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JUST ENERGY TRANSITION FOR CENTRAL EUROPE

Delieverable 2.4.2 - JETforCE solution 2 -"Technology Evaluation through a Just Energy Transition lens"

Output 2.4 JETforCE solution for digital technology-evaluation through a Just Energy Transition lens

Version 2

01 2026

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Introduction

The transition to greener and more sustainable energy systems is a central priority across Europe. However, achieving climate neutrality requires more than technological change alone. To be effective and socially acceptable, the energy transition must be just and inclusive, ensuring that no region, community, or social group is left behind. Public authorities and decision-makers are therefore increasingly challenged to balance technical performance, economic feasibility, and environmental benefits with social inclusion, equity, and local development needs.

The Interreg Central Europe JETforCE (Just Energy Transition for Central Europe) project responds to this challenge by harnessing digitalisation to support the co-design and co-implementation of energy transition strategies. JETforCE strengthens local and regional energy planning by equipping public authorities, policymakers, and stakeholders with innovative digital tools that support evidence-based, transparent, and participatory decision-making. A core objective of the project is to ensure that Just Energy Transition principles are systematically embedded into planning and investment processes.

By actively engaging citizens—including vulnerable and underrepresented groups—and by integrating socio-economic considerations into the assessment of energy technologies, JETforCE promotes a more balanced and fair transition process. The project recognises that energy investments can generate both positive and negative impacts across territories and social groups, and that these impacts must be anticipated, measured, and addressed at an early stage of decision-making.

At the heart of JETforCE are two complementary digital solutions designed to enhance transparency, participation, and strategic planning in the energy transition. The **JETforCE Challenge Mapping Tool** is digital participation application that enables citizens to identify and report local climate- and energy-related challenges. By capturing local perspectives and lived experiences, the tool ensures that energy transition policies are grounded in real territorial needs and reflect the concerns of vulnerable communities. Building on this participatory foundation, the **JETforCE Technology Evaluation Tool** provides a structured, web-based decision-support solution for assessing renewable energy and energy efficiency technologies through a **Just Energy Transition lens**. The tool supports decision-makers in evaluating potential investments by combining technical, economic, environmental, and socio-economic criteria within a single assessment framework.

This deliverable, D.2.4.2, presents the final version of the JETforCE Technology Evaluation Tool as a solution jointly developed by all partners and associated partners, under the guidance of PP2 – ElfI-Tech, within Output 2.4. It builds on the tool's co-creation and iterative testing during the project's transnational piloting activities and reflects lessons learned from real-life application across multiple Central European contexts. The deliverable describes the tool's functionality and features, provides guidance on its use, and outlines how piloting activities informed its final refinement, positioning the solution for uptake and replication beyond the project lifetime.

1. JETforCE Technology Evaluation Tool - Background

The **JETforCE Technology Evaluation Tool** is a decision-support software that enables policymakers, energy planners, and other stakeholders to evaluate the socio-economic and technical feasibility of various energy transition technologies. Designed as a web-based application, the tool provides a structured framework for assessing the costs, benefits, and impact of renewable energy technologies, guiding users towards informed and just investment decisions.

Unlike traditional cost-benefit analysis tools, the innovative JETforCE digital tool takes socio-economic and environmental indicators into consideration, ensuring that decisions are not solely based on financial metrics but also address equity, accessibility, and potential unintended consequences for vulnerable communities.
The evaluation process follows a structured questionnaire, where users input information about the technology they wish to assess. The tool then evaluates the selected technology based on key indicators, including:

- **Energy efficiency** – measuring the effectiveness of the technology in reducing energy consumption.
- **Economic viability** – considering upfront costs, maintenance, and long-term financial benefits.
- **Social impact** – analysing how the technology affects communities, including job creation, affordability, and accessibility.
- **Environmental benefits** – evaluating carbon footprint reductions and overall sustainability.
- **Equity and inclusion** – assessing how well the technology serves all citizens, particularly those in disadvantaged areas.

