PUSH-IT

Piloting Underground Seasonal Heat Storage In geothermal reservoirs

D4.1 Detailed dissemination, exploitation and communication plan

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List of Abbreviations

ATES	Aquifer thermal energy storage
BMC	Business Model Canvas
BMEM	Business Model Environment Map
BTES	Borehole thermal energy storage
DH	District Heating
EU	European Union
GHG	Greenhouse Gas
HT	High-Temperature
IP	Intellectual Property
KER	Key Exploitable Result
LCOE	Levelized Cost of Energy
MTES	Mine thermal energy storage
SWOT	Strengths, Weaknesses, Opportunities and Threats
TRL	Technology Readiness Level
UTES	Underground thermal energy storage
VPC	Value Proposition Canvas
WP	Work Package

Executive Summary

The PUSH-IT project, funded by the Horizon Europe Programme of the European Commission, aims to contribute to the transition towards a net-zero greenhouse gas (GHG) economy in Europe by demonstrating the full-scale application of high temperature heat storage in geothermal reservoirs using three different technologies across six different sites. The project seeks to reduce environmental impact and improves performance and robustness through the development and demonstration of enabling technologies and engagement with key stakeholders. As PUSH-IT embarks on this four-year project, it is important to consider the potential for the project results to be exploited for wider societal and economic benefits.

This deliverable, “Deliverable D4.1 Detailed dissemination, exploitation and communication plan” is a critical tool for ensuring the success of the PUSH-IT project. This document outlines the dissemination and communication strategy that will be deployed to pursue the maximum impact of the project results. It also serves as a guideline to the consortium for dissemination, exploitation and communication efforts throughout the project. In this plan, identification of the preliminary list of exploitable results is being described and an outline of the project governance procedures for knowledge management and intellectual property rights is being provided. The PUSH-IT project also present a comprehensive exploitation plan to ensure the successful commercialization of the project outcomes. Through this plan, the PUSH-IT project aim to make the results obtained in the demonstration sites available to parties in the supply chain and potential users, ensuring that the project contribute towards the long-term objectives of the EU.

The PUSH-IT dissemination, exploitation and communication plan is a living document and will be updated as required throughout the implementation of the project. Maintenance and distribution of the plan for the whole duration of the project will be the responsibility of the WP4 Lead.

1. Introduction

1.1. The PUSH-IT project

PUSH-IT is a project funded by the Horizon Europe Programme of the European Commission, the goal of which is to have a net-zero greenhouse gas (GHG) economy by 2050[1], with 55% reduction on 1990 levels by 2030[2]. At present, heating and cooling represent around 50% of the final energy demand in Europe and are mainly supplied by fossil fuel derived energy. It is therefore essential to decarbonise heating and cooling to achieve EU ambitions.

The PUSH-IT project will demonstrate the full-scale application of high temperature heat storage (up to 90°C) in geothermal reservoirs using 3 different technologies, aquifers, boreholes and mines, across 6 different sites. The 3 technologies addressed in PUSH-IT are relevant for different geological conditions, which are widely available in Europe. PUSH-IT will develop, deploy and test our technologies for a variety of configurations of heat sources, heat storage technologies, geological conditions, distribution systems, stakeholder populations and market and legal conditions. Hence, PUSH-IT provides a unique scope on demonstration, integration and advances for seasonal heat storage. These results will enhance the utilisation of sustainable energy and create a more balanced system for sharing benefits and burdens tied to sustainable heat generation, storage and distribution activities.

PUSH-IT aims to reduce environmental impact, levelized cost of energy (LCOE) and risks and improves performance and robustness via development and demonstration of several enabling technologies, i.e., newly developed monitoring and water quality control, novel drilling and completion and novel control systems. Societal engagement with these developments is a key element and achieved via citizen engagement, analysis of perceptions and levels of acceptance of heat storage technologies, and investigation of governance, policies and business models that engage citizens in decision-making around urban heating systems including storage.

The consortium of the PUSH-IT project combines heat suppliers, well-drillers, public planning offices and academic partners. Through our transdisciplinary collaboration, PUSH-IT will realise operational projects and use these to generate both general transferrable principles and context-specific practices of relevance to sites across Europe and beyond. All activities will be monitored and reported, yielding a valuable comprehensive dataset on the technical and social real-world performance.

1.2. Objectives for dissemination, exploitation and communication

Dissemination, exploitation and communication are a critical and integral part of PUSH-IT and play a key role in maximizing the impact of the project results, engaging stakeholders, showcasing project value, meeting project requirements, and promoting science communication and public engagement. Moreover, dissemination, exploitation and communication create foundations for technical advancements in future research as well as demonstrating where the regulatory framework might be improved. An outcome of dissemination, exploitation and communication can also be that opportunities are created for lessons learned when unanticipated issues arise. These might be communication issues/failures which should be treated as learning points for future work. In PUSH-IT, fast-track market upscaling is one of the key goals. Here, dissemination, communication and exploitation are playing a key role as well.

[1] EC, 2022. 2050 long-term strategy on climate strategies & targets.

[2] EC, 2022. 2030 climate & energy framework.

Dissemination, exploitation and communication each have their specific objectives in light of the overarching goal of the PUSH-IT project.

This first version of the dissemination, communication and exploitation plan will lay the foundation of the approach for PUSH-IT in such a way that the project is optimally structured and aligned for successful dissemination of the results. A second version of the plan will be created halfway through the project in M24.

This deliverable consists of four parts. Chapter 1, this chapter, introduces PUSH-IT and its objectives. Chapter 2 describes the dissemination strategy, approach and activities. Chapter 3 is focused on the consortium's approach to further exploitation of the results of PUSH-IT. This chapter also contains the approach towards intellectual property. Chapter 4, finally, describes the communication strategy, approach and activities.

1.2.1. Dissemination objectives

The key objectives of dissemination in PUSH-IT are:

- Provide public information on scientific results, through the project website, a newsletter and on social networks, with a strong emphasis on success stories to address potential concerns of stakeholders and public on underground activities.
- Disseminate research results via peer-reviewed publications, national and international conferences (in-person and online events). The results of the project are published in several articles in scientific journals as well as in various scientific conference presentations and papers.
- Create a webinar / vocational training series on main project findings.
- Organise a summer school that integrates technical, societal and system integration issues.
- Organise a final project symposium at demo site TU Delft.

1.2.2. Exploitation objectives

Exploitation of Key Exploitable Results (KER) is a critical and integral part of PUSH-IT and plays a key role in maximizing the impact of the project results.

The main objective of the exploitation plan for the PUSH-IT project is to exploit and utilize its results effectively to achieve the EU's energy transition objectives. The preliminary indicated KERs related to technical installations, optimised control systems, monitoring of environmental impact and technical performance, as well the pro-active public engagement approach, will play a crucial role in achieving this objective. These results will be used to develop innovative solutions to increase the efficiency and sustainability of the geothermal energy sector, contributing to the EU's overall goals of reducing greenhouse gas emissions and achieving carbon neutrality.

All stakeholders in the geothermal energy supply chain, including heat network companies, drilling companies, and geothermal operators, will have access to the KERs. Consortium partners will distribute these results, and their potential for further exploitation will be assessed through potential mapping. This will identify which of the initial KERs and potential other, newly identified, results could be exploited and assessed for their potential for further development.

To ensure the success of the exploitation plan, business models and plans will be developed for each eligible exploitable result. The business plan will outline the commercialization strategy, including the target market, marketing strategy, and financial projections. The business model will provide a framework for commercial partners to develop the product or service further, considering factors such as IP rights, distribution channels, and revenue streams.

1.2.3. Communication objectives

For communication specifically the described goal is to

- Ensure that PUSH-IT results are widely available to stakeholders and integrated in industry workflows.
- Transfer of scientific and technical project results to all relevant parties, such as system planners, heat network operators, approval authorities and the scientific community.
- Inform potentially other interested internal and external stakeholders of progress and outcomes and achievements of the project.
- Establish adoption of the results of the project by main stakeholders.
- Contribute to information and dissemination activities to increase the visibility and synergies between Horizon Europe supported actions (CINEA).

A range of multimedia content will be produced and published on the project website as well as on dedicated social media platforms.

2. Dissemination plan

2.1. Approach

The primary goal of the dissemination strategy is to extend the specific groups who will benefit from and find value in the project's findings, and to then determine the most effective ways to communicate with them. The strategy endeavours to amplify the impact of the project outcomes by engaging with influential target audiences. It outlines the dissemination tactics utilized and the tools employed to publicize the project's accomplishments. To ensure maximum effectiveness, dissemination efforts are planned throughout the project's entire timeline rather than solely at the dissemination of its final results.

The dissemination activities have a strong relationship with communication activities. Hence, this plan interlinks with the PUSH-IT communication plan.

2.2. Target audience

An initial comprehensive stakeholder analysis was performed to identify the most relevant target groups and determine the most effective means of implementing dissemination activities for PUSH-IT. As the project progresses, an extended stakeholder analysis will be conducted, and the dissemination plan will be kept up to date.

The PUSH-IT dissemination strategy distinguishes six primary target groups:

1. Scientific community
2. Academia;
3. District heat network operators, geothermal storage site operators including specialised engineering and software companies;
4. Investors;
5. Policy makers, Licensing authorities, municipalities (local, regional, national, EU-level);
6. General & local public / citizens.

2.3. Activities

The dissemination plan targets several audiences, and the means and objectives for these target groups vary slightly, while keeping as main objective to advocate for the urgent need to provide cleaner and more efficient DH systems by implementing underground storage solutions.

For dissemination purposes PUSH-IT will develop communication materials, such as:

- Dedicated website to engage stakeholders and share updates;
- Project identity, including logos & colour scheme;
- Factsheet & Infographics series and short explanation video;
- Social media channels;
- Media kit for journalists and policymakers;
- Roll-up banners, brochures and other material, if applicable.

The dissemination activities per target group is detailed in Table 1.

Table 1: Dissemination activities for each target group of audience

Target group	Objective	Means
Scientific community	Disseminate the scientific results and output of the PUSH-IT project on advances made on the critical bottlenecks and scientific barriers for heat storage systems in geothermal reservoirs	20-25 peer reviewed open-access publications and 30 presentations at sector-relevant international events
Academia	Advance scientific understanding of the technical and social challenges and approaches associated with implementing heat storage in geothermal reservoirs across different contexts	Summer/Winter schools and block-courses, workshops open to students in the academic institutions participating PUSH-IT consortium
District heat network operators, geothermal storage site operators including specialised engineering and software companies	Raise awareness among district heating network operators and geothermal site developers of practical solutions (relating to technical and societal challenges) relating to heat storage in geothermal reservoirs systems developments	Factsheets & infographics about industrial application, deployment, economic potential and societal benefits, clustering with other related projects to be shared at be trade fairs such as GeoTherm or GRC, the EGC and WGC as well as national geothermal events organisations such as Geothermie Nederlands, and EGEC in Europe
Investors	Raise awareness of the economic feasibility and opportunities of heat storage in geothermal reservoirs , solutions and related short-term, mid-term and long-term risks for the sector, despite relatively high investment costs for the implementation	High-level guidelines on the storage of heat in the subsurface, addressing the relevant steps and obstacles to be shared at relevant conferences and symposia
Policy makers, Licensing authorities, municipalities (local, regional, national, EU-level)	Raise the interest and awareness of heat storage systems in geothermal reservoirs as a viable solution for enhancing energy independence and decarbonisation and decentralise the heating costs	High-level final conference; suggestions for updated regulations, addressing regulatory bottlenecks
General & local public / citizens	Raise the interest and awareness of for heat storage systems in geothermal reservoirs as a solution for enhancing energy independence, climate change mitigation. Increase community and public understanding and support of such projects	Pro-active, two-way communication through information exchange events, social media and website updates, and webinars

The following media, conferences and events were selected to be used as platform for dissemination activities. This list is not yet finalised and will be updated yearly as part of the communication activities.

