil-based heat generators or installation of biomass boiler systems (heating modernisation, modernisation and replacement of heat transfer equipment)
- Construction of a small-scale maximum household power plant (MSHP) photovoltaic system
- Creating a barrier-free environment

Economic Metrics

Total implementation costs	43.313.600 HUF (cca. 108.440 EUR)
Potential savings in energy costs	390,014 HUF/year (cca. 976 EUR/year)



Number of jobs created	0
Return on Investment (ROI)	25 years

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	14,44 t Co2/year
Reduction of electricity usage	60,11 MWh/year

Social Metrics

Accessibility of the technology/investment to marginalised groups	YES
Addressing inequality using the technology/investment	YES
Fair distribution of the benefits/risks among all stakeholders	YES
Educating stakeholders about the new technology/investment	YES

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: By the energy efficient public building renovation, applying biomass heating- and photovoltaic systems, environmental harms can be reduced significantly.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The municipality will be able to save money on the maintenance costs of the public building, and the savings can be re-invested in local economies, local community initiatives.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Solely public (European Union ERDF) funding.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The local municipality owns the building; therefore, this question is not relevant.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The municipality has SECAP (as part of B-A-Z county), and this investment/technology is aligned with this local policy.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?



A: The planned investment cost is cca. 108.440 EUR, which is resulting in cca. 976 EUR/year savings. The return on the investment is more than 25 years, however it is necessary to invest in renewable energies due to environmental reasons.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: By a more energy efficient operating (e.g. reduction of CO2 emissions, primer energy use), the investment will positively impact the wellbeing of communities.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: N/R

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The energy renovation of such important public building contributes to the long-term community empowerment since the use of renewable energy instead of fossil fuel will highly benefit not just the municipality workers but also the community members on a long run.

Overall score and brief description of the result: 52%

The intended investment has received more than 50% overall score, which means that it is worth to consider for implementation. Although the return on investment is very long (more than 25 years), but the socio-environmental impact overruns the economic aspects.

3.2.2 PP4 - Metropolitan City of Bologna

Technology number: 1

Name of the technology: Conto Termico

Type of technology/investment: Energy Efficiency and Renewable Energy Investment Program

Duration of the implementation: Up 33 slow years

Brief description of the investment: It is an Italian government initiative that provides financial incentives for energy efficiency and renewable energy installations in buildings. The program offers grants for interventions such as the installation of solar panels, heat pumps, and energy-efficient systems. The goal 33 slo reduce energy consumption and promote the use of clean energy, with financial support given in the form of reimbursements based on the project's energy savings.

Economic Metrics

Total implementation costs	€2,000,000.000
Potential savings in energy costs	1,6 TWh/year
Number of jobs created	40.000
Return on Investment (ROI)	Expected ROI period between 5-7 years



Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	Approximately 500,000 tons of CO2 annually.
Reduction of electricity usage	Reduced consumption by up to 20%
Percentage of recycled materials used	Circa 30% of used materials were recycled

Social Metrics

Addressing inequality using the technology/investment	The program supports energy efficiency in both public and private sectors, but low-income households face barriers to upfront costs, limiting full access
Fair distribution of the benefits/risks among all stakeholders	While the program benefits individuals and municipalities, small businesses and contractors face risks due to delays in incentive payments and fluctuating energy prices
Educating stakeholders about the new technology/investment	Training programs for installers and workshops on renewable technologies have been implemented to improve knowledge across sectors
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	The program encourages collaboration between local authorities, energy service companies, and private entities to facilitate the transition to energy-efficient technologies

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The Conto Termico supports technologies that have positive environmental impacts, particularly for communities that are disproportionately affected by environmental harms, such as 34 low-income households and urban areas with high pollution levels. The key environmental benefits include:

Reduction in Air Pollution - By replacing inefficient fossil fuel-based heating systems with biomass boilers, heat pumps, and solar thermal systems, the program helps lower emissions of particulate matter (PM), nitrogen oxides (Nox), and sulfur dioxide (SO2), which contribute to respiratory diseases and poor air quality, especially in urban and industrial areas.

Decrease in Greenhouse Gas Emissions - Transitioning to renewable energy sources reduces CO2 emissions, helping to combat climate change. This is especially important for vulnerable communities that experience more extreme weather events, such as heatwaves and floods.

Lower Energy Costs for Vulnerable Groups - Many low-income households struggle with energy poverty, relying on inefficient heating systems that contribute to both high costs and indoor air pollution. By



incentivizing efficient systems, the Conto Termico helps reduce energy expenses and improves indoor air quality.

Encouraging Sustainable Resource Use - The use of solar thermal energy and heat pumps reduces dependence on non-renewable fossil fuels, decreasing overall environmental degradation.

Potential Risks:

Some biomass heating systems can still produce emissions if not properly maintained or if low-quality fuel is used.

Initial installation costs may be a barrier for lower-income households, even with incentives. Overall, the Conto Termico plays a crucial role in reducing environmental injustices by making an energy more accessible and improving air quality in areas that suffer from high pollution levels.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The Conto Termico boosts local economies by creating jobs in the renewable energy and construction sectors while reducing energy costs for households and businesses. It improves access to efficient heating and cooling systems, particularly for low-income communities, helping to combat energy poverty. By lowering energy expenses, families can allocate more resources to other essentials, improving their standard of living. The program also supports local suppliers and installers, strengthening regional supply chains and promoting long-term economic growth in the clean energy sector.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The Conto Termico is primarily financed through public funding managed by the Gestore dei Servizi Energetici (GSE), which provides direct incentives to cover a portion of the costs for energy efficiency and renewable energy upgrades. These incentives can reimburse up to 65% of eligible expenses, with funds disbursed in a lump sum or in installments depending on the investment size. Additional financing options may include private investments, bank loans, and regional grants that complement the national incentives. Some local governments and energy service companies (ESCOs) also offer financial support or financing models to help cover upfront costs.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The Conto Termico program does not involve direct community ownership or decision-making in the technology. However, it benefits communities by providing financial incentives for individuals, businesses, and public entities to invest in renewable energy and energy efficiency technologies. Low-income households and public entities (such as municipalities or social housing providers) are key beneficiaries, as they can reduce energy costs and improve living conditions through these upgrades. While these groups do not have ownership in the technology itself, they gain access to the financial returns from lower energy bills and improved comfort, effectively benefiting from the program's implementation.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The local regulatory and policy environment plays a significant role in the economic feasibility of the Conto Termico. Supportive energy policies, such as Italy's National Energy and Climate Plan (PNIEC) and regional incentives, promote the adoption of renewable energy and energy efficiency technologies, making them financially viable for households and businesses. Tax policies that offer tax deductions (such as those in the Superbonus 110%) and specific regulations for clean energy further reduce the initial



investment burden. These frameworks, alongside clear regulations on clean energy innovation, lower the financial risks and enhance the attractiveness of investing in renewable technologies, thereby improving the economic feasibility of projects under the Conto Termico.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The upfront costs of implementing technologies under the Conto Termico, such as solar thermal systems, biomass boilers, and heat pumps, can be significant, typically ranging from a few thousand to several tens of thousands of euros depending on the size of the installation. However, the program helps offset these costs by providing financial incentives that cover up to 65% of eligible expenses. Ongoing costs mainly include maintenance and operational expenses, which are typically lower than those of traditional fossil fuel-based systems. Over the long term, these technologies lead to substantial savings in energy bills, which can be especially beneficial for vulnerable communities, as they help reduce energy poverty. The long-term benefits, including lower energy costs, improved comfort, and reduced emissions, outweigh the initial investment, making it financially beneficial in the medium to long term, particularly for households with limited financial resources.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The technology supported by the Conto Termico positively impacts community well-being in several ways. By reducing energy costs, households, particularly in vulnerable communities, can allocate more resources to other essentials, improving overall living standards. The use of cleaner energy technologies, such as heat pumps and solar thermal systems, also improves indoor air quality, reducing respiratory problems associated with traditional heating methods. Furthermore, the program supports local job creation in the renewable energy and construction sectors, contributing to economic development. As demand for skilled workers increases, there is an opportunity for upskilling in renewable energy technologies, which enhances employment opportunities and long-term economic stability in local communities.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The Conto Termico project will create jobs in the region through both direct and indirect employment. Direct employment includes jobs for installers, technicians, and engineers who will be needed to install and maintain renewable energy systems like heat pumps, biomass boilers, and solar thermal panels. These roles will contribute to long-term job creation as the demand for energy-efficient solutions grows. Indirect employment will come from local suppliers providing materials, and service providers involved in supporting the technology's operation. Additionally, temporary construction or installation jobs will be created during the setup phase, benefiting local labor markets. Over time, as the use of renewable technologies increases, the sector will continue to generate sustainable employment opportunities, contributing to long-term economic growth.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The Conto Termico fosters long-term community engagement and empowerment by promoting energy independence and improving local sustainability. As communities adopt renewable energy technologies, they gain greater control over their energy use and costs, which enhances their resilience to energy price fluctuations. The program also creates opportunities for local involvement in decision-making, particularly through collaborations with municipalities, businesses, and local energy service providers. By encouraging the use of clean energy solutions, the program supports the development of local expertise in renewable technologies, empowering residents and local workers through training and upskilling opportunities. Additionally, the long-term environmental benefits of reduced energy consumption and lower emissions further encourage a sense of collective responsibility and



environmental stewardship, strengthening community cohesion and involvement in sustainable development.

Overall score and brief description of the result: 86%

The **Conto Termico** program demonstrates strong potential for creating long-term economic, environmental, and social benefits, especially for vulnerable communities. By promoting energy-efficient and renewable energy solutions, it helps reduce energy costs, improve living conditions, and generate local employment. Supported by government incentives and regulatory policies, the program enhances its feasibility and encourages the adoption of sustainable technologies. Overall, it has a significant positive impact on local communities, fostering energy resilience and sustainability.

Technology number: 2

Name of the technology: Eco-Bonus 65%

Type of technology/investment: Energy Efficiency and Renewable Energy Investment Program

Duration of the implementation: Up to 12 months

Brief description of the investment: It is an Italian government initiative that provides a **65% tax deduction** for energy efficiency improvements in residential and commercial buildings. This includes measures like the installation of insulation, energy-efficient windows, heating systems, and renewable energy technologies (e.g., solar panels). The goal is to reduce energy consumption, lower carbon emissions, and promote sustainability through upgrades that improve the overall energy performance of buildings.

Economic Metrics

Total implementation costs	€ 1,290,000,000
Potential savings in energy costs	0.85 TWh/year
Number of jobs created	35.000
Return on Investment (ROI)	Expected ROI period between 5-7 years

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	Approximately 290.000 tons of CO2 annually.
Reduction of electricity usage	Reduced consumption by up to 20%

Social Metrics



Addressing inequality using the technology/investment	The program supports energy efficiency in both public and private sectors, but low-income households face barriers to upfront costs, limiting full access.
Fair distribution of the benefits/risks among all stakeholders	While the program benefits individuals and municipalities, small businesses and contractors face risks due to delays in incentive payments and fluctuating energy prices.
Educating stakeholders about the new technology/investment	The program includes training programs for installers and workshops on renewable technologies to enhance sector knowledge.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	The Ecobonus 65% program encourages collaboration between local authorities, energy service companies, and private entities to facilitate the transition to energy-efficient technologies.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The technology reduces carbon emissions by shifting to renewable energy, which helps combat climate change that disproportionately affects vulnerable communities. It also improves air quality by reducing reliance on fossil fuels, benefiting communities in areas with high pollution. Additionally, energy efficiency measures lower energy costs, making it more affordable for low-income households and reducing the financial burden of high energy bills.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: Implementing this technology will provide significant socio-economic benefits to local communities. It will stimulate the local economy by creating jobs in construction, installation, and maintenance of renewable energy systems. The reduced energy costs from solar panels, heat pumps, and insulation will improve the standard of living, particularly for low-income households, by lowering utility bills. It will also increase energy independence, making communities more resilient to energy price fluctuations. Additionally, improved energy efficiency and cleaner environments will lead to better health outcomes, reducing healthcare costs and enhancing overall quality of life.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The financing options for the project in the region include public funding through government programs like Superbonus 110%, Ecobonus 65%, and Conto Termico, which provide tax credits and incentives for energy efficiency and renewable energy projects. Additionally, there are opportunities for private investment from banks or financial institutions offering loans or green financing. Some projects



may also benefit from grants or partnerships with local authorities and organizations, especially if they focus on public buildings or community-based initiatives.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: Communities that own or have a stake in the technology typically include homeowners, condominiums, public institutions, and local governments. Homeowners and condominium associations benefit financially through reduced energy costs and tax incentives, such as the Superbonus 110%. They may also decide on the type of energy improvements made to their properties. Public institutions, such as schools and municipal buildings, often play a role in the decision-making process and benefit from financial savings. Local governments can have a stake through projects that improve community infrastructure, reduce energy costs, and contribute to environmental goals.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The local regulatory and policy environment significantly impacts the economic feasibility of the project. Supportive energy policies, such as Superbonus 110% and Ecobonus 65%, provide financial incentives like tax credits and rebates, reducing the upfront costs for technology implementation. Additionally, regulations that promote clean energy, like renewable energy targets and energy efficiency standards, create a favorable market for such investments. These policies help make the project more economically viable by lowering initial costs, improving return on investment, and encouraging adoption of energy-efficient technologies.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The upfront costs of implementing the technology include the installation of renewable energy systems (such as solar panels), heat pumps, and insulation improvements, which can range from a few thousand to tens of thousands of euros, depending on the scale of the project. However, government incentives like the Superbonus 110% and Ecobonus 65% significantly reduce these costs.

Ongoing costs involve maintenance and occasional repairs, but they are typically lower than traditional energy costs. For vulnerable communities, these investments offer substantial long-term benefits in the form of reduced energy bills, improved living conditions, and lower reliance on external energy sources, making the technology both economically viable and sustainable. Over time, these savings often outweigh the initial costs, especially for low-income households, offering financial relief and enhanced energy independence.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The technology positively impacts the wellbeing of communities by improving health through better air quality and reduced indoor temperature extremes, which lower the risk of respiratory and heat-related illnesses. It promotes education and upskilling by creating job opportunities in installation, maintenance, and energy management, offering training to local workers. Additionally, the investment in energy-efficient and renewable technologies stimulates local development, boosting the economy by creating new jobs, reducing energy costs, and improving living conditions, particularly for vulnerable or low-income communities.



Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project will create both direct and indirect employment. Direct jobs will include roles in installation, maintenance, and energy system management (such as solar panel installers, HVAC technicians for heat pumps, and energy auditors). Indirect jobs will be created in related sectors like manufacturing of materials, logistics, and training programs for local workers. The project will also generate temporary construction jobs during the installation phase. Over the long term, jobs related to maintenance, energy efficiency consulting, and local service providers will continue to provide sustainable employment opportunities, benefiting the regional economy.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The technology fosters long-term community engagement and empowerment by involving local communities in the decision-making process and providing opportunities for active participation in the implementation. For example, communities may be involved in choosing the types of energy solutions for their buildings or neighborhoods. Additionally, the project creates opportunities for training and upskilling, enabling community members to take on roles in installation, maintenance, and energy management. This builds local expertise and self-sufficiency, empowering communities to manage their own energy systems and reduce dependence on external sources. The long-term benefits, such as cost savings and improved living conditions, further strengthen community resilience and autonomy.

Overall score and brief description of the result: 83%

The overall score reflects the positive impact and feasibility of the project. It demonstrates strong potential in creating long-term economic, environmental, and social benefits, particularly for vulnerable communities. The use of renewable energy technologies and energy-efficient solutions shows a clear potential to reduce energy costs, improve living conditions, and generate local employment. The project is supported by favorable government incentives and regulatory policies, enhancing its viability. Overall, the project is expected to have a high positive impact on local communities, fostering sustainability and resilience.

3.2.3 PP5 - Bautzen Innovation Centre

Technology number: 1

Name of the technology: Municipal heating network of Radibor (pop. ~3000)

Type of technology/investment: Public heating network including local heat generation

Duration of the implementation: 10 years

Brief description of the investment: The municipality of Radibor has initial plans to set up a heating network for its citizens. Realizing it will of course in large part depend on the availability of public funding, but they also intend to involve the community in more direct ways through the creation of an energy cooperative.

Economic Metrics	
Total implementation costs	~12 M EUR
Potential savings in energy costs	30%
Number of jobs created	~5



Number of employees involved in the implementation	-100
Return on Investment (ROI)	-20 years

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	25%
Reduction of fuel consumption and/or change in the type of fuel used	35%

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Yes, through creation of energy cooperative and practical necessity of having residents cooperate with these ambitious plans in the first place.
Public consultations and feedback	Yes.
Accessibility of the technology/investment to marginalised groups	Yes, benefits will be for all, whether they can make a financial contribution or not.
Addressing inequality using the technology/investment	Yes.
Fair distribution of the benefits/risks among all stakeholders	Yes.
Educating stakeholders about the new technology/investment	Inevitably, yes.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	Too early to be specific, but unavoidably, yes.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The public heating network will have positive environmental impacts by reducing reliance on fossil fuels, lowering carbon emissions, and improving air quality. For communities historically affected by industrial pollution, the switch to renewable energy sources like biomass or solar thermal will significantly reduce harmful emissions, benefiting public health. The project's focus on sustainability will minimize local environmental degradation, promoting cleaner, healthier living conditions for residents.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?



A: The heating network will provide socio-economic benefits by reducing heating costs for residents, which improves affordability and quality of life. It will create some local jobs in construction, operation, and maintenance. Access to reliable, affordable energy will improve living conditions, especially for vulnerable households. The project may also attract investment and potentially increase property values.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The project can be financed through a combination of public funding, EU grants, and low-interest loans aimed at supporting clean energy initiatives. Private investment will also be sought, especially from local stakeholders interested in sustainable development. Government incentives and subsidies for renewable energy infrastructure would further reduce upfront costs, while potential partnerships with regional utilities could help fund the network's construction and maintenance.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: In this project, local communities will have a stake through an energy cooperative, where residents invest in the heating network and share in the financial returns. The municipality itself will play a key role in decision-making, ensuring the project meets local needs. Community involvement could include representation in advisory boards or consultations to ensure the technology aligns with citizens' interests and priorities.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The local regulatory and policy environment supports the economic feasibility of the heating network through incentives like subsidies for renewable energy projects and favorable tax policies for clean energy initiatives.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The local regulatory and policy environment supports the economic feasibility of the public heating network through incentives, subsidies, and tax policies for renewable energy projects. Regulations promoting energy efficiency and sustainability align the project with regional climate goals.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The public heating network positively impacts community wellbeing by improving air quality and reducing health issues related to traditional heating methods, such as respiratory problems. It also creates opportunities for education and upskilling in renewable energy and infrastructure management, building a skilled workforce. The project encourages local development by creating jobs in construction, maintenance, and operation.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project will create direct jobs in construction, installation, and ongoing operation of the heating network. Long-term roles will include maintenance, system management, and customer service. Indirect employment will arise from local suppliers and service providers supporting the project. Training and upskilling opportunities in renewable energy and infrastructure management will prepare the local workforce for future roles in the green economy.

Question #9: How does the technology foster long-term community engagement and empowerment?



A: The technology fosters long-term community engagement by involving residents in decision-making processes, such as consultations and feedback opportunities. It also creates ownership through potential local investment models. Ongoing education and training programs in renewable energy and infrastructure management empower local workers. This active involvement ensures the technology aligns with the community's needs and priorities.

Overall score and brief description of the result: 97%
An almost perfect score, which does make sense as the municipality is doing pretty much everything right as far as involving their residents is concerned, at least in this early stage of the process.

Technology number: 2

Name of the technology: Citizen PV plant in Sohland

Type of technology/investment: Photovoltaics

Duration of the implementation: 2 years

Brief description of the investment: Following their already completed public PV project in Wehrsdorf, the Umweltinitiative Sohland is looking to repeat this success by expanding their operations and building another PV plant, this time on the roof of the gymnasium of a local school. Planning has progressed into the initial stages insofar that the fundamental feasibility has been evaluated and authorization by the local authorities has been granted.

Economic Metrics

Total implementation costs	25 K EUR
Potential savings in energy costs	5%
Number of employees involved in the implementation	~20
Return on Investment (ROI)	10 years

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	5%
Reduction of fuel consumption and/or change in the type of fuel used	5%

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Yes, per design.
Public consultations and feedback	Yes.
Accessibility of the technology/investment to marginalised groups	Yes.



Addressing inequality using the technology/investment	A little bit, yes.
Fair distribution of the benefits/risks among all stakeholders	Yes.
Educating stakeholders about the new technology/investment	Yes, wherever necessary.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	Most likely not.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The new PV plant will have positive environmental impacts by reducing reliance on fossil fuels and lowering carbon emissions. It will help improve air quality and mitigate climate change effects. Solar energy production is clean, renewable, and requires minimal maintenance.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The PV plant will provide socio-economic benefits by lowering energy costs for the school and potentially nearby facilities. It may create a few local jobs in installation, maintenance, and monitoring of the system. With the school benefiting from reduced energy expenses, more funds can be allocated to educational resources.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Similar to their previous project, Umweltinitiative Sohland will use crowdfunding to finance the investment.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The local community in Sohland and surrounding areas will have a stake in the technology through cooperative models. Residents and local businesses will be invited to invest in the PV plant, sharing in financial returns. The Umweltinitiative Sohland will involve the community in decision-making through consultations or advisory roles, ensuring the project aligns with local interests.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The local regulatory and policy environment supports the economic feasibility of the PV plant through incentives like subsidies for renewable energy projects and favorable tax policies for clean energy initiatives. Germany's strong regulatory framework for solar energy, including feed-in tariffs and grid access regulations, ensures stable revenue streams for such projects. Local authorities' approval and streamlined permitting processes further reduce barriers, making the project financially viable.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The upfront costs for implementing the PV plant include purchasing and installing solar panels, inverters, and related infrastructure. Ongoing costs involve maintenance, monitoring, and occasional repairs. However,



over time, the plant will reduce energy expenses for the school, freeing up resources for educational purposes.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The PV plant positively impacts community wellbeing by reducing energy costs, which can be redirected into improving educational resources at the school. It also contributes to better air quality by reducing reliance on fossil fuels, benefiting public health. The project creates opportunities for upskilling and job creation in renewable energy, fostering long-term local development.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project may create new jobs related to construction and maintenance, but it is unlikely that a single medium-sized solar power plant will create permanent employment for anyone just on its own.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: By involving local residents in decision-making processes, such as consultations or informational meetings about the project. Also, due to it offering investment opportunities or cooperative models, it allows the community to share in the financial returns. The project also empowers the community by providing educational opportunities related to renewable energy, which promotes sustainability.

Overall score and brief description of the result: 81%

Score here is lower than for the previous investment, which is clearly because this project with its much smaller scale really doesn't warrant / can't feasibly involve the aspects required for a higher score. The score itself is not unfair, but it seems there is still no way for the tool to really include the size and ambition of any given project into its score giving process, which could conceivably lead to some confusing scores in other contexts.

Technology number: 3

Name of the technology: Public EV charger in Hochkirch

Type of technology/investment: Charging station for EVs

Duration of the implementation: 1 year

Brief description of the investment: As inspired by a reported challenge, this theoretical project is an estimate of how feasible the comparatively minor investment of building an EV charger in a small town near a large road such as Hochkirch would be, if financed by citizens through a cooperative model.