The tool processes these inputs through a weighted scoring system, providing an objective assessment that helps stakeholders compare real-world implementation scenarios with ideal models. This approach ensures that investments in renewable energy are not only technically feasible but also socially responsible. The finalised version of the JETforCE Technology Evaluation Tool is available, having undergone extensive pilot testing by the partnership and its stakeholders. By collaborating with local and regional stakeholders, JETforCE continues to refine the software, ensuring that it remains user-friendly, scalable, and adaptable across different regional contexts. The tool's long-term goal is to become a standardised resource for public authorities, businesses, and organisations involved in shaping the energy future of Central Europe. By equipping decision-makers with reliable, structured, and justice-oriented evaluations, the JETforCE Technology Evaluation Tool contributes to fairer and more effective energy policies. It empowers stakeholders to make informed choices about energy investments, ensuring that the benefits of the Just Energy Transition are shared by all, without leaving vulnerable populations behind.

2. Technology Evaluation Tool - Development

2.1 Pilot 2 – Stage 1

A Just Energy Transition must ensure that no community or individual is left behind. Many vulnerable groups (e.g., low-income households, elderly citizens, individuals with disabilities, rural populations, digitally excluded individuals) face barriers to participation in energy transition initiatives. These barriers may be economic, educational, technological, or social. The JETforCE Capacity Building Programme is designed to actively engage, empower, and support these communities in adopting and benefiting from new energy solutions.

Pilot 2 - Stage 1 of the JETforCE project, "Testing the tool for technology evaluation," was designed to assess the initial functionality of the **Technology Evaluation Tool (D.1.4.1)** and to prepare it for practical deployment in real-world pilot settings. The stage ran from **Period 3 to Period 4 (M13-24)** and focused on applying the tool to technologies deployed in partner and associate partner territories between 2017 and 2022. The primary objective was to evaluate these investments from a just transition perspective and to gather feedback to inform improvements for subsequent pilot phases.

During Stage 1, partners and associate partners, supported by JETA outputs (O1.2), piloted the software for technology evaluation across multiple regional contexts. EIfI coordinated transnational work in collaboration with the WP leader, with technical support from YUNUS for cost-benefit analysis and socio-economic impact assessment. Partners applied the tool to their respective technologies, generating initial evaluations that fed into a transnational analysis input document. Feedback from the monitoring committee, gathered during the interim session (A2.1, Meeting 4), guided refinements to the software ahead of Stage 2.

The pilot was designed to be iterative and participatory, combining technical testing with stakeholder engagement. Partners tested the tool using a selection of technologies and investments, assessing how well the tool could capture environmental, social, economic, and justice-related dimensions. A transnational workshop was organised to analyse the technologies, validate scoring approaches, and produce an intermediate report (D2.3.1) detailing the findings and the work plan for subsequent piloting.

2.1.2 Partner and Stakeholder Engagement

A critical component of Pilot 2 - Stage 1 was the active involvement of partners and stakeholders in testing and refining the tool. The beta version of the tool, piloted between September and December 2024, incorporated a wide range of social, economic, and environmental indicators. Partners were invited to provide input on how to assign appropriate weights to these indicators, ensuring that the tool reflected the relative importance of each dimension for supporting a just energy transition in different regional contexts.

During the 5th Steering Group Meeting in Weiz, Austria (December 2024), breakout sessions were conducted to discuss weighting methodologies. Partners were divided into groups focusing on social, environmental, and economic indicators, and proposed approaches for applying transnationally consistent weighting were presented and debated. Feedback highlighted the need for AI-generated questions to be more specific to the technologies being assessed and for the tool interface to be more intuitive.

Stakeholder and partner inputs led to several concrete improvements, including the simplification of data inputs. Some fields, such as Return on Investment or the proportion of energy-impoverished citizens, were difficult for users to calculate. Pre-filled templates and guiding examples were introduced to improve usability, along with mechanisms for updating baseline data such as country-specific inflation rates. Enhancements to the interface, including colour-coded sections, visual progress cues, and better readability of graphics on larger screens, were also implemented. A glossary and tooltip explanations were added to clarify terms such as “socio-procedural justice” and “auxiliary services,” while an introductory guide helped users understand the tool’s purpose, target groups, and scoring methodology.

Pilot 2- Stage 1 also emphasised capacity-building for local authorities, energy professionals, civil society organisations, and stakeholders involved in energy planning and project evaluation. Partners organised workshops to demonstrate the tool’s value and usability, explored co-creation opportunities for refining its features, and promoted recognition for active participation. Digital Ambassadors were identified as key intermediaries for disseminating knowledge, bridging the gap between governments, industry, and the public. Through these capacity-enhancing activities, Stage 1 ensured that partners and stakeholders could meaningfully engage with the tool and contribute to its development.