Scientific journals

The results of the project will be published in several papers in scientific journals, such as Energy and Environmental Science, Renewable and Sustainable Energy Review, Renewable Energy, Energy Research and Social Science, Energy Policy, Geothermics, Solid Earth, EGU Sphere, Energies, Geosciences, etc.

Conferences and geothermal trade fairs

Also, the results of the project are disseminated in various scientific conference presentation, such as GeoTHERM Expo & Congress, the European Geothermal Congress, the World Geothermal Congress, the European Geoscience Union, European Geothermal Workshop, Earth System Governance, International Association for Society and Natural Resources, and International Conferences on Energy Research & Social Science, Earth System Governance Conference, Royal Geographical Society Conference.

2.4. Work Package specific related dissemination activities

2.4.1. WP1 Sites

The PUSH-IT project will, for the first time, demonstrate high temperature geothermal heat storage for seasonal balancing and for multi-source multi-user application. PUSH-IT concentrates all project activities on pilot sites. WP1 will address specific/local technical and societal issues and make the step to translate our findings into generic solutions that can be applied to heat storage systems across Europe. Full scale implementation of heat storage in geothermal reservoirs will be demonstrated at 3 demo-sites:

1. Delft: Aquifer thermal energy storage (ATES);
2. Darmstadt: Borehole thermal energy storage (BTES);
3. Bochum: Mine thermal energy storage (MTES).

Next to these key demo-sites, 3 'follower' locations will be involved:

1. Berlin: Aquifer thermal energy storage (ATES);
2. Litoměřice: Borehole thermal energy storage (BTES);
3. United Downs: Mine thermal energy storage (MTES).

The state of development of dissemination action is so far heterogeneously developed for the different demo-sites. Hereafter, for each demo-site and follower site, the activities are detailed according to current state of development. Further amendments of this plan for the demo-sites in the Netherlands and in Germany will be incorporated in the updated dissemination, exploitation and communication plan.

The follower sites also plan dissemination activities, but as for the demo-sites, the conception of the contents of such actions are not yet fully developed and will be amended over the course of the project.

2.4.1.1. Delft

The Delft site dissemination activities will be articulated around the various stakeholders present on site and in the area. Table 2 presents the various activities planned for the different groups of stakeholders and audience, with associated media use, and expected outcomes.

Table 2 Dissemination activities planned for the Delft demo site

Target group	Activity type	Media use	Expected outcome(s)
Scientific community	• Scientific publications • Scientific congresses participation	• Scientific journals listed previously. • Notification of journal publication on social networks, LinkedIn, ResearchGate, twitter, among other	Lay out the scientific basis for design, implementation and performance of HT-ATES systems.
Academia	• Summer school for advanced master students, and for PhD candidates • Integration of heat storage in geothermal reservoirs technologies for Bachelor and Master students of TU Delft: MSc SET program, as well as various MOOCS	• Email lists • MOOCS • Social networks, LinkedIn, Instagram (institute accounts have large reach) • Local symposia. E.g., regular DAP symposium, Urban Energy Institute symposium, All Energy Day. Other special events	Raise interest and awareness for students and young professionals, encouraging a portion to enter the multi-disciplinary work market needed for heat storage implementation.
District heat network operators, geothermal storage site operators including specialised engineering and software companies	• Demo-site visit organisation, including workshop part to raise awareness on ATES technology implementation in Delft, but also other heat storage in geothermal	• Publication as paper forms, and also available online of the Factsheets & infographics about industrial application, deployment, economic potential and societal benefits, clustering with other related projects	Raise awareness and showcase advantages of heat storage in geothermal reservoirs solutions and optimisation tools and workflows developed in PUSH-IT for district heating grid management

Target group	Activity type	Media use	Expected outcome(s)
	reservoirs technologies developed in PUSH-IT to the stakeholders • Colloquiums and clustering events online on storage technologies, implemented in other projects in Delft area (sharing knowledge events)	• Dedicated website for the Delft site: subsurface urban energy lab, including the HT-ATES, but also Geothermal well, Heat pump centre, DHN all used for heat supply of campus and Delft as well as research and education	
Investors	Demo site visits, and network activation and clustering to provide open science project and raise the technological development	• Publication online of High-level guidelines on the storage of heat in the subsurface, addressing the relevant steps and obstacles • Roadmap scheme on know-how and knowledge gained from PUSH-IT demo-sites • Provide guidelines for ways of fundings (governmental finance plans, etc.)	• Awareness of heat storage potential (economic and environmental), decreasing uncertainties and unknowns. • Highlighting potential bottlenecks and how to overcome them. • Decrease unknowns and the therefore reluctance to invest.
Policy makers, Licensing authorities, municipalities (local, regional, national, EU-level)	• Participation into clustering and network events involving policy makers, locally and at the federal level • Open the possibility for site visit on demand, and co-organise with policy makers large	• High-level final conference; suggestions for updated regulations, addressing regulatory bottlenecks • Social media publication of such events, to raise interests of other similar stakeholders	• Increase awareness of benefits of heat storage systems. • Awareness of demonstrated performance of heat storage, and its integration into wider heating systems. • Available data on environmental and energetic performance.

Target group	Activity type	Media use	Expected outcome(s)
	public events (see section below)		• Increased accessibility of operating systems to enable improved technical understanding of the HT-ATES system and showcase the implementation of such system at the university campus scale, proving possibility to roll-out to urban environments applicable to large portions of the energy demand.
General & local public / citizens	• Open-air scientific public events, with demo site visits, pedagogical presentation • Information panels on PUSH-IT project and on demo-site visits	• Social media • Local and national newspapers and other local press • Co-presentation with local political and association networks to widen audience • MOOCS	• Awareness of safe operation and potential (economic and environmental) benefits. • Availability of working sites to demonstrate performance. • Improved social understanding and support of such projects

2.4.1.2. Darmstadt

Darmstadt site dissemination activities will be articulated around the various stakeholders present on site and in the area. Table 3 presents the various activities planned for the different groups of stakeholders and audience, with associated media use, and expected outcomes.

Table 3: Dissemination activities planned for the TU Darmstadt Lichtwiese Campus demo-site

Target group	Activity type	Media use	Expected outcome(s)
Scientific community	• Scientific publications • Scientific conference participation	• Scientific journals, listed previously • Notification of journal publication on social networks, linked in, ResearchGate, twitter, among other	Spread knowledge out of the scientific excellence and multi-disciplinarity, and direct-use potential of scientific productions issued from the PUSH-IT implementation on Darmstadt site

Target group	Activity type	Media use	Expected outcome(s)
Academia	• Summer school for advanced MSc students, and for PhD candidates • Integration of heat storage in geothermal reservoirs technologies module for Bachelor and Master students of TU Darmstadt	• Email lists • Social networks, LinkedIn, Instagram • Information page on the TU DA institute home page	• Raise interest, awareness • Train young professionals in the field of heat storage to overcome the skills issue in the labour market • Address skilled, competent junior experts, able to work in a multi-disciplinary environment
District heat network operators, geothermal storage site operators including specialised engineering and software companies	• Demo-site visit organisation, including workshop part to raise awareness on BTES technology implementation in Darmstadt, but also other heat storage in geothermal reservoirs technologies developed in PUSH-IT to the stakeholders • Colloquium and clustering events online on storage technologies, implemented in other projects in Darmstadt area (sharing knowledge events)	Publication as paper forms, and also available online of the Factsheets & infographics about industrial application, deployment, economic potential and societal benefits, clustering with other related projects	Raise awareness and show case advantages of heat storage in geothermal reservoirs solutions and optimisation tools and workflows developed in PUSH-IT for district heating grid management

Target group	Activity type	Media use	Expected outcome(s)
Investors	Demo site visits, and network activation and clustering to provide open science project and raise the technological development	• Publication online of High-level guidelines on the storage of heat in the subsurface, addressing the relevant steps and obstacles • Best-practice code on know-how and knowledge gained from Darmstadt PUSH-IT demo-site • Provide guidelines for ways of fundings (governmental finance plans, etc.)	By sharing the success story and detailing what potential bottlenecks and how to overcome them, decrease the fear of investments
Policy makers, Licensing authorities, municipalities (local, regional, national, EU-level)	• Participation in clustering and network events involving policy makers, locally and at the federal level • Open the possibility for site visit on demand, and co-organise with policy makers large public events (see section below)	• High-level final conference; suggestions for updated regulations, addressing regulatory bottlenecks • Social media publication of such events, to raise interests of other similar stakeholders • Participation in networking style conferences e.g., like Berliner Energietage and activities therein	Increase the accessibility of technical understanding of the BTES system and show case the implementation of such system at the university campus scale, proving that it is possible to roll it out massively
General & local public / citizens	• Open-air scientific public events, with demo site visits, pedagogical presentation, community liaison groups.	• Social media • Newspaper local press • Co-use of the local political and association networks to actively integrate them into the dissemination	Inform locals of project updates in timely manner, address potential concerns about heat storage in geothermal reservoirs systems, create open dialogue with communities, increase local knowledge about project and technology

Target group	Activity type	Media use	Expected outcome(s)
	• Information panels on PUSH-IT project and on demo-site visits		

2.4.1.3. Bochum

The dissemination activities for the Bochum site will be articulated around the various stakeholders present on site and in the area. Table 4 presents the various activities planned for the different groups of stakeholders and audience, with associated media use, and expected outcomes.

Table 4: Dissemination activities planned for the Bochum MTES demo site

Target group	Activity type	Media use	Expected outcome(s)
Scientific community	• Scientific publications • Scientific congresses participation	• Scientific journals, listed previously • Notification of journal publication on social networks, linked in, ResearchGate, twitter, among other • Webinar (for example mine-water-symposium)	Spread knowledge out of the scientific excellence and multi-disciplinarity, and direct-use potential of scientific productions issued from the PUSH-IT implementation on Bochum site
Academia	Integration of heat storage in geothermal reservoirs technologies module for Bachelor and Master students of Ruhr-University / RWTH Aachen University / BTU Cottbus-Senftenberg	• Lectures (Chair of Geothermal Systems) • (YouTube)-Video-Explanation of the MTES principles (t.b.d.)	Raise interest, awareness and retain young professionals to help overcome the skills issue in the labour market where there is a need for skilled, competent juniors, able to work in a multi-disciplinary environment
District heat network operators, geothermal storage site operators including specialised	• Demo-site visit organisation, including workshop part to raise awareness on MTES technology	Publication as paper forms, and also available online of the Factsheets & infographics about industrial application, deployment, economic potential and	Raise interest and awareness, train young professionals to overcome the skills issue in the labour market address skilled, competent junior experts, able to work in a multi-disciplinary environment

Target group	Activity type	Media use	Expected outcome(s)
engineering and software companies	implementation in Bochum • Colloquium and clustering events online/On site projects in Bochum together with Energy Providers (Stadtwerke)	societal benefits, clustering with other related projects	
Investors	Demo site visits, and network activation and clustering to provide open science project and raise the technological development	• Publication online of High-level guidelines on the storage of heat in the subsurface, addressing the relevant steps and obstacles • Best-practice code on know-how and knowledge gained from Bochum PUSH-IT demo-site • Provide guidelines for ways of fundings (governmental finance plans, etc.)	By sharing the success story and detailing what potential bottlenecks and how to overcome them, decrease the fear of investments
Policy makers, Licensing authorities, municipalities (local, regional, national, EU-level)	• Inviting (local) politicians, parties and NGOs to our site to explain the technology • Integrate the MTES technology to "Kommunale Wärmeplanung"	• High-level final conference; suggestions for updated regulations, addressing regulatory bottlenecks • Social media publication of such events, to raise interests of other similar stakeholders • Participation in networking style conferences e.g., like "Stadtwerke.Nutzen.Geothermie"	Increase the accessibility of technical understanding of the MTES system and show case the implementation of such system at the university campus scale, proving that it is possible to roll it out massively

Target group	Activity type	Media use	Expected outcome(s)
		(event offered by Fraunhofer for energy supplier)	
General & local public / citizens	• In the frame of Institutional open days • Information panels on PUSH-IT project and on demo-site visits	• Social media • Newspaper local press • Co-use of the local political and association networks to actively integrate them into the dissemination • "Geothermal window" at the wells	Inform locals of project updates in timely manner, address potential concerns about heat storage in geothermal reservoirs systems, create open dialogue with communities, increase local knowledge about project and technology

2.4.1.4. Berlin

For the follower site of Berlin, Table 5 details the intended dissemination actions.

