Push2Heat

D1.1 Quality Assurance Plan

V0.3

Grant agreement: No. 101069689

From: TECNALIA

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ABBREVIATIONS

CA	Consortium Agreement
D	Deliverable
DoA	Description of Action
EC	European Commission
GA	Grant Agreement or General Assembly, on depend on the context
IMP	Innovation Management Procedure
IP	Intellectual / Industrial Property
KER	Key Exploitable Result
M	Month
MS	Milestone
PM	Person-month
PMP	Project Management Plan
PSC	Project Steering Committee
QAP	Quality Assurance Plan
ST	Subtask
T	Task
WP	Work Package
WPL	Work Package Leader

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VERSIONS

No.	Name	Partner	Contribution	Date
0.1	Maider Epelde	TECNALIA	First complete draft	2022/11/29
0.2	-	ALL	Checked by the partners	2022/12/09
0.3	Maider Epelde	TECNALIA	Format updated to the PUSH2HEAT report template	2022/12/21

1. INTRODUCTION

1.1 Objective of the deliverable

The main objective of the WP1 is to develop an effective, transparent and comprehensive administrative, financial and legal management to ensure the successful execution of the project.

The management WP consists of three tasks, that last the whole duration of the project:

- T 1.1 Project coordination and quality assurance
- T 1.2 Communication, reporting and monitoring
- T 1.3 Data management plan

This deliverable D1.1 is related to the task T1.1 and is aimed at ensuring the quality of the different activities to be carried out in the PUSH2HEAT project.

1.2 Deliverable description

The deliverable D1.1 is structured in several chapters explaining the following key aspects related to the quality assurance in the project:

- Detailed work plan for each WP
- Procedure for deliverables review
- Templates and formats for different documents, meetings, etc.
- Internal communication channels
- Innovation management
- Project Management Plan

Note: the PUSH2HEAT proposal was submitted with four demo sites but one of them (the pilot plant to be implemented at CAPSA) failed during the GA preparation phase. CAPSA is not officially a beneficiary of the PUSH2HEAT project and the consortium is looking for a demo site that will substitute it. Once the alternative demo site is confirmed the responsibilities that should

have been assumed by CAPSA will be transferred to the new partner. However, it has not been possible to confirm the alternative demo site yet, so for the sake of clarity 'CAPSA' and 'demo site in Spain' are used to refer to this demo site.

1.3 Contribution of partners

The task T1.1 in WP1 is led by TECNALIA and participated by the WP Leaders, i.e. TECNALIA, FRAUNHOFER, POLIMI, OST and EHPA.

Being so, TECNALIA, as the lead beneficiary of the project is the main contributor of the content provided in this deliverable.

1.4 Relation with other activities in the project

This deliverable is related with each and all activities, tasks and work-packages in the project as this "Quality Assurance Plan" will be the basis for the procedures to be followed in the execution of the project to guarantee the quality of the results and deliverables obtained in the project.

2. DETAILED WORK PLAN

2.1. Technical work to be carried out

The adequate planification of tasks and resources is key for the quality of the obtained results. The description of the work to be developed in each of the tasks for each WP is described in the Document of Action (DoA). In this document, a summary of each WP, in line with the extended description in the DoA, is included. The detailed work plans at WP and task level will be continuously discussed in dedicated WP meetings and updated accordingly during the lifetime of the project, considering the evolution of the different activities.

In the next Figure 0.1, the 6 work-packages in the project are exposed:

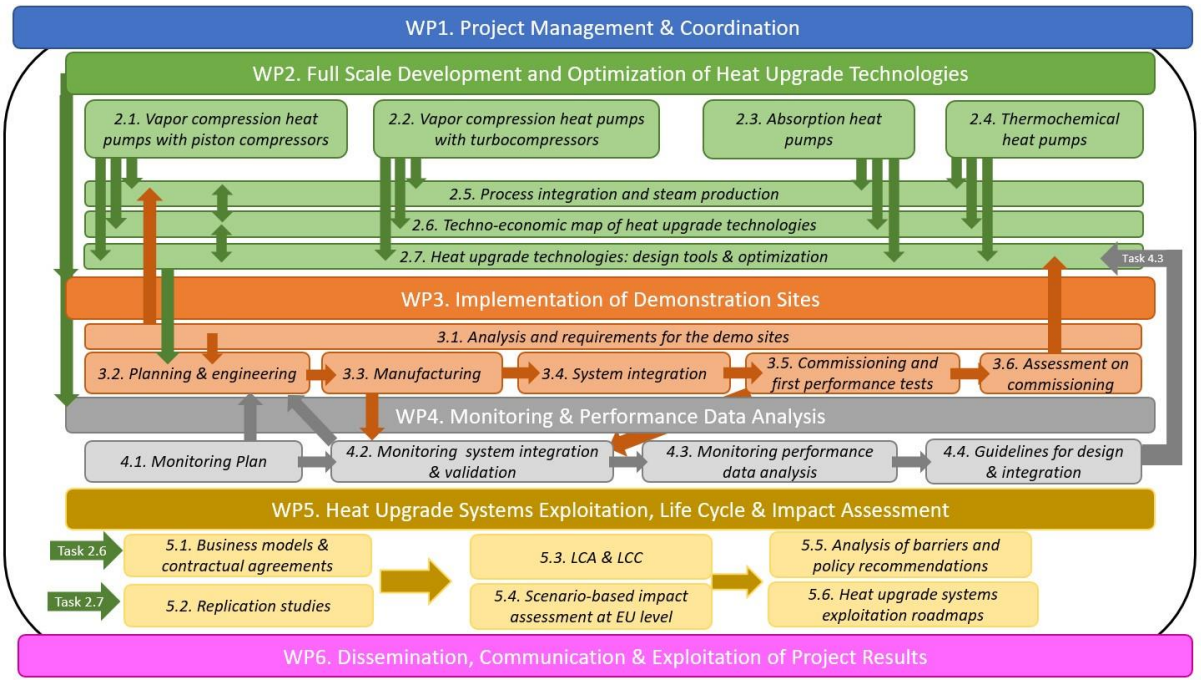

Figure 0.1: WP structure in the PUSH2HEAT project

As it can be seen in the Figure 0.1, the content and the outputs of each WP are related with other WPs. This means that the collaborative relationship among all the partners will be one of the keys for success in the project.

As results of all this work in the six WPs, 32 deliverables will be submitted during the life of the project. (see *"Annex I: List of deliverables"*)

In addition, during the project, 12 milestones are defined to assure the adequate advance of the project, from the first year of the project, related to the key outputs or results expected in each WP. (see *"Annex 2: List of milestones"*)

WP1: Project Management and Coordination
Objectives: - To develop an effective, transparent and comprehensive administrative, financial and legal management to ensure the successful execution of the project. - To ensure the achievement of all project objectives in terms of time, quality and costs, managing the consortium in a successful and cost-effective way. - The overall strategic and operational management and steering of the project, ensuring the accuracy, quality and timelines of deliverables.

To carry out smooth and continuous communication and high-quality technical and financial reporting to the project's progress to the European Commission.
Tasks Task 1.1 Project coordination and quality assurance [M1-M48] Lead: TECNALIA; Partners: FRAUNHOFER, POLIMI, OST, EHPA. Task 1.2 Communication, reporting and monitoring [M1-M48] Lead: TECNALIA; Partners: ALL Task 1.3 Data Management Plan [M1-M48] Lead: FRAUNHOFER; Partners: ALL
Deliverables D1.1 Quality Assurance Plan (M3, TECNALIA): A plan for project quality, risk, innovation and gender equality management. D1.2 Project Management Plan (M3, TECNALIA): A plan containing a Gantt chart and work breakdown structure including a schedule per task with responsible partners, use of resources, related subtasks, related deliverables and dependencies to other tasks. D1.3 Research Data Management Plan (M6, FRAUNHOFER): Plan for research data handling

