

Gate 1

Project Design and Problem Formulation

Why should this project be done?

Firstly, the WASTE4PCM Project should be done because it will contribute to increasing the energy efficiency and circularity of European industries by utilizing waste energy, waste resources and by-products, which aligns with the European goals of promoting a more energy- and resource-efficient and sustainable economy. Secondly, the WASTE4PCM project should be done because it is likely to produce impactful and relevant outcomes, since it involves an interdisciplinary consortium of R&I partners from Poland, Latvia, and Turkey, which ensures that the project is grounded in diverse perspectives and expertise.

Ethics

Anticipate

Who are the relevant stakeholders of your project?

1) Project partners: the consortium members involved in the project, including RIC, PLAST ENERGY, UL, METU. 2) Funding agencies: the organizations providing funding and resources for the project. 3) End-users: companies that could potentially benefit from the project's outcomes and technologies, such as: a) companies in the waste management sector (firms interested to dispose of plastic wastes or cooking oils), b) companies producing materials (firms interested to expand their offer of producing heat transfer fluids), c) companies operating in industries generating significant amounts of waste heat (e.g. non-ferrous metal, chemical, non-metallic mineral, food, paper and pulp) - firms interested to improve their sustainability and lower operational costs. 4) Policy-makers and regulators: the government bodies responsible for setting regulations and policies related to waste management, energy efficiency, and sustainability. 5) General public: the societies of Poland, Latvia and Turkey, who may be interested in learning how the project's outcomes and could potentially contribute to a more sustainable industrial practices. 6) Other stakeholders: NGOs, interest groups, and media that may be interested in the project's outcomes and impacts.

Public Engagement

Reflect

Which actions will be taken to involve all potentially relevant stakeholders including researchers, representatives from industry, policy-makers and civil-society actors in the project?

WASTE4PCM project will involve relevant stakeholders throughout the project's lifecycle to ensure that their perspectives and needs are taken into account in the development and implementation of the technology. The following actions will be taken to involve stakeholders: 1) Stakeholder mapping: Already started; the mapping exercise will be conducted in WP6 to identify relevant stakeholders from industry, academia, civil society, and policy-making bodies. 2) Exploitation plan: Based on the stakeholder mapping exercise, WASTE4PCM exploitation plan will be developed in WP6, outlining specific activities to be undertaken to engage with each stakeholder group. 3) Workshops and conferences: WASTE4PCM project partners will participate in national and international workshops and conferences in WP6 to bring together relevant stakeholders to share information and gather feedback on WASTE4PCM project's progress. 4) Website: The project will set up a website connected with the partners' social media channels to facilitate communication and collaboration among stakeholders. The website will be used to share information and provide updates on project developments. 5) Board of End Users: A board comprising relevant stakeholders will be established to provide guidance and feedback on the project's progress and outcomes.

Public Engagement

Include

How will different stakeholders benefit from your project?

The WASTE4PCM project has the potential to benefit various stakeholders, including: 1) Industrial companies, which can benefit from the project by reducing their energy consumption and costs as well as in engaging in production and selling of new products: not only WASTE4PCM slurries, but also other products along the value chain, e.g. WASTE4PCM bio-based surfactants. 2) Policy-makers: The project's outcomes can help policy-makers to design policies and regulations that promote energy efficiency and reduce greenhouse gas emissions in the industrial sector. 3) Society: The project can have a positive impact on the environment by reducing greenhouse gas emissions, thus contributing to the fight against climate change. Moreover, the project can promote the development of innovative technologies and contribute to the creation of green jobs. 4) Researchers: The project will contribute to the development of research collaborations between different countries, research institutions and individual researchers and innovators.

Public Engagement

Anticipate

How will you ensure that you maintain good relations with your stakeholders?