The testing in Pilot 2- Stage 1 produced valuable insights for improving the Technology Evaluation Tool. Feedback on weighting indicators, question specificity, data input simplification, and interface usability directly informed updates to the software. Partners’ hands-on experience with the tool confirmed its potential to support evidence-based decision-making, strategic planning, and integration of just transition principles across different contexts. Stage 1 provided a solid foundation

for Stage 2, where the tool would be applied in real-time pilot testing to evaluate current technologies and support energy planning and investment decisions.

Pilot 2 - Stage 1 successfully validated the initial design and functionality of the JETforCE Technology Evaluation Tool. Through iterative testing, partner feedback, and stakeholder engagement, the tool was refined to improve usability, indicator weighting, question specificity, and interface clarity. Stage 1 established a collaborative approach to co-developing a tool that can assess technologies across technical, economic, environmental, and justice dimensions, setting the stage for the real-time application and further refinement in Pilot 2 Stage 2.

2.2 Pilot 2 – Stage 2

Pilot 2 - Stage 2 of the JETforCE project, titled "Evaluating and deploying just transition responsive technologies," focused on testing and validating technologies identified in Stage 1 through three transnational case studies. This stage provided a practical setting to assess the performance of the Technology Evaluation Tool (D.1.4.1) and to refine it based on operational data and partner feedback. The pilot ran from Period 4 to Period 6 (M19–36) and involved close coordination between WP2, WP3, and all project partners.

The primary aim of Pilot 2 - Stage 2 was to test validated technologies in real-world settings and to update the Technology Evaluation Tool to ensure its usability, accuracy, and applicability for just energy transition planning. The pilot involved three sites, each representing a different energy context. In Istrian County, Croatia, IRENA deployed solar photovoltaic (PV) systems and conducted capacity-building workshops for students and vulnerable groups to promote upskilling and reskilling. In the Czech Republic, EAV monitored energy use in public buildings, including a kindergarten, with data collection from PV installations and heating and cooling systems to identify optimisation opportunities. In Weiz, Austria, the pilot focused on a historical area, where biomass district heating systems were upgraded, including boiler replacement, buffer storage integration, and intelligent load management, resulting in significant improvements in efficiency and emissions reduction.

Through these case studies, the pilot provided a test bench for the Technology Evaluation Tool, allowing partners to use the tool in real-time to monitor, evaluate, and adjust energy technologies, while simultaneously gathering operational and socio-economic data to inform improvements.

2.2.1 Technology Evluation Tool Final Updates

The insights gained from Pilot 2 Stage 2 directly informed updates to the Technology Evaluation Tool. Key improvements included enhanced navigation, allowing users to return to previous sections, modify inputs, and generate revised PDFs to compare scenario outcomes. Each AI-generated response now

includes a mandatory explanation, improving transparency and helping users understand how individual inputs influence the scoring. Additional refinements under development included the integration of an overall AI-generated description of the final score, the inclusion of participatory assessment elements, and consistent guidance for interpreting results. The project logo was also scheduled for inclusion to comply with programme requirements.

The pilot allowed for comprehensive testing of the tool across diverse contexts, validating its ability to evaluate technologies on technical, economic, environmental, and justice criteria. Partner feedback helped fine-tune scoring logic and interface functionality, while ensuring that the tool could support scenario testing and evidence-based decision-making. Draft scoring descriptions and testing documentation were prepared by mid-December 2025, and the tool was scheduled for full finalisation by 30 January 2026.

2.2.2 Impact and Integration

Pilot 2 Stage 2 confirmed the Technology Evaluation Tool as a simple, yet effective instrument for evaluating just transition-responsive technologies in real-world settings. The tool now supports evidence-based planning, enabling partners to assess renewable energy networks, energy efficiency measures, and social impacts such as skills gaps and energy poverty. Its outputs are linked to WP3 Local Action Plans, facilitating long-term regional energy strategies and ensuring that decisions are aligned with energy justice principles.

The tool's flexible and replicable design allows it to be applied across regions and projects, supporting the standardised assessment of energy technologies while promoting transparency and stakeholder participation. The real-time testing of the Technology Evaluation Tool during Pilot 2 Stage 2 provided critical insights into its functionality, usability, and applicability. The pilot sites offered diverse contexts that informed practical improvements to the tool, enhancing navigation, explanation clarity, scoring logic, and integration with participatory elements. The updated tool now serves as a robust and user-friendly instrument, capable of supporting evidence-based, justice-aligned decisions in the deployment and evaluation of just transition technologies across multiple sectors and regions.