WP2: Full Scale Development and Optimization of Heat Upgrade Technologies
Objectives: - Adapt and upscale the heat conversion units of the different heat upgrades technologies for its optimal integration in the demo sites. - Obtain an improved mechanical and thermal design for upscaling with minimal investment costs (CAPEX reduction). - Adapt and improve the control systems for industrial robustness and maximal efficiencies (thermal and electrical). - Design manufacturing procedures and process control systems for flexible adaptation of the technology for different industrial contexts. - Compare the different alternatives for the production of low-pressure steam regarding efficiency and reliability for each technology, and for its best-possible integration in the industrial process. - Obtain a techno-economic map of the different heat upgrade technologies for the identification of the most suitable technology for each application case. - Improve the design tools at component level and create a simplified map with common structure for all technologies to be used in the replication studies and monitoring.

Tasks

Task 2.1 Full scale development of vapor compression heat pumps with piston compressors [M1-M15] Lead: SPH; Partners: TEC, VITO

Task 2.2 Full scale development of vapor compression heat pumps with turbocompressors [M1-M15] Lead: ENER; Partners: TEC, VITO

Task 2.3 Full scale development of absorption heat pumps [M1-M15] Lead: BSNOVA; Partners: TUB, TEC

Task 2.4 Full-scale development of thermochemical heat pumps upgrading heat to 100 - 160oC [M1-M15] Lead: QPINCH; Partners: VITO, TEC.

Task 2.5 Process integration and steam production [M4-M15] Lead: TEC; Partners: BONO, SPH, ENER, BSNOVA, QPINCH

Task 2.6 Techno-economic map of heat upgrade technologies [M4-M15] Lead: TEC; Partners: BONO, SPH, ENER, BSNOVA, QPINCH, UPV, POLIMI, OST, CARTIF.

Task 2.7 Heat upgrade technologies: design tools and optimization. [M1-M15, M37-M48] Lead: TUB Partners: TEC, POLIMI, SPH, ENER, BSNOVA, QPINCH, UPV, VITO

Deliverables

D2.1 Full-scale heat development of vapor compression heat pumps with piston compressors (SPH, M15): A description of the improvements: new modules developed of the heat pump kit, description of the optimised heat transfer units and new control strategies. Includes description of the changes in the design tool.

D2.2 Full-scale development of vapor compression heat pumps with turbocompressors (ENER, M15): A description of the improvements: mainly new optimised configuration of the components and new control strategy. Includes alternatives calculated by VITO. Includes description of the changes in the design tool.

D2.3 Full scale development of absorption heat pumps (BSNOVA, M15): A description of the improvements: new mechanical design of the upscaled prototype aimed for cost reduction and optimized control strategy. Includes description of the changes in the EES and Modelica design tools.

D2.4 Full scale development of thermochemical heat pumps (QPINCH, M15): A description of the improvements: optimizised design of the recuperator including the design analysis. Includes the version 2 Process Design Pack (PDP, with block scheme, equipment list, preliminary 3D model and budget quote)

D2.5 Process integration and steam production in industrial processes. (TEC, M15): An analysis of alternatives for steam generation for the four heat upgrade technologies.

D2.6 Techno-economic map of heat upgrade technologies (TEC, M15) : A performance map in a standarized form that points up the performance of all four technologies under the same boundary conditions, operating ranges and preliminary investment and operation costs.

D2.7 Optimized heat upgrade technologies (TUB, M48): A report based on the lessons learned during the project, from design, manufacturing, comissioning until operation, that gives feedback to the design tool of each technology provider and updates the preliminary performance maps based on real operation data.

Milestones

MS1: Techno-economic map of heat upgrade technologies (TEC, M15)

WP3: Implementation of Demonstration Sites

Objectives:

- Best practice examples for heat upgrade systems in industrial processes using compression heat pumps and heat transformers.
- Access to generated experiences and knowledge by a broad end-user community.
- Support technology development and potential investors in their decision for resource-saving heat supply concepts.
- Provide EPC's, energy service companies and contractors with methods and strategies for an energy- and cost-efficient operation of heat upgrade system.
- Technical guidelines based on lessons learned, gained experiences and emphasis on structured and successful technology implementation, commissioning and key aspects for an energy efficient plant operation.