Table 5: Dissemination activities planned for Berlin Adlershof follower site

Target group	Activity type	Media use	Expected outcome(s)
Scientific community	• Scientific publications • Scientific congresses participation	Scientific journals and conference presentations	• Lay out the scientific basis for design, implementation and performance of HT-ATES systems and PUSH-IT implementation on Berlin ATES site. • Adopting methods developed in other projects (e.g., Very-High-Temperature Heat Aquifer Storage, project in the DACH region Project in Germany)
Academia	ATES lecture at TU Berlin including modelling workshop for master students	• University Lecture • Seminars	• Raise interest, awareness and retain young professionals to feed the work market

Target group	Activity type	Media use	Expected outcome(s)
			• Able to work in a multi-disciplinary environment
Academia/scientific community	Organisation of workshops with experts and stakeholders from research, industry, politics and authorities to discuss underground thermal storage and its integration into DH systems.	Guidelines and criteria catalogue for HT ATES applications	Identify and reduce obstacles regarding legal aspects, technical and financial risks
District heat network operators, geothermal storage site operators including specialised engineering and software companies	Demo-site visit	Networks	Raise awareness
Investors	Demo-site visit and the organisation of workshops with experts and stakeholders from research, industry, politics and authorities to discuss underground thermal storage and its integration into DH systems.		Identify and reduce obstacles regarding legal aspects, technical and financial risks
Policy makers, Licensing authorities, municipalities (local, regional, national, EU-level)	Publications and the organisation of workshops with experts and stakeholders from research, industry, politics and authorities to discuss underground thermal	Social media	Identify and reduce obstacles regarding legal aspects, technical and financial risks

Target group	Activity type	Media use	Expected outcome(s)
	storage and its integration into DH systems		
General & local public / citizens	• Open-air scientific public events, with demo-site visits, • Information panels on project site	• Social medias • Paper local press • Use of the association networks to actively integrate them into the dissemination	Inform locals of project updates in timely manner, address potential concerns about heat storage in geothermal reservoirs systems, create open dialogue with communities, increase local knowledge about project and technology

2.4.1.5. Litoměřice

For the follower site of Litoměřice, Table 6 details the intended dissemination actions.

Table 6: Dissemination activities planned for Litoměřice follower site

Target group	Activity type	Media use	Expected outcome(s)
Scientific community	• Presentation on the national/international conference/seminar • Information published in scientific journals	• Personal power point presentation • Scientific journals	• PowerPoint presentation • Scientific articles
Academia	• Presentation during classes for MSc/PhD students at Charles University	• Personal power point presentation • Information on UKR website	• PowerPoint presentation • Increased knowledge of the students on UTES/BTES systems
District heat network operators, geothermal storage site operators including specialised engineering and software companies	Invitation of the DH systems operator to the Litoměřice demo site to showcase drilling technologies and development of the pilot wells	• Personal meeting incl. presentation • Information on the meeting published on RINGEN web site	• Photos, power point presentation • Established network • Increased knowledge of the DH systems operator on UTES/BTES systems and their use for heating & cooling

Target group	Activity type	Media use	Expected outcome(s)
Investors	DH systems operator and municipality is the potential investor		
Policy makers, Licensing authorities, municipalities (local, regional, national, EU-level)	Invitation of the city councillors to the Litoměřice demo site to showcase drilling technologies and development of the pilot wells	• Personal meeting • Workshop with public officials (water management, environmental protection etc.)	• Photos & list of attendance • Better understanding of the BTES/UTES systems and their current legal framework and permitting procedures + feedback for the PUSH-IT project implementation
General & local public / citizens	• Information panels on PUSH-IT project and on demo-site visits • Invitation of the local and regional media to showcase drilling technologies and development of the pilot wells and PUSH-IT project presentation	• Website CGS/ • Newsletter of CGS/ Ministry of the Environment/ Charles University • Social media • Local & regional media (press, radio, TV) • Litoměřice website	• Exhibition stand at the largest outdoor popular science event in the Czech Republic "Věda Fest" • Two-day outdoor popular science event Geological Day with the Czech Geological Survey • Articles and interviews in the local & regional media • Press release on the Litoměřice website

2.4.1.6. United Downs

The advances on the development of the United Downs site are still at an early stage, and the main aim of PUSH-IT there is to investigate accesses to the mines and perform feasibility studies, to be disseminated through the following means:

- Information on the GEL website.
- PUSH-IT content shared on GEL's social media.
- Updates on GEL's work on the project shared on GEL's social media.
- Information panel in GEL's visitor room highlighting the project and explaining the concept of MTES.
- Publication of information/FAQ sheets.
- Engagement in the Mine Water Energy Expert Group, and with the BGS and the Coal Authority.

2.4.2. WP2 Societal Engagement

In the first phase of the project WP2 will work with project partners to identify local community members and policymakers to target for information dissemination, creating networks of local stakeholders across the six sites. This will likely include households in the local community but also local organisations with established social networks.

Across all phases of the project, WP2's dissemination strategy will be focused on local community members that might be impacted through their proximity to the demonstration and/or follower sites. This will likely include households in the local community, but also local organisations with established social networks. In the initial phase of the project, WP2 will record evidence of all previous approaches to dissemination of information to local communities across the different project types, while also determining what types of dissemination may be most effective in each location. After determining this, WP2 will use a variety of the dissemination types which have been deemed appropriate across these locations (e.g., social media, community meetings, workshops, newsletters, etc.), ensuring that dissemination strategies also incorporate space for community members to feedback information to the project team.

In focusing on local community members and policymakers, WP2 will include in the information that will be disseminated, findings from the work package on the regulatory and economic barriers and opportunities to implementing geothermal energy.

In the final phase of the project, findings associated with economic, political, and social research conducted within this work package will be disseminated through a variety of activities, targeting policymakers, community members, industry, academics and the general public. These activities will take place through a variety of avenues, such as conferences, academic journals, project reports, webinars, and community events.

2.4.3. WP3 Enabling Technologies

The WP3 objective is to reduce CO_2 emissions and costs by developing, applying, and evaluating technologies for heat storage in geothermal reservoirs systems. The dissemination in WP4 will mainly aim for broadcasting this message and the results and outcomes of the project and will adapt specific dissemination activities for the main tasks of WP3.

2.4.3.1. Task 3.1 Enhanced well drilling and completion activities

The main expected outcomes of drilling activities will be disseminated mainly by encouraging local events, and by showing the roll-out potential from the demo-sites to the follower sites, with a binding development and shared of gained experience with the communities implied in the follower sites and tackling also broader audience topic and thematic such as the well integrity (cross-projects activities planned).

Specifically, the content of the dissemination is tailored to each targeted group, with the following development:

The scientific community will be targeted through scientific publications and participation in scientific congresses. The media used will primarily be scientific journals. The expected outcome is to notify the publication of research findings through social networks, LinkedIn, ResearchGate, Twitter, and other platforms. Additionally, the aim is to lay out the scientific basis of underlying technologies and showcase the technology developments that can be applied to ensure high-temperature (HT) geothermal storage systems can be designed, implemented, and integrated using a smart control system.

The dissemination activities for academia include organizing a summer school for advanced MSc students and PhD candidates. A key part of this will be conducting dissemination and teaching sessions of the tool in the modelling courses offered during the summer school. Lectures and site visits will be organized to raise awareness of the technological application and developments specifically in the context of HT-geothermal storage.

The target group of district heating network operators, geothermal storage site operators, and drilling contractors will be invited to demo sites to showcase tested technology results. Presentations will be made at exhibitions and professional organizations. Verbal communication during site visits will be used as a means of dissemination. Additionally, information will be published on the PUSH-IT webpage, including factsheets, posters, and social media. There is also a possibility of utilizing patents for evaluating technology, extending portfolios, and showcasing new service/products.

The dissemination activities for investors are expected to be primarily through the site plan rather than focusing on individual technologies.

Policy makers, licensing authorities, and municipalities will be engaged through the demonstration of new drilling and completion technologies at the demo-sites, in Delft and also in other sites. Scientific publications will also be utilized to disseminate relevant information. The media used will include scientific journals and the PUSH-IT website. Site visits and contributions to meetings and working groups will further provide opportunities for dissemination. The expected outcome is to contribute to the underlying knowledge required for the improvement of drilling operations and legislation concerning smart control technologies.

2.4.3.2. Task 3.2 Smart district heating network control

The goal of this task is the dissemination is to broadcast and advertise the tailor-made control objective and collaboration between control and co-simulation approaches, both empirical and numerical. Specifically, the relative dissemination activities are dependant for each targeted group.

WP3 propose to engage the scientific community through an activity focused on publishing scientific papers and active participation in prestigious scientific congresses. The communication channels will primarily consist of open-access peer-reviewed scientific journals and conference proceedings. Our objective is to contribute valuably to the ongoing research on smart control algorithms for DH (District Heating) networks, thereby advancing the field and fostering collaboration within the scientific community.

For the second target which is academia, additionally from academic classic dissemination through papers and conference, the PUSH-IT project wants to launch an engaging initiative specifically targeting advanced master students and PhD candidates. The proposed initiative includes a summer school program designed to cater to their needs. As part of the program, dissemination, and teaching sessions on control strategies, and how to use the control tool will be conducted within the modelling courses. Additionally, lectures and workshops will be given to raise awareness among students and PhD candidates about the importance of smart control. The objective is to provide them with knowledge and understanding in this field, encouraging their interest and active involvement in research and innovation.

The third target, district heat network operators and geothermal storage site operators, will be invited to a demonstration site showcasing the results of the smart DH network controller. The invitation includes workshops and site visits as part of the engagement. The purpose of this dissemination strategy is here is to raise awareness among network operators about the potential benefits of smart control and aims to demonstrate how the implementation of smart control can optimize operations and enhance the efficiency of district heat networks.

The objective of this dissemination plan is to also raise investor awareness of the potential and benefits of smart control technologies, fostering technological development and enhancing investment efficiency. Proposed activities include demo site visits, network activation and clustering, informative workshops, and site visits to operational projects. Communication channels will involve a project website, social media platforms, direct communication through emails and newsletters, and collaborations with industry associations. By implementing this plan, the PUSH-IT project aims to raise awareness, foster collaboration,

and drive investments in smart control technologies, unlocking their full potential for sustainable development and improved efficiency across sectors.

Another target of this plan is to disseminate awareness among policy makers, licensing authorities, and municipalities regarding the importance of smart control in decision-making processes and policy development. To achieve this, it proposes contributing to exhibitions, panel discussions, and conferences specifically targeting decision makers. Through presentations and exhibition booths, it will actively engage decision makers and provide them with information about the benefits and necessity of smart control. Additionally, the PUSH-IT will collaborate with sector organizations to maximize our reach and impact. By effectively disseminating the advantages of smart control technologies and emphasizing their role in policy development, it aims to influence decision makers and promote the adoption of smart control in various sectors.

Finally, our dissemination plan for the smart control activities will also target the general public, with following content and means, e.g. through open-air scientific public events, including demo site visits and pedagogical presentations. Information panels about the PUSH-IT project and demo-site visits will be displayed. The plan also involves utilizing social media, press releases, and an advertising campaign in the city to reach a wider audience and effectively communicate the advantages of smart control technologies.