3. Finalised Technology Evaluation Tool – User Manual

The following subsection provides step-by-step instructions on how to use the JETforCE Technology Evaluation Tool effectively. It explains how to navigate the assessment process, interpret results, and apply insights to support informed decision-making. The tool guides users through a structured set of questions covering key indicators, including socio-procedural justice, energy performance, and financial viability. The responses are weighted to provide a well-rounded decision-support framework, helping stakeholders evaluate the potential benefits and trade-offs of different energy investments.

By following the instructions in this guide, users can effectively leverage the JETforCE Technology Evaluation Tool to make well-informed, socially just, and sustainable investment decisions.

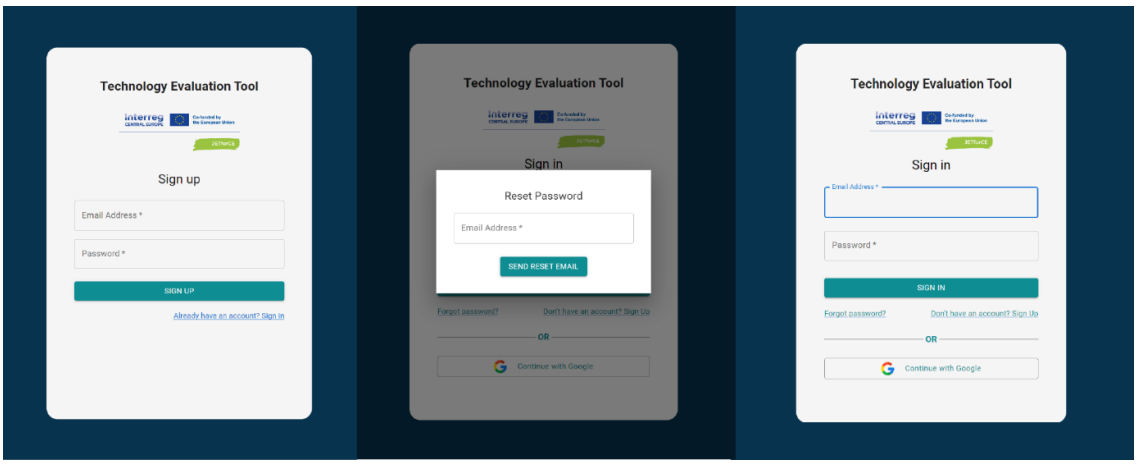
3.1 Technology Evaluation Tool – Step-by-step User Manual

JETforCE Technology Evaluation Tool – User Manual – Supporting Policymakers in Implementing Just Sustainable Solutions

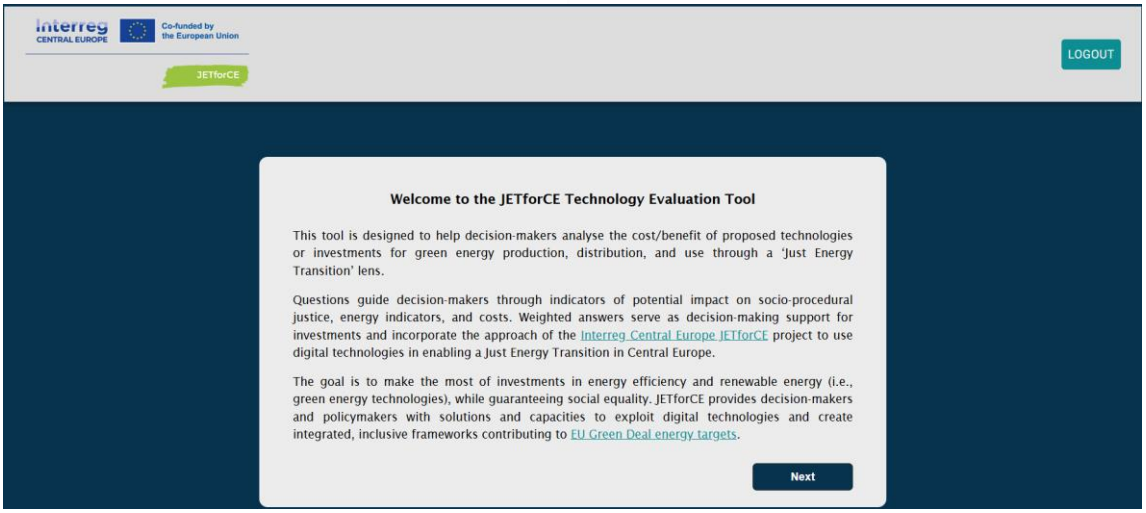
Access the Tool: https://jetforce-1d009.web.app/