Tasks

Task 3.1. Demonstration site at STC [M1-M30] Lead: FRAUNHOFER; Partners: STC, SPH

Task 3.2. Demo site 2 (Italy) [M1-M30] Lead: POLIMI; Partners: CDG, BONO, ENER

Task 3.3. Demo site 3 (Spain) [M1-M30] Lead: TEC; Partners: CAPSA, BSNOVA, TUB

Task 3.4 Assessment on commissioning of heat upgrade systems [M31-M36] Lead: FRAUNHOFER; Partners: TEC, BSNOVA, SPH, VITO, POLIMI, ENER, STC, CDG, CAPSA, BONO

Each of these tasks is divided into the following subtasks:

Task 3.X.1 Analysis and requirements for the demo sites [M1-M6]

Task 3.X.2 Planning and engineering [M4-M12]

Task 3.X.3 Manufacturing of heat upgrade technologies [M10-M21]

Task 3.X.4 System integration [M13-M24]

Task 3.X.5 Commissioning and first performance tests [M22-M30]
Deliverables D3.1. Demonstration site at STC – system design (FRAUNHOFER, M12): conceptual design of the demonstration site at STC including the pre-design of the system to be implemented D3.2. Demonstration site at CDG – system design (POLIMI, M12): conceptual design of the demonstration site at CDG including the pre-design of the system to be implemented D3.3. Demonstration site at CAPSA – system design (TECNALIA, M12): conceptual design of the demonstration site at CAPSA including the pre-design of the system to be implemented D3.4. Demonstration site at STC – completed installation and first performance tests (FRAUNHOFER, M30): Report describing the system finally installed at STC, including a detailed list of all system, subsystems and equipments installed, and all documents necessaries for the operator, and the evaluation of the commissioning phase. D3.5. Demonstration site at CDG – completed installation and first performance tests (POLIMI, M30): Report describing the system finally installed at CDG, including a detailed list of all system, subsystems and equipments installed, and all documents necessaries for the operator, and the evaluation of the commissioning phase. D3.6. Demonstration site at CAPSA – completed installation and first performance tests (TECNALIA, M30): Report describing the system finally installed at CAPSA, including a detailed list of all system, subsystems and equipments installed, and all documents necessaries for the operator, and the evaluation of the commissioning phase. D3.7 Assessment report on the commissioning of the heat upgrade technologies (FRAUNHOFER, M36): This document would represent a best practices manual to serve as a reference for future installations, and will include all necessary steps to be considered in future installations.
Milestones MS2: Demo site requirements (FRAUNHOFER, M6) MS3: Completed installation for demo site 1 (Germany) (STC, M24) MS4: Completed installation for demo site 2 (Italy) (BONO, M24) MS5: Completed installation for demo site 3 (Spain) (CAPSA, M24) MS6: Commissioned demonstration site 1 (Germany) (STC, M30) MS7: Commissioned demonstration site 2 (Italy) (BONO, M30) MS8: Commissioned demonstration site 3 (Spain) (CAPSA, M30)

WP4: Monitoring and performance data analysis

Objectives

- Preparing an energy performance monitoring strategy protocol able to return uniform, reliable and comparable data and KPI from demo sites.
- Designing, installing and commissioning the monitoring system in the demo sites.
- Performance data analysis and KPIs calculation.
- Continuous monitoring of the on-site operation for performance optimization.
- Providing feedback about the quality of the installation and control strategy at system level.
- Developing a guideline for the integration of the technologies in industrial process, including cost analysis for implementation and operation.