Economic Metrics

Total implementation costs	15 K EUR
Number of jobs created	0
Number of employees involved in the implementation	10
Return on Investment (ROI)	5 years

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	10%
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Reduction of fuel consumption and/or change in the type of fuel used 10%

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Yes.
Public consultations and feedback	Yes.
Accessibility of the technology/investment to marginalised groups	Yes.
Addressing inequality using the technology/investment	Yes.
Fair distribution of the benefits/risks among all stakeholders	Yes.
Educating stakeholders about the new technology/investment	Yes.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	Probably not.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The EV charging station will have positive environmental impacts by encouraging the use of electric vehicles, which reduce greenhouse gas emissions and air pollution compared to traditional gasoline-powered cars. As this community is located near a busy road, the station will contribute to improved air quality and reduced noise pollution. The shift to electric vehicles also supports broader climate goals.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The EV charging station will have socio-economic benefits by attracting more electric vehicle owners to the town, potentially boosting local businesses. The station improves access to sustainable transportation, enhancing mobility and convenience for residents. Over time, it could also contribute to a higher standard of living by promoting cleaner air and supporting eco-friendly practices.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Financing for the EV charging station can come from a combination of public funding, EU grants for green mobility, and private contributions from local citizens or businesses. The local government may also explore low-interest loans or green bonds to secure additional capital. Public-private partnerships could help share the financial burden and bring in further investment from local stakeholders interested in sustainable infrastructure.



Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The local community will have ownership through private contributions from citizens who can invest in the project and share in potential financial returns. The town's residents, businesses, and local authorities will be involved in decision-making through public consultations or advisory groups. This ensures the project aligns with local needs and interests. The town will benefit from the long-term environmental and economic advantages of the station.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The policy environment supports the economic feasibility of the EV charging station through incentives such as subsidies for green infrastructure and tax policies that favor clean energy investments. National and EU regulations promoting electric vehicle adoption and the expansion of charging networks further enhance financial viability. Streamlined permitting processes for sustainable infrastructure also reduce bureaucratic hurdles compared to earlier points in time.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: Upfront costs for the EV charging station include purchasing and installing the charging units, electrical infrastructure, and potential site preparation. Ongoing costs involve maintenance, electricity, and operational expenses. While the initial investment can be significant, the long-term benefits outweigh these costs. Vulnerable communities will particularly benefit from better access to affordable and clean transportation options, improved health from reduced pollution, and potential job creation in the local green economy.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The EV charging station positively impacts community wellbeing by improving air quality, leading to better public health, especially by reducing pollutants from traditional vehicle emissions.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project will not directly create new jobs, as it is too small-scale for that.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The technology fosters long-term community engagement by involving local residents in the planning and funding process, allowing them to contribute to the project's success and have a stake in its outcomes. Public consultations and decision-making processes ensure that the station aligns with community needs and priorities.

Overall score and brief description of the result: 77%

Similar conclusion as previous investment, this is another fairly small project.

3.2.4 PP6 - Local energy agency Spodnje Podravje

Technology number: 1

Name of the technology: Water-to-Water Heat Pump

Type of technology/investment: Replacing Fossil Fuels with Renewable Energy Sources

Duration of the implementation: 2025-2026

Brief description of the investment: This project involves replacing fossil fuels with renewable energy sources in the municipal building and cultural hall in Dornava through the installation of a heat pump. The investment aims to enhance energy efficiency and reduce environmental impact by utilizing sustainable heating and cooling



technology. The primary objectives are to ensure a stable and efficient energy supply, decrease dependence on fossil fuels, and contribute to the sustainable development of the local community.

Economic Metrics

Total implementation costs	Total estimated costs (own funds + other sources, such as BORZEN) are estimated at EUR 244.000 EUR (own funds 154.000 EUR; other funds - subsidy 90.000 EUR).
Potential savings in energy costs	Estimated annual savings of 23.500 EUR, which is approximately a 40% reduction in electricity costs for heating.
Return on Investment (ROI)	<p>The annual rate of return is 15.3%.</p> <p>The investment would be repaid in 6.5 years.</p> <p>The return on the initial investment over 15 years is 129%, meaning the investment would yield 1.3 times the initial amount.</p> <p>The cumulative return (sum of all returns over time) is 229%, indicating that over the entire 15-year period, the total returns would amount to 2.29 times the initial investment.</p> <p>These calculations demonstrate that the investment is economically justified, as it would be repaid in less than half of its expected lifetime.</p>
Incremental revenue growth	The investment does not bring direct revenue growth, but rather a reduction in heating costs. Annually, it is expected to decrease from EUR 68.000 EUR to 42.000 EUR.

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	<p>A measure to use energy efficiently by switching to a renewable energy source and at the same time reduce dependence on fossil fuels and contribute to the sustainable development of the local community.</p> <p>Greenhouse gas emissions are key to reducing the impact of climate change, i.e. negative impacts on the environment.</p>
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	We anticipate a reduction in greenhouse gas emissions (CO ₂) at an annual level of 52t (66,600 kg CO ₂ - 14,420 kg CO ₂)
Reduction of electricity usage	We expect a 38% saving in electricity. From 333,000 kWh a reduction to 206,000 kWh.
Reduction of fuel consumption and/or change in the type of fuel used	It is planned to change the type of fuel for heating from natural gas to electricity from a renewable source - a water-to-water heat pump. The estimated reduction in natural gas is 13,000 m ³ .

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	The goal is to contribute to the general well-being of the community, so we are considering including community representatives (members of the municipal council, representatives of the cultural association) in a committee that would monitor the implementation of the investment and evaluate the effects of this investment.
Public consultations and feedback	Raising awareness among employees and visitors about energy savings. In order to reach the widest possible circle of the population, we plan to publish the presentation of the investment on the municipal website and in the municipal newsletter.
Accessibility of the technology/investment to marginalised groups	Information about the investment and the implementation timeline will be published regularly on the municipal website, on the municipal bulletin boards and in the cultural hall. This information will also highlight long-term benefits, such as lower heating costs and a smaller impact on the environment.
Addressing inequality using the technology/investment	With this energy project, we want to equip other municipally owned facilities (elementary school, multi-purpose hall) in the future and further increase the share of renewable energy sources.
Fair distribution of the benefits/risks among all stakeholders	Reducing risks in the field of public health. The expected results are noise reduction and improved air quality.



Educating stakeholders about the new technology/investment	In cooperation with the Eco Fund of the Republic of Slovenia (through their ENSVET program), we want to organize education for the residents of the municipality about this technology and its positive effects, as well as possible subsidies, during the implementation of the investment. Such education contributes to the empowerment of the population in the transition to a more sustainable and energy-efficient way of living and working.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	To implement the investment, we will conduct the activity within the framework of strategic partners with whom we already cooperate in the field of renewable energy sources. These are BORZEN (electricity market operator), Local Energy Agency of Spodnje Podravje, installation contractor. When implementing the investment, we also want to be known or recognized by like-minded people, with whom we can strategically connect in the future in the form of energy communities in the field of rooftop solar energy.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: This technology is one of the most efficient heating systems. It achieves a very high efficiency coefficient, its operation is independent of external temperatures, due to the stability of the water source temperature, which is especially crucial in the cold winter months. Due to its high efficiency, it allows for significantly lower heating costs. In the long term, it brings savings to the community, since with the received subsidy, the investment can be repaid already in half of its lifetime.

The high efficiency of the technology significantly reduces greenhouse gas emissions compared to fossil fuel heating systems. Reduced greenhouse gas emissions, in turn, improve air quality in the community area, which has positive effects on the health of residents, this is especially true for children and the elderly.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: By switching to a heat pump for heating, we will reduce our dependence on fossil fuels (in our case, natural gas). We will create conditions for greater energy independence and reduce the risk of fluctuations in fossil fuel prices. By reducing heating costs and improving air quality, the standard of living of residents will improve. Savings in heating costs will be allocated to other needs in the field of health and active leisure (outdoor fitness, free rental of a hall for physical and sports activities) for local associations. General price increases, global conflicts and price imbalances are also pushing the municipality towards the area of energy poverty. This more efficient heating system will help to some extent to avoid this situation in the long term.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The investment is expected to be financed from own funds (budget funds), in the amount of 55%, and subsidies from the Ministry of the Environment, Spatial Planning and Energy, in the amount of 45%, for which the tender is led by Borzen, the electricity market operator, which supports sustainable and energy projects as part of a fair green transition. Such incentives are key to implementing such investments, because only in this way will we be able to follow the policy of the National Energy and Climate Plan (NEPN), which sets goals for increasing the share of renewable energy sources by 2030.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The ownership of the technology will be under the jurisdiction of the Municipality of Dornava. The municipality will be the main investor, which will decide on the choice of technology, contractors, timetable and other key aspects of the project. A committee or working group (members of the municipal council, representatives of the cultural association) is envisaged to oversee the implementation of the project. With this group, we want to ensure the inclusion and participation of the community in the planning and supervision of the investment. Borzen (the institution for granting subsidies) will also play a role here, i.e. a partial financier, who will set certain conditions or requirements that will influence the decision-making. Its function may appear in the future in terms of project supervision or audit. The obligation is to meet the conditions for drawing funds.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: Feasibility largely depends on supportive energy policies and strategies that encourage the use of renewable energy, such as subsidies, financial incentives, and support schemes. These include the National Energy and Climate Plan (NEPN), which sets targets for increasing the share of renewable energy by 2030.

Tax relief measures are also available to help lower the costs of investments in renewable energy sources. However, challenges remain in obtaining the necessary permits. Regulatory requirements for construction permit often cause delays and increase project costs. The Renewable Energy Sources Promotion Act (ZSROVE) is expected to help in this regard. This act regulates self-supply of electricity from renewable sources, aiming to simplify the permitting process and grid connection procedures, thereby reducing administrative barriers and costs.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The initial costs of the technology include administrative expenses such as obtaining permits, conducting hydrogeological surveys, planning a preliminary project, implementing equipment installations, and completing the final inspection and acceptance process.

The estimated investment cost is 250.000 EUR (160.000 EUR from own funds and a 90.000 EUR subsidy). The expected ongoing costs, including management, maintenance, and insurance, are estimated at 3.000 EUR annually.

Since the introduction of this technology is supported by subsidies and tax incentives as part of renewable energy promotion programs, the long-term benefits outweigh the initial and ongoing costs. Lower energy expenses will free up budget resources, which we plan to redirect toward improving services for vulnerable groups in the social, health, and education sectors.

By reducing greenhouse gas emissions, we will contribute to a cleaner environment, positively impacting the health and well-being of all residents in the area.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The following positive impacts on community well-being are expected:

- The use of renewable energy sources will reduce harmful emissions, leading to cleaner air and improved public health, particularly benefiting children and the elderly.
- The selected technology can serve as a practical example for educational programs on renewable energy and sustainable development.
- Implementing renewable energy will enhance access to reliable and affordable energy.



- Involving the local community in the planning and supervision of the project is expected to foster a sense of ownership and cooperation.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: At this stage, we do not expect immediate direct job creation. However, we are confident that indirect effects and long-term benefits may generate opportunities in this area. Additionally, our investment will contribute, albeit modestly, to sustaining existing jobs for the contractor, who is based in a neighboring larger municipality within our shared region.

In the future, we plan to continue investing in renewable energy sources, such as ventilation systems and solar power plants. As activities related to management, monitoring, and maintenance expand, new job opportunities are expected to emerge.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The project aims to bring the community together around shared goals, including sustainability, emission reduction, and improving quality of life.

At the community level, we seek to foster cooperation among members and build partnerships with other organizations to achieve common objectives, such as reinvesting savings from renewable energy projects into other community initiatives. Looking ahead, we are particularly focused on community solar power plants, where households will play a key role. To support this vision, we aim to dedicate significant time to educating residents about the benefits of sustainable technologies, fostering greater awareness and commitment to sustainable development.

We recognize that empowering communities through active participation is essential for sustainable development and improving living conditions. Our vision includes long-term collaboration and community engagement, ultimately leading to energy independence.

Overall score and brief description of the result:

The answer will be given when the tool allows for the calculation of the actual total score. Currently, it has bottlenecks that prevent this, as the economic aspect of the database does not allow for the actual calculation according to the algorithm.

Technology number: 2

Name of the technology: Light Emitting Diode (LED) Lighting

Type of technology/investment: Replacement of existing lighting with energy-efficient lighting in Dornava Primary School

Duration of the implementation: 2025-2026

Brief description of the investment: The investment aims to optimize electricity consumption for school lighting, reduce operating costs, and enhance the working environment for students and staff. The existing outdated lighting system is inefficient, providing suboptimal illumination while generating unnecessary expenses due to high electricity consumption. This investment serves as a key measure to improve energy efficiency and minimize environmental impact through the use of sustainable technology.

Economic Metrics

Total implementation costs

Total estimated costs (own funds + other sources (Eco Fund of the Republic of Slovenia)) estimated at



	85.000 EUR (own funds 71.000 EUR, other funds - subsidy 14.000 EUR).
Potential savings in energy costs	Estimated annual savings of 13.000 EUR, which is approximately 70% savings in electricity for lighting on an annual basis.
Return on Investment (ROI)	<p>The annual rate of return is 18,2%.</p> <p>The investment would be repaid in 5,5 years.</p> <p>The return on the initial investment over 15 years is 173%, yielding 1,7 times the initial investment. The cumulative return, which is the sum of all returns over this period, is 273%. This means that over the entire 15-year period, you would receive 2,7 times the initial investment.</p> <p>The calculations demonstrate that the investment is economically justified, as it would be repaid at the beginning of the second third of its lifespan.</p>
Incremental revenue growth	The investment does not bring direct revenue growth, but rather a reduction in heating costs. Annually, it is expected to decrease from 68.000 EUR to 42.000 EUR.

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	<p>This energy efficiency measure will help reduce environmental impact and support the sustainable development of the local community. Greenhouse gas emissions serve as a key indicator of progress in mitigating climate change and minimizing negative environmental effects.</p> <p>We anticipate an annual reduction in CO₂ emissions of 21 tons, decreasing from 29.000 kg CO₂ to 8.000 kg CO₂.</p>
Reduction of electricity usage	We expect a 70% savings in electricity, with a reduction from 97.000 kWh to 27.000 kWh.
Reduction of waste generation	In the current lighting system, we use a variety of lamps (fluorescent, incandescent, and sodium), totaling 950 pieces. When switching to LED lighting, we estimate that we will need only 360 lamps. The



	current system requires us to replace up to 200 lamps annually due to failures. By switching to LED lighting, we will reduce waste by almost 20% annually.
Social Metrics	
Community engagement and participation in the design and implementation of the technology/investment	The aim is to contribute to the general well-being of the community by enhancing visibility and visual perception at school desks, workplaces, and blackboards. We are considering conducting a survey of students and teachers to better understand their needs and expectations regarding lighting. This will provide us with valuable insight into their concerns and suggestions.
Public consultations and feedback	Raising awareness among students and employees about the energy savings offered by this technology. Setting up information boards to demonstrate how simple measures can influence lighting consumption. The savings from these measures can be up to 10%.
Accessibility of the technology/investment to marginalised groups	Information about the investment and the implementation schedule will be published on the municipal website, municipal bulletin boards, and elementary school bulletin boards. The new lighting system will be significantly better adapted for people with disabilities, as motion sensors will ensure that the lamps are turned on as needed.
Addressing inequality using the technology/investment	We see positive impacts on addressing inequality through better lighting quality, as LED lamps emit more uniform and high-quality light. This will improve visibility and, consequently, learning outcomes. Students will be able to read and write more effectively under improved lighting conditions. LED lamps emit less heat, contributing to a more comfortable learning environment, especially during the warmer months of the year. Additionally, LED lamps have been proven to reduce eye fatigue, which is particularly important for students who read and work for long periods of time.
Fair distribution of the benefits/risks among all stakeholders	Investing in technology will certainly reduce the risk to public health. The long-term effects of eye strain



	can contribute to vision impairment and the need for corrective glasses. An additional risk factor is the financial burden on parents to purchase these glasses. LED bulbs do not contain mercury or other hazardous substances found in fluorescent bulbs, making them safer for children, employees, and the environment.
Educating stakeholders about the new technology/investment	In cooperation with the Eco Fund of the Republic of Slovenia (ENSJET network), we aim to organize lectures and workshops for students in grades 5 through 9, focusing on this technology and its positive effects.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	To implement the investment, we will collaborate with strategic partners in the field of renewable energy sources and efficient energy use. These partners include the ENSJET network (providing independent, free energy consulting in the areas of URE and OVE for citizens, legal entities, and the public sector), the Local Energy Agency of Spodnje Podravje, the installation contractor, the Institute for Occupational Safety and Environmental Protection, and the Eco Fund of the Republic of Slovenia.

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: LED technology has revolutionized the world of lighting due to its high efficiency and long lifespan. It allows for significantly lower costs because it converts a much larger proportion of the energy consumed into light rather than heat. In the long term, it brings savings to the community, as the investment is recouped after just a third of its lifespan. The high efficiency of this technology significantly reduces greenhouse gas emissions, as LED lamps use 70% less energy than traditional light bulbs. Reduced greenhouse gas emissions improve air quality in the community. LED lamps do not contain mercury, unlike fluorescent lamps, making them safer for both health and the environment. By reducing waste, they promote a fairer distribution of environmental burdens, benefiting communities exposed to landfills.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: By reducing energy dependence and lowering costs, we will enhance the economic resilience of the community to fluctuations in energy prices. By minimizing negative environmental impacts and improving air quality, the standard of living for residents will improve. Savings in electricity costs at the school will be redirected to other community needs. We also expect indirect positive health effects from better and safer lighting quality, such as reduced headaches, improved concentration among students, and prevention of low vision. Throughout the entire investment process, awareness of sustainable practices in the community will increase.



Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The investment is expected to be financed through 80% own funds (budget funds) and 20% subsidies from the Ministry of the Environment, Spatial Planning, and Energy. The tender is managed by the Eco Fund of the Republic of Slovenia, which supports sustainable energy projects within the framework of efficient energy use. Incentives are key to implementing such investments, as they enable us to align with the policy of the National Energy and Climate Plan (NEPN), which sets goals for increasing the share of efficient energy use by 2030.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The ownership of the technology will fall under the jurisdiction of the Municipality of Dornava. The Municipality will serve as the main investor, making decisions regarding the choice of technology, contractors, timetable, and other key aspects of the project. The Eco Fund of the Republic of Slovenia, as the institution responsible for granting subsidies, will act as a partial financier and may set specific conditions or requirements that influence decision-making. Its role may also include future supervision or auditing of the project. Our obligation is to comply with the conditions for securing funds.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: Feasibility largely depends on supportive energy policies and strategies that promote energy efficiency, such as subsidies, financial incentives, and support schemes. These include the National Energy and Climate Plan (NEPN), which sets targets for increasing energy efficiency by 2030. To implement the investment, we will adhere to technical regulatory frameworks, including building energy efficiency standards, regulations, and energy audit requirements. To further enhance the project and explore broader opportunities, we will commission an extended energy audit to identify energy inefficiencies and develop measures for a comprehensive energy renovation of the building.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The initial costs of the technology include administrative expenses, conceptual design planning, equipment installation, and the final inspection and acceptance. The estimated investment cost is 85.000 EUR, with 71.000 EUR covered by own funds and 14.000 EUR from subsidies. Ongoing costs, including management, maintenance, and insurance, are estimated at 1.000 EUR annually.

Since the introduction of this technology is supported by subsidies promoting energy efficiency projects and because its high efficiency significantly reduces electricity consumption (by 70%), the long-term benefits outweigh both the initial and ongoing costs. Lower energy expenses will improve the financial sustainability of the school, ensuring the long-term stability of educational services. Additionally, by reducing greenhouse gas emissions, we will contribute to a cleaner environment, positively impacting the health of all residents in the area.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The transition to LED lighting is not just a technological upgrade but a step toward a healthier, more informed, and more sustainable community, with benefits that extend both short- and long-term. The potential positive impacts on community well-being include:

- Improved learning conditions, leading to better academic outcomes.
- Reduced environmental impact through lower emissions.
- Enhanced community resilience to energy crises due to decreased consumption.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)



A: We do not anticipate immediate direct job creation at this stage. However, our investment may contribute slightly to sustaining existing jobs for the contractor, who is based in a neighboring larger municipality within our shared region.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: By promoting energy literacy, we aim to create a sustainable community within the school and municipal administration, fostering collaboration with other schools and public institutions to exchange experiences. Our goal is to empower the community by strengthening awareness that we all share responsibility for the environment.

Technology number: 3

Name of the technology: Solar Photovoltaic Power Plant (PV Power Plant)

Type of technology/investment: Renewable energy sources - Solar Energy / Photovoltaic Power Plant

Duration of the implementation: 2025-2026

Brief description of the investment: The investment involves installing solar power plants on the roofs of 17 public buildings in the Municipality of Ptuj, with a total nominal capacity of 1.6 MW. The purpose of this investment is to increase the use of renewable energy sources, reduce electricity costs, and contribute to the reduction of greenhouse gas emissions. The project will support sustainable development by promoting eco-friendly practices, raising awareness of the importance of renewable energy, and enhancing the community's energy independence.

Economic Metrics

Total implementation costs	Total estimated costs (own funds + other sources, including the Ministry of the Environment, Climate, and Energy) are estimated at 1.930.000 EUR (own funds 770.000 EUR; other funds - grants from the Recovery and Resilience Plan 1.160.000 EUR).
Potential savings in energy costs	Estimated annual savings 334.350 EUR, representing approximately 93% in electricity savings.
Return on Investment (ROI)	The annual rate of return is 43,4%. The investment would be repaid in 2,3 years. The return on the initial investment over 15 years is 551%, meaning the investment would yield 5,5 times the initial amount. The cumulative return (the total value the investment generates as a percentage of the initial value) is 651%, meaning that over the entire 15-year period, the investment would generate 6,5 times the initial amount.



	The calculations confirm that the investment is economically justified, as it would be repaid in less than three years within the defined 15-year lifespan.
Incremental revenue growth	The investment does not generate direct revenue growth but significantly reduces electricity costs. Annually, costs are expected to decrease from 371.000 EUR to 26.000 EUR.

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	This renewable energy technology, as a sustainable project, will contribute to a cleaner environment and align with the goal of combating climate change. We anticipate an annual reduction in greenhouse gas emissions (CO ₂) of 500 tons (from 543.000 kg CO ₂ to 39.000 kg CO ₂).
Reduction of electricity usage	We expect a 93% reduction in electricity consumption, decreasing from 1.810.000 kWh to 130.000 kWh.

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	The goal is to contribute to the overall well-being of the community. We aim to encourage citizens to consider harnessing solar energy by generating electricity through photovoltaic systems. The installation of the system will foster a sense of belonging within the local community, as residents will see the municipality taking steps toward sustainable development and environmental responsibility.
Public consultations and feedback	To enhance project acceptance, the community will be involved in several ways. An official presentation for the general public is planned at the city municipality's premises. Following this, a roundtable discussion will be held with the participation of the working group and technical experts, aiming to address any questions



	<p>related to the planning and implementation of the project.</p> <p>Local television, owned by the municipality, will play a key role in providing information and raising awareness through reports and interviews.</p> <p>Given the project's large scale, households will also be informed about the impact assessment in the planning, implementation, and operation of the system, in accordance with the principle of no significant harm.</p>
Accessibility of the technology/investment to marginalised groups	<p>The working group responsible for planning and implementing the investment will provide information about the project through various channels, including printed brochures, publications on the municipality's website, and updates in all public institutions involved in the investment. Additionally, roundtable discussions will be organized to ensure the inclusion of marginalized groups, such as the elderly, disabled individuals, and those with lower incomes.</p> <p>The emphasis will be on highlighting the long-term benefits, including lower costs, reduced emissions, and an improved quality of life.</p>
Addressing inequality using the technology/investment	<p>As the project is part of the Recovery and Resilience Plan, with a high percentage of co-financing from the EU, its large scale (17 buildings) will make a significant impact in addressing inequalities in a single step. These include improved access to significantly cheaper energy, better health outcomes, and the expansion of energy communities.</p>
Fair distribution of the benefits/risks among all stakeholders	<p>We see equitable benefits in the consistent reduction of energy costs, increased community awareness and involvement in sustainable development, and the fair distribution of shared financial savings among all stakeholders.</p>
Educating stakeholders about the new technology/investment	<p>The participating educational institutions—primarily primary schools—will integrate the topic of</p>



	<p>renewable energy sources into their curricula to raise awareness.</p> <p>Additionally, the municipal working group will facilitate informal education for the general public by providing relevant information and resources.</p>
<p>Strategic partnerships and joint ventures in the design and implementation of the technology/investment</p>	<p>To implement the investment, we will collaborate with strategic partners with whom we already work in the field of renewable energy sources. These include the Local Energy Agency of Spodnje Podravje, contractors for the planned building works, RCI Development Center, Public Services Ptuj, and the Ministry of the Environment, Climate, and Energy.</p>

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The technology produces clean energy without direct greenhouse gas emissions, helping to combat climate change.