WASTE4PCM will maintain good relations with stakeholders through: 1) Regular communication - to keep our stakeholders informed about project progress and involved in planning the exploitation of project results. 2) Stakeholder engagement - The project team will engage with stakeholders through the Board of End Users, to gather feedback and suggestions to improve project outcomes and prepare for moving to higher TRLs after the project end. 3) Collaborative approach: The project team will adopt a collaborative approach with stakeholders to ensure that their needs and concerns are taken into account during project development and implementation.

Public Engagement

Anticipate

At which phases in the project will stakeholder involvement have the most crucial impact, and why?

1. Project design phase: Involving industrial stakeholders (e.g., the company that participates in the consortium directly: PLAST ENERGY, as well as the companies that expressed their support for WASTE4PCM, such as K-FLEX and PARS Makina) helped to identify and prioritize the research questions, goals, and objectives that are most relevant and important to them. Stakeholders can also provide valuable feedback on the feasibility and potential impact of the proposed research, helping to ensure that the project is aligned with their needs and expectations. 2. Prototype development phase: During the prototype development phase, stakeholder involvement will be critical to ensure that the developed slurries meet the technical requirements and performance criteria set by the end-users. 3. Planning of field-testing phase (after successful completion of TRL5 as targeted by the current proposal): Involving stakeholders in the field-testing phase can help to ensure that the developed slurries meet the needs and expectations of the end-users in real-world settings. Stakeholders can provide feedback on the performance, usability, and practicality of the slurries, helping to refine and improve the final product. 4. Implementation and dissemination phase: During the implementation and dissemination phase, stakeholder involvement can help to ensure the effective uptake and adoption of the developed slurries by the end-users. By engaging with stakeholders throughout the different phases of the project, WASTE4PCM consortium can ensure that the project meets the needs and expectations of the end-users, and that the developed slurries have the greatest possible impact on decarbonisation of the European industry.

Public Engagement

Anticipate

How early in the project do you plan to involve potential stakeholders?

WASTE4PCM involved potential stakeholders already at the project ideation stage. For instance, as confirmed by the obtained letters of support, WASTE4PCM consortium gained interest from companies that are not directly involved in the consortium, but are interested in exploiting the project results: e.g. K-FLEX and PARS Makina.

Public Engagement

Anticipate

Have relevant stakeholders been involved in defining the research problem?

Yes, relevant stakeholders have been involved in defining the research problem for the WASTE4PCM project. The letter of support from companies such as K-FLEX and PARS Makina, as well as the involvement of PLAST ENERGY as a member of the consortium, demonstrate that the project has engaged with stakeholders who have expertise and interests in the industrial decarbonization and production of materials with advanced thermal properties as well as in waste processing. Their involvement in the project confirms that the research problem was identified in consultation with industry experts and potential end-users, which is a best practice in developing innovative solutions. The participation of these stakeholders will likely be crucial in ensuring that the project results align with market needs and have a high potential for commercialization.

Public Engagement

Reflect

What can be done to make proceedings and the final results of your project easily accessible and intelligible to a diverse set of stakeholders?

WASTE4PCM project team can develop clear and concise communication strategies, including plain language summaries and infographics, to present the project's proceedings and results in an easily understandable format. We can also use different communication channels such as social media, websites of RIC, UL, METU, newsletters, and press releases to reach a wider audience and make the project results accessible to diverse stakeholders. The project team can engage with stakeholders throughout the project's duration, seeking feedback and input from them on how best to communicate the project proceedings and results to ensure they are understood and accessible.

Open Access

Include

Which stakeholders will take part in the project's education and training activities, and why?

The stakeholders who will take part in the project's education and training activities may include mainly researchers (from RIC, UL, METU) and students from the participating universities (UL, METU), who will benefit from the project's research and training opportunities. Another group are representatives from industry, who will be interested in learning about the potential benefits of using WASTE4PCM slurry as a heat transfer fluid and heat storage material, as well as the potential environmental and economic impacts.

Science Education

Include

Will your education and communication activities be tailored to specific stakeholder groups, and which?