Tasks

Task 4.1 Monitoring plan [M7-M18] Lead: POLIMI; Partners: TEC, UPV, BSNOVA, SPH, VITO, FRAUNHOFER, ENER, STC, CARTIF, CAPSA, BONO, CDG

Task 4.2 Monitoring system integration and validation [M16-M27] Lead: FRAUNHOFER; Partners: POLIMI, TEC, TUB, CAPSA, BONO, CDG, STC

Task 4.3 Monitoring performance data analysis [M19-M48] Lead: POLIMI; Partners: TEC, FRAUNHOFER, UPV, VITO, TUB, CARTIF, CAPSA, STC, CDG, STC, QPINCH

Task 4.4 Guidelines for heat upgrade technologies design & integration [M37-M48] Lead: OST; Partners: TEC, UPV, BSNOVA, EHPA, SPH, VITO, FRAUNHOFER, POLIMI, QPINCH, ENER, STC, CARTIF, CAPSA, BONO, CDG, QPINCH

Deliverables

D4.1 Monitoring planning and implementation (FRAUNHOFER, M27): This document will include the common Key Performance Indicators for all demo-sites, and the common requirements for the measurement equipment and data acquisition systems. It will define as well the common methodology for monitoring.

D4.2 Performance data analysis of demonstration sites (POLIMI, M48): The delivery will include three subsections, one for each demo-site, and a fourth subsection for the thermochemical heat pump performance data analysisThe performance data of the heat upgrade systems installed in the three demo-sites will be included and analysed following the methodology from D4.2

D4.3 Guidelines and evaluation tool for heat upgrade technologies design & integration (OST, M48): This document should put together the results learned from the design and installation and monitoring phases of the project, deriving general guidelines and the description of the feasibility tool.

Milestones

MS9: Monitoring planned (POLIMI, M18)

MS10: Monitoring system deployed (POLIMI, M27)

WP5: Heat upgrade systems Exploitation, Life Cycle & Impact Assessment

Objectives

- Developing innovative and tailored business models (including revenue models, customer segments, value proposition, pricing, value chain, network, and architecture) to calculate the success of the options and risks through market analysis.
- Developing an unbiased definition of business cases and dedicated exploitation roadmaps for the heat upgrade technologies.
- Assessing the technologies' potential to contribute to carbon reduction, social acceptance of technology, and economic welfare.
- Evaluating the potential for replication in other relevant industries.
- Estimating the potential for using the technologies in the building sector through district heating networks.
- Evaluating the potential to integrate waste heat with renewable energy sources as solar heat.
- Gaining better awareness of the challenges and benefits of heat pump (HP) technologies in relevant industry sectors.
- Distillation of best practices for cooperation and contractual agreements facilitating the benefits and potential of the particular technology in different setups (inside plants & networks) with various heat sources (waste heat, solar thermal, etc.).

Tasks

Task 5.1 Business Models and Contractual Agreements [M1-M48] Lead: OST; Partners: TEC, TECV, BSNOVA, SPH, QPINCH, ENCI, STC, BONO, CDG, CAPSA, CARTIF

Task 5.2 Replication studies [M13-M48] Lead: UPV; Partners: POLIMI, FRAUNHOFER, OST, CARTIF, QPINCH, TEC

Task 5.3 Life cycle environmental and cost assessment (LCA/LCC) [M13-M48] Lead: TEC; Partners: (inputs are coming from others tasks)

Task T5.4 Scenario-based Impact Assessment at EU level [M13-M48] Lead: CARTIF; Partners: TEC, BSNOVA, EHPA, OST, SPH, POLIMI, QPINCH, ENCI, CARTIF, BONO

Task 5.5 Analysis of Barriers and policy recommendations [M6-M48] Lead: EHPA; Partners: TEC, BSNOVA, OST, SPH, QPINCH, ENCI, BONO, CAPSA, CARTIF, STC, CGD

Task 5.6 Heat upgrade systems exploitation roadmaps [M3-M48] Lead: CARTIF, Partners: ALL

Deliverables

D5.1 Report on promising business models & contractual agreements (OST, M48): This deliverable will include an overview of the more suitable business models and contractual agreements, explain the results of the SWOT Analysis and the impact of the regulatory frame on it.