2.4.3.3. Task 3.3 Water quality and environmental impact control

Task 3.3 on water quality and environmental impact control aims to deliver guidelines to deal with various issues related to water quality, and recommendations for facilitating regulatory and political evolutions. For this, several disseminations actions are planned towards different audiences.

The BRGM (leading the task and co-supervising a PhD student with GFZ), GFZ and KWR will target three publications and participations to conferences and scientific congresses. The journals selected for submission target the scientific community of heat storage systems in geothermal reservoirs, as well as geochemistry/ microbiology community, to raise the awareness on the water quality and environmental impact for the heat storage systems in geothermal reservoirs community, and to raise interest and applicability of geochemistry- trans disciplinarity in fundamental academic community.

The main deliverable of the task will have a broader audience, proposing a framework to deal with water quality issues in heat storage systems. Decision making support (e.g. decision trees) will be elaborated. General recommendations for future sites will be formulated. This deliverable will target all stakeholders of future sites. It will be delivered at the end of the project (M46).

Findings tied to environmental impacts will be fed into the dissemination strategies described above in WP2, so they are communicated globally and locally (site-specific results all along the project and more general results at M46).

2.4.3.4. Task 3.4 focuses on the system performance assessment and optimization.

Installation and monitoring the heat storage system is done in the previous tasks, the role of task 3.4 is to assess from these datasets and workflow the performance of the system and attempt to optimise it to its best. In this task, several dissemination activities relative to the specific sub-tasks, as well as cross-tasks activities are planned to promote the PUSH-IT outcomes.

For this the following audiences are targeted on the specific high technical ends related to the sub-tasks with Reservoir assessment with High Pressure Production Trap and Enhanced Geothermal Response Test methodologies and publications.

Scientific dissemination also goes through publicly available datasets of the demo sites test phases (both sub surface and district heating grid datasets), when possible (example of Darmstadt)

The co-simulation subtask (3.4.2) has a considerable potential for dissemination, as this task will provide a toolbox and hand-on solution. Both the scientific community, as well as district heating network managers to have a numerical estimation and potential optimisation platform for the modular adaptation of heat storage in geothermal reservoirs systems into the district heating grid, with large possibilities of scenarios and time frequency analyses from seasonal optimisation, to long terms scenarios model simulations, which can help policy makers in their multicriteria based decision making processes.

2.5. Timeline

The dissemination strategy considers the project to consist of the following three main parts, coupling priorities to each of these phases:

1. During the initial 8-month period of the project, efforts will be focused on developing a project branding strategy and identifying opportunities for dissemination. This will involve creating a project website and establishing a graphical identity and stationery that includes a project logo and templates for various project documents such as presentations and newsletters. Additionally, liaising opportunities with other relevant Horizon Europe geothermal projects will be identified and possible clustering activities can be organised.
2. From months 9 to 36, the project will enter a targeted dissemination phase, utilizing various tools to reach stakeholders and audiences. Virtual methods such as social media and website updates will be employed, along with printed materials such as infographics and project brochures. Live meetings, including expert workshops and conferences, will also be utilized to promote the project objectives and explain the work plan timeline and activities taking place within the consortium's WPs. To build trust with stakeholders, transparency will be a key focus, including sharing methodologies used and showing intermediate and preliminary results. Video updates will be produced to achieve this goal.
3. From Month 37-48 the project enters its final stage. It will focus on finalizing activities, analysing, and presenting final results, and disseminating the final outcomes and recommendations to stakeholders. Planning for any potential follow-up activities or next steps based on the project's results will also be considered.

Important dissemination milestones are shown in Table 7.

Table 7: Milestone listing for the dissemination activities

Milestones	Milestone Title	Due date [M]	Means of verification
M4.1.	Technical progress - Newsletters at M9, M18, M27, M36, M45]	9	Newsletters
M4.1.	Technical progress - Newsletters at M18	18	Newsletters
M4.1.	Technical progress - Newsletters at, M27	27	Newsletters
M4.1.	Technical progress - Newsletters at, M36	36	Newsletters

Milestones	Milestone Title	Due date [M]	Means of verification
M4.1.	Technical progress - Newsletters at, M45	45	Newsletters
M4.2.	Demo/follower site video's	24	Video's
M4.4.	Public stakeholder Demo site workshops	36	Minutes of meeting
M4.6.	PUSH-IT Summer school	40	Minutes of meeting
M4.7.	PUSH-IT final Symposium	48	Minutes of meeting

3. Exploitation plan

3.1. Vision and Goals

To reach EU long-term objectives, the results obtained in the demonstration and follower sites will be made available to parties in the supply chain e.g., heat network companies, drilling companies and geothermal operators. PUSH-IT will do this by developing and executing the exploitation plan. This plan will further develop during the PUSH-IT execution. The exploitation plan can be on a partner's individual level but also potential for synergies will be explored. In M24 the plan will be re-evaluated and assessed by relevant partners on their market potential. The plan will then receive an update and submitted as D4.2 Updated dissemination, exploitation and communication plan, PUSH-IT website, and SM channels

At the end of the project the marketable results will be taken up by the commercial partners for further development as product or service.

3.2. Target Sectors and Stakeholders

Successful further exploitation of the results of PUSH-IT requires a clear and thorough determination of the target sectors and stakeholders. PUSH-IT initially determined the following sectors and stakeholders for the purpose of exploitation:

- Scientific community;
- Academia;
- District heat network operators, geothermal storage site operators including specialised engineering and software companies: they will be the direct users of PUSH-IT's results;
- Investors;
- Licensing authorities, municipalities, and citizens.

During the trajectory of PUSH-IT a more thorough and specified overview of relevant stakeholders will be developed. This overview will be created in direct relationship with the KER that will be further exploited as a result of PUSH-IT.

3.3. Business Models and Market Analysis

PUSH-IT will develop business models for each of the eligible KERs. Some of these KERs are already developed as a business proposition by a partner of the PUSH-IT consortium and will therefore also be further developed in that partner's own organisation. Other KERs, developed during PUSH-IT's work, will be carefully assessed on the market potential. Based on the market potential of a KER a business model will be developed. The proposed business models will include three key elements: value proposition, configuration of value creation and revenue model. All industrial partners will contribute to the development of PUSH-IT main exploitable solutions and will be involved both in the configuration of value creation and in the definition of the revenue model. By 2026, the solutions will have been tested at Technology Readiness Level (TRL) 7 in the 3 demo-sites, enabling the further rapid uptake and expansion of solutions under different scenarios.

To perform the business model and market analysis, PUSH-IT will use tools that are commonly used in the innovation management field: the Business Model Environment Map (BMEM), the Value Proposition Canvas (VPC) and the Business Model Canvas (BMC).

3.3.1. Business Model Environment Map

The Business Model Environment Map (BMEM) helps in identifying new opportunities for innovation. It helps to looks at an existing business model through a series of lenses: Key Trends, Market Forces, Macro-economic forces, and Industry forces. By addressing these forces, potential new propositions can be determined and developed further.

During the implementation of PUSH-IT, these forces will be mapped and updated when major changes will occur with significant potential impact to the business model of a KER. For example: when regulatory trends towards underground heat storage will change in favour of these solutions, this will create a major positive impact on projects delivering these solutions. It is paramount for PUSH-IT to consistently keep track of these forces when assessing the real-world potential of PUSH-IT KERs.

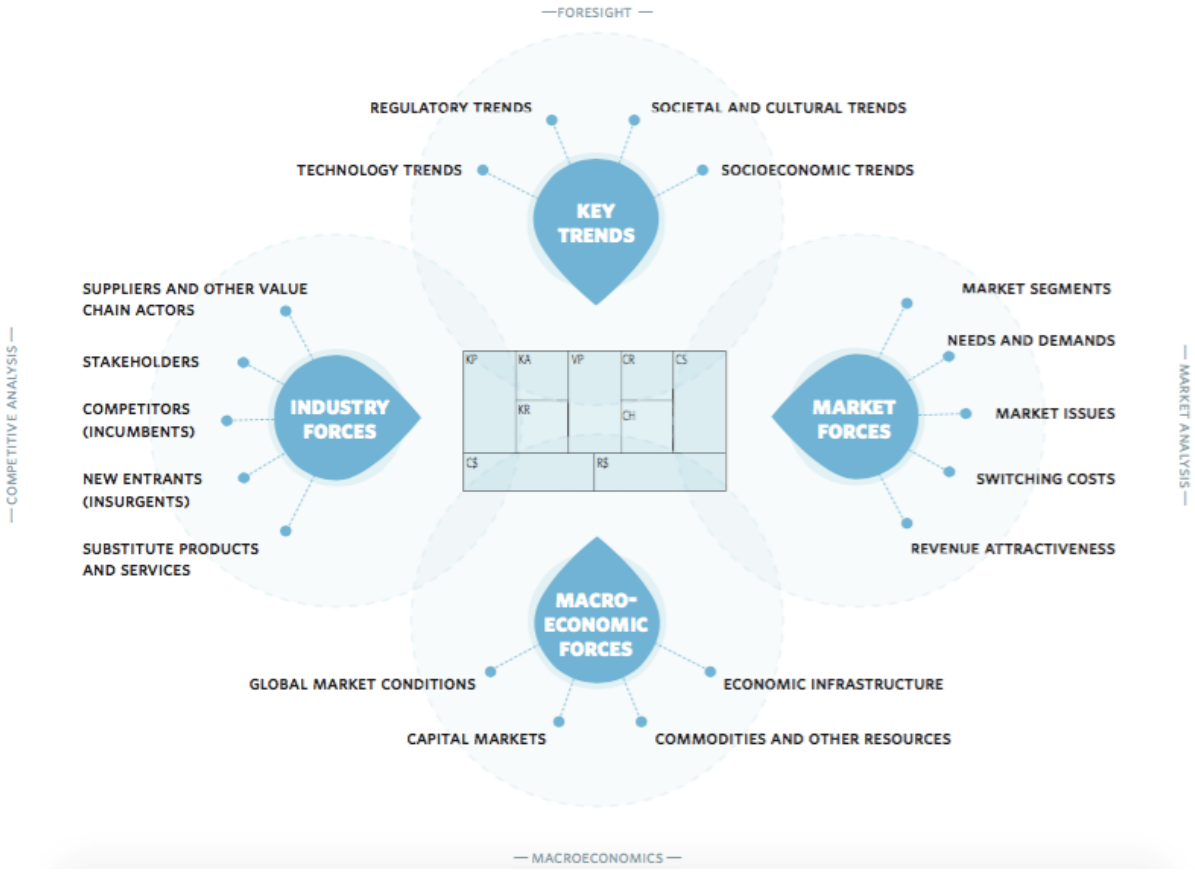

Figure 1: Business Model Environment Map

3.3.2. Value Proposition Canvas

When a KER is assessed and ready for further exploitation the team working on that KER will enter the next phase: the creation of the initial Value Proposition for that KER and the validation of existing assumptions surrounding the initial Value Proposition for that specific KER.

The VPC will help in determining the specific value that can be derived from the KERs and for which target audience this value is most important in order to create adoption. The starting point is the customer's side and their specific needs and goals. With this information in mind, a mapping will be made towards the proposition's side to complement the customer's needs. In a standard innovation process these mapping points are assumptions which need to be

validated with the intended target customer. It needs to be determined if, when and how this will be done in the context of the PUSH-IT project.