Yes, WASTE4PCM education and communication activities will be tailored to specific stakeholder groups, such as industry representatives, policymakers, and researchers. This will help to ensure that the information provided is relevant and useful to each group, and that they are more likely to engage with and apply the project's findings.

Science Education

Include

Who will be the primary users/beneficiaries of the project, and could this change?

The end-users and beneficiaries of the WASTE4PCM project are expected to be energy-intensive industries and production companies that use high-temperature processes, as they will benefit from the innovative PCM-based solution developed in the project. Another group are companies producing HTFs. However, the potential benefits of the project could extend beyond these users to include other stakeholders such as policymakers, researchers, and civil society organizations interested in promoting sustainable and low-carbon industrial practices.

Public Engagement

Anticipate

Who might be excluded from the benefits of the project, and how will you address this?

1) The general public: the planned dissemination may reach only some parts of societies in Poland, Latvia, and Turkey. WASTE4PCM will ensure that all members of the public in the participating countries have equal access to the project results via the project website. 2) Industrial companies that generate waste heat, but do not have adequate waste heat recovery systems that could be used together with the WASTE4PCM slurries. Addressing this type of exclusion will be tackled by WASTE4PCM WP6, which will strive to consider various industrial applications as well as suggest solutions and solution providers (e.g. producers of heat exchangers).

Public Engagement

Anticipate

Could your project benefit from involving citizens in data collection and analysis, and how?

The main focus of the WASTE4PCM project is on energy-intensive industries and production companies that may be interested in starting production of WASTE4PCM slurries and their components, such as bio-based surfactants. However, there may still be opportunities to involve citizens in certain aspects of the project, such as: 1) Collecting data on industrial sites where WASTE4PCM materials could be used, as waste heat sources are available: Citizens could help identify potential sources of waste heat in their workplaces, such as large industrial facilities. 2) Disseminating information: Citizens can be important partners in spreading the word about the benefits of the WASTE4PCM technology.

Science Education

Anticipate

What would it take to better accommodate citizens interested in contributing to your work, and how?

WASTE4PCM project could use social media to share information and updates and to solicit feedback from interested citizens.

Science Education

Reflect

Who will be involved in identifying the ethical issues and possible solutions to these issues in your project, and how?

Member of WASTE4PCM Steering Committee, which will involve one senior expert from each participating organisation. If necessary, the WASTE4PCM SC may invite external independent experts in ethics or related fields (e.g., environmental safety), as well as representatives from relevant stakeholder groups.

Ethics

Include

With whom do you plan to share the results of your work?

The results of WASTE4PCM work will be shared with a wide range of stakeholders including academic researchers, industry professionals, policymakers, and the general public.

Open Access

Include

Which aspects of the project do you plan to make open access?

Publications, research data, and other project outputs that do not have proprietary or confidential information will be in principle granted open access. WASTE4PCM consortium plans to be as open as possible, but keeping the confidential information (e.g. patent claims) protected by secrecy - if needed to protect the commercial interests of the partners involved, to allow for effective exploitation of project results.

Open Access

Anticipate

What are the potential barriers to making your data, coding and publications open access and how could these barriers be addressed?

Protecting the commercial interests of the WASTE4PCM project partners can be a potential barrier to making project data and publications open access. This barrier can be addressed by releasing non-sensitive data and findings to the public while keeping sensitive data confidential. Another approach may be to delay the release of sensitive data until after the commercial interests have been satisfied.

Open Access

Reflect

Could pre-registration ensure transparency and openness in this project?

Yes.

Open Access

Anticipate

Do you have valid reasons for not preregistering your research?

The main concern is that it may require a significant amount of time and resources to plan and execute.

Open Access

Reflect

What can you do to ensure that all project partners comply with your open-access strategy?

These aspects will be covered by the Consortium Agreement.

Open Access

Anticipate

Will the project contribute new knowledge of relevance for science education, and how?