By increasing the use of renewable energy sources, such as solar energy, we will contribute to greater energy sustainability and self-sufficiency. This will also enhance resilience to potential disruptions in the energy supply.

The technology will significantly reduce the high costs of electricity in public buildings. The successful implementation of the project will set a new strategic direction for investing savings in other sustainable projects or community improvements.

We anticipate an indirect impact in raising awareness among residents about the importance of sustainable energy sources and fostering greater interest in “green” technologies.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The implementation of this technology will reduce electricity costs in public institutions, such as schools, kindergartens, healthcare facilities, and multi-purpose halls. This will free up funds that can be redirected to other essential social needs, including education, healthcare, infrastructure, and social services.

Collaboration with local contractors is planned, which could stimulate economic activity and support the local business environment.

The introduction of solar power plants may also encourage the development of other green industries focused on energy efficiency and renewable sources. This could include comprehensive energy renovations of public buildings or the installation of photovoltaics in degraded areas, such as closed landfills for non-hazardous waste.

The municipality aims to promote the broader adoption of sustainable practices by raising awareness of resource conservation, clean energy, and environmental protection. This shift will positively influence cultural and social values.

By implementing this technology, the municipality will enhance its long-term sustainability, positioning itself as a competitive, environmentally conscious, and energy-efficient community.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The investment is expected to be financed through a combination of own resources (budgetary funds), covering 40%, and grants from the Ministry of the Environment, Spatial Planning, and Energy, covering 60%.



The funding will come from the Recovery and Resilience Plan under the "Green Transition" area, specifically the "Renewable Energy Sources and Energy Efficiency" component. The project aligns with EU strategic priorities and is highlighted in key programs such as NextGeneration EU and the European Green Deal.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The technology will be owned by the City of Ptuj, with the municipality serving as the investor. It will be responsible for selecting the technology, contractors, timeline, and other key aspects of the project. The Ministry of the Environment, Climate, and Energy will also play a role by setting the conditions and requirements for allocating non-repayable funds. In the future, its role may extend to project supervision or auditing. Our responsibility will be to fulfill the requirements necessary for securing the funds.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The feasibility of the investment is strongly influenced by supportive energy policies and strategies that promote renewable energy sources. A national energy policy that prioritizes renewable energy is essential for the project's success. Grants will significantly lower initial investment costs, enhancing economic viability and enabling a faster, more accessible implementation of the technology. The municipality aims to develop a strategy for transitioning to clean energy through a Local Energy Concept. Existing regulations and legislation support energy efficiency and renewable energy initiatives. Additionally, construction and technical regulatory frameworks—such as standards and guidelines for installing solar power plants—are flexible, allowing for a streamlined permitting process for public buildings. This will help reduce administrative barriers and accelerate project implementation.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The initial costs will include administrative expenses, the cost of the investment program, a local energy audit, project documentation for construction, execution of construction works, and the final inspection and acceptance. The estimated total investment cost is 1.930.000 EUR, 770.000 EUR funded from own resources and 1.160.000 EUR covered by grants. Ongoing costs will include management, maintenance, and insurance, estimated at approximately 10.000 EUR annually. The investment is expected to be co-financed through grants promoting renewable energy sources. Since solar energy production will significantly increase electricity self-sufficiency (93%), the long-term benefits will outweigh both initial and ongoing costs. Over time, these costs will become negligible compared to the substantial long-term savings and broader social and environmental benefits. Additionally, reducing reliance on external energy suppliers will enhance energy independence, contribute to greater price stability, and mitigate risks associated with global energy market fluctuations.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: Reducing reliance on external energy sources will enhance the community's energy stability, ensuring a more reliable power supply for educational institutions, healthcare services, and other essential infrastructure. Healthcare facilities will be able to allocate savings from lower energy costs toward improving patient care. Meanwhile, educational institutions will integrate environmental awareness into their curriculum, fostering sustainability-minded generations. The investment will involve collaboration with local companies for the installation, maintenance, and operation of solar power plants, supporting the local economy.



Increased use of renewable energy sources will help mitigate environmental challenges such as climate change and ecosystem degradation.

Additionally, the solar power plants will serve as a model for other communities and institutions, encouraging the adoption of sustainable technologies and raising awareness about the importance of environmental protection.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The investment is not expected to create direct jobs. However, we anticipate an indirect positive impact on employment, particularly in the following areas:

- Construction and maintenance of solar power plants,
- Development of the renewable energy industry, especially in data management for optimizing the operation of interconnected systems, and
- Support sectors such as logistics, engineering, and consulting.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: Community participation in the planning process will foster greater accountability and strengthen trust among stakeholders and external actors. Our goal is to create a more connected and engaged community. We envision long-term collaboration in expanding this technology through community energy cooperatives, where residents and local businesses could invest in solar power plants to become owners of their own energy sources, increasing their energy independence.

By involving the community, we will raise awareness of the importance of sustainable practices and renewable energy, encouraging greater participation in other eco-friendly initiatives such as recycling and water conservation.

Community engagement in energy projects will also boost self-confidence, strengthen social connections, and promote mutual support, laying the foundation for future collaboration in other areas.

Additionally, the technology will enhance the community's resilience to climate change by increasing energy independence, ensuring long-term stability.

By actively involving the community in the project, we will ensure a more equitable distribution of benefits, providing access to resources that might otherwise be out of reach.

3.2.5 PP7 - IRENA - Istrian Regional Energy Agency

Technology number: 1

Name of the technology: Establishment of green and sustainable public transport in Labin area

Type of technology/investment: Improvements in transport sector

Duration of the implementation: 2026-2027 onwards

Brief description of the investment: The project to establish a sustainable and green form of public transport is necessary to reduce urban traffic congestion, reduce pollutant emissions, improve active transport and offer the population an alternative to the current majority of transport by private cars using fossil fuels. The project aims to achieve target values in terms of emissions, support and promote the use of sustainable alternative fuels in transport and change the current habits of citizens. The main objective of the project is to offer citizens previously non-existent urban and suburban public transport lines and create a more accessible, cleaner and more cost-effective form of transport. The project initially plans to purchase a total of 3 electric minibuses, as well as the digitalization of public urban transport.



Economic Metrics

Total implementation costs	<p>Total estimated costs:</p> <p>Vehicle Procurement €750,000-€1,050,000</p> <p>Charging Infrastructure €150,000-€300,000</p> <p>First-Year Personnel Costs €194,000</p> <p>First-Year Operating & Maintenance €50,000-€100,000</p> <p>Marketing & Branding €30,000</p> <p>TOTAL INITIAL INVESTMENT approximately 1.500,000,00 EUR with annual cost of around €270,000 per year (for staff, energy, maintenance, insurance, and other operational needs).</p>
Potential savings in energy costs	<p>Annual savings per bus: €7,500-€11,000</p> <p>Annual savings for 3 buses: €22,500-€33,000 (in comparison to the buses powered by fossil fuels).</p>
Return on Investment (ROI)	<p>The ROI ranges from -0.99% to 6.97% per year, depending on the type of scenario used for the calculation. If a scenario is calculated in which savings will be minimal, then the ROI is negative and additional subsidies are needed to achieve a positive indicator.</p>

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	<p>We anticipate a reduction in greenhouse gas emissions (CO₂) at an annual level of 172.5-202.5 metric tons CO₂ saved per year (for 3 electrical buses).</p>
Reduction of fuel consumption and/or change in the type of fuel used	<p>Since the buses would be electrical, the use of this type of buses would result in total fossil fuel savings of ~37,500 liters of diesel annually.</p>

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	<p>From the beginning, the idea is to involve citizens in planning through organisation of public consultations, surveys, and workshops to gather feedback on routes, schedules, ticket pricing, and accessibility features. Also, the plan is to co-design</p>
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	<p>workshops with local businesses, elderly groups, students, and workers to ensure that the transport system meets actual community needs.</p> <p>When the buses will be purchased and ready for operation, the idea is to have pilot programs & test runs. It means to introduce a trial period where residents can test the minibuses, provide feedback, and suggest improvements before full implementation.</p>
Public consultations and feedback	<p>Are very important in order to design the public transport system on the best possible way. The idea is to conduct regular town hall meetings and online surveys to collect opinions before, during, and after implementation. Include marginalized groups (elderly, low-income communities, disabled individuals, women, youth) in discussions to ensure inclusivity. Publish progress reports and share environmental, economic, and social impact data with the public. Establish a community oversight group to monitor performance, recommend improvements, and increase trust in public transport initiatives.</p>
Accessibility of the technology/investment to marginalised groups	<p>It is plan to work on ensuring physical accessibility (purchase of low-floor electric minibuses with ramps/lifts for wheelchair users and individuals with reduced mobility), financial accessibility (discounted fares for students, elderly, unemployed, and low-income individuals.), geographical accessibility.</p>
Addressing inequality using the technology/investment	<p>The aim of the project is to provide affordable, reliable transport for low-income groups that enables better access to jobs, education, and healthcare.</p> <p>The public transport system should have flexible scheduling to cater to caregivers and shift workers.</p>
Educating stakeholders about the new technology/investment	<p>The process of educating stakeholders can be made by organising awareness campaigns such as public exhibitions and test rides.</p>



Strategic partnerships and joint ventures in the design and implementation of the technology/investment

The project has numerous possibilities in enhancing strategic partnerships and joint venture such as:

- Possible collaboration between Labin area municipalities, private transport companies, and technology firms for funding, maintenance, and smart ticketing.
- Establishment of partnership with Croatian universities & research institutes to study the long-term impact of electric public transport on air quality, urban mobility, and economic growth.
- Cooperation with tourist boards and hotel companies.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The transition to electric minibuses and the establishment of green and sustainable public transport can have significant environmental benefits. Electric minibuses significantly reduce environmental harms, with disproportionate benefits for low-income, elderly, and high-traffic exposed communities.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The implementation of the project aims to boost the local economy and create jobs by hiring bus drivers, maintenance technicians, charging station operators, and administrative staff. Enhanced transport will encourage longer tourist stays, benefiting hotels, restaurants. The project aims to improve connectivity for rural villages like Raša Kršan, and can ensure better access to healthcare and educational institutions, and provide inclusive transport for the elderly, disabled, and rural residents. When it comes to environmental benefits, it should result with significant CO₂ reduction, ensuring less traffic congestion.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Implementing electric minibuses and a sustainable public transport network in Labin and its surrounding municipalities will require a mix of funding sources. Given the EU's commitment to green mobility and Croatia's transition to sustainable transport, there are several viable public, private, and hybrid financing options available.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: At the moment, the project is in its planning phase, and the decision on who will have ownership of the technology has not been made. Ideally, it will be convenient if it will be operated by a public company owned by all municipalities from Labin area (City of Labin, Municipalities of Raša, Sveta Nedelja, Kršan and Pićan.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The economic feasibility of implementing electric minibuses and a green public transport network in Labin and surrounding municipalities is strongly influenced by Croatian national policies, EU regulations, and local incentives. Positive policy and financial support circumstances are those related on strong EU & Croatian policies that promote green mobility, there are tax incentives that make electric minibuses more affordable and also available grants and subsidies which significantly reduce initial costs. Challenges can be found in bureaucratic delays in funding approvals and initial infrastructure costs (charging stations, digital systems).

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The total upfront costs come around 1.500.000,00, which includes the purchase of 3 electric bus vehicles, charging infrastructure, smart transport system (ticketing, tracking, route optimization), bus depots and maintenance facilities, and training for drivers and staff. The ongoing costs are estimated around 300.000,00 EUR and they include driver salaries, electricity for charging, maintenance and repairs and administrative costs.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The introduction of electric minibuses and a green public transport network in Labin will significantly enhance community wellbeing by allowing students, job seekers, and low-income residents to reach schools, training centres, and workplaces more affordably, fostering education and upskilling opportunities. Additionally, the project can create local employment in driving, maintenance, and smart transport management, supporting economic growth. Cleaner, quieter streets will enhance livability, attract eco-conscious tourism, and encourage sustainable urban development, making Labin area a healthier, more connected, and economically vibrant community.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The green public transport project in Labin area can create both direct and indirect employment opportunities. Direct jobs will include the hiring of full-time drivers, along with maintenance staff, administrative personnel. Temporary jobs can be generated during the installation of charging stations, construction or upgrading of bus depots, and implementation of digital infrastructure.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The green public transport project in Labin will foster long-term community engagement by actively involving residents in planning, decision-making, and ongoing improvements. Through public consultations, surveys, and community meetings, local stakeholders can shape the transport network to meet their specific needs.

Overall score and brief description of the result: 79%

The green public transport project in Labin area is a forward-thinking, sustainable initiative that promises significant environmental, economic, and social benefits. By introducing electric minibuses, the project can help in reducing carbon emissions, improve air quality, and lower noise pollution. Overall, this initiative is a smart, future-proof solution that aligns with regional and European sustainability goals, making Labin a model city for green mobility and inclusive urban development.

Technology number: 2

Name of the technology: Use of renewable energy sources through the energy communities

Type of technology/investment: Renewable energy generation - PV systems

Duration of the implementation: The start of the operation is estimated for 2026.

Brief description of the investment: The obligation of the Istrian County is to strategically plan the sustainable management of energy resources in public facilities managed or used by the county, or its companies,



institutions or foundations. The Istrian County manages 152 public facilities, and has started with the installation of PV powerplants on the roofs of public buildings. At the moment, Istria County has installed photovoltaic power plants with a total installed capacity of 250 kW have been installed on 6 facilities, main electrical engineering projects for the installation of integrated photovoltaic power plants with a total installed capacity of 250 kW have been prepared for 5 facilities, for which permanent operation is expected by the end of 2025 and installation and commissioning of an integrated photovoltaic power plant with a capacity of 150 kW is planned for the facility of the Novigrad home for the elderly and disabled by the end of 2026. By taking all this into account, the plan is to establish an energy community with the aim of sustainable management of energy resources in public facilities. The second segment of the Energy Community planned to be established in the Istrian County is the segment of the energy community for protected cultural environments. In the first phase, IRENA, as the county energy agency, plans to establish an energy community in the City of Labin, which aims to enable the population, entrepreneurs and the public sector, located in the old town core, to be included in the energy transition process, from which they are exempted due to the impossibility of installing renewable energy sources, especially photovoltaic systems on buildings protected as cultural heritage.

Economic Metrics

Total implementation costs	Total estimated costs for the establishment of the energy community are around 5.000,00 EUR, and operating costs are 10.000,00 annually. This is all without investments in new PV powerplants. For the installation of additional 400 Kwp, the estimated cost for the installation is around 400.000,00 EUR,
Potential savings in energy costs	With the current PV production (250 kWp) (325,000 kWh/a) the potential savings are estimated at 58.500,00 EUR per year. When the capacity will be expanded with additional 400 kWp (650 kWp in total), the potential savings are estimated at 152.100,00 EUR per year.
Return on Investment (ROI)	The payback period for the new installation (400 kWp) is about 7 years, meaning the investment starts generating net profit relatively quickly. The ROI after 5 years is 17%, meaning the investment becomes slightly profitable within that period. The project will continue generating savings well beyond 10 years, as PV systems typically last 25+ years with minimal maintenance.



Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	For the initial capacity of 250 kW, it is estimated that the reduction is 76 tons of CO2 annually, and for the additional capacity (+400 kWp, total 650 kWp) it is estimated that the reduction of CO2 emissions will amount to 198,4 tons of CO2.
Reduction of electricity usage	Current (250 kWp) 325,000 kWh per year Future (650 kWp by 2026): 845,000 kWh per year

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	The project fosters community engagement by involving public institutions, businesses, and residents in decision-making.
Accessibility of the technology/investment to marginalised groups	The project aims to enhance the accessibility for marginalized groups by enabling their participation in the energy community without requiring individual investments.
Fair distribution of the benefits/risks among all stakeholders	The project aims to ensure a fair distribution of benefits and risks by structuring the energy community to include public institutions, businesses, and residents.
Educating stakeholders about the new technology/investment	The idea is that the project includes workshops, training sessions, and public awareness campaigns to educate stakeholders on renewable energy, energy communities, and financial benefits.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	The project will try to establish strategic partnerships with municipalities, energy agencies (IRENA), universities, solar companies, and financial institutions.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The project significantly reduces reliance on fossil fuels, lowering greenhouse gas emissions which helps mitigate climate change and improve air quality. By utilizing rooftops and public spaces for solar energy, the project prevents land degradation and habitat loss. Additionally, integrating solar power in the vicinity of heritage-protected areas allows equitable access to clean energy for communities otherwise excluded from the energy transition.



Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The project brings significant socio-economic benefits to local communities by reducing energy costs, creating jobs, and improving access to clean energy. Lower electricity expenses for public institutions free up resources for healthcare, education, and social services. The energy community model ensures that savings are reinvested locally, fostering economic resilience. Additionally, the project supports local job creation in solar installation, maintenance, and energy management, boosting the regional economy.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The project can be financed from different sources. From the public sources, the investment can be financed in the form of direct investment in PV powerplants on the roofs of public buildings, while citizens can invest in the PV powerplants which will form a joint investment of the members of energy community.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The ownership of the project/technology depends on who owns the PV powerplants. For existing solar power plants on public buildings, they are owned either by the Istrian County or by institutions managed by the county. For new solar power plants, ownership will depend on the investor structure (public, private-citizens or companies).

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The local regulatory and policy environment in Croatia generally supports the project's economic feasibility through tax benefits and supportive regulations. Croatia's National Energy and Climate Plan (NECP) promotes solar energy adoption. EU and national subsidies can reduce upfront costs, while tax incentives (e.g., VAT reductions on solar equipment) improve affordability. However, challenges like administrative barriers, grid connection regulations, and permitting processes may slow implementation. Policies supporting simplified permitting and faster grid integration could further enhance project feasibility.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The estimation for the project's upfront costs is €5,000 for registration and €400,000 for installing 400 kWp of additional PV capacity. Ongoing costs are €10,000 annually for staffing, accounting, and administration. Over 10 years, total costs reach €495,000. However, the long-term benefits far outweigh these costs. For vulnerable communities, reduced public facility energy costs can free resources for social programs, education, and healthcare, improving services. Additionally, stable electricity prices protect low-income groups from energy price volatility, while job creation in solar installation and maintenance provides economic opportunities. Over time, the project reduces energy poverty, enhances sustainability, and strengthens local economies, benefiting all residents.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The project promotes upskilling, offering training in solar energy installation, maintenance, and energy management, creating new job opportunities in the green sector. For local development, reduced energy costs for public institutions and businesses enhance economic stability, while increased renewable energy adoption strengthens the region's energy resilience. Overall, the project fosters a healthier, more educated, and economically stronger community.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project can create jobs, supporting short-term employment during installation and long-term positions in maintenance, energy management, and education. Direct jobs can include temporary roles for solar panel installation, electrical work, and project management, boosting employment in construction and



engineering. Over the long term, roles in system maintenance, energy monitoring, and administration ensure ongoing job creation. The project can also ensure upskilling opportunities, enabling workers to transition into the green energy sector.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The idea is that the project fosters long-term community engagement and empowerment by creating an energy community where residents, businesses, and public institutions collaborate in decision-making. By enabling participation in the green transition, the project empowers communities with energy independence, economic resilience, and a sustainable future.

Overall score and brief description of the result: 81%

The score reflects the importance of ensuring the possibility to share the produced renewable energy among the members of energy communities. Currently, in Croatia, legislative burdens don't allow the operating functionality of the energy communities, but it is expected that by 2026. Energy communities should be operational.

Technology number: 3

Name of the technology: Ensuring qualitative working force in the energy supply sector - organisation of practical workshops with high-school students

Type of technology/investment: PV systems; Heat pumps

Duration of the implementation: 2024

Brief description of the investment: The problem of the lack of qualified labor force is one of the main identified weaknesses that could jeopardize the speed of the energy transition in the Istrian Region. In this regard, IRENA launched the first workshop in 2015 to train students of secondary technical schools in the installation of heat pump systems. This workshop, then in the form of a nine-month practical educational cycle, was carried out as part of the LEGEND project and resulted in the energy renovation of two classrooms of the Mate Blažine Secondary School by installing a geothermal heat pump. The entire system was installed independently by students of the said secondary school under professional supervision, and it is still fully functional today and, in addition to the functions of heating and cooling the space, it also functions as an educational center. As part of this project, for the purposes of testing the tool, the installation of an aerothermal air-to-water heat pump with a capacity of 12 kW and two solar power plants with a capacity of 8.1 and 9 kW will be analyzed. The installation of the heat pump will be carried out by students of the Mate Blažine high school. Students from the same school will install and commission two solar power plants for socially vulnerable groups on the roof of the Singles' Home in Labin, and this is the only example of such an installation model in both Istria and the Republic of Croatia.

Economic Metrics

Total implementation costs	PV powerplants (8,1 + 9,45 kWp):14,200 + 15,000= 29.200,00 EUR Heat pump: 20.000,00 EUR
Potential savings in energy costs	Since the investment will be made on two different buildings, the data will be presented for each



	building separately. For the PV powerplants, the estimated annual savings are 2.700,00 EUR, for heat pump the potential savings for heating and cooling are around 1.400,00 EUR annually.
Return on Investment (ROI)	PV panels: 11 years Heat pump: 15 years

Environmental Metrics	
Reduction of greenhouse gas (GHS) emissions	PV panels: 5,27 tons CO ₂ /year Heat pump: 2,68 tons CO ₂ /year
Reduction of electricity usage	PV: 21.060 kWh per year Heat pump: 10.715 kWh per year
Reduction of fuel consumption and/or change in the type of fuel used	Heat pump: approximately 1.700,00 liters of light fuel oil per year

Social Metrics	
Community engagement and participation in the design and implementation of the technology/investment	Local students actively install and maintain heat pumps and solar panels under expert supervision, gaining hands-on experience.
Accessibility of the technology/investment to marginalised groups	The project provides cheaper solar energy to vulnerable groups, reducing energy costs. Students gain technical skills, enhancing job prospects.
Addressing inequality using the technology/investment	By providing cheaper solar energy to vulnerable groups and equipping students with valuable skills, the project reduces energy poverty and enhances job opportunities.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	The project involves partnerships between schools, local authorities, energy experts, and NGOs. Industry professionals provide training, ensuring quality installation and fostering collaboration for sustainable energy solutions.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?



A: The project reduces fossil fuel reliance and cuts electricity costs for disadvantaged groups, enhancing energy equity. By replacing polluting fuels with sustainable solutions, the project mitigates climate change effects.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The project boosts the local economy by training students in renewable energy, enhancing job prospects. Improved access to affordable, clean energy raises living standards and fosters energy independence. Local businesses benefit from increased demand for green technology, while the region gains a skilled workforce, supporting long-term economic growth and a sustainable energy transition.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Currently, the project is financed by IRENA, but in the future, participation from local authorities and private initiatives is also expected.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The ownership of the technology will be in the hand of the final users, in this case City of Labin for the two powerplants and High school Mate Blažine for the heat pump.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: At the moment, the tax incentives are only available in the form of 0% VAT for the installation of PV solar powerplants, but for the installation of heat pumps, there is only the possibility to apply for national calls financed by the Environmental Fund or Ministries.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The project's upfront costs are in total 49.200,00 EUR (29.200,00 for PV power plants and €20.000 ,00 for the heat pump). Ongoing costs include 1.500 EUR/year for electricity and maintenance. In the long-term, the project eliminates fossil fuel dependence, lowers energy costs, and significantly reduces the CO2 emissions, making it both financially and environmentally sustainable for the community.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: Lower energy costs support vulnerable groups, improving their quality of life. Local development benefits from a skilled workforce and investment in sustainable infrastructure, fostering long-term economic and environmental resilience in the region.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project creates jobs by training students in renewable energy installation and maintenance, enhancing their employability in the growing green sector. It increases demand for local technicians, electricians, and energy professionals. As renewable energy adoption expands, businesses benefit from new opportunities in equipment supply, installation, and servicing.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The project fosters long-term community engagement by involving students in hands-on renewable energy training, empowering them with valuable skills. It promotes sustainability awareness through educational initiatives and local partnerships.