STEP 1: Initially, the user must create an account to access the application. Once the account is created, they can sign in and enter the application. A secure sign-in option via Google is available if the user has a Gmail account.

If the user forgets their password, a reset link is sent to their email, allowing them to create a new password.

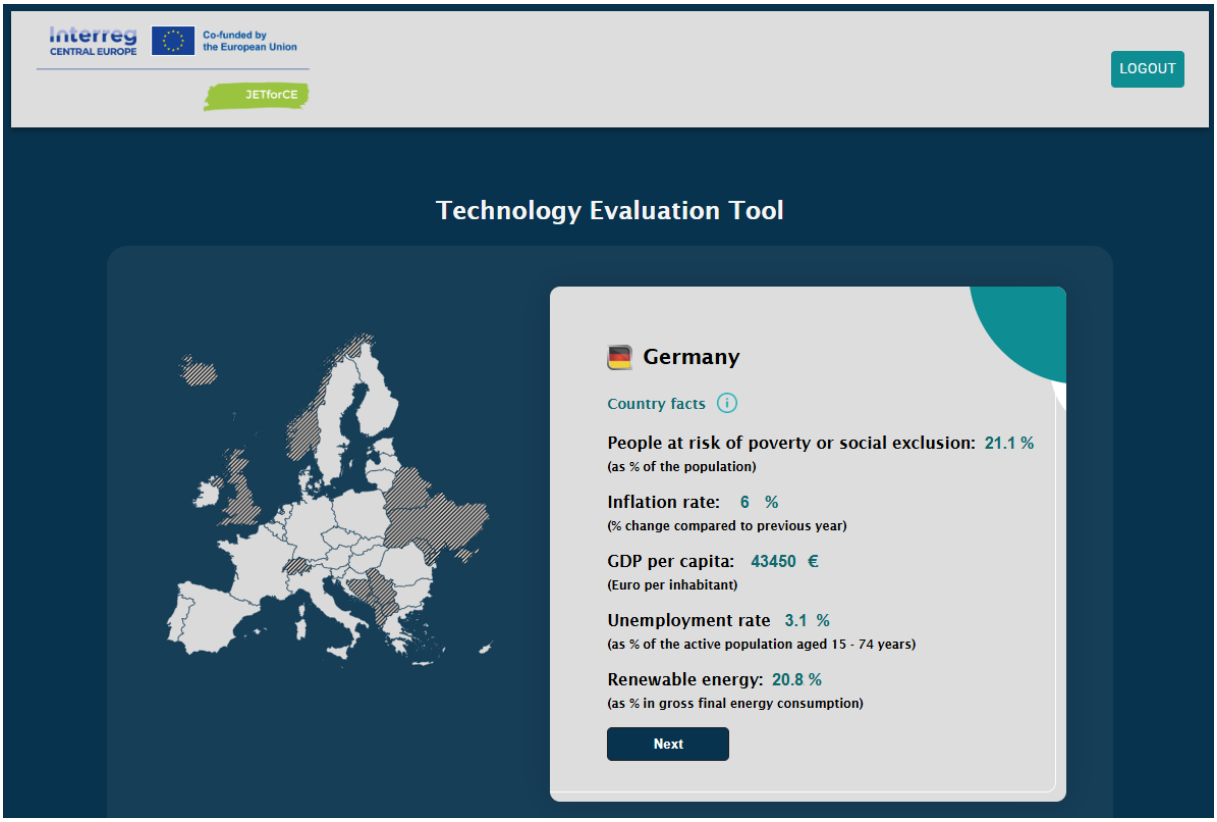


STEP 2: Upon entering the application, the user is greeted with a welcome message explaining what the "Technology Evaluation Tool" is, along with a reference to its funding.