The involvement of the University of Latvia and Middle East Technical University from Turkey in the consortium confirms that new knowledge generated in WASTE4PCM will be relevant for science education, especially among university students. Both universities have a strong tradition in science education and are likely to benefit from the research and results generated by the project. The project's dissemination and outreach activities, which aim to communicate the results and findings to a wide range of stakeholders, including general public, students, educators, and companies, will also contribute to science education. The project's website and publications will provide access to new knowledge on PCM and thermal energy storage, which can be used in science education and research.

Science Education

Anticipate

Could the outcomes of this project benefit from incorporating a gender dimension into research content, and how?

Yes. In the design and development of WASTE4PCM slurries, the female researchers present in research teams in all countries (Katarzyna Korczak - Poland, Guzide Atasoy - Turkey, Elīna Dāce - Latvia) can contribute to ensuring that the materials' characteristics and potential applications are considered from a gender perspective. This might include considerations such as the working conditions and safety of those using or handling the materials, e.g. pregnant women. By incorporating such considerations, the project can develop a more inclusive and equitable technology that benefits all members of society, including women.

Gender

Anticipate

What are the possible gender and sex dimensions of the problem at stake?

There are no obvious gender or sex dimensions of the problem at stake in the WASTE4PCM project. Still, the gender and sex dimensions of the industrial context of WASTE4PCM could be understood in a wider way: for instance the WASTE4PCM materials will be used in energy-intensive industries, which are usually male-dominated.

Gender

Reflect

How may your project contribute to improve gender equality in society?

The WASTE4PCM project may contribute to improving gender equality in society by ensuring the involvement of diverse perspectives, including those of female researchers and stakeholders, in the development and implementation of the technology. Additionally, the project may create new job opportunities in the field of waste heat recovery and thermal energy storage, which could benefit women who are currently underrepresented in STEM-related fields. Finally, the project's focus on sustainable and efficient energy solutions may help mitigate the negative impacts of climate change, which disproportionately affect women in many parts of the world.

Gender

Anticipate

What are the barriers to gender balance among researchers and leaders in this project and how can these be addressed?

While WASTE4PCM is having female researchers on each team (in Poland, in Latvia and in Turkey), it does not necessarily guarantee gender balance. Some of the barriers to achieving gender balance may include: 1) Unconscious attitudes and assumptions about gender can influence decision-making, leading to disparities in opportunities for female researchers to advance to leadership positions. 3) Insufficient flexibility and support for work-life balance that can make it difficult for women to balance family responsibilities and work commitments, which can affect their ability to progress in their careers. To address these barriers and promote gender balance in the project, WASTE4PCM strategies will include: 1) Implementing unconscious bias training for all team members to help raise awareness of potential biases and provide strategies for mitigating them. 3) Providing support for work-life balance, such as flexible schedules or parental leave policies, to enable female researchers to balance family responsibilities and work commitments. 3) Initiating mentor-mentee opportunities specifically for female researchers to help them progress in their careers and achieve leadership positions.

Gender

Reflect

What can be done to ensure gender balance among researchers and leaders in this project?

In case any open positions are available, WASTE4PCM will encourage female candidates to participate in recruitment, as the disciplines involved in the project are typically male-dominated. WASTE4PCM project can also offer training and mentorship opportunities to all researchers, with a focus on supporting the development of women in leadership roles.

Gender

Include

What can be done to ensure gender diversity among research subjects?

Not applicable - we do not plan to have research subjects (persons).

Gender

Include

Among the involved stakeholders, what actions will be taken to ensure diversity, e.g. in terms of gender, nationality, ethnicity, class, and age?

1) Involving WASTE4PCM stakeholders from all participating countries (PL, LV, TR) to ensure diversity in nationality. 2) Encouraging and supporting the participation of underrepresented groups, such as women, through targeted messages through WASTE4PCM website. 3) Ensuring that project activities and key outputs (e.g. summaries for the general public) are accessible and available in multiple languages: not only English, but also Polish, Latvian and Turkish.

Public Engagement

Include

To what extent will you be able to predict the long-term societal outcomes of the project?