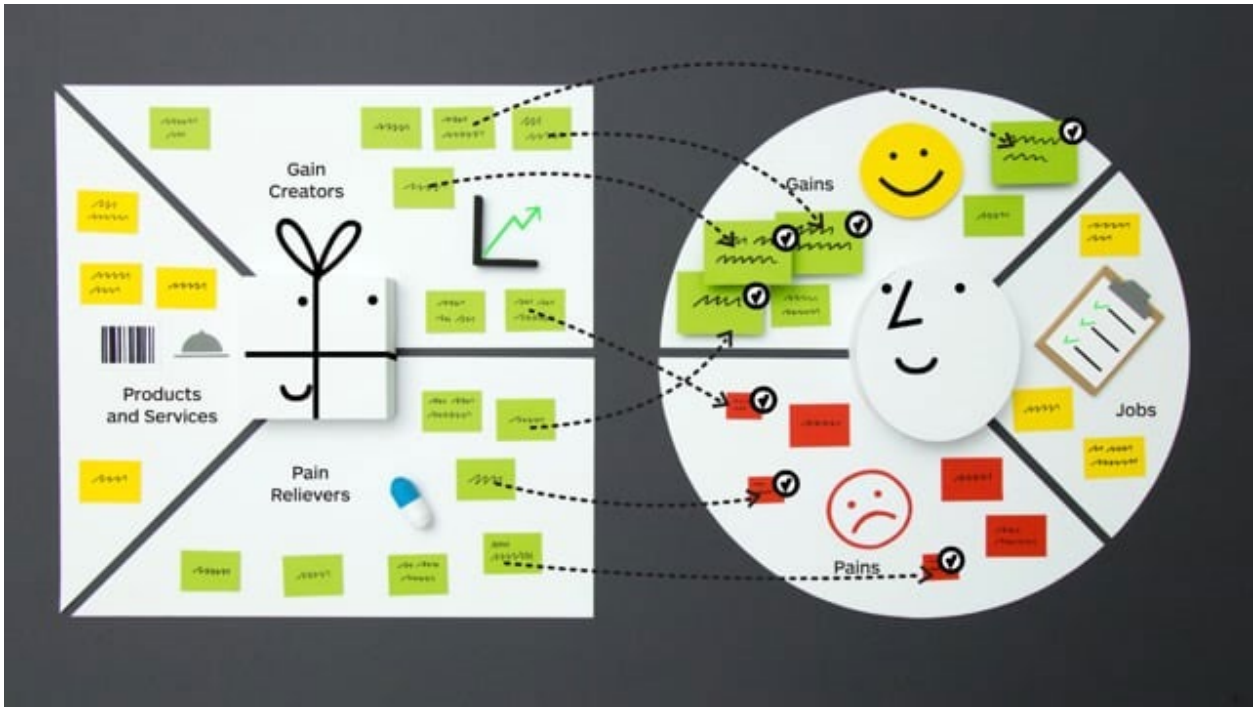

Figure 2: Value Proposition Canvas

3.3.3. Business Model Canvas

After completing the VPC the initial business model of the KERs can be established. The Business Model Canvas (BMC) will help in visualising the potential business models and in determining the next steps towards successful exploitation of a KER. The BMC is a tool that can help PUSH-IT map out the business model of KERs in a clear and concise way. It allows to identify the key components that work together to create value for customers and generate revenue.

To use the BMC effectively, teams working on a KERs will use the value proposition that came out of the VPC session. Next, teams will fill out the canvas with information in the nine sections. These sections include customer segments; value proposition; channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure.

Once the canvas is filled out, the KERs responsible teams will look for connections between the different sections. Focus will be on how the initial value proposition connects with the established customer segments and how the key resources support the key activities.

Next focus is on the testing of the assumptions by talking to customers, partners, and other stakeholders. Feedback will then be used to refine the business model and make it more effective.

Also, PUSH-IT partners need to be aware of the fact that the BMC is a living document that should be updated and refined as the business evolves. It can be used to track changes and make strategic decisions about the future of the business.

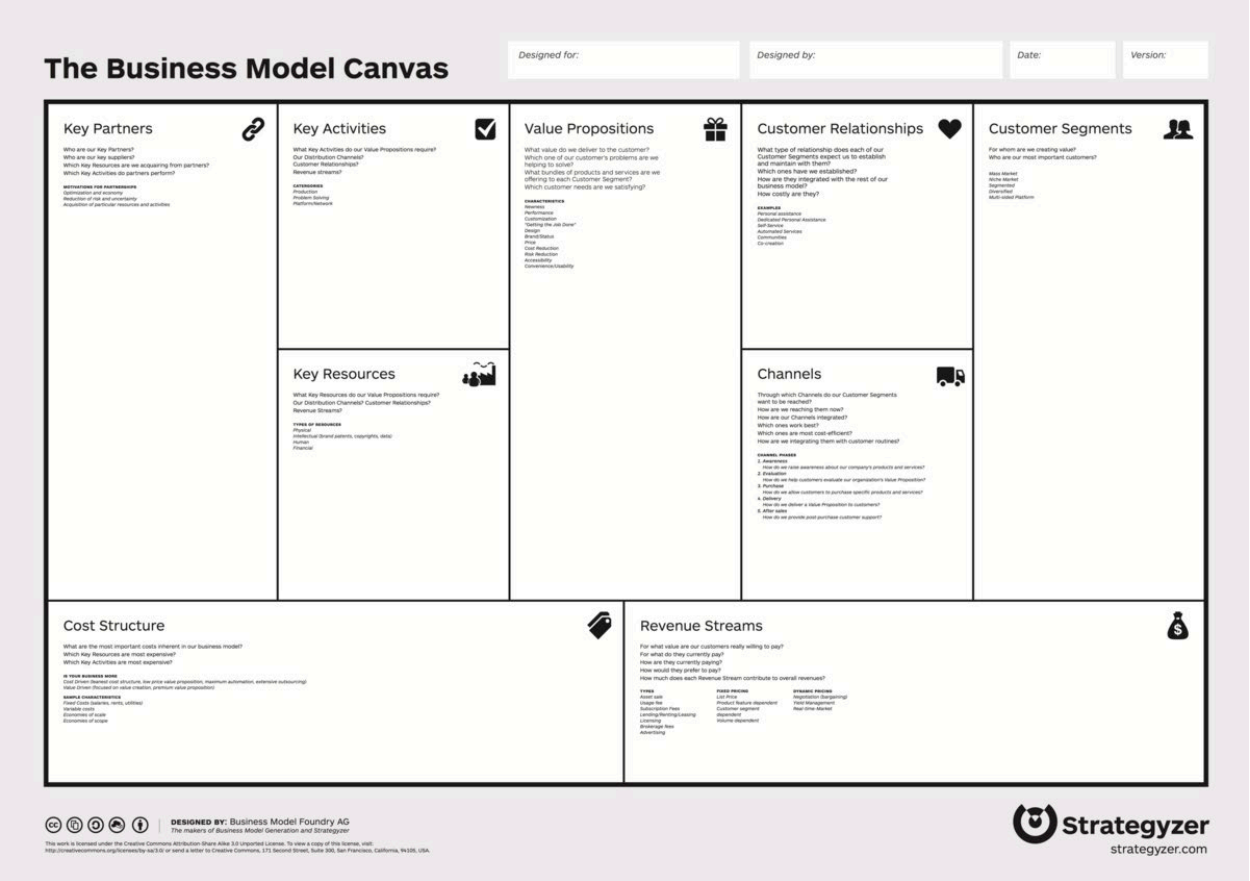

Figure 3: Business Model Canvas

3.4. Key Exploitable Results

PUSH-IT has determined an indicative list of Key Exploitable Results (KER) that will be taken into account during the Exploitation activities. The initial overview is derived from the initial PUSH-IT proposal and Grant Agreement. These KER are:

Drilling: GRE casing

Glass fiber re-enforced epoxy (GRE) is a composite material, newly applied for cheap completion of HT-wells. These products and methods will be developed to a demonstration level.

Drilling: Expanded diameter gravel wells

This technology has been recently demonstrated for low temperature storage allowing wells to be installed with a diameter of over 2m in the geothermal reservoir. This will reduce the number of wells needed in such systems and reduce the injection pressure required, thus reducing both capital and operational expenditure.

Integration: Machine learning based DH control system

The smart DH network controller is able to adjust the heat demand of the network using demand response so that the heat demand is tailored to the real-time conditions of the geothermal reservoir and the heat producing installations. Furthermore, the smart DH network controller will be able to minimize the supply and return temperature of the network, and as such minimizing the heat losses in the network and maximizing the capacity of the capital cost intensive geothermal wells by increasing the difference between extraction and injection temperature.

Integration: Develop algorithms for coordinated management of multiple heat sources:

These algorithms actively control the temperature profile of the storage system, thus providing a flexible online storage capacity adjustment. It actively controls the heat flow infeed temperature to the DH system, increasing the network operation flexibility by admitting different return temperatures.

Integration: Co-simulation

PUSH-IT will optimise integration in heat systems via co-simulation and machine learning based control for demand side management to optimise heat utilisation, reduce supply and return temperatures in the network, and maximise network flexibility to reduce GHG emissions. Digital twins will be developed and applied to optimise the design of parameters, operation, and integration into heating systems for each site. It will compose and validate a toolbox that can be used to predict subsurface dynamics, system performance and economically optimise integration of geothermal energy storage in local heat distribution networks and power infrastructures.

Monitoring: ATES and MTES

The multi-disciplinary and glass fiber based geomechanical and thermal monitoring of open systems reservoir provides a cost-efficient and 4D monitoring of energy storage, to ensure its performance and sustainability.

Monitoring: Enhanced Geothermal Response Test and glass fiber monitoring for BTES

Well test for closed loop systems to characterise the reservoir behaviour in terms of geothermal storage potential. Here the standardised procedure for monitoring installation, test, and evaluation will be applied for BTES demo-sites.

Testing: Push-pull HT performance test

The test procedure will be further developed for HT-ATES/MTES into a standard test procedure and will be applied at project demo sites.

Engagement: LCOE reduction

A developed open-source tool will be used to assess and optimise LCOE reduction and costs of carbon emission reduction. The tool can capture the system dynamics of heat supply, storage operational performance, techno-economic parameters, and uncertainty of future heat demand. Quantitative risk assessment on the business case will be carried out to provide the probability distribution of LCOE.

Engagement: Geographical Information System web-app for potential mapping

The delivery of a PUSH-IT WEB- Geographical Information System platform to visualize and interrogate a set of grid maps displaying the favourability of implementation for the different heat storage in geothermal reservoir technologies analysed at different scales (national to the individual site implemented in PUSH-IT).

During PUSH-IT all the above KERs will be assessed on their potential which is depending on the result of their usage in the project itself.

3.5. Planning and Milestones

Phased approach

The PUSH-IT exploitation plan consists of the following phases:

Phase 1 (2023 – 2024)

- Potential mapping: The initial potentially KER will be reviewed other results will be identified and their potential for further exploitation will be assessed.

Phase 2 (2024 – 2025)

- Market analysis: To identify the feasibility of the KERs listed in this section and other project results, a market analysis will be conducted, and the results will be included in the revised exploitation plan in M22. PUSH-IT will use the following methods to analyse the attractiveness and target users of exploitable results:
    - Competitor analysis (BMEM): Competitors in the supply chain and their products and services will be analysed to get a better understanding of the market and the operation mechanism and the competition.
    - Strengths, Weaknesses, Opportunities and Threats analysis (BMEM): a SWOT analysis will be conducted to identify strengths, weaknesses, opportunities, and threats of all potentially KERs.
    - Market mapping (BMEM): market mapping will match potential customers for exploitable results. Early strategies for customer development will be considered.

Phase 3 (2025 - 2026)

- Business plan and VPC and BMC: For all eligible results, a specific business plan and model will be developed in the scope of the execution of the PUSH-IT project and reviewed with commercial partners towards the end of the project.
- Preparation: Exploitation/KER plan [M1-6].
- Management of research exploitability and transfer; identify, monitor, qualify and protect the exploitable knowledge and know-how enhanced within collaboration in the consortium [M1-48].
- Market analysis for the attractiveness of KER's. This will lead to an exploitation plan, detailing the approach for further exploitation of the products/services that will be developed during the project [M24].
- Where applicable exploitation roadmaps will be developed together with accompanying business plans, including IP potential and issues [M46].