D5.2 Replication studies (UPV, M48): This deliverable will present the outcome of the simulation studies performed for the most promising industrial sectors with regards of the PUSH2HEAT technologies.

D5.3 Assessment of the environmental and economic performance of heat upgrade technologies based on the demonstration sites (TEC, M48): This deliverable will report the results of the life cycle analysis of the technologies considering all phases of the project.

D5.4 PUSH2HEAT techno-economic and environmental impacts at EU scale (CARTIF, M48): This deliverable will report the expected technoeconomic impact of the PUSH2HEAT technologies taking into consideration the technical performances monitored, the identified business models and life cycle cost results.

D5.5 Report on PESTEL & SWOT analysis covering environment & economic business barriers (EHPA, M48): The results of these analysis will be included.

D5.6 Final PUSH2HEAT Exploitation Action Plan (CARTIF, M48): The roadmap for the exploitation of each of the four technologies developed in the project will be presented in this deliverable.

Milestones

MS11: LCA/LCC of heat upgrade technologies (TEC, M24)

MS12: LCA/LCC of PUSH2HEAT systems, replication studies and impact assessment (TEC, M42)

MS13: Demonstration of business models and analysis of barriers completed (OST, M42)

MS14: All impact assessment results prepared for dissemination (CARTIF, M42)

WP6: Dissemination, Communication and Exploitation of project results

Objectives

- Ensure the impact of PUSH2HEAT's work and key results on the selected target audiences with the use of an effective dissemination and communication plan as well as suitable exploitation strategy.
- Implementing a strategic approach, which will actively capture important activities and

results from the project and maximise PUSH2HEAT's impact within a complex and diverse network of stakeholders.
- Customising the engagement and messaging towards: relevant industry representatives, policy makers, researchers and the general public.
- Organising workshops and events to engage the key stakeholders and create awareness of the challenges, as well as technical and economic benefits of heat upgrade and the technologies associated with it.
- Disseminating the main findings of the project and to support partners in efficiently communicating and disseminating their work.
- Reinforcing the impact of the Strategic Plan's key strategic impact areas, particularly: Industrial leadership in key and emerging technologies that work for people; Affordable and clean energy; Circular and clean economy.
- Maximising the dissemination and exploitation of the project by collaborating (among others) with: other projects and project alliances, clusters, platforms, initiatives and policy events.
- Facilitating regular flows of information between project partners and ensure a constant exchange of information between the work of the project and policy developments.
- Supporting the exploitation of key systems, concepts, business models and technologies.
- Managing and coordinating the External Advisory Board and assuring a relevant, diverse and engaged membership.

Tasks

Task 6.1 Communication and dissemination: planning and coordination [M1-M48] Lead: EHPA; Partners: ALL

Task 6.2 Stakeholders' engagement and capacity building: conferences and workshops [M6-M48] Lead: EHPA; Partners: ALL

Task 6.3 Communication and dissemination activation: creating impact and expanding outreach [M6-M48] Lead: EHPA; Partners: ALL

Task 6.4 External Advisory Board: Management and coordination [M1-M48] Lead: EHPA; Partners: ALL

Task 6.5 Exploitation of project results [M3-M48] Lead: TECV; Partners: ALL

Deliverables

D6.1 Communication, dissemination and exploitation strategy including stakeholder analysis (EHPA: M4, M16, M28 and M40): The communication, dissemination and exploitation strategy will be reported including all planned actions. The report will be updated on M16, M28 and M40

D6.2 First annual report on communication, dissemination and exploitation (EHPA: M12, M24, M36, M48): This delivery will report the results and impact of the communication, dissemination and exploitation actions. The report will be updated on annual basis (M24, M36 and M48)