Overall score and brief description of the result: 76%

The initiative is generally very well rated and gives positive feedback on the efforts that have been made to put the project into operation.



3.2.6 PP8 - Energy Agency Vysočiny

Name of the technology: Installation of photovoltaic power plant in ZOO Jihlava

Type of technology/investment: Renewable energy generation

Duration of the implementation: Expected duration of implementation of this project including elaboration of all necessary documents is about 9 months

Brief description of the investment: Installation of a PV power plant on the roofs of ZOO Jihlava buildings. ZOO Jihlava has the second-highest electricity consumption among properties owned by the City of Jihlava. Therefore, reducing its dependence on energy supplies is very important for them.

Economic Metrics

Total implementation costs	€ 165 000
Potential savings in energy costs	€ 16 461 per year
Number of jobs created	1
Number of employees involved in the implementation	7
Return on Investment (ROI)	11 % (10 years)
Incremental revenue growth	3 %

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	86 t CO2
Reduction of electricity usage	80 MWh per year
Percentage of recycled materials used	40 %

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	The project can involve local businesses, public consultations, and opportunities for community-owned energy initiatives.
Public consultations and feedback	Regular public meetings, surveys, and transparent communication ensure stakeholder involvement and feedback.
Fair distribution of the benefits/risks among all stakeholders	Benefits and risks are shared fairly among stakeholders, preventing monopolization and ensuring local impact.
Educating stakeholders about the new technology/investment	Educational campaigns can raise awareness about renewable energy.



Strategic partnerships and joint ventures in the design and implementation of the technology/investment

The project connect municipalities, technology firms,

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The installation of a PV power plant on the roofs of ZOO Jihlava buildings has predominantly positive environmental impacts. Solar energy reduces reliance on fossil fuels, lowering greenhouse gas emissions and improving air quality.

For communities that may be disproportionately affected by environmental harms, such as those near conventional power plants or areas with high pollution levels, this project contributes to a cleaner energy mix and reduced local emissions. Additionally, solar panels produce no noise or direct air pollution, minimizing their impact on the surrounding ecosystem.

However, some minor environmental concerns include the production and disposal of solar panels, which require raw materials and energy-intensive manufacturing. Proper recycling and disposal strategies can help mitigate these impacts.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The installation of a PV power plant at ZOO Jihlava will reduce energy costs, allowing the zoo to allocate funds to other essential areas like animal care and facility upgrades. It will create local job opportunities during installation and maintenance, boosting the regional economy. By increasing energy independence, the project helps stabilize costs and reduce reliance on external suppliers. It also provides educational benefits, raising awareness about renewable energy and sustainability among visitors and schools. Additionally, the shift to clean energy improves air quality and public health while enhancing the zoo's attractiveness, potentially benefiting local businesses.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The project can be financed through multiple options, including public funding from the City of Jihlava, which owns the zoo and may allocate budgetary resources to support the installation. Additionally, various subsidy programs and grants from national or EU funds, such as the Modernization Fund or Operational Program Environment, could provide financial assistance for renewable energy projects. Another viable option is the Energy Performance Contracting (EPC) model, where a specialized company finances and implements the project, with repayment covered by the savings on energy costs. Private investment or bank loans could also supplement funding, especially if the project demonstrates long-term financial viability through reduced electricity expenses.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The primary stakeholder in the project is the City of Jihlava, which owns ZOO Jihlava and would benefit from reduced energy costs and improved sustainability. As a publicly funded institution, the zoo indirectly serves the local community, which benefits from its financial stability and enhanced services. If the project receives subsidies or public funding, taxpayers contribute to its financing and share in its long-term benefits, such as lower municipal energy expenses. In the case of an EPC model, an energy service company (ESCO) would have a financial stake, recovering its investment through energy savings. Additionally, if private investors or grant providers are involved, they may influence decision-making regarding implementation and future expansions.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The local regulatory and policy environment plays a crucial role in the economic feasibility of the project, as supportive energy policies and financial incentives can significantly reduce costs. National and EU-level subsidies, such as those from the Modernization Fund or Operational Program Environment, make renewable energy projects more affordable. The Czech Republic's feed-in tariffs and net metering policies can also enhance the financial viability by allowing excess energy to be sold back to the grid. Additionally, municipal support from the City of Jihlava, including potential co-financing or administrative facilitation, can accelerate project implementation. However, regulatory hurdles, such as permitting processes or grid connection requirements, may impact timelines and costs, requiring careful planning to ensure compliance.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The upfront costs of installing a PV power plant at ZOO Jihlava include expenses for solar panels, inverters, mounting systems, installation labor, and potential grid connection fees. These costs can be partially offset by subsidies, grants, or EPC financing. Ongoing costs mainly involve maintenance, occasional repairs, and inverter replacements over the system's lifetime. While the initial investment may be significant, the long-term benefits—such as reduced electricity costs, energy independence, and lower carbon emissions—outweigh these expenses. Vulnerable communities benefit indirectly through improved municipal budget allocation, potential reductions in local energy costs, and environmental improvements, such as cleaner air and enhanced energy security.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The installation of a PV power plant at ZOO Jihlava positively impacts community well-being by improving air quality through reduced reliance on fossil fuels, leading to better public health. It creates educational opportunities by serving as a real-world example of renewable energy, helping schools, visitors, and local organizations learn about sustainability. The project can also support upskilling and workforce development by generating demand for skilled labor in solar installation and maintenance. Additionally, by lowering the zoo's operational costs, it allows for reinvestment in conservation, infrastructure, and community programs, enhancing local development and making the zoo a more attractive destination for residents and tourists.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project will create both direct and indirect employment opportunities in the region. Direct employment includes jobs for solar panel installation specialists, electricians, and engineers during the construction and setup phases. Ongoing maintenance of the PV system will also require technicians and service providers, ensuring long-term job creation. Indirect employment could arise from local businesses supporting the project, such as suppliers of materials, logistics, and administrative services. Additionally, the project may stimulate the local economy by creating demand for workers in the renewable energy sector, providing opportunities for upskilling and professional growth in emerging green technologies.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The PV power plant project fosters long-term community engagement and empowerment by involving local residents in the transition to renewable energy. It provides opportunities for education and awareness through the zoo's role as a sustainability ambassador, where visitors and schools can learn about clean energy and environmental responsibility. The project also empowers the community by creating local jobs and skills development in renewable energy fields, strengthening the local workforce. Additionally, the financial savings generated by the PV system can be reinvested into community programs, enhancing public services and infrastructure, thereby directly benefiting residents and encouraging their active participation in sustainability initiatives.



Overall score and brief description of the result: Total Score 27%

I was surprised with this poor result, nevertheless this investment probably does not meet the aim of JUST energy transition sufficiently.

Technology number: 2

Name of the technology: The installation of a green facade on a residential building.

Type of technology/investment: Passive cooling innovation

Duration of the implementation: Expected duration of implementation of this project is around one year.

Brief description of the investment: The investment involves installing a green facade to enhance the building's indoor climate during the summer months, providing natural cooling and improving air quality.

Economic Metrics

Total implementation costs	€ 10 200
Potential savings in energy costs	€ 160 per year
Number of employees involved in the implementation	3
Return on Investment (ROI)	1,6 % (62 years)
Incremental revenue growth	5 %

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	6,4 t CO2
Reduction of electricity usage	6 MWh per year

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Local communities and residents can provide feedback on the design and impact of the green facade.
Public consultations and feedback	Public consultations before installation to gather feedback on the green facade's impact and benefits,
Accessibility of the technology/investment to marginalised groups	Offering financing options or subsidies but not concretely for marginalised groups
Fair distribution of the benefits/risks among all stakeholders	Ensuring the benefits (energy savings, improved living conditions) for homeowners



Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The "green facade" technology has positive environmental impacts by reducing the heat island effect, especially during the summer. By promoting natural cooling through water evaporation from plants, it decreases the need for air conditioning and reduces energy consumption. This results in lower greenhouse gas emissions and improved air quality. For communities disproportionately affected by environmental harms, such as those in urban areas with high temperatures or poor air quality, this technology helps mitigate heat stress and improve the overall living environment, promoting healthier living conditions.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: Implementing green facades can lead to a reduction in energy costs by naturally cooling buildings in the summer, improving energy efficiency. This could have a significant impact on household budgets, particularly for low-income households. The project creates local job opportunities for professionals in landscaping, gardening, and building maintenance. Furthermore, the aesthetic value of a green facade enhances the appearance of urban spaces, potentially boosting property values and stimulating local economies. Long-term, the project contributes to a more sustainable and resilient urban environment, improving the overall quality of life for residents.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Financing options for implementing green facades in the region include public funding through government grants aimed at improving energy efficiency and sustainability, such as subsidies for households. The Czech government and the EU offer financial incentives for environmental projects, including for all income groups, which makes this technology more accessible to a wide range of residents. The City of Jihlava may also provide local financial support through green initiatives. Additionally, the Energy Performance Contracting (EPC) model could be an option for private investments, where savings from energy reduction can be used to repay the upfront costs of installation.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The primary stakeholders in the green facade project are the homeowners who implement the technology, as they will benefit from reduced energy costs and improved building performance. If subsidies are involved, the wider community, including taxpayers, has a financial stake in the project. Public authorities, such as the City of Jihlava, also have an interest in the project as it contributes to urban sustainability goals and overall community well-being. In terms of decisionmaking, homeowners and local governments are the main decision-makers, with homeowners deciding on the installation of the green facades and local authorities supporting the initiative through financing and regulation.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The local regulatory and policy environment plays a key role in making the green facade project economically feasible. The Czech Republic's energy policies encourage energy efficiency and sustainable building practices, which support the adoption of green facades. Government tax policies, grants, and subsidies for energy-saving measures further enhance the affordability of such projects for all income groups. Local policies, such as those from the City of Jihlava, may also provide additional incentives or streamline the permitting process, making it easier for homeowners to implement green facades. However, local regulations related to building modifications and vegetation management may need to be considered when planning the project.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?



A: Upfront costs for implementing green facades include purchasing plants, materials for installation, and labor for setup. Ongoing costs mainly involve maintenance, such as trimming and ensuring the health of the plants. In comparison to the long-term benefits, the project offers significant cost savings through reduced energy consumption for cooling, particularly for vulnerable communities where energy bills may be a higher proportion of household income. The green facade also contributes to the durability and energy efficiency of buildings, reducing future repair and renovation costs. Furthermore, the long-term environmental benefits, such as improved air quality and resilience to climate change, support the well-being of the community

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The green facade technology positively impacts the well-being of communities by improving air quality, reducing heat stress, and making living environments more comfortable, especially in urban areas. This leads to better health outcomes, particularly for vulnerable populations who may be more susceptible to heat waves and poor air quality. The project also offers educational opportunities, as it can be used to teach residents and local schools about sustainable building practices, environmental stewardship, and climate change adaptation. Moreover, by creating jobs in landscaping and construction, it promotes local development and offers upskilling opportunities for residents in green technologies and sustainable practices.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The green facade project will create both direct and indirect employment opportunities in the region. Direct employment includes jobs for landscaping professionals, horticulturists, and installation teams responsible for setting up the green facades. Ongoing maintenance jobs will also be created, including gardeners and maintenance staff to care for the plants. Indirect employment may arise from local businesses supplying materials, tools, or equipment for the installation and upkeep of the green facades. Additionally, the broader renewable energy and sustainability sectors may see job growth as the demand for eco-friendly building technologies increases.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The green facade project fosters long-term community engagement and empowerment by involving local residents in the transition to more sustainable, energy-efficient living. It provides opportunities for education and hands-on involvement in environmental initiatives, fostering a sense of ownership and responsibility for the local environment. By reducing energy costs and creating jobs, it also empowers communities economically. Over time, the project encourages the adoption of similar sustainable practices in the wider community, strengthening local resilience and promoting long-term environmental stewardship.

Overall score and brief description of the result: Total Score 0%

I realize that this project doesn't have very good measurable results = parameters. The main benefit is the improvement of the indoor climate in the house. However, given that the scores for the individual parts of the investment are quite high - on average around 75% - I was surprised by the result of 0%.

Investment 3

Name of the technology: The installation of photovoltaic panels on a supermarket parking lot

Type of technology/investment: Renewable energy

Duration of the implementation: Expected duration of implementation of this project is around half a year

Brief description of the investment: This project involves the installation of solar panels on the roofs of a supermarket's parking lot. The aim is to generate clean, renewable energy to power the supermarket and its operations, while reducing energy costs and the building's carbon footprint. The system will also provide shaded



parking spaces, offering additional benefits to customers. The project supports sustainability efforts and contributes to the reduction of greenhouse gas emissions.

Economic Metrics

Total implementation costs	€ 71 900
Potential savings in energy costs	€ 2 057 per year
Number of employees involved in the implementation	5
Return on Investment (ROI)	2,86 % per year (3,5 years)
Incremental revenue growth	5,71 % per year

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	36 t CO2
Reduction of electricity usage	55 MWh per year
Reduction of fuel consumption and/or change in the type of fuel used	40 %
Percentage of recycled materials used	40 %

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Collaboration with the local community through public consultations.
Public consultations and feedback	Public consultations to gather feedback and align the project with local needs.
Fair distribution of the benefits/risks among all stakeholders	Ensures shared benefits (lower energy costs, environmental impact) and manages risks.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The installation of photovoltaic panels on a supermarket parking lot has positive environmental impacts by reducing the supermarket's energy consumption and lowering its carbon emissions. This contributes to a cleaner, more sustainable environment. For communities that are disproportionately affected by environmental harms, such as urban heat islands, the shade provided by the solar panels can help mitigate heat stress, improving the comfort and well-being of residents and visitors, particularly during hot summer months.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The project will lead to a reduction in energy costs for the supermarket, which can translate into lower prices for consumers or reinvestment in other services. By generating its own clean electricity, the supermarket can reduce its dependence on external energy suppliers, contributing to local energy security. Additionally, the shading from the solar panels improves the comfort of customers parking their vehicles, which could increase foot traffic and sales at the supermarket, benefiting the local economy. The project also supports sustainability, which aligns with the growing demand for environmentally responsible practices, enhancing the community's overall standard of living.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Financing options for this project could include private investment from the supermarket itself, or through external funding such as green loans or investment from private companies focused on renewable energy. There are also opportunities for public funding and grants from national or EU level programs dedicated to supporting renewable energy projects and energy efficiency. For supermarkets, Energy Performance Contracting (EPC) could be an option, where the costs of installation are covered by the energy savings generated over time, minimizing the financial burden upfront. Local governments or municipalities may also offer subsidies to support sustainability initiatives.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The supermarket, as the owner of the parking lot and the recipient of the energy savings, is the primary stakeholder in terms of financial returns. The local community, however, benefits from the environmental and economic advantages, such as improved comfort in the parking area and the reduction of energy consumption and emissions. If public funding or grants are involved, taxpayers may also have an indirect stake in the project. Decision-making will primarily be in the hands of the supermarket and any private investors or contractors involved in the project, although local authorities may support it through funding or policy incentives.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The local regulatory and policy environment plays a significant role in the economic feasibility of the project. Supportive energy policies, such as incentives for renewable energy investments and subsidies for sustainable projects, make the installation of photovoltaic systems more affordable. Tax policies that favor clean energy, such as tax breaks or deductions for renewable energy investments, further enhance the project's economic feasibility. Local regulations may also streamline the permitting process for such installations, making it easier and quicker to deploy. Compliance with building codes and environmental standards is necessary but can also be facilitated by government policies promoting energy-efficient infrastructure.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The upfront costs of implementing the photovoltaic system include the purchase and installation of the solar panels, inverters, and related infrastructure, as well as any necessary site preparation. Ongoing costs involve maintenance and potential system upgrades over time. However, the long-term benefits—such as reduced electricity costs, lower carbon emissions, and improved comfort for customers—far outweigh these costs. Vulnerable communities benefit from the shading provided by the system, which helps mitigate the effects of heatwaves, and from the overall environmental improvements. Additionally, the supermarket may reinvest the savings from reduced energy bills into other community-friendly initiatives.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The photovoltaic system positively impacts community well-being by reducing the urban heat island effect through shading, which can improve the comfort and health of residents and visitors. The cooling effect of the solar panels reduces the risk of heat stress, making the parking area more comfortable, particularly in the summer. Moreover, the project supports local development by creating jobs related to the installation



and maintenance of the photovoltaic system. It also contributes to the broader goal of environmental sustainability, which can inspire further green initiatives in the region and raise awareness of clean energy options.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project will create both direct and indirect employment opportunities. Direct jobs include those involved in the design, installation, and maintenance of the photovoltaic system, such as engineers, electricians, and installation technicians. There will also be ongoing maintenance jobs to ensure the system operates efficiently. Indirect employment could be generated by local businesses that provide materials, tools, or other services required for the installation process. In the long term, there may be a continued demand for professionals in renewable energy and sustainable building practices, further boosting local employment.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The photovoltaic system fosters long-term community engagement and empowerment by involving local residents in a sustainable energy solution that benefits the environment and their everyday lives. The shading and cooling effect from the solar panels improve the quality of life for visitors, making them feel more comfortable and engaged with the supermarket's efforts to become more sustainable. As the project reduces the supermarket's energy consumption, it demonstrates the practical benefits of renewable energy, inspiring others in the community to consider similar environmentally friendly practices. Over time, this can lead to greater community awareness, participation in sustainability initiatives, and a sense of shared responsibility for environmental stewardship.

Overall score and brief description of the result: Total Score 54%

The average result, however, it is an installation of a photovoltaic system by a private entity, from which the general public will benefit through shading of cars in the parking lot.

3.2.7 PP9 - Slovak Innovation and Energy Agency

Number of the technology: 1

Name of the technology: Insulation of building of the public school

Type of technology/investment: Insulation of building envelope

Duration of the implementation: 2 months

Brief description of the investment: Insulation of building envelope of public building

Economic Metrics	
Total implementation costs	2 610 000 eur
Potential savings in energy costs	1 292 675 eur
Number of jobs created	20
Number of employees involved in the implementation	20
Return on Investment (ROI)	12 years
Incremental revenue growth	8,34 %



Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	5 000 tonnes
Reduction of fuel consumption and/or change in the type of fuel used	30 %

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	80 %
Public consultations and feedback	80 %
Accessibility of the technology/investment to marginalised groups	50 %
Addressing inequality using the technology/investment	50 %
Educating stakeholders about the new technology/investment	100 %
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	70 %

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: Reducing fuel consumption for heating and thus reducing air emissions.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: Significant reduction in building heating costs and thus financial savings. Creating a healthier environment inside the school building.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Use of the EU funding schemes related to decarbonisation in construction sector.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: Only in terms of financial returns.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)



A: In general, such projects are implemented with financial support from EU funds, which in Slovakia is managed at the national level.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: Approximately the same as the life of the insulation itself. With the EU subsidy used in this case, the return is 12 years, which is significantly less than the assumed life of the insulation of 25 years. Long-term benefits for residents (including vulnerable groups of the population, as this is a public building).

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: Local development, education in use and operation of new energy technology, upskilling of installers and workforce, learning of effective use of EU funds for support of innovative building renovation technologies.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: Creation of opportunity for employment of approximately 20 local construction workers as well as for related administration personnel and construction supervision during the implementation of the insulation project.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The community will benefit from the opportunity to use a modern building that offers both ecological and social benefits and motivates residents to replicate this solution for other public or private buildings requiring renovation.

Technology number: 2

Name of the technology: Reducing energy consumption of “non-green” sources

Type of technology/investment: Development and maintenance of local farm

Duration of the implementation: 2 years

Brief description of the investment: Development and maintenance of local farm

Economic Metrics	
Total implementation costs	100 %
Potential savings in energy costs	80 %
Number of jobs created	8
Number of employees involved in the implementation	4
Return on Investment (ROI)	10 years
Incremental revenue growth	10 %

Environmental Metrics	
Reduction of greenhouse gas (GHS) emissions	10 %
Reduction of electricity usage	70 %



Reduction of fuel consumption and/or change in the type of fuel used 10 %

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Yes
Public consultations and feedback	No
Accessibility of the technology/investment to marginalised groups	Yes
Addressing inequality using the technology/investment	Yes
Fair distribution of the benefits/risks among all stakeholders	No
Educating stakeholders about the new technology/investment	Yes
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	No

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: Reducing energy consumption of "non-green" sources.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: Increasing living standards.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Private investment.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: -

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: Supportive policies.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?



A: -

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: Definitely - health, local development.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: Development and maintenance of farm.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: -

Technology number: 3

Name of the technology: Installation of RES technology (PV Panels) in an apartment building using a model of Renewable Energy Community (REC)

Type of technology/investment: PV Panels

Duration of the implementation: 5 days

Brief description of the investment: Installation of PV system in an apartment building using a model of REC

Economic Metrics

Total implementation costs	50 000 EUR
Potential savings in energy costs	50 000 EUR
Number of jobs created	1
Number of employees involved in the implementation	8
Return on Investment (ROI)	100 %
Incremental revenue growth	10 %

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	40 %
Reduction of electricity usage	80 %
Reduction of fuel consumption and/or change in the type of fuel used	15 %

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Yes
Public consultations and feedback	Yes



Accessibility of the technology/investment to marginalised groups	Yes
Addressing inequality using the technology/investment	Yes
Fair distribution of the benefits/risks among all stakeholders	Yes
Educating stakeholders about the new technology/investment	Yes
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	Yes

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: Reducing energy costs increasing diversification of energy sources, supporting exclusively renewable energy sources without causing secondary environmental damage.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The concept of Renewable Energy Community supports local communities, supports the creation and development of jobs at the local level. Since the goal of the community is not to generate profit, the generated revenue (savings) can be reinvested or directed into the local economy and other community projects. Providing affordable and cheap electricity for socially vulnerable groups, classified as energy poor -> directly contributes to increasing their standard of living.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

- Private resources: limited, due to regional imbalances and population structure,
- State financing instruments such as SFRB and building savings: limited, as the current rules for drawing these supports do not allow it
- Public financing: possible, but it is necessary to ensure a measurable and continuous system of providing support financing/guarantee schemes
- Grants: possible.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

- A:**
- Civil communities: 100% (each member of the community has proportionally equal decision-making rights)
 - Self-governing communities: 100% (each community entity has proportionally equal decision-making rights).
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Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)



A: There is no local supportive regulatory policy, rather the opposite: the national regulatory office prefers the monopoly position of large electricity producers and suppliers over the possibility of self-production at the regional, community level >there is no tax, political relief, or support for community energy activities yet > moreover, the given intention for community clean energy is disadvantaged by the need to replace the IMS at the user's (community member's) cost of €150 (without support or a state financing model).

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: For 1 apartment building (48 apartment units), expected cost of construction of PV: 30 kWp and 20 kWh battery storage: approx. 50 000 €; Ongoing operating costs: approx. 1500€/year/house, or 2.5€/month/apartment (family).

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A:

- Renewable energy source -> direct positive impact on clean air at the place of production
- Local energy community -> supports education and the creation of jobs and skills at the local/community level
- Community energy -> this is a modern tool, an innovation that will prevent the outflow of young people outside their home and, conversely, help attract them back.
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Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A:

- support of SK installation and service companies providing PV installation,
- support of local energy community administrators (similar to current housing administrators)
- possibility of secondary redistribution of revenues to local community projects (schools, kindergartens, community gardens, etc.).

Question #9: How does the technology foster long-term community engagement and empowerment?