In order to prepare ourselves in the best way for a successful exploitation of KERs, PUSH-IT will apply to the Horizon Results Booster services Portfolio Dissemination & Exploitation Strategy and Business Plan Development. It is foreseen that the services will start in Q4 2023 and will be finalised in Q2 2024.

3.6. Intellectual Property Management

3.6.1. Identification of IP and Protection Strategy

Intellectual Property (IP) generated by the PUSH-IT project will be managed according to the broad agreement reached by the consortium partners at the start of the project. The PUSH-IT Consortium Agreement states that parties or individuals that develop technologies own their respective IP, and that exploitation of the technology will be done within the consortium. The consortium will work collaboratively to ensure that the exploitation of the project's IP is managed effectively and efficiently, and that the benefits of the project are maximized.

The PUSH-IT consortium recognizes that IP generated by the project is a valuable asset and is committed to protecting and managing it in accordance with best practices. As such, the consortium will establish an IP management plan that outlines the procedures for identification, ownership, protection, and exploitation of the project's IP. The plan will be developed in consultation with legal experts and will be regularly reviewed and updated as necessary throughout the duration of the project.

The IP management plan will include clear procedures for the identification and ownership of the project's IP. The plan will specify that the individual or organization that develops a technology or invention will be considered the owner of that IP. The plan will also outline how

ownership and usage rights will be assigned to the consortium partners. The consortium will work to ensure that any necessary agreements or licenses are in place to allow for the successful exploitation of the project's IP.

The plan will also include provisions for the protection of the project's IP. The consortium will use a variety of methods, including patents, trademarks, and copyrights, to protect the project's IP. The consortium will also establish guidelines for the management and sharing of confidential information and trade secrets.

Finally, the IP management plan will outline the procedures for the exploitation of the project's IP. The consortium will work together to identify potential commercialization opportunities and to develop innovative business models that can maximize the impact of the project's results. The consortium will also work to ensure that any exploitation of the project's IP is done in a way that aligns with the project's broader goals and objectives, and that benefits all consortium partners.

3.6.2. Management and Commercialization of IP

The intellectual property (IP) generated during the PUSH-IT project is an important asset for the consortium partners, and it is essential that it is managed and commercialized effectively. The broad agreement within the consortium partners is that parties that develop technologies own their IP, and the exploitation of the technology will be done within the consortium. The following procedures will be followed to manage and commercialize the IP generated during the project:

Identification of IP: Each partner will be responsible for identifying the IP generated within their respective WPs. The project coordinator will compile a comprehensive list of all identified IP, which will be maintained throughout the project.

Ownership of IP: The partner or partners who generate the IP will own the IP. This ownership will be established in the consortium agreement and confirmed in the respective partner's contribution agreement.

Protection of IP: The protection of the IP will be ensured by obtaining the necessary patents, copyrights, and other legal protections. The consortium partners will decide which IP will be protected and the means by which it will be protected. All partners will work together to ensure that the IP is protected effectively.

Exploitation of IP: The exploitation of the IP will be done within the consortium. The consortium partners will determine which IP will be exploited, and how it will be exploited. The exploitation of the IP will be governed by the consortium agreement and confirmed in the respective partner's contribution agreement.

Licensing of IP: If a partner decides not to exploit their IP, they can choose to license it to another partner within the consortium or to a third party. The licensing agreement will be governed by the consortium agreement and confirmed in the respective partner's contribution agreement.

Commercialization of IP: The commercialization of the IP will be done by the consortium partners. The consortium partners will determine which IP will be commercialized and how it will be commercialized. The commercialization of the IP will be governed by the consortium agreement and confirmed in the respective partner's contribution agreement.

Monitoring of IP: The project coordinator will be responsible for monitoring the IP generated during the project. The IP will be monitored to ensure that it is protected, exploited, licensed, and commercialized in accordance with the consortium agreement and the respective partner's contribution agreement.

3.6.3. Confidentiality and Trade Secret Guidelines

The PUSH-IT consortium recognizes the importance of confidential information and trade secrets in the development and commercialization of the project's intellectual property. The consortium partners agree to establish guidelines for the management and sharing of such information to ensure its protection and to prevent unauthorized use or disclosure.

Identification of Confidential Information and Trade Secrets: The consortium partners will identify any confidential information or trade secrets developed or used in the project. Confidential information is defined as any information that is not generally known or easily accessible to the public, and which has commercial value. Trade secrets are defined as confidential information that gives a competitive advantage to the owner.

Ownership of Confidential Information and Trade Secrets: The ownership of confidential information and trade secrets developed in the project will be determined by the agreements between the consortium partners. The partners who develop the confidential information or trade secrets will own them, unless otherwise agreed upon in writing.

Protection of Confidential Information and Trade Secrets: The consortium partners will take reasonable measures to protect the confidentiality and secrecy of the information, including:

- Limiting access to confidential information and trade secrets to those with a need to know.
- Marking all documents containing confidential information and trade secrets with a notice that the information is confidential.
- Storing all documents containing confidential information and trade secrets in a secure location.
- Implementing physical and technical security measures to prevent unauthorized access to the information.

Sharing of Confidential Information and Trade Secrets: The consortium partners will share confidential information and trade secrets only on a need-to-know basis, and only with those who have signed a non-disclosure agreement. The non-disclosure agreement will include provisions for the protection of the information, including limitations on use and disclosure, and obligations to return or destroy the information upon request. In cases where the consortium partners wish to share confidential information or trade secrets with third parties, they will obtain written consent from the owner(s) of the information and will ensure that the third-party signs a non-disclosure agreement.

Enforcement of Confidentiality and Trade Secret Guidelines: The consortium partners will enforce the confidentiality and trade secret guidelines through appropriate legal means, including injunctive relief, damages, and/or termination of the agreement. Any breaches of the guidelines will be investigated promptly, and the consortium partners will take all necessary steps to mitigate the damage caused by the breach.

4. Communication plan

4.1. Introduction

As described in Chapter 1 the goal of communication is to ensure that PUSH-IT results are widely available to stakeholders and integrated in industry workflows. To successfully reach these goals as consortium, it first has to establish key communication principles and process guidelines. These, together, form the foundation of the communication strategy and approach.

4.2. Communication principles

Technology driven, people oriented

- Focus on future societal impact: technology for the benefit of people, society & planet

Although PUSH-IT is focused on new heat storage technologies, it aims to communicate the impact on people, society, and planet. How could or will they benefit from these technologies? How does technology solve their issues? How could these technologies be of benefit? PUSH-IT is technology driven and people oriented.

Feasible, viable, tangible

- Real questions, real concepts, real results, real people

PUSH-IT does not merely want to communicate ambitions, plans or ideas - it wants to be as concrete as it can. The PUSH-IT project wants to address the actual scientific and societal questions. Convey feasible and viable concept. Show real and tangible results, both scientifically and in terms of building and realisation of the site. And tell about the actual needs and wants of the people involved: users, stakeholders, project team members.

Central coordination, local execution

- Centralised communication strategy, local focus, and execution

PUSH-IT amplifies the local content of the local sites. By providing a communication framework with strategic content, it conveys a uniform message of PUSH-IT's goals. The specific local content makes every PUSH-IT message relevant to the local stakeholder-community, because it has a strong focus on the local context and practise. And via the European PUSH-IT communication network, this can in itself inspire other local stakeholder-communities.

4.3. Communication process guidelines

Central coordination, local execution

- Centralised communication strategy, local focus and execution

The central communications team provides the strategic framework and strategically relevant content calendar. Local communication teams are able to provide a local add-on to the generic PUSH-IT content and communicate this through their own local channels and to their own local stakeholder network.

Collaboration through co-creation

- Local focus amplified via overall communications team and v.v.

Together with the local communication teams it focuses on organising and executing the overall content calendar. Since the local teams have a good understanding of the progress

within their own project, they can provide for the needed local content. Having the overview of all the project sites, the central communication team is able to put all these elements together.

Alignment with project development

- Milestones in Research & Development project development are met by communication milestones

Communication always follows the project development progress. The progress and contents of the WPs is leading for the communication process and content.

4.4. Global – local approach

During PUSH-IT all communication activities will be in line with these principles and process guideline. Much of the above is based on the situation that PUSH-IT, although a project with a multi-country scale and approach, consists of a local project dimension with its own local particularities. The PUSH-IT project can govern and structure much of the central communication activities and keep these aligned with the core project. However, the local sites will also have to communicate to their own stakeholders on their own project's behalf. This cannot be governed from a central team. That is why PUSH-IT has chosen for a global – local approach which is illustrated in Figure 4.

Figure 4: Framework for global and communication local approach

The 'scale' determines at what level a topic is relevant and which stakeholders would be interested in these topics. The **top row represents the global scale**, which includes content relevant for the entire PUSH-IT project and its partners, external stakeholders such as policy makers, the public, and industry professionals. This global scale content is coordinated and disseminated by the PUSH-IT communication team; content is provided by the WP and site communication leads. The **bottom row represents the local scale**, which included content relevant only to the local context of a specific site, such as implications of the PUSH-IT project on the local community and developments at the site. The local scale content is aimed at local

stakeholders and disseminated and created by the site communication leads, using the overall project communication strategy as guidelines.

The 'topics' consider global, project-wide topics (such as safety, social impacts, sustainability, technological developments, project results) and local topics (local results). Global topics include the project goals and themes and are mainly steered by the communication team via the strategic content calendar. Local topics follow from the site developments.

Each box in the diagram of Figure 4 specifies the content owner and the type of content that belongs in that box.

4.5. Communication organisation design

Coordinating communications for a large consortium with multiple WPs and site locations requires a thorough structure. It has established the following setup with corresponding task division (Figure 5).

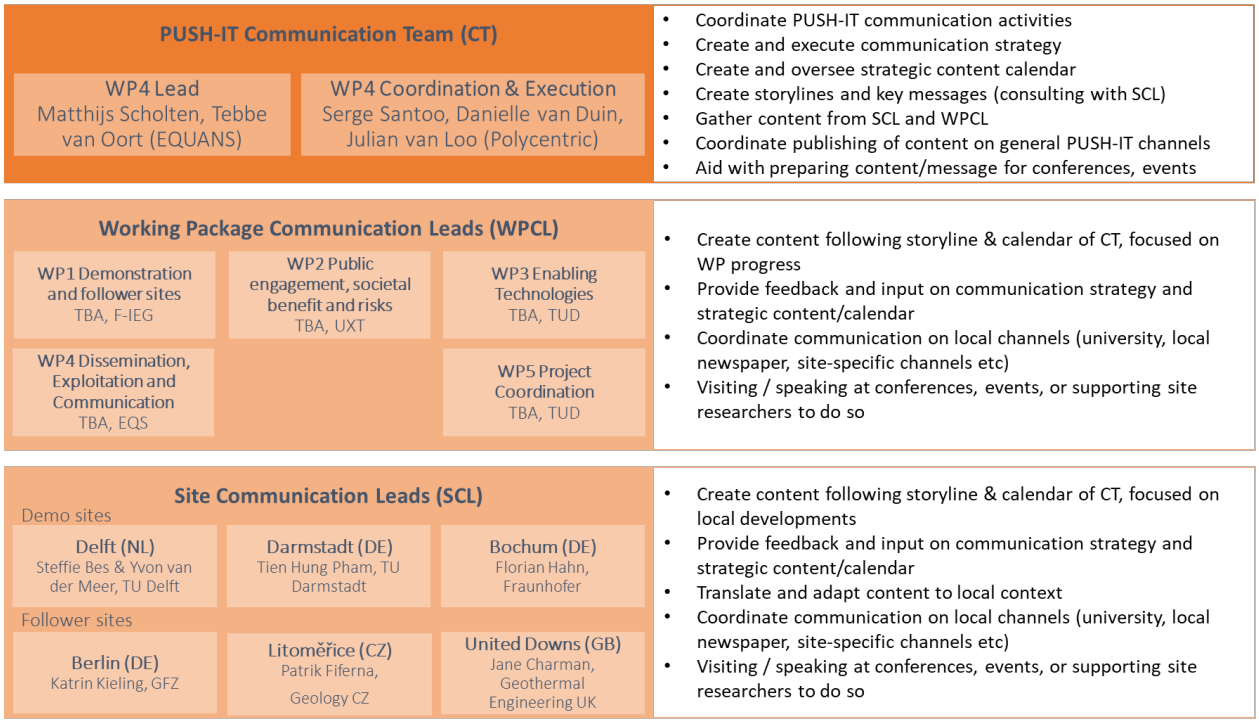

Figure 5: Communication organisation and division of responsibilities

4.6. Communication strategy

Communication within PUSH-IT is based on a centrally driven message house structure. This framework is used to develop and articulate key messages for PUSH-IT. This way, it provides a structured approach to ensure consistent and effective messaging.