WASTE4PCM project will take steps to ensure that its outcomes align with its long-term goals and values. This will ongoing engagement with stakeholders going beyond the project end, to understand their needs and concerns, monitoring and evaluation of project activities, in line with M-ERA.Net requirements (participation in surveys and evaluations also after the project end).

Ethics

Anticipate

Have you considered alternative definitions of and approaches to the problem at stake?

Yes. There are several potential alternative approaches to solving the problem of utilizing waste heat and developing new PCM materials for industrial processes. 1) Renewable energy sources: Instead of focusing on waste heat from industrial processes, WASTE4PCM could consider alternative energy sources such as wind, solar, or geothermal energy. However, this alternative approach would be against the Energy Efficiency First principle. 2) Energy efficiency: The project could shift its focus towards improving energy efficiency in industrial processes by developing more efficient equipment, optimizing processes, and reducing energy waste. However, this approach would go beyond the expertise of the research team, which focuses on developing and testing advanced materials for sustainable energy applications. 3) Circular economy: The project could explore ways to reduce waste generation and promote the reuse of materials within industrial processes, in line with the principles of a circular economy, instead of their recycling. However, this alternative approach would assume a possibility of 100% reuse of plastic wastes or 100% reuse of waste cooking oils. This is not practically feasible.

Public Engagement

Reflect

Can RRI perspectives be integrated into the training and supervision of project staff, and how?

Yes, WASTE4PCM project staff can be trained on RRI principles, such as ethics, gender equality, public engagement, and open access.

Science Education

Reflect

How do you plan to communicate the uncertainty of your research?

Yes. Uncertainty in WASTE4PCM research will be communicated by: (1) Clearly defining and stating the limitations of the research in reports, papers, and presentations; (2) Using appropriate language and terminology that reflects the level of uncertainty or confidence in the results; (3) Sensitivity analyses to reflect the range of possible outcomes, e.g. in WASTE4PCM LCA studies.

Science Education

Reflect

What ethical issues could your project potentially give rise to?

Ethics consideration in WASTE4PCM concern safe use of processes and substances that may cause harm to the environment or to humans. Furthermore, WASTE4PCM involves a non-EU country (Turkey). Research-related activities undertaken in this country does not raise any potential ethics issues. WASTE4PCM will not use any protected local resources, such as animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples. It is not planned to import any material from Turkey into the EU. Samples of WASTE4PCM slurries will be exported to Turkey from the EU.

Ethics

Anticipate

Which actions should be taken to ensure research integrity and compliance with ethical standards in the project?

Ethics consideration in WASTE4PCM concern safe use of processes and substances that may cause harm to the environment or to humans. Usual safety conditions at well-experienced participating organisations (e.g., gloves, goggles, labcoats, using the fumehood) and correct disposal procedures will allow for significant lowering of the potential risk of environmental contamination and harming the health of the exposed researchers. Export of samples outside the EU will be compliant with the EU and Turkish national legislation.

Ethics

Reflect

Does your project involve any risks of negative impacts, and which?

Some potential risks and negative impacts to consider include: 1) pollution and resource depletion, e.g. unintended release of waste-based slurries into natural environment. 2) health and safety risks to researchers and others involved in the project. 3) unintended economic impacts, such as displacing existing industries or creating new economic disparities.

Ethics

Reflect

Which actions will be taken to ensure diverse perspectives on the potential ethical issues arising in your project?

WASTE4PCM's Steering Committee (SC) will involve senior experts with diverse backgrounds, including different gender and disciplinary perspectives. The SC will provide advice and guidance on ethical issues that may arise during the project, ensuring diverse perspectives are considered.

Ethics

Include

Gate 3

Data analysis and evaluation of project results

Which stakeholders will benefit from your result and which may not?

test

Public Engagement

Anticipate

This document is generated using thinkingtool.eu.

You can resume the project by going to thinkingtool.eu/tool/ttMFBIFTSmauGUvg9oiXpQ.