A: This is to support the use of promising, sophisticated, technical and energy systems with a long lifespan (today's PV systems have a lifespan of 20-25 years).

3.2.8 PP10 - Lodzkie Region

Technology number: 1

Name of the technology: Replacement of heat sources in the Osjaków commune

Type of technology/investment: Heating and Cooling Innovations / Heat pumps

Duration of the implementation: 2020-03-23 - 2022-12-28

Brief description of the investment: The main goal of the project is: Reducing air pollution in the Osjaków commune through replacement low-efficiency and non-ecological heat sources into new heat sources more ecological. The scope of the project includes the replacement of heat sources (including purchase and installation of equipment) infrastructure for the production of thermal energy using boilers pellet (10 pcs.), gas (4 pcs.), air heat pumps (22 pcs.), ground heat pumps (16 pcs.) in single-family buildings located in the Osjaków commune.



Economic Metrics

Total implementation costs	4 858 689,72 PLN
Other	Number of modernized heat sources [pcs.] - 52

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	202,60 tons CO2/year
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Social Metrics

Accessibility of the technology/investment to marginalised groups	The technology is available to residents of 52 buildings in the Osjaków commune covered by the investment
Educating stakeholders about the new technology/investment	Within investment, the introduced technology will be promoted

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The investment leads to a reduction in air pollution in the Osjaków commune, which has a direct impact on the residents commune (52 households), and indirectly to all residents of the commune and nearby areas of the Lodzkie Region.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: A significant reduction in CO2 emissions affects the air quality in the Osjaków commune and, as a result, the health of its inhabitants, their quality of life, and the attractiveness of this area for visitors. In addition, reducing the level of energy poverty.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The project was financed by the Regional Operational Program of the Lodzkie Region for 2014-2020 (public funding).

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The project is financed by the local government - the Osjaków commune. In turn, it is the recipients of support - residents from rural areas - who will be the owners of new, ecological heating devices: low-emission stoves and heat pumps.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The project was implemented by the local government. The area of the Osjaków commune is located in the Transition Area of the Lodzkie Region.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?



A: The total value of the investment amounted to PLN 4,858,689.72 (approx. EUR 1,160,000.00). Its main goal is to improve the living conditions of the inhabitants of the Osjaków commune. The long-term effect of the investment will be the improvement of the health of the local community.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The most important long-term impact of the investment is to improve the health of residents and reduce the negative impact on the environment. As a further consequence, this may increase the number of visitors to the commune.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The investment provided temporary jobs during construction works. It does not generate permanent new jobs.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: Implementation of an investment that directly affects the local community increases residents' awareness and their sense of responsibility for their immediate surroundings.

The investment will also reduce domestic energy costs, due to the rising price of fossil fuel energy. It will also help reduce energy poverty in the commune.

Overall score and brief description of the result:

Total score: 62%

Technology number: 2

Name of the technology: RENEWABLE ENERGY SOURCES IN THE MUNICIPALITY OF KAMIENÍSK

Type of technology/investment: Renewable Energy Generation

Duration of the implementation: 2019-09-01 - 2021-10-31

Brief description of the investment: The primary goal of the project is to achieve an ecological effect consisting in increasing production of electricity from renewable sources in the commune. The direct goal of the project is: design, purchase, delivery and installation of 223 RES micro-installations, including 100 PV micro-installations, 104 solar collectors and 19 biomass boilers, used to partially cover the needs of farms households for electricity and heat.

Economic Metrics

Total implementation costs	3 352 992,73 PLN / approx. 800 000,00 EUR
Number of employees involved in the implementation	The contractor's employees were involved in the investment implementation process for the duration of the work
Other	Additional power of electricity thermal light source [MWt] - 0,88 Additional power generation capacity electricity from renewable sources [MWe] - 0,38



Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	521,13 tons CO2
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Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	During the implementation of the project promotional activities will be implemented in accordance with the principle non-discrimination and accessibility for people with different disabilities types of disabilities.
Public consultations and feedback	During the implementation of the project promotional activities will be implemented in accordance with the principle non-discrimination and accessibility for people with different disabilities types of disabilities.
Accessibility of the technology/investment to marginalised groups	The technology is available to residents of buildings in the Kamięńsk commune covered by the investment
Educating stakeholders about the new technology/investment	Within investment, the introduced technology will be promoted.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The investment leads to a reduction in air pollution in the Kamięńsk commune, which has a direct impact on the residents commune (households covered by the project), and indirectly to all residents of the commune and nearby areas of the Lodzkie Region.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The primary goal of the project is to achieve an ecological effect consisting in increasing production of electricity from renewable sources in the commune. A significant reduction in CO2 emissions affects the air quality in the Kamięńsk commune and, as a result, the health of its inhabitants, their quality of life, and the attractiveness of this area for visitors.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The project was financed by the Regional Operational Program of the Lodzkie Region for 2014-2020.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The decision-making entity regarding the project is the Kamięńsk Commune and the building owners who decided to join the project.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The project was implemented by the local government. The area of the Kamięńsk commune is located in the Transition Area of the Lodzkie Region.



Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The total value of the project was 3 352 992,73 PLN / approx. 800 000,00 EUR. The project is to design, purchase, delivery and installation of 223 RES micro-installations, including micro-installations, solar collectors and biomass boilers, used to partially cover the needs of farms households for electricity and heat. Purchase and installation of complete PV installations equipped with a set of photovoltaic modules using solar energy to produce e.g. for own needs with the possibility of sending the surplus energy to the power grid.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: Thanks to the used technologies, significant savings will be possible in the long term. At the same time, greener energy sources will provide healthy environment for the community citizens.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The investment provided temporary jobs during construction works. It does not generate permanent new jobs.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: Implementation of an investment that directly affects the local community increases residents' awareness and their sense of responsibility for their immediate surroundings.

Technology number: 3

Name of the technology: Construction of a nursery using passive technology in Sulmierzyce

Type of technology/investment: Building Energy Efficiency / Energy refurbishment of building envelope

Duration of the implementation: 2020-08-27 - 2022-12-30

Brief description of the investment: Task involves the design and construction of a nursery along with the necessary landscaping elements, internal and external installations and the construction of micro-installations photovoltaic.

Economic Metrics

Total implementation costs	5 355 712,79 PLN / approx. 1 300 000,00 EUR
Number of employees involved in the implementation	The contractor's employees were involved in the investment implementation process for the duration of the work
Other	Number of objects adapted to needs of people with disabilities [pcs.] - 1 Number of buildings constructed from taking into account standards passive construction [pcs.] - 1

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	34,92 tons CO2
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Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	During implementation of the project meetings were organised for residents of the municipalities and other interested persons. During the meetings residents could learn about technologies presented in the building and their possibilities adaptation in single-family housing.
Public consultations and feedback	During implementation of the project meetings were organised for residents of the municipalities and other interested persons.
Accessibility of the technology/investment to marginalised groups	The technology can be used by all residents of the Sulmierzyce commune. The building has also been adapted for people with disabilities.
Addressing inequality using the technology/investment	In the project the universal design concept was taken into account. The building is adapted to needs of disabled people.
Fair distribution of the benefits/risks among all stakeholders	
Educating stakeholders about the new technology/investment	Activities in the field of dissemination of solutions used in the project in a demonstrative form - conference promoting the use of new demonstration solutions

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The project involves the construction of a nursery using passive technology (taking into account passive construction standards). Task involves the design and construction of a nursery along with the necessary landscaping elements, internal and external installations and the construction of micro-installations photovoltaic. The project met all of the program goals and contribute to reducing heat losses, utility values of the annual demand for damage consumption, reduce energy consumption costs and level of operating costs. The project uses and promotes the most detailed and pro-ecological technologies, water and sewage devices and installations.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The implementation of the project will contribute to reducing the use of conventional fuels and thus limiting degradation local environment as a result of reducing the share of emissions pollutants (including CO₂) into the air (reduction of greenhouse gas emissions - 34.92 t=/year). There will be improvement air quality, which will affect the comfort of life in the commune Sulmierzyce and increased social activity.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Project was funded by Regional Operational Programme of the Lodzkie Region for 2014-2020 (EU funds).

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The created nursery is run by the Sulmierzyce commune. The project directly serves the inhabitants of the commune - 4496 people.



Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The project was implemented by the local government. The area of the Sulmierzyce commune is located in the Transition Area of the Lodzkie Region.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The total value of the project was PLN 5,355,712.79 (approx. EUR 1,300,000.00). Thanks to the building construction method, significant savings will be possible in the long term during the use of the building. At the same time, the nursery will provide a healthy environment for the children attending it, their parents and guardians. It will also provide access for people with disabilities.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The most important long-term impact of the investment is to improve the health of residents and reduce the negative impact on the environment. As a further consequence, this may increase the number of visitors to the commune.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The investment provided temporary jobs during construction works. It does not generate permanent new jobs.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The project also includes activities aimed at popularizing the solutions used using the project as a demonstration. This is why the organization of meetings and lectures is also planned promoting the use of new solutions. It is planned to organize 4 meetings with residents Municipalities and other interested parties topic. Every meeting will be destined for a different audience. The purpose of the meeting is to present modern solutions that have been left used in the facility. These solutions have become a clue for other objects built not only in the commune.

Overall score and brief description of the result: 77%

3.2.9 PP12 - Weizer Energy and Innovation Centre

Technology number: 1

Name of the technology: Solar Heating-System for District Heating Weiz

Type of technology/investment: Solar

Duration of the implementation: 1 year

Brief description of the investment: The Biomass Heating Plant wants to install a solar system.

Economic Metrics	
Total implementation costs	75.000
Potential savings in energy costs	20.000 - 7 Years
Number of jobs created	2
Number of employees involved in the implementation	10



Return on Investment (ROI)	2,5 years
Incremental revenue growth	5

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	1,5 t CO2
Reduction of electricity usage	15.000 kWh/Year

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Yes
Public consultations and feedback	Yes
Accessibility of the technology/investment to marginalised groups	Yes
Addressing inequality using the technology/investment	Yes
Fair distribution of the benefits/risks among all stakeholders	yes
Educating stakeholders about the new technology/investment	Yes - within the consultancy of the energy agency

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: Households can exchange their old oil boilers for heating with district heating, also the solid heating ovens can be replaced. Elderly people do not need to heat with wood anymore which could be a problem with the health in a certain age regarding pollution in the air and also to carry the wood.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: To connect to the district heating grid, local companies are needed for the installations.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: There are fundings from the KPC in Austria and the district heating is a daughter company of the city so the city can give them loans

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The municipality, the district heating itself, the households which can then connect to the grid



Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: the policy in Weiz supports the technology and also the regulations from the state

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The implementation costs about 150.000 but is repaired by the additional connected households by the monthly heating costs. The households benefit from the implementation by the lower heating costs for the district heat, and the heating costs will be lower with more connected households as the maintenance works and ongoing works are lower on more households

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: local companies are needed for installing the district heating at the households and for expanding the grid. The maintenance works for the solar system will be done by a local company.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: If the people are connected to the same heating grid this will lead to a better community feeling

Overall score and brief description of the result: 134 %

Most of the questions are answered detailed enough but two lack on some information. These tips or explanations are useful for further evaluations. All in all, the score is good and the technology has a good chance to be implemented in the future.

Technology number: 2

Name of the technology: Moss beds for the main square in Weiz

Type of technology/investment: Greening Measures

Duration of the implementation: 3 years

Brief description of the investment: The main square in Weiz struggles with heat islands in the summer months. To avoid this, moss beds are installed with an innovative watering system to avoid using drinking water. Sensors are installed which measure when the plants need water.

Economic Metrics

Total implementation costs	250.000
Number of employees involved in the implementation	12
Other	Research expandables 250.000 € - 190.000, payed with non-repairable funding



Environmental Metrics

Reduction of water usage	70 %
Percentage of recycled materials used	100 % water recycling

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	yes
Public consultations and feedback	yes
Accessibility of the technology/investment to marginalised groups	yes
Addressing inequality using the technology/investment	yes
Fair distribution of the benefits/risks among all stakeholders	yes
Educating stakeholders about the new technology/investment	yes
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	yes

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The technology makes a better environment at the main square regarding heat islands in the summer months. It leads to a better climate in the surrounding there.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The technology helps to make a better standard for living at the location and helps especially elderly people to overcome the hot months. It provides know how on the topic to regional companies.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The project is mainly financed through a non-repairable funding and a small part is carried by the budget of the municipality.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The municipality, the project partners - research institutes and local gardening and sensoric companies.



Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The technology is supported by the climate policy of Austria and the climate driving plan of the city to get a smart and climate neutral / friendly city

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The investment in the technology itself is 250.000 € but there are some more costs on research but this is financed through non-repairable funds and the budget of the municipality.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: It makes a better climate at the main square and all people benefit from this. The citizens are involved in the finding measures workshops to create a new main square in Weiz what raises awareness for such topics.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project helps to generate know how on the topic for regional companies and can be scaled in other regions what creates jobs.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: Within the project the whole main square is considered to be renovated and the citizens are engaged in the finding measures for it in workshops and questionnaires.

Overall score and brief description of the result: The result is 228 %. Although the technology is not specifically related to reducing carbon emissions or the use of fossils it has a big impact in the energy transition. The score shows, that also technologies for the well-being of the people are important to foster the just energy transition.

Technology number: 3

Name of the technology: Moakt Bus and Moakt Store in Weiz

Type of technology/investment: Regional Food Supply

Duration of the implementation: 1 year

Brief description of the investment: In Weiz with have the so called “Moakt Bus” and the “Moakt Store” where people can buy food and other goods from regional suppliers. This bus drives to some specific stations on specific days and hours, where people can get their ordered goods. The number of stations will be enlarged.

Economic Metrics

Total implementation costs	10.000 / year
Potential savings in energy costs	1,1 tons CO2 per year through savings in gasoline
Number of jobs created	1
Number of employees involved in the implementation	3
Return on Investment (ROI)	1 year
Incremental revenue growth	100



Environmental Metrics

Reduction of greenhouse gas (GHS) emissions	1,1 tons CO2 per year
Reduction of electricity usage	100 kWh
Reduction of fuel consumption and/or change in the type of fuel used	2.500 litre per year

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Yes
Public consultations and feedback	
Accessibility of the technology/investment to marginalised groups	Yes
Addressing inequality using the technology/investment	Yes
Fair distribution of the benefits/risks among all stakeholders	Yes
Educating stakeholders about the new technology/investment	Yes
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	Yes

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The technology helps to avoid driving separately a longer distance for some people which leads to a reduction in exhaust gases.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: When the bus has an additional station in another municipality people there can benefit from the goods, they can buy regional products without using a car. They can go to the station by feet which is a big advantage for people without a car especially elderly people.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: The project can be financed by the organisation which hosts the bus and the ongoing project for this and also by the gaining in the sales from the people buying goods



Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The company which is owner of the bus, the regional farmers by having more customers and selling more goods.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: The regional policy for supporting the regional economy has impact on this and supports the initiative.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: The costs are mainly in having more employees for driving the bus and increasing the capacity for goods, there are no installation costs as the bus already exists. The costs are carried by the owner of the bus and reimbursed by the income of the sales.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: It helps older people to get to regional goods easier without a car. It makes it more comfortable to buy regional goods for all people. They are getting more awareness for buying regional.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: With the new route for the bus and the increase of the customers one more employee will be necessary for driving and for the logistics.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: People are getting together while buying at the bus station or picking up goods there and they will be empowered to buy regionally.

Overall score and brief description of the result: The score of 97% is lower as for the other two technologies but this leads mainly on the answers. They were not deep enough for the systems and lack on information. But there are not as much information. To evaluate the technology, you need a lot of information and a lot of knowledge.

3.3 Use of analysed technologies for better policy design

Following the evaluation of selected technologies, project partners were invited to provide in their reports an overview how selected technologies can be used for policy design in WP3, specifically for JETforCE Strategy (D.3.2.1&D.3.2.2) and Action Plans (D.3.3.1), but also for addressing local and regional policies their regions.

The following paragraphs will present the partners' comments prepared as part of their reports.

LP in its report stated that as regards JETforCE Strategy (D.3.2.1 & D.3.2.2), municipalities in their region have renovated their public buildings recently, thanks to European Union ERDF funding, which funded 100% of these renovations. From their point of view this is very important since they highly contributed to the reduction of CO2 emissions and savings on primary energy use, which is a long-term goal. In the strategy the benefit for local communities through these investments, renewable technologies should be emphasized, and good examples should be collected from local municipalities and communities using renewable energy sources (e.g. energy communities). In the local Action Plan, they intend to focus on 3 areas, such as renewable energy



communities, sustainable urban mobility (for better air quality, using renewable energy solutions e.g. in public bus/tram stops) and energy renovations of buildings (both public and residential). These examples contribute to these planned actions.

Metropolitan City of Bologna-PP4 reported that by focusing on renewable energy technologies and energy efficiency solutions, such as solar panels and heat pumps, the technology can inform the JETforCE strategy by promoting sustainable energy systems. The integration of these technologies can help set clear, measurable goals for reducing carbon emissions and improving energy efficiency, which can guide the strategy's implementation. These technologies can be leveraged to showcase successful pilot projects, which can serve as best practices for scaling up similar initiatives across regions. As regards the JETforCE Action Plans, the technologies can shape the Action Plans for the region by identifying clear objectives for transitioning to clean energy. The local/regional governments can include the deployment of solar power and insulation improvements in their action plans, targeting vulnerable communities that need financial support for the transition. Additionally, the technologies can help create job training programs for local workforces, ensuring that the workforce is prepared for the transition to a green economy, a key aspect of action plans. At the local level, the integration of renewable energy technologies can inform policy design by setting up incentives, tax breaks, or subsidies that encourage communities to adopt energy-efficient solutions. Regional policies can focus on improving the accessibility of these technologies for marginalized groups and ensuring that the transition to renewable energy is just and inclusive. Policies may also include specific targets for reducing energy consumption and carbon emissions, with clear pathways for community involvement, public-private partnerships, and local collaborations.

PP6 - LEASP provided a comprehensive overview on how the technologies which they have tested can be used for better policy design in WP3. In their report, PP6 states that by integrating renewable energy solutions such as PV Power Plant, Light Emitting Diode (LED) Lighting, and Water-to-Water Heat Pump, the JETforCE Strategy can build on real-world examples of sustainable energy investments. These technologies can demonstrate the feasibility of transitioning towards cleaner energy sources and provide valuable data for defining clear objectives in carbon reduction, energy efficiency improvements, and long-term sustainability efforts. The findings from the pilot project serve as a reference for expanding similar initiatives across other regions and incorporating best practices into strategic energy planning.

Furthermore, PP6 reports that insights gained from testing mentioned technologies form a foundation for regional JETforCE Action Plans by identifying key areas for investment and policy support. The pilot results highlight how municipalities can benefit from renewable energy adoption through financial savings, emission reductions, and enhanced energy security. These findings can inform policy measures such as targeted funding programs, improved coordination among stakeholders, and the promotion of energy-efficient public infrastructure. Additionally, the pilot showcases effective approaches to integrating these technologies into regional climate and energy strategies. At the local and regional levels, the tested technologies provide a strong evidence base for policy development. Their implementation can encourage adjustments in regulations



to support broader adoption of renewable energy and energy-efficient solutions. Policy recommendations based on pilot findings, according to PP6 may include:

- Strengthening financial incentives to accelerate the uptake of clean energy technologies.
- Implementing new energy efficiency standards for public sector investments.
- Enhancing public awareness campaigns and educational initiatives on sustainable energy.
- Integrating renewable energy targets into local energy plans to ensure long-term commitments.

EAV-PP8 in its report emphasizes that selected technologies, such as energy-efficient solutions, renewable energy systems (like photovoltaic panels, heat pumps, etc.), and energy storage technologies, can be integrated into the strategy and action plans and form key tools to meet the energy transition goals. The strategy and action plans can incorporate specific technologies to overcome barriers such as financial constraints, lack of infrastructure, and insufficient public awareness and be aligned with technological advancements with sustainability goals, ensuring that the selected technologies contribute to both environmental impact reduction and energy security in the region.

PP9-SIEA in its report states that the evaluated technologies relate mainly to the energy performance of buildings as well as to the topic of Renewable Energy Communities. In the Banská Bystrica self-governing region, which their project focuses on within Slovakia, there are many buildings in both public and private ownership that need to be renovated to meet the latest EU legislative requirements on the energy performance of buildings. Privately owned family homes and apartments often represent the largest investment in people's lives, and this is especially true in regions at risk of energy poverty or poverty caused by the loss of job opportunities as a result of the energy transition. Concerning renewable energy communities, the development of these activities in Slovakia is still at the beginning. The first successfully functioning models of such communities are currently only operating outside the territory of the JETforCE partner region.

In Austria, PP12 reports that all the identified technologies can help in the JUST Energy Transition in the region of Weiz. The first technology is dedicated on reducing fossil fuels for heating directly, the second one provides more well-being for citizens and reduces the impact of climate change and also helps to mitigate it by the consumption of CO₂ by the implemented moss beds. The third technology provides access to regional products to all groups of people in a certain municipality and helps to reduce the usage of cars.



4. Technology-evaluation tool

For the purposes of evaluating the effectiveness of the application, project partners were invited to evaluate 8 different criteria with grades from 1 to 5. Below will be presented the results of the ratings and comments for improving the application:

- 1) Usability: 3,57
- 2) Functionality: 3,43
- 3) Performance: 4,00
- 4) Customization/Personalization: 3,00
- 5) Accuracy and reliability of results: 3,14
- 6) Data security and privacy: 3,80
- 7) Integration with other tools/systems: 4,00
- 8) Overall user experience (UX): 3,57

As regards the suggestions for improvements, LP in his report commented that questions #4 and #10 are almost the same. They suggest to eliminate one or the other. Furthermore, they state that the final scores are not consistent: e.g. the final page shows Score 52%, but when they download the pdf file, it shows only 51%. And within the downloaded pdf document, LP reports that there are several “Total scores” and “Overall score” at the end, which is different from the Total score received on the final page before download, which is a bit confusing.

PP4 suggests enhancing the tool’s user interface for better accessibility and ease of navigation. Adding more customizable features would allow the tool to be tailored to specific regions or projects. Additionally, incorporating real-time data and regional benchmarks could provide users with more accurate and context-specific insights.

PP5 in its report has prepared a list of suggestions/comments which will be used for further improvement of the tool. PP5 suggests that it would be nice to have persistent log-ins (not requiring the user to sign in anew upon every reload of the page). Furthermore, they state that in the text-based question section of the tool, there are two possibly related issues with the back button. In the Environmental Impact section, PP5 reports that a number of questions asks for a percentage by which a number of metrics are expected to decrease due to this project, for example carbon emissions. However, they state that these questions give no indication as to what this reduction should be put in relation to in order to arrive at this percentage, which causes some ambiguity. For the final PDF report, at the top of the document, the total score is stated but also under every succeeding question, there is also a value that is presented as a “Total score”. While it is clear from context



that this only refers to the answer directly above, it would be better to choose a different label such as “Answer score”.

PP6-LEASP in its report states that a final result of 70%, 80%, 90% or higher is generally considered good; however, it may not be very informative. On the other hand, PP6 states that a 30% difference in economic terms can create uncertainty, potentially discouraging an investor from proceeding if not presented appropriately. They suggest adding a description of the investment suitability to the final result in the form of a matrix with threshold values expressed as percentages. This additional explanation or more detailed description would help users better understand the results and facilitate more informed investment decisions.

For PP7, the most important thing is to provide the explanation of the final score and how users can use it in the decision-making process. At the moment, it is hard to understand if the final result can trigger the implementation of the investment or not. Also, in its report, PP7 states that it would be convenient to have a sort of explanation on the beginning of the testing process, in order to introduce the tool for the users who see it for the first time, and to provide instructions on what the user can expect from it. One important thing is also the multiple use of the tool. After one technology is tested, there is no button to start new testing.