PUSH-IT's message house structure of a message consists of the following elements:

Foundation: This represents the core message or central idea that needs to be conveyed. It is often a brief and memorable statement that captures the essence of what you want to communicate.

Pillars: These are the key supporting points that reinforce and elaborate on the core message. Pillars help provide context, evidence, and additional information to support the main message.

Walls: The walls represent the barriers or challenges that need to be addressed or overcome. They can include potential objections, misconceptions, or competing messages that might hinder the acceptance of the core message.

Roof: The roof symbolizes the desired outcome or the overarching goal of the communication effort. It reflects the impact or change that the organization or initiative aims to achieve.

Table 8 shows the proposed description of PUSH-IT's purpose, goal, and three focus storylines with key messages and topics. These focus storylines will be further expanded and refined in the first phase of the communication approach as described in the next section.

Table 8: Proposed focus storylines for the PUSH-IT communication strategy.

Purpose	Contribute to a net-zero European economy and society in 2050.		
Goal	Successfully demonstrate the full-scale applications of heat storage (up-to 90°C) of 3 different technologies in geothermal reservoirs to overcome the seasonal mismatch between demand for heat and heat generation from sustainable sources with the ultimate goal to contribute to the EU's aim to have a net-zero greenhouse gas (GHG) economy by 2050, with 55% reduction on 1990 levels by 2030		
Solutions	Underground heat storage is the missing link for future sustainable district heating networks.	Underground heat storage is a safe, reliable and affordable method to support the production and usage of sustainable thermal energy.	Underground heat storage is economically viable and fits existing and future regulatory frameworks.
Key messages	PUSH-IT's ambition is to increase the adoption of new technologies in district heating networks. The project believes that the enabling technologies of PUSH-IT will significantly increase the adoption and impact of thermal energy storage in Europe	PUSH-IT aims to create a systemic approach to increase social acceptance of these novel technologies and its implementation in the build environment.	PUSH-IT's ambition is to prove the value of the enabling technology for operators and enable wider adoption of heat storage in district heating networks. With its research results, PUSH-IT aims to create a more favourable environment for the wider adoption of its solutions.
Topics	Thermal energy storage technologies District heating networks Innovative technologies in geothermal energy & thermal energy heat storage	Societal engagement in energy transition Public understanding and support of heat storage Local community & consumer involvement in building and exploiting heat storage installations	Regulatory approaches towards high temperature underground heat storage Economic viability of high-temperature heat storage

Communication also follows the project development progress. The progress and contents of the WPs is leading for the communication process and content. In the WPs, there is a focus on the development of both TRLs and MRLs (Market readiness levels).

The communication related activities follow a phased approach. The phases and their high-level activities are:

0: CREATING THE PUSH-IT COMMUNICATION FOUNDATION (YEAR 1)

Map stakeholder network per site, create PUSH-IT communication way of working, incorporate site plans in communication planning, involve Advisory Board, prepare social media channels.

1: AWARENESS (YEAR 1)

The aim of the first communication phase is to raise awareness on the issues that PUSH-IT aims to address and on the importance of the project in solving these issues. Activities include Website launch, create and execute proactive external communication calendar (including interviews, press releases, LinkedIn posts), event calendar, stakeholder sessions where relevant, progress updates, create and share videos.

2: ENGAGEMENT (YEAR 1, 2, 3 and 4)

The aim of the second communication phase is to engage key stakeholders in the research and solutions that PUSH-IT is developing, to make these stakeholders interested and engaged in the project results. Activities include Maintain and execute pro-active external communication calendar (including interviews, press releases, LinkedIn posts), events, stakeholder sessions where relevant, progress updates, update communication plan, create and share videos.

3: ACTIVATION (YEAR 3 &4)

The aim of the third communication phase is to activate key stakeholders in adopting the results of the PUSH-IT project. Activities include Maintain (social) media calendar, press releases, events, stakeholder sessions where relevant, progress updates, create and share videos.

PROJECT CLOSE (YEAR 4)

Follow-up steps and closing report.

The plotting of these phases in a timeline result in the view shown in Figure 6. The objectives and activities of phase 1 are described in more detail in the next section. The details of the other phases will be determined later in the project.

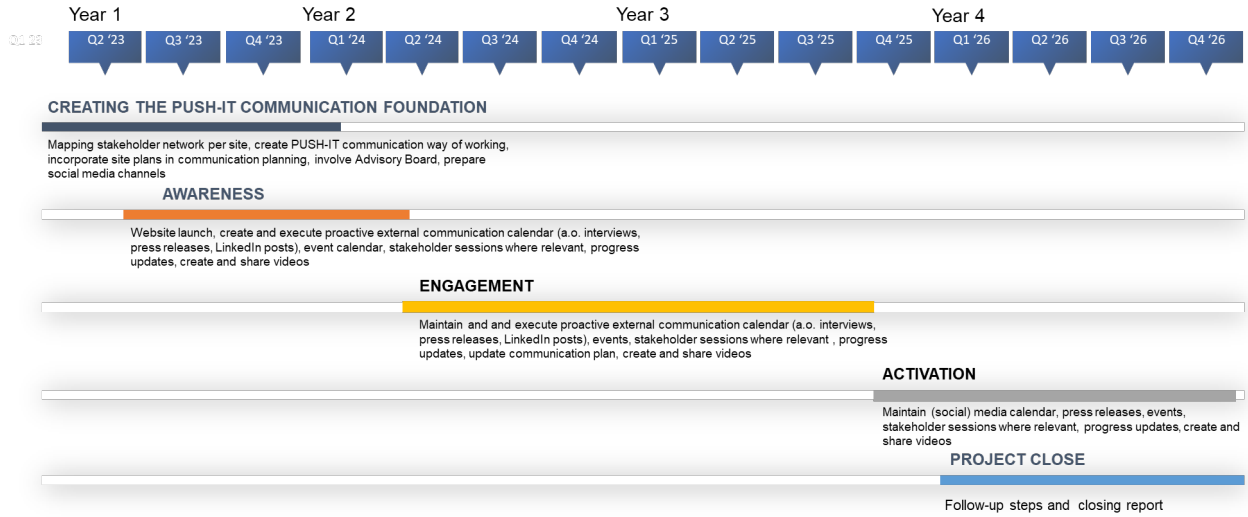

Figure 6: Indicative timeline

4.7. Communication approach 2023 – Phase 1: Awareness

In the awareness phase there are 3 main objectives:

1. Establish and maintain pro-active public relations & public affairs: update focus storylines and share key messages with media and stakeholders

   Activities

   - Align & update focus storylines with PUSH-IT purpose & activities
   - Create and execute pro-active external communication calendar (including interviews, press releases, LinkedIn posts)
   - Strengthen relations with key stakeholders, including media
   - Create and manage stakeholder network
   - In collaboration with other WP's create a pro-active approach on priority items
   - Align with PUSH-IT focus storylines
   - Build relations with key stakeholders
   - Initiate roundtables/events & speaking opportunities

2. Create and implement an active & integrated social media management strategy

   Activities

   - Quarterly news stand-up to feed media calendar
   - Update progress overview & share with consortium communication partners and wider media network
   - Preparing statements and Q&As on major progress points
   - Initiate pro-active approach on linked issues (a.o. geothermal energy, district heating networks, energy storage and societal engagement in energy transition

3. Create a strong foundation for public relations & public affairs activities

   Activities

   - Implement PUSH-IT communication way of working (structures & processes)
   - Monitor media & stakeholders
   - Update external communication channels
   - Build PUSH-IT internal communications network

The details of the subsequent communication phases (Engagement, Activation and Project Close) will be determined later in the project.

4.7.1. Stakeholder analysis

To reach the appropriate stakeholders and increase the effectiveness of communication efforts, a stakeholder analysis is needed. For each of the three demo and three follower sites, a stakeholder analysis will be made by the local project teams to determine the needs, interests and barriers of the key players for each site. This stakeholder analysis will be used to determine a suitable local communication strategy. A global stakeholder analysis will be done by the Communication Team for the global communication approach.

Since multiple WPs in PUSH-IT include performing a stakeholder analysis, and each site has to address their specific stakeholders for successful communication and dissemination, close coordination between each WP and the sites is key. This is why the analysis will be done in collaboration, coordinated by the Communication Team. Special attention will be given to collaborating with WP2 (Societal Engagement) to align the stakeholder mapping efforts.

A systemic approach to selecting stakeholders will be used, meaning that actors from technological, economic, ecological, social and policy domains of innovation will be considered.

The result of the stakeholder analysis will be a visual mapping of each stakeholder relevant to their interest and power and a grouping of each stakeholder group and the communication approach (Figure 7).

In line with the global – local approach principle, each site will organize its own local stakeholder management and communication based on the overall communication principles of PUSH-IT. An example of a local stakeholder approach matrix is given in Figure 8.

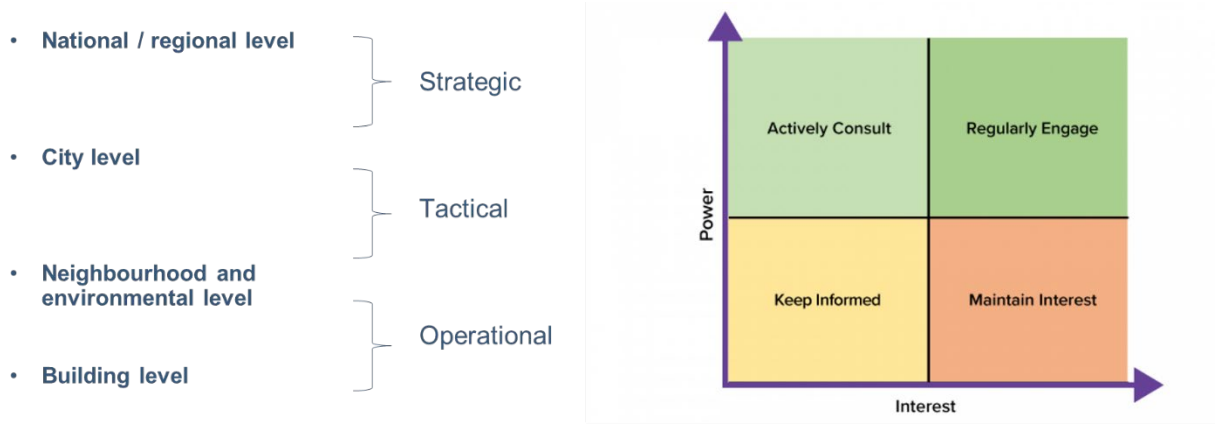

Figure 7: Example of a stakeholder map for a local site

Stakeholders	Level	Approach
Partners	**Key figure** Inspire, engage and activate	Strategic
Local residents	**Subjects** Keep informed, maintain interest	Operational
Governments	**Key figure** Inspire, engage and activate	Strategic
Educational institutions	**Context setter** Keep satisfied & engage	Tactical
Energy companies & Grid operators	**Key figure** Inspire, engage and activate	Strategic
Entrepreneurs/ companies	**Subjects** Keep informed & maintain interest	Operational
Interest groups	**The crowd** Monitor & keep informed	Tactical
Housing companies	**Subjects** Keep informed & maintain interest	Operational
Media	**Subjects** Keep informed & maintain interest	Strategical
Environmental agencies	**Context setter** Keep satisfied & engage	Tactical

Figure 8: Example of a stakeholder approach matrix

4.7.2. Content strategy

The stakeholder mapping will lead to a focused content strategy where each stakeholder group will be addressed in a manner that best reflects their specific needs. For local (site level) topics, the creation of this strategy and content will be the responsibility of the site teams. An example of a content strategy is given in the table below. For global (project-level) topics, the content strategy will be coordinated by the Communication Team, where content will be provided according to a content calendar by the relevant WP actors (see section 4.8).