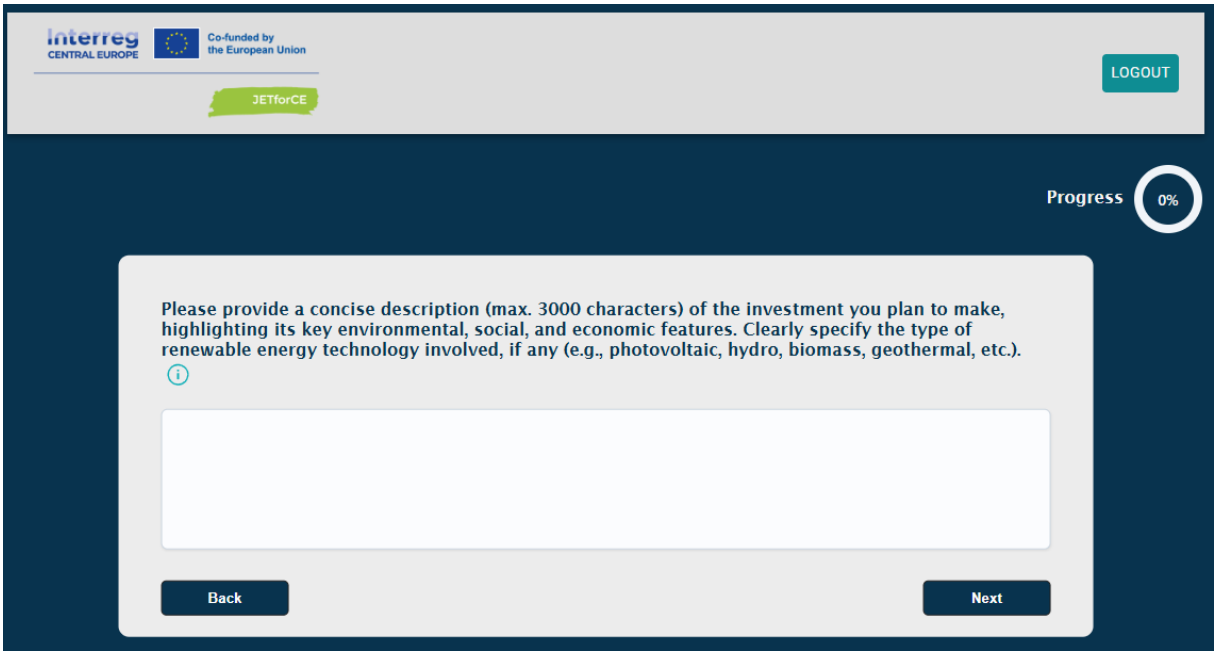
STEP 3: Next, the user sees a map of the European Union on their screen. Through this map, they can select a country and view specific data related to it. This data is sourced from the Eurostat database, which is continuously updated.

If the user has more up-to-date data for their country, they can edit the respective fields.