PP8 suggests to add the explanation of the achieved score. This could be based on key performance indicators (KPIs) and how the project or technology meets or falls short of expectations. Furthermore, they suggest to include a suggested improvements section that points out the areas with the greatest potential for improvement. For example, if the energy efficiency or renewable energy adoption is low, it should recommend specific changes to boost those elements, such as using higher efficiency equipment or integrating more renewable energy sources.

PP9 in its report states that most users would appreciate a more attractive design of application. For investment managers with limited knowledge in environment and energy, the application appears too complicated.

When it comes to the question of possible sharing the tool with their stakeholders, in their reports, project partners have stated that they intend to share the tool with key stakeholders in their regions, aiming to support them in easier decision-making and in the adoption of sustainable technologies.

As possible additional comments or suggestions, PP4 has reported that it would be beneficial to continue gathering user feedback to refine and improve the tool, ensuring it meets practical needs and real-world applications. Regular updates and the inclusion of new features based on user experiences could make the tool more effective and adaptable to future challenges from their point of view. PP6 proposes inclusion of new or additional features to improve the efficiency of the tool and the user experience, such as adding instructions or guidelines before the questions begin and providing multilingual support for the tool.



5. Conclusion

The Transnational Pilot 2 - “Evaluating and deploying Just Energy Transition responsive technologies” - STAGE 1: Testing the tool for technology evaluation during the period of twelve months has resulted in significant improvement of the JETforCE Technology Evaluation Tool and consequently with a numerous proposed technologies which hopefully will be implemented in partner regions.

The testing process was divided in two phases, one dedicated on testing already implemented technologies, and one dedicated on testing new technologies/investments which could be used to address challenges identified in Transnational Pilot 1 - Mapping energy transition challenges with citizens. In parallel with testing the technologies/investments, project partners, led by Elfi-Tech have put significant effort in improving the tool, and ensuring its usability also for the users outside the project consortium. Through active collaboration with local and regional stakeholders, the JETforCE consortium will continuously work on updating the software, maintaining its user-friendliness, scalability, and adaptability across various regional contexts. The tool aims to become a standardized resource for local and regional public authorities, businesses, and organizations shaping Central Europe’s energy future. By providing decision-makers with structured, reliable, and justice-oriented evaluations, the JETforCE Technology Evaluation Tool supports the development of fairer and more effective energy policies. It enables stakeholders to make well-informed energy investment decisions, ensuring that the Just Energy Transition benefits everyone, without excluding vulnerable communities.

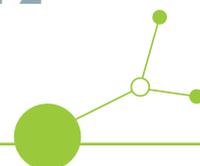
The Transnational Pilot 2 continues with practical testing of three technologies through the case studies in Austria, Croatia and Czech Republic.



JETforCE

JUST ENERGY TRANSITION FOR CENTRAL EUROPE

D.2.4.1 Final report of Transnational Pilot 2 - STAGE 2



Final version
1/2026





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Introduction

This report presents the results of Transnational Pilot 2 - Stage 2, implemented by PP7 - IRENA (Istrian Regional Energy Agency), PP8 - Energy Agency Vysočiny (EAV), and PP12 - Weizer Energy and Innovation Centre (WEIZ) within the framework of the Interreg CENTRAL EUROPE project JETforCE. The pilot activity focuses on the testing and validation of Just Energy Transition-responsive technologies, combining renewable energy deployment with social inclusion, skills development, and community-level benefits.

Across the three pilot actions, different but complementary technologies were tested in real-life settings to address local energy challenges while supporting environmental sustainability and social cohesion.

In the Istrian Region, PP7-IRENA implemented a photovoltaic pilot case study on a public building used by vulnerable groups, integrating renewable energy production with an innovative learning-by-doing approach that involved vocational high school students, teachers, certified installers, and local authorities. The pilot aimed to reduce energy costs, strengthen workforce skills, and demonstrate socially inclusive renewable energy solutions.

PP8-EAV tested a smart energy monitoring and management system in a public kindergarten (MŠ Bystrouška), focusing on improving energy efficiency, increasing awareness of energy consumption, and supporting better operational decision-making in public buildings. The pilot demonstrated how digital energy solutions can contribute to cost savings, improved energy management, and the creation of healthier and more sustainable public facilities.

PP12-WEIZ focused on the modernisation of a biomass-based district heating system in the Schlossgasse-Weizberg area, replacing outdated fossil fuel heating with efficient renewable energy solutions. The pilot combined high-efficiency biomass boilers, thermal storage, and digital monitoring to improve system performance, reduce emissions, and enhance energy security, while engaging local stakeholders through structured coordination and capacity-building activities.

All the other partners were involved in continuous monitoring, evaluation and improvement, attending the Monitoring and Evaluation sessions organised within Activity A.2.1. The sessions were organized during the project meeting in Telč (Czech Republic) on 28th of May 2025, and online on 5th of November 2025.

PP2 Elfi-Tech, followed the Pilot 2 Stage 2, collected insights gained directly and informed updates to the Technology Evaluation Tool, fully reported in Deliverable 2.4.2 (Output 2.4).

Together, the three pilot actions provide a comprehensive assessment of technical performance, environmental impact, social outcomes, and economic feasibility, supported by the application of the Technology Evaluation Tool and structured monitoring and evaluation activities. The report summarises key results, lessons learned, and replication potential, demonstrating how diverse technologies can contribute to a just, inclusive, and replicable energy transition across Central Europe. For the reporting purpose, each involved project partner has prepared the report, and in this document all the findings are summarized.



1. Transnational Pilot 2 - Evaluating and deploying Just Energy Transition responsive technologies - STAGE 2

1.1 Description of the case studies

Transnational Pilot 2 - Stage 2 consists of three complementary case studies implemented by project partners IRENA (PP7), EAV (PP8), and WEIZ (PP12). Each case study was designed to test Just Energy Transition-responsive technologies in real-life conditions, while addressing local energy challenges, social needs, and workforce development objectives.

The case study implemented by PP7 - IRENA was designed to address several interlinked objectives: strengthening the availability of a qualified workforce in the energy sector, supporting the inclusion of vulnerable groups, applying JETforCE digital tools (Challenge Mapping Tool and Technology Evaluation Tool), and testing the suitability of renewable energy solutions within a just transition context. The pilot was implemented in the City of Labin and focused on the installation and operation of a photovoltaic system on a public residential building known as the “Samački hotel,” owned by the City of Labin and used for housing citizens with low or no income. The location and partners were selected through an open call for expressions of interest. In addition to testing the technology, the case study deliberately moved beyond a standard procurement approach by involving vocational high school students and teachers from Mate Blažine High School in the installation process together with certified installers. The initial expectations included verifying the technical performance of the PV system, assessing its social and economic impacts using digital evaluation tools, enhancing practical skills and employability of students, and developing a replicable learning-by-doing model for upskilling and reskilling in the green energy sector.

The case study implemented by PP8 - EAV focused on a public kindergarten (MŠ Bystrouška) owned and operated by the Statutory City of Jihlava. The building was selected due to its public ownership, high social relevance, and the presence of multiple energy-related technologies requiring coordinated monitoring and management. The pilot aimed to test a digital energy monitoring and management system in a public service facility where improved energy performance could directly benefit children, staff, families, and vulnerable or low-income households. The main motivation was to demonstrate how digital solutions can improve transparency and control of energy consumption, reduce operating costs for municipalities, enhance indoor comfort, and lower environmental impacts. Initial expectations included measurable reductions in electricity and heat consumption, improved energy management practices, positive social and environmental effects in line with Just Energy Transition principles, and assessment of the technology’s scalability and replication potential.

The case study implemented by PP12 - WEIZ focused on the modernisation of a biomass-based district heating system in the **Schlossgasse-Weizberg area**. The testing area was selected due to the presence of outdated fossil fuel-based heating systems and its suitability for integrating renewable energy solutions with high relevance for local energy transition objectives.

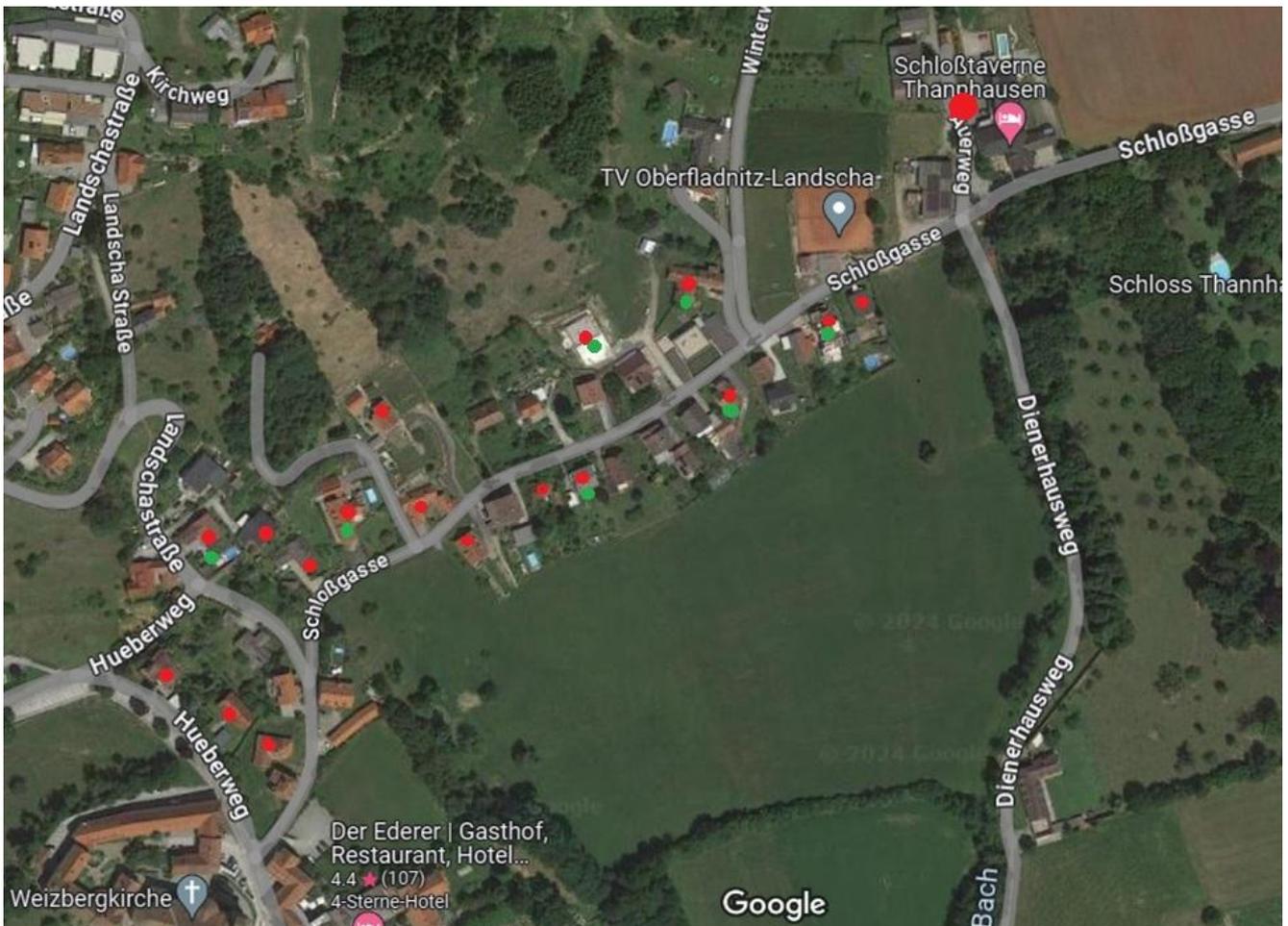


Figure 1 - PP12-WEIZ location of the pilot area

The pilot aimed to improve system efficiency, reduce emissions, and increase the share of renewable energy in heat supply through the deployment of modern biomass boilers, thermal storage, and digital monitoring solutions. In addition to technical upgrades, the case study placed strong emphasis on stakeholder coordination and capacity building, ensuring engagement of local actors and demonstrating how district heating modernisation can contribute to a socially just and environmentally sustainable energy transition.

Together, the three case studies reflect the diversity of technological, social, and territorial contexts across Central Europe, while collectively demonstrating how targeted investments, digital tools, and stakeholder engagement can support a just, inclusive, and replicable energy transition.



1.2 Organisation of the testing process

In all three cases, the organisation of activities was based on clearly defined roles, structured cooperation with external stakeholders, and phased implementation covering preparation, testing, and evaluation.

For the case study implemented by **PP7-IRENA**, the testing process was fully organised and coordinated by IRENA staff, with the number of involved employees varying depending on the implementation phase. In addition to IRENA, key partners included the City of Labin and Mate Blažine High School.

The role and responsibilities of involved entities:

- 1) IRENA - responsible for overall management of the case study and installation of the first PV powerplant.
- 2) High school Mate Blažine Labin - ensured the involvement of students and teachers in the installation activities.
- 3) City of Labin - provided the installation site and financed one of the photovoltaic power plants.

In case of **PP7-IRENA**, case study had a comprehensive timeline since it covered a significant number of activities. The timeline was as follows:

- 1) Preparatory and start-up phase
 - a. Preparation of open calls for expression of interest
 - b. Selection of partners for the case study
 - c. Procurement of first part of the equipment
 - d. Installation of the first part of the equipment - 1st PV powerplant
- 2) Testing process
 - a. First tests with the equipment
 - b. Installation of second part of the equipment - 2nd PV powerplant
 - c. Continuation of the testing
- 3) Finalisation of the testing process
 - a. Final analysis
 - b. Reporting

In Czech Republic, the case study was implemented and coordinated by the **PP8-EAV**-Energy Agency Vysočina, which acted as the central body responsible for overall management, methodological guidance, supervision, evaluation, and reporting.

Organisations involved in pilot testing:

- Energy Agency Vysočina (EAV): coordination, supervision, data analysis, reporting.
- Municipality/kindergarten operator:



- kindergarten director,
- school caretaker responsible for technical cooperation.
- Technology supplier:
 - system design, delivery, commissioning.
- Installation team:
 - physical installation and assembly works.

Responsibilities were clearly distributed, with EAV coordinating the process and evaluating results, the municipality ensuring operational cooperation, and the suppliers delivering technical functionality. The testing process followed a clear timeline from preparatory activities, through installation and commissioning, to testing, evaluation, and final reporting.

For the case study implemented by **PP12-WEIZ**, the testing process was carried out by a coordinated internal team with clearly assigned responsibilities as follows:

- **Andrea Dornhofer - Project Manager**
Responsible for the overall organisation of the implementation, including preparation and handling of the funding application, management of the funding process, and all related reporting.
- **Katharina Halper - Capacity Building & Stakeholder Engagement**
She led the activities related to capacity building and played a key role in forming the JET Alliance, ensuring that all relevant stakeholders were integrated into the project and aligned with the project goals.
- **Gottfried Köberl - Data Acquisition Lead**
He managed all aspects of *data acquisition*, ensuring that the necessary technical and operational data was collected to support the testing, analysis, and evaluation phases.
- **Günther Maier - Project Supervisor**
As director of the Innovation Centre, he took on a supervisory role, overseeing the strategic direction of the testing activities and ensuring alignment with organisational priorities.

External organisations involved by PP12-WEIZ:

- **Biomass Heating Plant Weizberg** - providing technical access, operational data, and system insights needed for the testing period.
- **Municipal and regional stakeholders** (e.g., City of Weiz departments involved in infrastructure and planning).
- **Local utility and network partners** (for heating network integration, electricity network modernisation, and digital infrastructure alignment).
- **Residents and building owners** in the Schlossgasse area who participated in the transition to the renewed district heating and infrastructure model.



The timeline of the process implemented by PP12-WEIZ:

Preparation Phase (2022):

- Identification of the testing area and stakeholders
- Development of the project concept and definition of responsibilities
- Preparation and submission of the funding application

Stakeholder Coordination Phase (2023):

- Formation of the JET Alliance
- Engagement with external partners and residents

Implementation Phase (2023 - 2024):

- Conducting the testing activities in the district heating system area
- Collection of operational and infrastructure data
- Continuous supervision and strategic guidance

Reporting & Evaluation Phase (2024 - 2026):

- Compilation of results, funding documentation, and project reporting
- Integration of stakeholder feedback and capacity-building outcomes
- Final evaluation and review under Maier's supervision

1.3 Analysed technologies

When it comes to the technologies, each project partner focused on different project or investment.

In case of **PP7-IRENA**, they have chosen PV technology due to several reasons. Firstly, in Croatia, and respectively in Istria Region where the case study took place, at the moment when the case study was in preparatory phase (2023-2024), the use of PV technology just started to become more used, but there was a lack of certified installers. Secondly, there was a of projects where the use of RES can be used for directly or indirectly help vulnerable groups in lowering their energy bills or improve the conditions where they live. Thirdly, with PV technology, PP7 decided that measurement of the Digital evaluation tool impact could be more effective with technology where can have very precise data on energy production and consumption in the building. Taking all this into account, the decision came to use solar photovoltaic (PV) as the technology for the piloting.

For testing purposes, the case study involved two PV power plants. Both PV power plants have been installed on the roof of a public building located at Katuri Street 17, 52220 Labin.

The first PV system is installed on the southern part of the flat roof (roof terrace), extending from the chimney towards the edge of the building. During installation, the required safety distances from roof edges and surrounding parapet walls were respected, taking into account wall heights of approximately 0.6 m, 1.0 m, and over 2.0 m. The roof has a slope of 0°. Photovoltaic modules are mounted on a ballasted concrete mounting

substructure suitable for flat-roof installation. The modules are installed at a tilt angle of 3° and oriented towards the southeast, in accordance with the design documentation. The modules are electrically interconnected and connected to a DC combiner box (string box), from which DC power is supplied to the inverter, where it is converted into AC electrical energy. For the installed photovoltaic power plant, photovoltaic modules with a nominal power of 450 Wp per module have been installed. A total of 18 PV modules are installed, resulting in a total installed DC capacity of 8.1 kWp. The photovoltaic modules are connected to a single inverter designed to support a maximum PV generator capacity of up to 15 kWp (STC). The inverter has a rated AC output power of 8 kW. The installed PV power plant is intended for self-consumption of the building, namely, to lowering the cost of energy bills in the building, used by people with low or without any income.

The system is connected to the public electricity distribution network and complies with all technical and safety requirements prescribed by the electricity distribution system operator. Electricity consumption of the building exceeds the electricity production of the PV system, and the remaining demand is supplied from the public grid. The system is equipped with either two electricity meters or a single bidirectional meter, enabling separate measurement of electricity imported from the grid and electricity exported to the grid. In the event of a grid outage, the PV system automatically disconnects from the public electricity network within a very short time for safety reasons, preventing unintentional feeding of the grid during maintenance or repair works. Once normal grid conditions are restored, the system automatically reconnects to the grid.

The expected annual electricity production of the photovoltaic power plant is approximately 9.2 MWh/year.

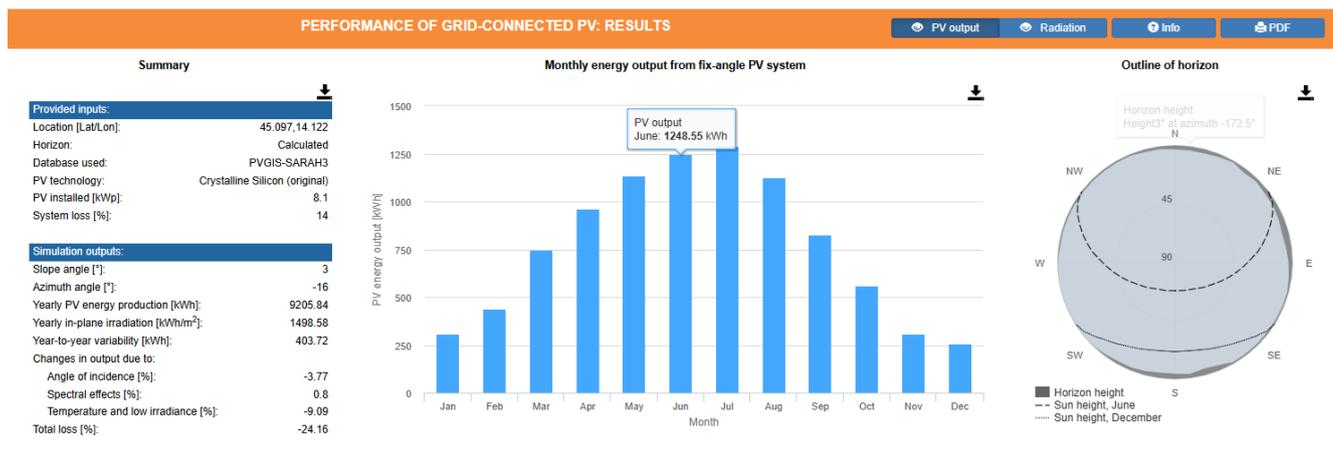


Figure 2 - PV production for the first powerplant

The energy yield assessment was performed using the PVGIS application, based on the installed system configuration and local climatic conditions. According to the calculations, electricity production is lowest during the winter months and highest during the summer period.



Figure 3- Installed 8,1 kWp powerplant

A second grid-connected photovoltaic (PV) power plant has been installed on the northern part of the roof terrace of the same building. During the layout and installation of the system, the required safety distances from the roof edges were respected, taking into account the surrounding parapet walls with heights of approximately 0.6 m, 1.0 m, and over 2.0 m. Photovoltaic modules are installed on the roof surface and electrically interconnected. The modules are connected to a DC combiner box (string box), from which the generated DC power is supplied to the inverter, where it is converted into AC electrical energy. The PV modules are mounted on prefabricated ballasted concrete mounting structures, suitable for flat-roof installations. The installed photovoltaic power plant is intended for self-consumption of the building. The system is connected to the public electricity distribution network and complies with all technical and safety requirements prescribed by the electricity distribution system operator. As a grid-connected system, it is equipped with either two electricity meters or a single bidirectional meter, enabling separate measurement of electricity imported from and exported to the grid. In the event of a public grid outage, the PV system automatically disconnects from the grid within a very short time for safety reasons, preventing unintentional feeding of the network during maintenance or service works. After restoration of normal grid conditions, the system automatically reconnects to the public electricity network. The electricity consumption of the building exceeds the electricity production of the photovoltaic system, and the remaining energy demand is supplied from the public grid. According to the calculations presented in the project documentation, electricity production from the PV system is lowest during the winter months and highest during the summer period.

For this photovoltaic power plant, photovoltaic modules with a nominal power of 450 Wp per module are installed. A total of 21 PV modules have been mounted, resulting in a total installed DC capacity of 9,45 kWp. The modules are fixed to the concrete substructure at a tilt angle of 3° on the flat roof, in accordance with the design documentation, and are oriented towards the southeast. The PV modules are connected to a single inverter designed to support a maximum PV generator capacity of up to 15 kWp (STC), with a maximum rated AC output power of up to 10 kW. The expected annual electricity production of the photovoltaic power plant is approximately 10,7 MWh/year. The energy yield calculation was performed using the PVGIS application, based on the installed system configuration and local climatic data.