Table 9: Example of a content strategy.

Target group	Level	Approach	What content is relevant and inspiring for this stakeholder?
Partners	Key figure Inspire, engage and activate	Strategic	Broader approach, main milestones, updates on progress, implications of results on their work/sector, inspire and build relationships through sharing of inspiring stories and achievements
Local residents	Subjects Keep informed, maintain interest	Operational	Planning, construction-related disturbances, accessibility, liveability, safety, impact on their lives/environment, inspire with positive and unique aspects of underground heat storage, plant visits, education, engagement
Governments	Key figure Inspire, engage and activate	Strategic	Site invitations, progress updates, showcases, highlight climate-related results, link political ambitions to results, environmental management
Educational institutions	Context setter Keep satisfied & engage	Tactical	Engage students in the story and possibilities, interviews with professors/students, guest lectures, engagement
Energy companies	Key figure Inspire, engage and activate	Strategic	Main milestones, updates on progress, inspire and build relationships through sharing of inspiring stories and achievements
Entrepreneurs/ companies	Subjects Keep informed & maintain interest	Operational	Planning, construction-related disturbances, accessibility, liveability, safety, economic prospects, connection and contribution

Target group	Level	Approach	What content is relevant and inspiring for this stakeholder?
Interest groups	The crowd Monitor & keep informed	Tactical	Seek input and address needs, status, planning, site visits, possibilities for collaboration, safety
Housing corporations	Subjects Keep informed & maintain interest	Operational	Sustainable and economic elements
Media	Subjects Keep informed & maintain interest	Strategical	Main milestones, progress, emphasize sustainability, inspiration and information
Environmental agencies	Context setter Keep satisfied & engage	Tactical	Main milestones, progress, emphasize sustainability, liveability, safety

4.8. Global strategic content calendar

Developing a global strategic content calendar is crucial for the success of the PUSH-IT project. By having a well-planned and organized content calendar, it can ensure **better control** and **results** when producing and publishing content. It allows us to tailor our messaging to the specific needs and interests of our target groups, ensuring that the content created resonates with them effectively. The content calendar serves as a roadmap for informing and engaging our target groups throughout the project duration.

In addition to providing information about the research and realization of the project, the PUSH-IT project aims to inspire our target groups and increase awareness of PUSH-IT's significance. By incorporating inspiring and engaging content into our calendar, it can captivate the attention of our target groups and create a lasting impact.

To develop the content calendar, it will identify the main target groups that the project wants to reach and engage with. For each target group, it is determined what content will be shared, when it will be published, where it will be distributed, and the means through which it will be communicated. The Communication Team will develop the content calendar and coordinate its implementation; the WP and site communication leads will use it to create content and publish it to their local channels.

To ensure a comprehensive approach, it has structured the content calendar around seven themes: **technology, social, business & economics, governance, development & realization, safety and environment & sustainability.** Each theme corresponds to a specific aspect of the project. This approach allows us to delve into various dimensions of the PUSH-IT project, ensuring that our communication provides a system perspective. Furthermore, the project aims to link our topics to relevant current events and project milestones, creating timely and impactful content that resonates with our target groups. Table 10 shows examples of what topics can be discussed in content for the different themes. The specific topics will be determined in collaboration with the WP teams and local sites.

Table 10: Content themes and corresponding topics.

Technology	Social	Business & Economics	Governance	Development & Realisation	Safety	Environment & Sustainability
Why do we need this technology ?	Social acceptance of the different technologies	Is this economically viable compared to other technologies?	Regulatory challenges in heat storage systems	Meet the researchers / General explanation research	How is safety monitored and ensured?	Role of the technologies in the energy transition EU
Animation explainers/ infographic technology	Results of social engagement survey Exeter	How does heat storage contribute to affordable energy?	Should a government or an energy company be responsible for energy storage	Summer school update	Impact on water quality / biodiversity	The environmental benefits of high-temperature heat storage.
Linking issues: geothermal	What are the benefits of	How does the system perform	Should a government or an	General explanation of the	Impact on the natural	What are the spatial

Technology	Social	Business & Economics	Governance	Development & Realisation	Safety	Environment & Sustainability
- district heating - energy storage	heat storage for society?	compared to other energy solutions?	energy company be responsible for energy storage	research at each site	environment surrounding the project	effects of TES?
Conversations with experts on advancements in Geothermal Energy.	What is the role of the end-user / energy consumer?		Way in which this technology fits in the country's energy plan	Lectures / information nights about the project	Safety during drilling	Insights from Environmental experts on PUSH-IT's Impact

Based on the content themes, project progress, and in collaboration with the WP teams and project sites, a strategic content calendar will be made by the Communication Team. This calendar will be used by the defined content owners (those responsible for creating the content) to create the content at the right time for the right medium. An example of what the content calendar could look like is shown in Figure 9.

Year	Date	Week	Theme	Subject	Target Group	Angle	Prio **	Type content	Content Owner	Channel
			Technology	Why do we need this technology?	Geothermal operators, district heating operators, governments, municipalities	Explaining the role of this technology in the energy transition	1	Article	TBD	Website
			Social	What are the benefits of heat storage for society?	Local communities, public	How does heat storage contribute to a more sustainable and healthy society?	3	Article	TBD	Website
			Business & Economics	Upscaling of the technology	Geothermal operators, district heating operators, governments, municipalities	How easily can this be upscaled / applied to other sites?	3	Article	TBD	Website, newsletter
			Governance	Regulatory challenges in heat storage systems	Geothermal operators, district heating operators, governments, municipalities	The complexities of governance and regulations surrounding heat storage systems	3	Article	TBD	Website, newsletter
			R&D dissemination	Project wide update on progress	Scientific community	What are the newest project findings?	2	Article	TBD	Website, newsletter
			Safety	Safety of the technologies	Geothermal operators, district heating operators, governments, municipalities, local communities	How is safety monitored and ensured?	1	Article	TBD	Website
			Environment & Sustainability	Role of the technology in the EU energy transition	Geothermal operators, district heating operators, governments, municipalities	What is the potential of the technology in Europe?	3	Article	TBD	Website
			Technology	Explainer video	Local communities, public	Animation explainers about the different technologies	2	Video	TBD	Website, newsletter
			Realisation	What is the progress on the pilot sites?	Local communities, public	Short update of every project site	2	Article	TBD	Website, newsletter

Figure 9: Content calendar example

4.9. Communication tools

The channels and media PUSH-IT will use as communication means will derive from the stakeholder analysis and is work in progress for now. An indication of relevant media is given in Table 11. On these channels, a mix of media will be created, including videos, interviews, explainers, infographics, info stands, workshops and others. Ambassadors will be selected among key figures involved in PUSH-IT who can use their network, expertise and reputation to amplify PUSH-IT's communication efforts. These will be determined for each communication effort in more detail when creating the content calendar after performing the

stakeholder analysis. A visual identity will be created to ensure consistency and recognisability in all of PUSH-IT's communication. An overview of the communication means used is given in Table 12.

Outreach, engagement and number of views and followers of content on PUSH-IT's own media channels will be monitored on a quarterly basis and used to evaluate efficacy of communication efforts. Coordinators of the PUSH-IT consortium partner channels will be involved to amplify PUSH-IT's content and increase our reach.

Table 11: Overview of media used for PUSH-IT communication.

Medium	Examples
PUSH-IT own channels	**Website** https://push-it-thermalstorage.eu https://push-it-project.eu (Latter redirects to the former and can be used as shorter email domain) The website is the main portal for PUSH-IT information and will be regularly updated to provide all pertinent project information until at least 2032, and web traffic will be monitored. It will contain the following information: • General information PUSH-IT: goals, WPs, facts & figures, partners, FAQ • Project deliverables and an overview/archive of all published data and/or links hereto • Publication press & news releases • Image database • Contact information spokespersons **Social media** LinkedIn: https://www.linkedin.com/company/project-push-it/ Twitter (to be created) YouTube (to be created) Social media pages of consortium partners Social media profiles of key figures involved in PUSH-IT Every week at least 1 post about purpose topics • Reposts and comments on relevant posts from others • Active participation in conversations • Posts with links to website articles and updates **Newsletter** Once every 3 months • Overview of project progress and news • Most recent articles and interviews • Upcoming milestones • Upcoming events
	•
Media channels of PUSH-IT consortium members	To amplify the reach of PUSH-IT's communication, media channels of PUSH-IT's consortium members will be used, since these already have a significant reach. This will include the websites, LinkedIn, Instagram and Twitter pages of consortium members, including those of specific faculties

Medium	Examples
	tied to the project. Use of these media will be coordinated via the communication leads of the involved teams.
External websites and blogs	Think GeoEnergy International Geothermal Association Geothermal Rising Blog
Newspapers	Local and regional newspapers in demo and follower site locations
Magazines	National trade journals International trade journals
External events	GeoTHERM Offenburg Energy Geoscience Conference 2023 Euroheat & Power RHC Annual Conference 2023 EAGE Annual European Sustainable Energy Week 2023 European Geothermal PhD Days IGC 2023 - International Geothermal Investment Conference
PUSH-IT own events	Workshops, information events, site visits, final symposium

Table 12: Overview of communication means used for PUSH-IT communication.

Means	Description
Videos and graphics	Interviews, explainers, infographics, factsheet
Project identity	Including logos & colour scheme, templates and other materials to be used for PUSH-IT communication.
Ambassadors	Key figures involved in PUSH-IT who can use their network, expertise and reputation to amplify PUSH-IT's communication efforts
Media kit	Media kit for journalists and policymakers
Physical promotion materials	Roll-up banners, brochures and other material, if applicable

4.10. PUSH-IT visual identity & colour schemes

Figure 10: PUSH-IT horizontal log

Figure 11: PUSH-IT vertical logo

Figure 12: PUSH-IT colour scheme

The EU aims to have a net-zero greenhouse gas (GHG) economy by 2050, with 55% reduction on 1990 levels by 2030. At present, heating and cooling represent around 50% of the final energy demand in Europe and are mainly supplied by fossil fuel derived energy. It is therefore essential for heating and cooling to decarbonise to achieve EU ambitions.

A challenge for decarbonizing heat systems is the size of the seasonal mismatch between demand for heat and heat generation from sustainable sources – this mismatch is much larger than the equivalent intermittency in electricity supply and demand. The two main solutions to address this mismatch are: (i) to install a large capacity, so that peak demands can be met even at low production levels; or (ii) to store energy for later use if it is not needed at time of conversion. Many sustainable heat supply systems are characterised by high capital expenditure and low operational costs. Therefore, an installed capacity tailored at peak demand is not cost effective, while extending the annual operation period is advantageous for meeting energy needs, reducing levelized cost of energy (LCOE) and decarbonisation. Optimal utilisation of sustainable heat requires storing large amounts of heat to account for seasonal supply and demand fluctuations. Various technologies have been proposed for large-scale heat storage in geothermal reservoirs and low temperature storage is routinely applied. PUSH-IT focuses on extending storage temperature ranges to high temperatures. We will tackle remaining barriers, demonstrate applicability, increase public engagement, and optimise and de-risk operations. We will showcase three technology options that are fit for a wide variety of geological conditions covering most locations in Europe.

Funded by
the European Union