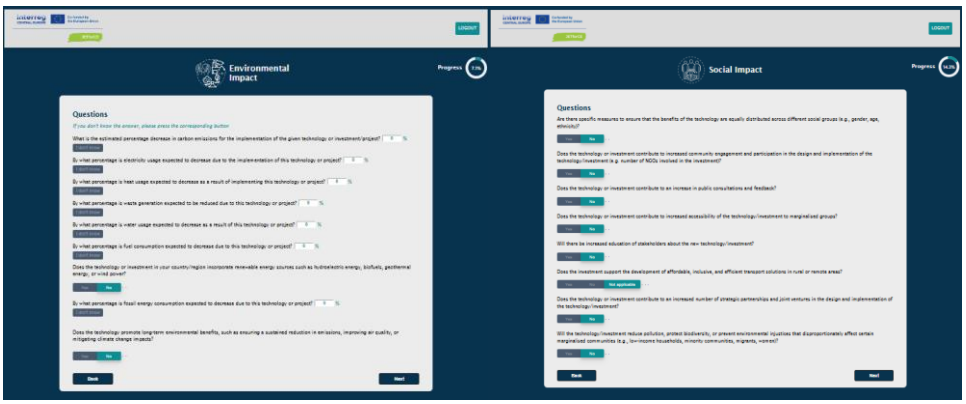


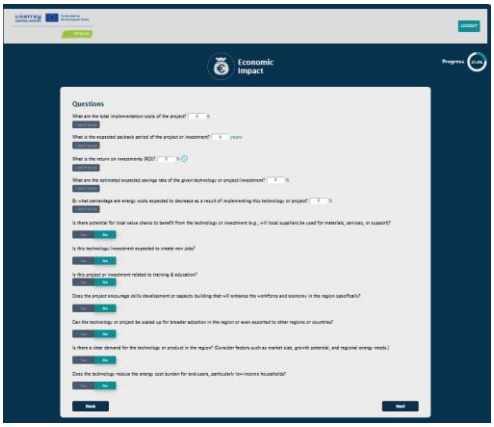
STEP 4: In the next step, the user is required to provide a "description of investment," marking the beginning of the evaluation process for their responses.

At the top right, a progress bar is visible, allowing the user to track their progress throughout the process until all questions are completed and the final score is displayed on the screen.



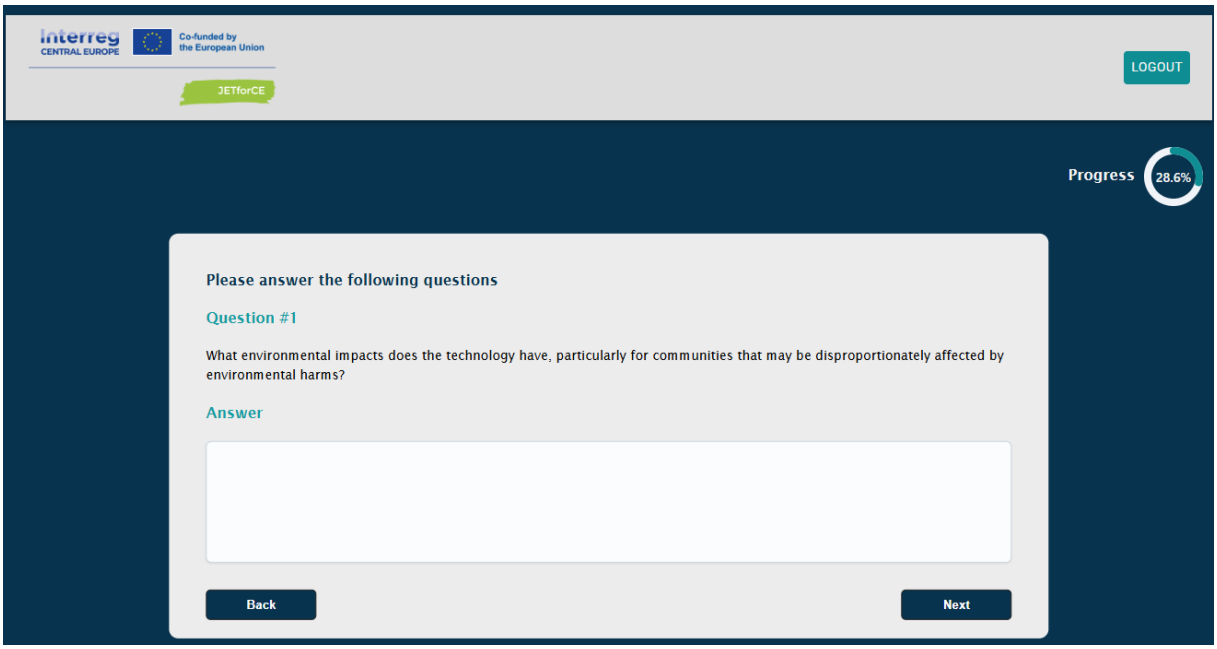
STEP 5: In the following stage, the user answers questions related to the environmental, social, and economic impact of their investment. Weight indicators are applied to the user's responses. Each answer is assigned a specific scoring coefficient based on the importance of the question being answered.





STEP 6: Next, the user must answer a series of 10 questions. The responses at this stage are evaluated and scored by an AI model.

All data from the application is stored in a database to facilitate further development and improvement of the application, as well as to enhance the scoring algorithm based on the results.



STEP 7: Once the user has answered all 10 questions, the final score is displayed on their screen. The user also has the option to download a **.pdf** file containing the questions asked, their responses, and the score assigned by the AI evaluation model.

Technology Evaluation Tool

Total Score: 79%

Question #1
What strategies can your organization implement to mitigate and reverse the environmental impacts caused by coal mining and burning in the region?