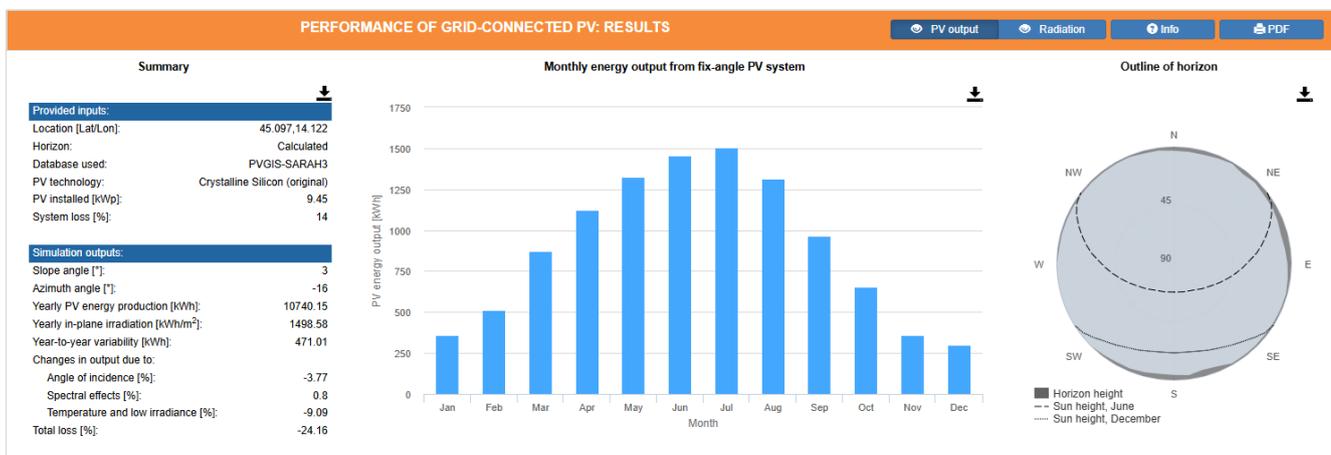


Figure 4 PV production for the second powerplant

In case of **PP8-EAV**, the analysed technology was a **smart energy monitoring and management system** based on smart metering devices and LoRaWAN communication infrastructure. The system enables continuous monitoring of electricity and heat consumption and data transmission with low energy demand.

Key characteristics of the technology include:

- real-time and historical monitoring of energy consumption,
- identification of inefficiencies and operational anomalies,
- support for optimisation of building operation,
- low operational and maintenance requirements,
- compatibility with renewable energy integration and future system expansion.

The technology is designed as a scalable solution suitable for public buildings with similar operational profiles.

PP12-WEIZ for the testing purposes has chosen the technology of a **biomass-based district heating system** enhanced with digital monitoring and operational optimisation tools. The system is designed to supply heat



efficiently to multiple buildings via a central renewable energy source—a modernised biomass heating plant connected to a low-temperature district heating network.

The described system can be divided into 5 main sections:

1. Biomass Combustion Technology

At the centre of the system are **high-efficiency wood-chip boilers**. These boilers combust regionally sourced biomass (mainly wood chips) and convert the chemical energy in the fuel into thermal energy. Upgrades to the Weizberg plant include:

- High-efficiency combustion chambers ensuring complete and clean combustion
- Low-emission burner systems, significantly reducing particulate matter and NOx
- Optimised flue gas management, including potential condensation modules to recover additional heat
- Automated fuel feeding and ash removal systems to guarantee stable operation

This enables operation at higher efficiencies (up to 92%) and minimal emission output while maintaining stable heat supply.

2. Buffer Storage Integration

A 33 m³ stratified thermal storage unit is integrated into the system. Technically, this component stabilises the entire heating network by reducing boiler cycling, allowing flexible charging and discharging and maintaining temperature layers (stratification) for efficient use of stored heat, which is particularly important during peak load conditions or when consumption fluctuates.

3. District heating network

Heat is distributed via a network of insulated underground pipes consisting of:

- Flow line: transports hot water (70-85 °C depending on operating mode) from the plant
- Return line: brings cooled water (typically 40-55 °C) back to the plant

Optimisations measures tested include:

- Hydraulic balancing
- Lowering supply temperatures
- Pump control adjustments
- Reduction of thermal losses through improved pipe temperature management

4. Digital monitoring and control systems

A key component of the testing process was the evaluation of enhanced digital monitoring systems, including:

- Real-time temperature monitoring (supply/return lines, buffer layers)
- Load and consumption profile analysis for different buildings
- Outdoor-temperature-compensated control algorithms



- Automatic optimisation of pump speeds and boiler firing cycles
- Data-driven fault detection

These tools create the basis for continuous operational optimisation, energy savings, and proactive system management.

5. Transfer stations in buildings

Each building is equipped with a heat transfer station consisting of:

- Plate heat exchangers
- Flow and return temperature sensors
- Control valves and local controllers
- Safety components (pressure relief, filters, backflow preventers)

These units ensure efficient, safe, and stable delivery of heat into the building-side system.



2. Testing validated technologies through case studies

In this chapter, we will describe the testing process in all three involved pilot sites.

2.1 Preparatory and start-up phase

In Istria Region, **PP7-IRENA** with the preparatory phase started early in 2024. with preparing open calls for expression of interest for proposal of pilot site and in parallel open call for expression of interest of high schools who can join the process.

In March 2024. the agreements were signed with City of Labin and High-school Mate Blažine from Labin, where City of Labin has ensured the location for the instalment, and has agreed that second powerplant (9,45 kWp) will be installed with the funds provided by the City.

In March 2024, slightly earlier than originally planned, the procurement for the first powerplant was prepared by IRENA, and in April installation started. The installation, supervised by certified engineer was made by certified installers and by high-school children and their teachers.



Figure 5 - Installation process



Figure 6 - Installation process

The installation process took longer than initially planned, primarily due to delays in the final step—official connection to the electricity grid—which, owing to administrative and bureaucratic procedures, was completed in December 2024. With the grid connection finalised, the preparatory phase was concluded and the testing process officially commenced.

In parallel, the City of Labin prepared the procurement procedure for the second photovoltaic power plant in spring 2025. The installation of the second system was again carried out by certified installers together with students from Mate Blažine High School in Labin, this time under the supervision of certified engineers from IRENA.



Figure 7 - Installation process for the 2nd PV plant

In the Czech Republic, the preparatory phase implemented by **PP8-EAV** included the selection of the building, definition of baseline energy consumption, and coordination with municipal stakeholders and the technology supplier. The procurement of the technology followed standard public procurement procedures.

The installation phase comprised the deployment of smart meters, configuration of LoRaWAN communication, system integration, and system commissioning. All activities were completed within the planned timeframe and without significant disruption to the operation of the kindergarten.

The preparatory phase implemented by **PP12** began with an analysis of the existing energy infrastructure in the Schlossgasse-Weizberg area, identifying the need to replace outdated oil-based heating systems with a more sustainable biomass-based district heating solution. This was followed by the organisation of technology acquisition, including the definition of technical specifications, comparison of supplier offers, securing of funding, and coordination of delivery and installation schedules.

The implementation phase included the installation of a high-efficiency biomass boiler, a stratified buffer storage tank, and the necessary hydraulic and digital components to integrate the new equipment into the existing heating network. On-site preparation works were carried out, including adaptation of pipework, establishment of monitoring interfaces, and verification of system compatibility.

Following installation, a digital monitoring system was implemented to collect real-time data on temperatures, flow rates, boiler performance, and storage stratification. In parallel, strong stakeholder engagement was ensured through the JET Alliance, involving local partners and residents, while project reporting, funding



documentation, and strategic supervision were carried out to maintain alignment with innovation and sustainability objectives.

The process concluded with commissioning tests, optimisation of system parameters, and the initiation of operational performance evaluation and energy savings assessment for the upgraded district heating system.



Figure 8 - Construction site in Weiz

2.2 Testing process

In the **Istria Region**, the testing process was managed by **PP7-IRENA** and divided in several areas. Mainly, it was completed on the first installed powerplant, as this powerplant was officially connected to grid long enough to provide adequate data to test the results.

At first, the testing process included comparison of the actual annual production of the PV powerplant, and the estimated production based on calculations made during the design phase. For 2025, the data analysis has demonstrated that actual production (in kWh) was lower for approximately 10% in comparison to the estimated amount. The reasons for this can vary; for example, mistakes made during the design phase, physical barriers on the roof that affect the production more than planned, and lower number of sun hours in the analysed year.

The second parameter on which IRENA had put its main focus was the process of providing possibility to install functional systems/technologies through the learning-by-doing method. In the case of this case study, instead of making regular procurement of work and equipment, a combination of including certified installers as well as high school students, together with their teachers, was made in order to provide practical and valuable knowledge to high school students, also preparing them for the labour market.



During the testing process, and through the time of two installations (2024 and 2025), PP7 had put particular focus on investigating how this process affects several involved actors, namely:

- 1) **Certified installers:** During the testing process, they have stated that possibility to share the knowledge to students, bring them closer the practical work is a great way to show what they can expect when they will have same or similar job, and can provide real life example, which they cannot practice in their regular school work. However, there are of course some limitations. On the building where the testing process was implemented, the safety regulations were easily respected since it was the case of flat roof; this being said, if there was sloping roof, then this kind of installation would not be possible.
- 2) **High school students:** Generally, all involved students have expressed positive impressions, with several of them stating that they for sure plan to work with the tested technology. A general comment from the involved students was that there should be more similar activities in their curricula, with which they can gain more practical skills.
- 3) **Teachers:** Similar to the students' statements, involved teachers reported that without collaboration between real sector-business and educational institutions, there will be constant disparity between market needs (in the terms of labour market supply and demand). Projects like this can lead to minimise disparities and design curricula according to the business and market needs.

The parameter of creating new jobs in this case was not directly influenced or reached, but certainly the piloting of JETforCE had a strong indirect influence on this factor by promoting the technology evaluation tool as one of the most affordable and easy to use, thus increasing the demand for this type of technology and consequently creation of new jobs. In parallel and in the long term, this kind of project involving the learning-by-doing method can be easily replicated not only in other high schools, but also in other educational institutions where upskilling and reskilling -particularly for "green transitions" jobs - can take place.

Making connection to the JETforCE objectives of involving or reaching vulnerable groups, the case study was implemented in the building used by citizens with lower or without any income. Owned by the City of Labin, the gained energy savings will be used for the purpose of improving the living conditions in the building, or for the same purpose (always focused on vulnerable groups and social care) in similar building.

Meanwhile, the testing process in Czech Republic, managed by **PP8-EAV**, focused on the following key parameters relevant to Just Energy Transition objectives:

- reduction of electricity and heat consumption,
- reduction of energy costs,
- reduction of greenhouse gas emissions,
- operational feasibility and reliability,
- social impacts related to public service quality and inclusiveness.

Energy performance was monitored through the installed digital energy management system and compared with baseline consumption data. Environmental impacts were calculated using officially applied emission factors. Social impacts were assessed qualitatively, taking into account the public nature of the building and the distribution of benefits among users.

In Austria, following installation and commissioning, the system was monitored by **PP12-WEIZ** over a defined period to assess technical, environmental, and organisational outcomes. The testing process focused on evaluating the performance of the upgraded biomass-based district heating system by analysing energy savings, system efficiency, CO₂ emission reduction, and temperature stability within the heating network.

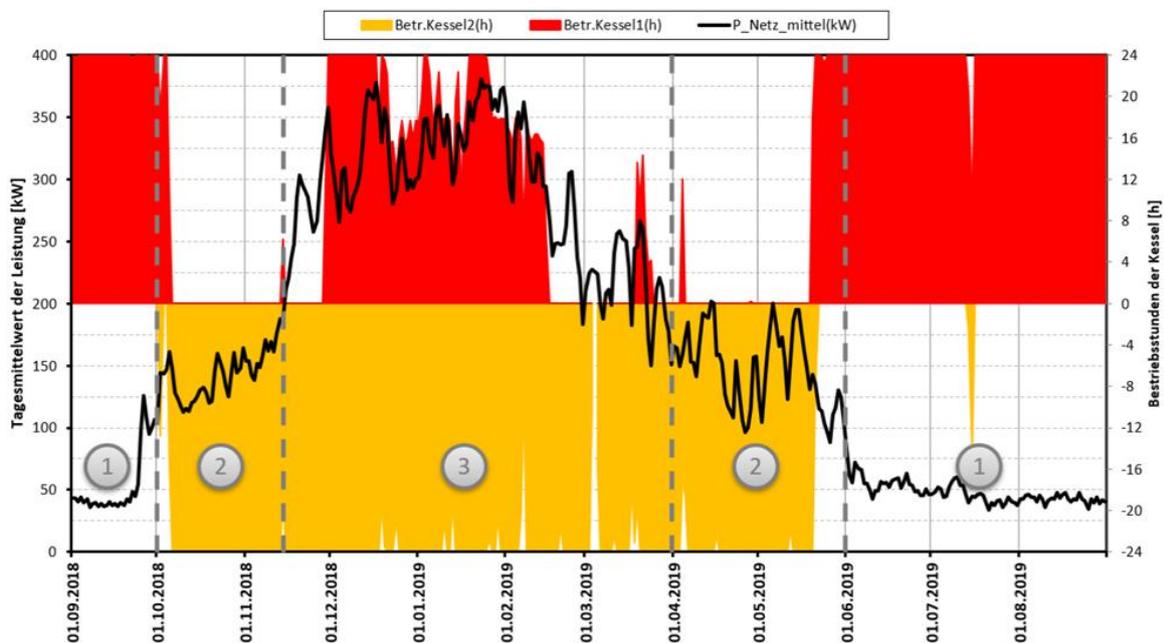


Figure 9 - Extract from the monitoring system

Continuous data were collected on heat output, fuel consumption, supply and return temperatures, boiler performance, buffer storage behaviour, and the operation of the digital monitoring and control system. In parallel, user feedback and system stability in connected households were observed, while stakeholder involvement and social aspects of the testing process were documented through structured engagement activities carried out within the JET Alliance.

2.3 Conclusion of the testing process

The testing process within the JETforCE pilot activity implemented by **PP7-IRENA** in the Istrian Region was officially concluded in January 2026, in line with the overall project timeline. By that time, both photovoltaic



power plants had been installed, and in the case of the first plant, monitored long enough to allow for a meaningful assessment of technical, educational, and social aspects of the pilot activity. From a technical perspective, the testing process confirmed that the installed PV systems are functional and capable of delivering the expected benefits in terms of renewable energy production and energy cost reduction. Although the actual electricity production was slightly lower than initially estimated, the deviation remained within acceptable margins and provided valuable lessons for future design and planning processes.

From an educational and capacity-building perspective, the testing process was considered highly successful by all involved actors. The learning-by-doing approach, which combined certified installers, high school students, and teachers, proved to be an effective method for transferring practical knowledge and skills. Students gained hands-on experience with real-life installations, teachers highlighted the strong added value for vocational education, and installers recognised the importance of early exposure of young people to labour market realities. This approach was widely perceived as innovative, replicable, and highly relevant for future green transition-related professions.

In terms of social impact, the pilot activity demonstrated that renewable energy investments can be effectively linked with social objectives. By installing the PV systems on a building used by vulnerable groups, the pilot directly contributes to reducing operational costs and improving living conditions, while reinforcing the role of local authorities in addressing energy poverty through sustainable solutions.

Overall, the general conclusion of all involved stakeholders (IRENA, the City of Labin, High School Mate Blažine, certified installers, and students) is that the testing process met its objectives and generated clear added value at technical, educational, and social levels. The pilot confirmed that the tested model has strong potential for replication within the JETforCE framework and beyond, particularly in the context of upskilling, reskilling, and supporting a just green transition.

In the Czech Republic, the testing process is ongoing and based on continuous monitoring and evaluation of operational data. Energy consumption is regularly measured and analysed, enabling ongoing assessment of system performance and the identification of optimisation opportunities. This monitoring-based approach is already delivering the expected results in terms of improved transparency, better control of energy use, and gradual energy savings.

The general conclusion at this stage is that the solution is technically reliable, economically feasible, and socially relevant. It provides clear added value for public building management and aligns well with the principles of a Just Energy Transition, while continuous evaluation supports long-term improvement and adaptability.

As regards **PP12-WEIZ**, the testing process was formally concluded following the installation, commissioning, and several months of operational monitoring of the upgraded biomass-based district heating system. The finalisation phase included a public opening of the heating plant with the participation of local citizens, demonstrating transparency and strong community involvement. The process was officially closed with the



preparation of an emissions report documenting achieved efficiency improvements and significant reductions in CO₂ and particulate emissions. Upon completion of these evaluations, the technical monitoring period was successfully concluded.

All involved actors—including project partner, local stakeholders, and members of the JET Alliance—reached a shared positive conclusion. The modernised system proved to be reliable and effective, delivering measurable environmental and operational benefits while strengthening regional confidence in renewable heating solutions. Stakeholders particularly valued the transparent communication and active involvement of citizens, while JET Alliance partners recognised the project as a strong example of effective cooperation, successful capacity building, and a scalable model for future sustainable energy initiatives.



3. Technology-evaluation tool in the testing process

3.1 Analysed technologies

In the following three sub-chapters, it will be presented the data inserted in the technology-evaluation tool for the tested technology/investment. The data was provided by each involved partner in the testing process:

3.1.1. PP7-IRENA

Name of the technology: Photovoltaic powerplant installed through learning-by-doing method

Type of technology/investment: Photovoltaic technology

Duration of the implementation: April 2024 - January 2026

Economic Metrics	
Total implementation costs (EUR):	13.500,00 + 14.000,00= 27.500,00 EUR
Potential savings in energy costs (on annual base in EUR):	3.900,00 EUR
Number of jobs created:	Directly 0, Indirectly we assume at least 5 to 10 in the sector.
Number of employees involved in the implementation:	4 certified installers, 3 supervision engineers, 15 students, 2 teachers, 4 IRENA staff members
Return on Investment (ROI) (Please indicate the time period):	7 years

Environmental Metrics	
Reduction of greenhouse gas (GHS) emissions:	4,6 t/CO2 annually
Reduction of electricity usage (from grid):	19.900 kWh

Social Metrics	
Community engagement and participation in the design and implementation of the technology/investment	The community was not involved during the design phase, but was informed through media channels about the implementation of the technology.
Accessibility of the technology/investment to marginalised groups	The technology was installed on the roof of public building, owned by the City of Labin and used by citizens with low or without any income. The energy savings will be used to improve the living conditions for the tenants.



Educating stakeholders about the new technology/investment	The involved stakeholders (City of Labin, High school Mate Blažine teachers and students) had the opportunity to learn about the technology during the installation and operational phase.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	Strategic partnership was established with the City of Labin and High School Mate Blažine Labin.

Inputs from the Technology-evaluation tool (please fill for the tested technology):

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: The photovoltaic (PV) technology implemented through this investment has positive environmental impacts, particularly for communities that are more vulnerable to environmental and socio-economic challenges. By producing electricity from a renewable and zero-emission source, the PV systems reduce reliance on electricity generated from fossil fuels and contribute to a reduction of approximately 4.6 tonnes of CO₂ emissions annually. This directly supports climate change mitigation efforts and helps improve overall air quality, which is especially important for vulnerable populations that are often more exposed to environmental pollution and its associated health risks. The technology has no local air, water, or noise pollution during operation, making it well suited for residential and socially sensitive buildings. Since the systems are installed on an existing rooftop, there is no additional land take, no impact on biodiversity, and no disturbance to the surrounding environment. For communities disproportionately affected by environmental harms—such as low-income households—the investment contributes to environmental justice by ensuring access to clean energy and by reducing energy costs without transferring environmental burdens elsewhere. Lower operational energy costs help stabilise household expenses, indirectly improving living conditions and resilience to energy price fluctuations. Overall, the technology supports a cleaner, healthier, and more equitable energy system, ensuring that the environmental benefits of the energy transition are shared with vulnerable groups rather than exacerbating existing inequalities.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: The implementation of photovoltaic (PV) technology through this investment is expected to generate significant socio-economic benefits for local communities, particularly by improving living conditions, strengthening local capacities, and supporting a more inclusive energy transition. At the community and social level, the PV systems are installed on a public building used to accommodate citizens with low or no income. The resulting reduction in electricity costs will allow financial resources to be redirected toward improving housing conditions, social services, and overall wellbeing of the residents. This contributes to a higher standard of living and reduces vulnerability to rising energy prices. From an economic perspective, the investment supports the local economy by engaging local certified installers, engineers, and service providers during installation and maintenance. **While the project does not create immediate permanent**

jobs, it stimulates demand for skilled labour in the renewable energy sector and strengthens the local market for photovoltaic technologies, generating indirect and long-term employment opportunities. A key socio-economic benefit lies in education and workforce development. By involving vocational high school students and teachers in the installation process through a learning-by doing approach, the project enhances practical skills, increases employability, and better aligns educational curricula with labour market needs. This helps reduce skills mismatches and supports long-term economic resilience. In addition, the project improves access to clean and affordable energy, particularly for vulnerable groups, and increases local awareness of renewable energy solutions. Overall, the investment contributes to social inclusion, economic efficiency, and community resilience, reinforcing the foundations for sustainable local development within a just energy transition framework.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: At the moment of testing the technology, there are no available grants schemes for similar initiatives (combining physical investments with learning by doing method). The only possible funding is by public funds (local or regional).

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: The ownership of the technology is divided by two separate investments. In the first one, meaning the first PV powerplant the ownership has IRENA-Istrian Regional Energy Agency, and the second one is owned by City of Labin since they have provided funds for the second PV powerplant.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: Currently in Croatia, investments in photovoltaic power plants are exempt from the calculation of value-added tax (VAT at 25%) on both construction works and equipment.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A:
The upfront costs of implementing the photovoltaic (PV) technology amount to approximately 27.500 EUR, covering the procurement of equipment, installation works, supervision by certified engineers, and system commissioning for two PV power plants with a total installed capacity of 17,55 kWp. These costs were shared between project funding and local public resources, ensuring affordability and risk-sharing.
The ongoing costs are relatively low and mainly include routine operation and maintenance, such as periodic inspections, system monitoring, and minor servicing. These costs are minimal compared to conventional energy expenditures and do not impose a significant financial burden on the building owner or users. In comparison, the long-term benefits clearly outweigh both upfront and ongoing costs. The PV systems generate estimated annual energy cost savings of around 3,900 EUR, resulting in a payback period of approximately seven years. Over their expected operational lifetime of 20-25 years, the systems will continue to deliver substantial net savings, providing long-term financial stability. For vulnerable communities, these benefits are particularly significant. The reduction in energy costs allows savings to be reinvested into improving living conditions, building maintenance, and social care services, directly enhancing quality of life. At the same time, the use of clean energy reduces exposure to environmental harms without transferring costs or risks to residents. Overall, the investment represents a cost-effective, low-risk, and socially just solution, delivering sustained economic, environmental, and social benefits while supporting long-term energy affordability for vulnerable groups.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The photovoltaic (PV) technology implemented through this investment has a positive and multidimensional impact on community wellbeing, particularly in the areas of health, education, and local development. From a health and environmental wellbeing perspective, the production of electricity from a clean, renewable source reduces reliance on fossil fuel-based energy and contributes to lower greenhouse gas emissions and improved air quality. Although the impact is indirect, reduced environmental pollution supports better public health outcomes, which is especially relevant for vulnerable populations that are more exposed to environmental and economic stressors. In terms of education and upskilling, the investment introduces a strong learning-by-doing component by actively involving vocational high school students and teachers in the installation of the PV systems alongside certified professionals. This hands-on experience enhances technical skills, increases awareness of renewable energy technologies, and improves employability in green transition-related professions. It also helps align educational pathways with labour market needs and supports long-term workforce development. Regarding local development, the investment strengthens cooperation between public authorities, educational institutions, and the private sector. It promotes renewable energy as a practical and accessible solution for public and residential buildings, encouraging replication and wider adoption. The reduction in energy costs further enables the reallocation of financial resources toward social services and community support measures.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project contributes to job creation in the region primarily through indirect and long-term effects, while also generating temporary employment during the implementation phase. During the installation and commissioning phase, the project engaged local certified installers, engineers, and technical experts, creating short-term employment opportunities related to system design, supervision, installation, and grid connection. These activities supported local businesses and professionals active in the renewable energy and electrical installation sectors. In the indirect and long-term perspective, the project strengthens the regional labour market by promoting photovoltaic technology as a reliable and cost-effective energy solution. By increasing awareness and demonstrating the feasibility of PV systems on public and residential buildings, the project contributes to growing demand for renewable energy installations, maintenance, and related services, which can lead to sustained job creation in the clean energy sector. A key employment-related impact is achieved through skills development and workforce preparation. The learning-by-doing approach, involving vocational high school students and teachers, equips future workers with practical experience in renewable energy technologies. This improves employability, reduces skills mismatches, and supports the availability of qualified labour for emerging green jobs in the region. Overall, while the project does not create permanent jobs directly, it plays a catalytic role in job creation by supporting sector growth, strengthening local capacities, and preparing the next generation of skilled workers for long-term employment in the renewable energy and green transition sectors.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The technology fosters long-term community engagement and empowerment by combining renewable energy deployment with social inclusion, education, and local ownership of benefits. Firstly, the photovoltaic (PV) systems are installed on a publicly owned building and are used for the benefit of residents with low or no income. By reducing energy costs and improving the financial sustainability of the building, the project ensures that the benefits of clean energy remain within the local community. This strengthens trust in public institutions and demonstrates how renewable energy can directly improve everyday living conditions. Secondly, the project actively empowers the community through knowledge transfer and capacity building. By involving vocational high school students, teachers, and local installers in the installation process, the technology becomes a shared learning experience rather than a purely technical intervention. This approach increases awareness of renewable energy solutions, builds local expertise, and encourages active participation in the energy transition. In the long term, the project supports community empowerment through replicability. The tested model can be applied to other public buildings, educational institutions, and social housing facilities, enabling communities to take an active role in planning and implementing future renewable energy investments. This reinforces local decision-making capacity and encourages broader civic engagement around sustainable energy solutions. Overall, the technology fosters a sense of shared ownership, skills development, and long-term engagement, empowering communities to participate meaningfully in the just energy transition and benefit from its outcomes.



Overall score and brief description of the result: 78%

The Technology Evaluation Tool resulted in an overall score of 78%, confirming that the photovoltaic investment performs well in terms of environmental impact, social inclusion, and community benefits. The project scored particularly high in renewable energy generation, CO₂ emission reduction, support for vulnerable groups, and skills development through a learning-by-doing approach. Areas for improvement were identified in financing diversification, regulatory context, and community ownership structures, providing clear guidance for enhancing future replications.

3.1.2 PP8-EAV

Name of the technology: Smart energy monitoring and management system for public kindergarten building

Type of technology/investment: Digital energy management system/ smart metering solution combined with renewable energy integration

Duration of the implementation: Within 1 year (installation + commissioning)

Economic Metrics

Total implementation costs (EUR):	12 295 €
Potential savings in energy costs (on annual base in EUR):	2 042 €/year
Number of jobs created:	0 (no permanent new jobs created)
Number of employees involved in the implementation:	11 persons, including: <ul style="list-style-type: none"> • 1 school caretaker (kindergarten) • 1 kindergarten director • 3 employees of EAV (Energy Agency Vysočina) • 2 representatives of the technology supplier • 4 installation workers (assembly team)
Return on Investment (ROI) (Please indicate the time period):	16.53 % , with an expected payback period of 6,05 years

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions (t/CO ₂ annually):	5,87 t CO ₂
Reduction of electricity usage (kWh/MWh/GWh):	4 553 kWh/year



Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Yes - the project increases transparency of energy use in a public kindergarten and demonstrates sustainable energy solutions in a publicly accessible building.
Public consultations and feedback	No - not directly implemented.
Accessibility of the technology/investment to marginalised groups	Yes - benefits are delivered through a public kindergarten serving families and children, including vulnerable and low-income households.
Addressing inequality using the technology/investment	Indirectly - by improving indoor comfort and health conditions and reducing operational costs of public services.
Fair distribution of the benefits/risks among all stakeholders	Yes - benefits such as cost savings, improved comfort, and environmental improvements are shared across the community.
Educating stakeholders about the new technology/investment	Yes - the project supports education, awareness-raising, and capacity building related to energy efficiency and smart energy management.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	Yes - cooperation between the municipality, EAV, and technology suppliers and contractors.

Inputs from the Technology-evaluation tool (please fill for the tested technology):

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: Positive environmental impacts: reduced air pollution and GHG emissions through optimised energy use and higher share of renewables; improved local air quality and environmental justice benefits for vulnerable groups using the public kindergarten.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: Benefits for public services and community wellbeing: improved indoor comfort/health conditions, reduced operating costs for the municipality and increased resilience to energy price volatility.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: Financing via municipal/regional budgets, national & EU grants, EU structural funds; potentially complemented by preferential public loans; private contractors mainly via procurement for installation/maintenance.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?



A: Municipality holds ownership and decision-making; community benefits indirectly through improved service provision and cost savings reinvested into public priorities; democratic oversight via municipal governance.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: Supportive policy/regulatory environment (EE/RES/digitalisation in public buildings), building energy performance requirements, subsidies/grants and stable RES rules reduce risk and improve feasibility.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: Moderate upfront costs (meters, LoRaWAN, integration) + low O&M; long-term savings with payback ~6.05 years, benefits for vulnerable groups via stronger public budgets and healthier indoor environment.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: Better health/comfort and learning conditions; supports sustainability awareness; upskilling of facility managers/technicians; savings can be reinvested into local development.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: Mainly short-term installation jobs + indirect effects in supply chain; long-term skilled work in energy management/data analysis/maintenance; replication potential supports future employment.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: Long-term engagement via transparency and awareness from measured data, educational use of the building as a “living lab” and strengthened local capacity to replicate similar solutions.

Overall score and brief description of the result: 77 %

The assessment indicates strong environmental and social performance, solid economic feasibility (ROI 16.53%, payback ~6.05 years), and high replication potential; no permanent job creation expected, but clear capacity-building and public-service benefits.

3.1.3 PP12-WEIZ

Name of the technology: Smart solutions for Schlossgasse Weiz and the Biomass District Heating Plant Weizberg

Type of technology/investment: Enlargement of the district heating plant

Duration of the implementation: 2 years

Economic Metrics	
Total implementation costs (EUR):	EUR 1.700.000, - total costs 460.000, - Subsidies 400.000, - fee for connection (households) 840.000, - to pay from biomass plant
Potential savings in energy costs (on annual base in EUR):	EUR 3.000, - / year for heating for residents 1.200, -/year for electricity
Number of jobs created:	~ 6



Number of employees involved in the implementation:	~ 25
Return on Investment (ROI) (Please indicate the time period):	10 years 20.000, - (12 flats) +40.000, - (24 flats) + 24.000, - (16 households)

Environmental Metrics

Reduction of greenhouse gas (GHS) emissions (t/CO ₂ annually): (Heating: 83.000 l savings / year * 3,45 = CO ₂)	286,35 tons for heating 1,76 tons for electricity
Reduction of electricity usage (kWh/MWh/GWh):	4.800 kWh /Year
Reduction of fuel consumption and/or change in the type of fuel used	83.000 liters oil/year

Social Metrics

Community engagement and participation in the design and implementation of the technology/investment	Event with residents and stakeholder bevor the start of the works.
Public consultations and feedback	Meetings with residents every Tuesday morning.
Accessibility of the technology/investment to marginalised groups	More subsidies available for marginalised groups.
Addressing inequality using the technology/investment	Subsidies to reach all groups of people.
Fair distribution of the benefits/risks among all stakeholders	Highest costs were on Biomass heating plant, but stakeholder were engaged early to minimise the risks.
Strategic partnerships and joint ventures in the design and implementation of the technology/investment	6 different companies were involved in the works to distribute the costs among the partners.

Inputs from the Technology-evaluation tool:

Question #1: What environmental impacts does the technology have, particularly for communities that may be disproportionately affected by environmental harms?

A: Biomass-based district heating generally brings strong environmental benefits, especially when replacing fossil-fuel systems such as oil heating. It reduces overall greenhouse-gas emissions, supports sustainable forest management when fuel is regionally sourced, and lowers the dependency on imported energy. Modern



biomass systems also operate with high efficiency, especially when paired with optimized combustion controls, buffer storage, and continuous monitoring. These advantages contribute to long-term climate mitigation and more stable, resilient local energy systems. At the same time, the technology can have localized environmental impacts that need careful management. Biomass combustion, even in high-quality systems, produces some particulate matter and NO_x emissions. Although these are far lower than emissions from old wood stoves or open fireplaces, they may still affect nearby residents if not filtered effectively. Communities that are already exposed to environmental stresses—such as low-income households, elderly residents, or groups living near transport routes—may be more sensitive to these localized impacts. Additional factors such as increased traffic from biomass deliveries, noise from plant operations, or siting of energy infrastructure can put a disproportionate burden on these groups if not planned carefully.

In well-designed systems, however, these risks can be mitigated. Modern filtration technologies, careful siting of plants away from sensitive neighbourhoods, minimizing transport distances through local fuel sourcing, and transparent community engagement all help ensure that benefits—such as cleaner air compared to individual oil burners, cost stability, and improved energy security—are shared fairly across all residents. When implemented responsibly, biomass district heating can thus support both environmental sustainability and environmental justice by reducing regional emissions while ensuring that no community carries an undue share of remaining local impacts.

Question #2: What are the anticipated socio-economic benefits of implementing this technology for local communities? For example, how will it affect local economies, access to services, or standard of living?

A: Implementing biomass-based district heating provides several important socio-economic advantages that directly improve the well-being and living standards of local communities. First, it strengthens the local economy by relying on regionally sourced biomass, which keeps energy spending within the community instead of flowing to foreign fossil-fuel markets. This supports local forestry, logistics, and maintenance companies and often creates new employment opportunities in harvesting, transport, plant operation, and system maintenance. Because biomass prices tend to be more stable than global oil or gas prices, communities also benefit from greater energy price stability, reducing the risk of energy poverty for households with limited income. The technology also improves access to reliable and modern heat services, especially for rural or underserved areas where fossil-fuel infrastructure may be outdated or expensive to maintain. District heating eliminates the need for individual boilers, oil tanks, and complex household maintenance, reducing unexpected repair costs and improving comfort and safety. For vulnerable groups such as elderly residents or low-income families, a stable and affordable heat supply can significantly improve the standard of living, especially during winter months. In addition, local air quality can improve compared to decentralized oil or old wood-burning systems, contributing to health benefits and reducing long-term healthcare costs in the community. When communities are included in planning—through alliances like JETA or participatory city programmes—the project also strengthens social cohesion, builds trust in local governance, and fosters a shared sense of progress toward sustainability. Overall, biomass district heating supports a resilient, inclusive, and future-oriented regional development mode that benefits both the economy and the daily lives of residents.

Question #3: What are the financing options for the project in the region? (e.g., private investment, public funding, grants, loans)

A: A variety of financing instruments are available for biomass-based district heating modernisation and renewable-energy investments in Austria. These include public funding schemes, EU-backed grants, national subsidies, and long-term loans.

Question #4: Which communities have ownership or a stake in the technology, either in terms of financial returns or decision-making? If so, which communities and how?

A: In summary, ownership and stakeholding are distributed across:

- The local energy cooperative / plant operator (financial and operational ownership),
- Residents and heat customers (user stake, comfort, affordability),
- JET Alliance stakeholders (strategic and participatory decision-making influence),
- Local forestry and service providers (economic stake through biomass supply and jobs).

This combination ensures the technology serves the community while involving them in key decisions.

Question #5: How does the local regulatory and policy environment impact the economic feasibility of the technology or project? (e.g., supportive energy policies, tax policies, regulations for clean energy or innovation)

A: Austria's regulatory environment strongly supports the economic feasibility of biomass-based district heating through ambitious climate-neutrality targets, financial incentives, and heating-sector regulations. National policies such as the Renewable Heating Act promote renewable heat by restricting new fossil-fuel installations and encouraging district-heating connections, while substantial public funding—including Austria's Recovery and Resilience Plan, grants covering up to 75-100% of heating-system replacements, and the €657 million Climate and Energy Fund—reduces upfront investment costs and increases customer uptake. Provinces like Styria further reinforce feasibility through supportive regional permitting and renewable-energy frameworks. Together, these policies create stable demand, lower financial barriers, and offer long-term investment security, making renewable district-heating projects economically attractive.

Question #6: What are the upfront and ongoing costs of implementing the technology, and how do they compare to the long-term benefits, particularly for vulnerable communities?

A: Implementing a biomass-based district heating system involves significant upfront costs, including the installation of the biomass boiler, buffer storage, digital monitoring equipment, network upgrades, and connection of individual households. These initial investments are typically higher than the cost of installing or replacing individual oil boilers. Ongoing costs include biomass fuel supply, plant operation, system maintenance, and periodic technical optimisation. However, these operating costs are generally more stable than oil prices, because biomass is sourced regionally, has less price volatility, and avoids international market shocks. In the long term, the benefits outweigh the costs, particularly for vulnerable communities. District heating eliminates the need for households to invest in expensive individual heating systems, reduces maintenance responsibilities, increases safety, and ensures reliable heat supply.

Vulnerable groups—such as elderly residents or low-income households—benefit from more predictable heating bills, protection from oil price spikes, and improved indoor comfort.

Additionally, the system provides health and environmental benefits, as cleaner combustion and centralized emissions control reduce local air pollution compared to individual oil burners. The long-term financial stability, improved living conditions, and reduced exposure to energy price risks mean that the technology creates lasting social and economic advantages that extend far beyond the initial investment period.

Question #7: How does the technology or investment positively impact the wellbeing of communities (e.g., health, education/upskilling, or local development)?

A: The technology strengthens community wellbeing in several interconnected ways. Health improves because centralized biomass heating replaces individual oil or old wood-burning systems, reducing local air pollutants and providing cleaner, more controlled combustion. This especially benefits vulnerable groups such as children, seniors, and residents with respiratory conditions. The system also enhances energy security and comfort, ensuring stable, reliable heating during winter without the risks or maintenance burdens of individual boilers. The project contributes to education and upskilling by involving local operators, technicians, and stakeholders in training on digital monitoring, efficient system operation, and renewable-energy management. Through the JET Alliance, the initiative also creates a platform for



knowledge exchange and community learning around climate-friendly heating solutions. Finally, the investment supports local economic development by relying on regional biomass supply chains, which stimulates forestry, logistics, and technical service sectors. This creates local jobs, keeps economic value in the region, and reduces dependence on external energy markets. For vulnerable households, predictable heating costs and improved living comfort translate directly into a better standard of living, lower financial stress, and improved long-term wellbeing.

Question #8: How will the project create jobs in the region? (Consider both direct and indirect employment, including long-term job creation and temporary construction or installation jobs)

A: The project generates employment through both short-term construction and installation work and long-term operational and economic activity. Direct jobs are created during the installation phase, including construction workers, heating technicians, electricians, pipefitters, and digital system installers who are needed to build, connect, and commission the upgraded biomass district heating system and monitoring infrastructure. These roles are typically temporary but provide a significant local employment boost during the implementation period. Once the system is operational, long-term jobs arise in plant operation, system monitoring, maintenance, customer service, and network management. Because biomass relies on locally sourced wood chips, the project also supports stable employment in regional forestry, fuel preparation, transport, and logistics, creating ongoing economic demand in sectors that are traditionally important in rural areas. These activities strengthen regional value creation and help maintain local supply chains. The project further creates indirect employment by stimulating demand for technical services, engineering consulting, and digital-skills development. Training activities associated with the new technologies—such as data acquisition, system optimisation, and renewable-energy management—lead to upskilling opportunities for local workers and technicians, improving long-term employability and supporting a more resilient regional labour market. Overall, the project provides meaningful job creation across multiple phases while reinforcing long-term economic stability for the community.

Question #9: How does the technology foster long-term community engagement and empowerment?

A: The biomass-based district heating system fosters long-term community engagement and empowerment by giving residents, local organisations, and stakeholders an active role in shaping their energy future. Because the system is locally sourced and operated, communities are more directly connected to the energy they use, reinforcing a sense of ownership and shared responsibility. The project's collaborative structures such as the JET Alliance—create ongoing opportunities for residents, local authorities, and service providers to participate in decision-making, voice needs, and influence future improvements. This engagement strengthens trust, transparency, and collective problem-solving. The technology also empowers the community through knowledge-building and skill development. The introduction of digital monitoring, data analysis, and renewable-energy management creates new learning opportunities for local technicians, plant operators, and young professionals. Over time, this builds local technical capacity and ensures that expertise remains within the region. Additionally, the system's visible benefits—such as stable prices, improved comfort, and cleaner air—reinforce public confidence in renewable energy and motivate continued community participation in sustainability initiatives. Overall, the project transforms residents from passive energy consumers into active partners in a modern, low-carbon heating system, strengthening both social cohesion and long-term community resilience.

Overall score and brief description of the result:

Total Score: 83%

3.2 Use of the tool for adapting the technology outcomes

The Technology Evaluation Tool was applied by all three partners to examine how changes in selected parameters influence the overall evaluation results and to identify areas where technology design or implementation could be further improved. By adjusting both qualitative and quantitative inputs, the partners



gained insights into the relative importance of environmental, social, and economic dimensions within the Just Energy Transition framework.

For **PP7-IRENA**, the tool proved to be particularly sensitive to social parameters. Improvements related to social inclusion, skills development, and benefits for vulnerable groups led to a more noticeable increase in the overall score than changes limited to economic indicators alone. This confirmed the strong emphasis placed by the tool on social aspects of the energy transition and demonstrated its usefulness for both analysing existing investments and supporting the design of future projects with enhanced social impact.

In the case of **PP8-EAV**, the tool supported a structured assessment of the tested solution across economic, environmental, and social dimensions by adjusting parameters such as energy savings, emission factors, and cost assumptions. The results helped validate the balance between investment costs and long-term operational benefits, highlighted the relevance of operational savings for public budgets, and confirmed the strong social and environmental value of the solution despite limited direct job creation. The tool also supported decision-making regarding the replication of similar solutions in other public buildings.

For **PP12-WEIZ**, adjustments to numerical assumptions—such as increased return on investment, higher energy savings, and greater cost reductions—resulted in only minor changes to the overall score. This indicated that the tool places greater emphasis on qualitative and open-ended responses, particularly those addressing social, governance, and stakeholder-related aspects, rather than purely quantitative performance indicators. While this supports a broader assessment of just transition impacts, it also highlighted a methodological limitation: the requirement to provide all numerical inputs as percentages. Without clear reference values, this can complicate accurate estimation. Allowing inputs in absolute values (e.g. MWh for energy or euros for costs) would improve usability and enhance comparability of results.

The Technology Evaluation Tool was assessed as a useful and informative instrument for identifying strengths, revealing improvement potential, and guiding the development of more balanced and socially responsive energy investments. Across all three case studies, the tool contributed to more evidence-based decision-making and supported alignment with Just Energy Transition objectives.



4. Monitoring and evaluation

4.1 Monitoring of the pilot action implementation

The management and organisation of the pilot actions across all three case studies were overall efficient and well-coordinated, supported by clearly defined roles, structured communication, and close cooperation among project partners and key stakeholders.

For the pilot implemented by **PP7-IRENA**, activities were planned and carried out in close cooperation with the City of Labin and Mate Blažine High School, ensuring effective coordination across technical, educational, and administrative components. Most activities were implemented in line with the planned timeline. A delay occurred in the final grid connection of the photovoltaic power plants due to administrative and bureaucratic procedures beyond the direct control of the project partners. This delay did not affect the scope or quality of the pilot action. Corrective measures were applied through adjustments to the testing schedule and closer coordination with the electricity distribution system operator, allowing the project to proceed without compromising its objectives.

In the case of **PP8-EAV**, the pilot action was implemented largely according to the planned schedule. The trial operation and fine-tuning phase required additional time to ensure stable system performance and reliable data collection. This adjustment was considered a necessary optimisation rather than a delay, and no major corrective measures were required. Cooperation between EAV, the municipality, and the technology supplier remained effective throughout the implementation.

For **PP12-WEIZ**, the pilot activities were managed efficiently with clearly distributed responsibilities and regular coordination within the project team. The implementation followed the planned timeline, supported by structured communication and close supervision by the innovation centre. Only minor corrective measures were required, mainly involving small adjustments to scheduling and coordination with external partners, which helped optimise workflow and ensure alignment with operational requirements. These measures did not result in significant delays and contributed to the overall effectiveness of the pilot action.

At project level, monitoring was assured by Activity 2.1 “Monitoring, Evaluation and continuous improvement of Transnational Pilots 1 and 2”. Several Monitoring Committee sessions were organised along the activity implementation. As specifically focused on Pilot 2 stage 2 can be mentioned: at the 5th Project meeting: Weiz, Austria, on 3-4 December 2024; at the 6th project meeting: Telč, Czech Republic, on 28 May 2025, and the online monitoring session on 5th November 2025.



4.2 Risk management protocol

In line with the Monitoring and Evaluation (M&E) Methodology, potential risks related to the implementation of the pilot actions were identified, monitored, and addressed throughout the testing process by all three project partners.

For the pilot implemented by **PP7-IRENA**, the main identified risk concerned potential delays in finalising planned activities, primarily related to administrative and coordination processes. This risk was mitigated through regular and proactive communication with all involved stakeholders and engaged third parties, including installers and supervising engineers, which helped minimise delays and maintain overall implementation effectiveness.

In the case of **PP8-EAV**, potential risks related to technical performance, stakeholder coordination, and data availability were identified. These risks were mitigated through a clear allocation of responsibilities, close cooperation with the technology supplier, and continuous monitoring of system functionality and data quality. As a result, no critical risks materialised during the implementation of the pilot action.

For **PP12-WEIZ**, several risks identified in the M&E Methodology emerged during implementation, particularly those related to coordination with external partners, minor delays in material delivery, and the need to ensure consistent data quality during the testing phase. Mitigation measures included strengthening internal communication routines, increasing the frequency of coordination meetings with contractors, introducing additional data quality checks, and adjusting the implementation schedule where necessary. Tasks were reassigned within the team to maintain the planned timeline. These measures ensured that the identified risks did not have a significant impact on the effectiveness of the pilot actions or the achievement of their objectives.



5. Conclusion

The implementation of Transnational Pilot 2 - Stage 2 successfully demonstrated how diverse energy technologies can contribute to a Just Energy Transition when combined with social inclusion, stakeholder engagement, and capacity-building measures. Across the three case studies implemented by IRENA, EAV, and WEIZ, the pilots confirmed the technical feasibility, environmental benefits, and socio-economic relevance of the tested solutions in real-life conditions.

The pilot implemented by PP7-IRENA showed that photovoltaic technology can be effectively integrated into public residential buildings serving vulnerable groups, delivering tangible environmental benefits through reduced greenhouse gas emissions and lower reliance on grid electricity. The innovative learning-by-doing approach, involving vocational high school students and teachers, generated strong educational and social impacts by enhancing practical skills and employability in green transition-related professions. The application of the Technology Evaluation Tool, resulting in an overall score of 78%, confirmed the project's strengths in environmental performance and social inclusion, while also highlighting areas for future improvement such as financing diversification and community ownership models. Despite minor administrative delays, the pilot was efficiently managed and successfully completed, demonstrating strong replication potential.

The case study implemented by PP8-EAV confirmed that smart energy monitoring and management systems are effective tools for improving the energy performance and sustainability of public buildings. The pilot achieved measurable energy and cost savings, reduced greenhouse gas emissions, and improved transparency and control of energy use in a public kindergarten setting. While no permanent jobs were created, the project contributed to capacity building, skills development, and increased awareness of energy efficiency solutions. The tested approach proved to be technically reliable, economically feasible, and highly relevant for replication at local and regional levels.

The pilot implemented by PP12-WEIZ demonstrated the successful modernisation of a biomass-based district heating system, delivering improved system efficiency, reduced emissions, enhanced energy cost stability, and positive impacts on community wellbeing. Strong organisational structures, clear task distribution, and effective coordination ensured timely implementation. Minor risks related to scheduling, coordination, and data consistency were identified and mitigated without affecting overall project performance. The pilot also strengthened stakeholder engagement through the JET Alliance and supported local capacity building, showcasing renewable district heating as a viable pathway for a just energy transition.

Transnational Pilot 2 - Stage 2 confirms that technological innovation, when combined with social considerations, stakeholder involvement, and digital evaluation tools, can deliver balanced and replicable



solutions for the just green transition. The results provide valuable insights for regional and local authorities, energy agencies, and service providers, and form a strong foundation for the wider deployment and replication of Just Energy Transition-oriented investments across Central Europe.



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