Answer
LEAG can mitigate the environmental effects of coal mining and burning in Lusatia by accelerating its transition to renewable energy, supported by large-scale battery storage systems. By investing in advanced battery technologies, LEAG can enhance the reliability of renewable sources like solar and wind, ensuring consistent energy supply even during periods of low generation. This shift will reduce reliance on coal-fired power plants, cutting carbon emissions and improving air quality. Moreover, integrating battery storage will help stabilize the regional grid, balancing supply and demand fluctuations and preventing blackouts, thus fostering a more resilient energy system.

Additionally, LEAG can leverage battery storage to repurpose former mining sites for renewable energy projects, creating "energy hubs" that combine solar farms and wind turbines with storage facilities. This will not only support the decarbonization of the energy sector but also stimulate local economic growth through job creation and investment in clean technology.

Based on the criteria given, the answer would receive a score of 80%. The response is relevant to the question, specific to the region of Lusatia, and demonstrates expertise in renewable energy and battery storage technologies. The proposed strategies can effectively mitigate and reverse the environmental impacts of coal mining and burning, offering value by promoting clean energy and economic development. The suggestion of repurposing mining sites for renewable projects shows innovation and commitment to sustainable solutions. The answer is clear, professional, and expedient in addressing the issue at hand.

Question #2
What are the most effective methods for developing sustainable production and supply of heat in the region?

Enviromental Impact

Question	Answer
What is the estimated percentage decrease in carbon emissions?	5%
By what percentage is electricity usage expected to decrease?	12%
By what percentage is heat usage expected to decrease?	13%
By what percentage is waste generation expected to be reduced?	13%
By what percentage is water usage expected to decrease?	13%
By what percentage is fuel consumption expected to decrease?	3%
Does the technology incorporate renewable energy sources?	Yes
By what percentage is fossil energy consumption expected to decrease?	13%
Does the technology promote long-term environmental benefits?	Yes

Social Impact

Question	Answer
Are there specific measures to ensure equal benefits distribution?	Yes
Does the technology contribute to increased community engagement?	No
Does the technology contribute to increased public consultations?	Yes
Does the technology increase accessibility for marginalized groups?	Yes
Will there be increased education of stakeholders?	Yes
Does the investment support transport solutions in rural areas?	No applicable
Does the technology contribute to strategic partnerships?	Yes
Will the technology reduce pollution or prevent environmental injustices?	Yes

Economic Impact

Question	Answer
What are the total implementation costs of the project?	13%
What is the expected payback period of the project or investment?	3 years

STEP 8: If the user would like to adjust one or more of the parameters inputted into the tool, they may do so simply by clicking the 'back' button. This will also allow them to see the estimated impact of certain environmental, social or economic factors, as well as their descriptions of the given project or investment being evaluated, on the overall effectiveness of the project/investment in addressing the just energy transition.

3.2 Tips for Stakeholders

- **Public Authorities**: Use structured evaluations to guide sustainable energy policies and investments.
- **Businesses & Investors**: Assess the long-term feasibility of renewable energy projects before committing resources.
- **NGOs & Advocacy Groups**: Leverage the tool's social impact scoring to push for equitable energy solutions.
- **Researchers**: Utilise the database to analyse trends and improve technology assessments.

3.3. Contact

For technical support and partnership opportunities: **European Institute for Innovation - Technology e.V.**

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Let's drive an equitable energy transition together.

Smart decisions. Just solutions. A sustainable future.

4. Conclusion

The JETforCE Technology Evaluation Tool serves as a vital resource for empowering key decision makers to actively engage in the Just Energy Transition. By providing this valuable digital tool, the goal is to further the develop of inclusive strategies, enabling the ability of decision makers to contribute to a fair and sustainable energy transition across Central Europe. With a particular focus on engaging vulnerable and marginalised groups, the tool ensures that no community is left behind in the shift towards greener energy solutions. Through the integration of the JETforCE digital tools, participants gain hands-on experience in assessing local energy challenges and making informed decisions about renewable energy technologies. As we move forward, it is crucial to maintain momentum and ensure that the skills and knowledge gained are actively applied and expanded upon. Collaboration among public authorities, energy experts, community organisations, and citizens remains essential in shaping an inclusive and just energy transition. The success of JETforCE lies in its ability to inspire and empower individuals to take ownership of the transition process, making sustainable energy solutions a reality for all.