D6.3 Exploitation report: Key results, project innovations and post project strategy (TECV: M42): The key exploitable results of the project will be summarized and a strategy for their explotation beyond the project included. (Responsible partner: TECV)
Milestones MS15: Website and PUSH2HEAT's unique visual identify (including project templates) MS16: Comprehensive list of External Advisory Group members, their respective expertise and organisations

2.2. Use of resources

Regarding the use of resources the DoA establishes the expected dedication of each beneficiary per WP. A more detailed resources distribution has been defined, indicating the expected PMs distribution of each beneficiary per WP and per task. This will be the baseline for the PUSH2HEAT consortium for the work that has to be carried out in order to fulfil the project objectives. If and when necessary, this preliminary PMs distribution will be updated accordingly. The following table gathers the PMs distribution per partner and per task that the project starts with.

	Workpackages and Tasks	TECNALIA	TECV	UPV	BSNOVA	EHPA	SPH	VITO	FRAUNHOFER	POLIMI	QPINCH	ENER	ENCI	TUB	STC	CARTIF	OST	CAPSA	BONO	CDG
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	TOTALES	122,25	8,00	35,70	24,70	34,70	20,95	19,70	54,00	56,20	49,70	36,70	6,95	24,70	22,70	46,70	43,70	28,70	34,75	27,00
WP1	**Project Management & Coordination**	**41,00**	**0,00**	**0,70**	**0,70**	**1,70**	**0,70**	**0,70**	**5,50**	**1,70**	**0,70**	**0,70**	**0,70**	**0,70**	**0,70**	**0,70**	**1,70**	**0,70**	**0,70**	**0,70**
T1.1	Project coordination and quality assurance	20,00				1,00			1,00	1,00							1,00			
T1.2	Communication, reporting and monitoring	20,00		0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50
T1.3	Data Management Plan	1,00		0,20	0,20	0,20	0,20	0,20	4,00	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20
T1.4																				
T1.5																				
T1.6																				
WP2	**Full Scale Development and Optimization of Heat Upgrade**	**22,00**	**0,00**	**4,00**	**7,00**	**0,00**	**8,50**	**13,50**	**0,00**	**5,00**	**21,00**	**18,00**	**0,00**	**16,00**	**0,00**	**6,00**	**2,00**	**0,00**	**2,60**	**0,00**
T2.1	Full scale development of vapor compression heat pumps						5,00	2,00												
T2.2	Full scale development of vapor compression heat pumps							2,00				12,00								
T2.3	Full scale development of absorption heat pumps	10,00			5,50									12,00						
T2.4	Full scale development of thermochemical heat pumps							9,00			15,00									
T2.5	Process integration and steam production	6,00			0,50		1,00				3,00	3,00							1,50	
T2.6	Techno-economic map of heat upgrade technologies	3,00		3,00	0,50		0,50			2,00	1,00	1,00				2,00	2,00		1,10	
T2.7	Heat upgrade technologies: design tools & optimization	3,00		1,00	0,50		2,00	0,50		3,00	2,00	2,00		4,00		4,00				
WP3	**Implementation of Demonstration Sites**	**26,00**	**0,00**	**6,00**	**9,00**	**0,00**	**5,50**	**1,50**	**31,00**	**18,00**	**2,00**	**15,00**	**0,00**	**4,00**	**18,00**	**6,00**	**0,00**	**22,00**	**25,40**	**19,80**
T3.1	Analysis and requirements for the demo sites	5,00						0,50	5,00	5,00	2,00	1,00				6,00		4,00	5,00	1,50
T3.2	Planning and engineering	3,00		6,00	0,50		1,00	0,50	8,00	5,00		3,00		2,00	8,00			8,00	9,70	4,50
T3.3	Manufacturing of heat upgrade technologies				7,00		2,00					3,00								
T3.4	System integration	6,00			0,50		1,00		9,00	2,00		1,00			8,00			8,00	8,00	8,80
T3.5	Commissioning and first performance tests	6,00			0,50		1,00		5,00	5,00		6,00		2,00	1,00			1,00	2,00	3,50
T3.6	Assessment on commissioning of Heat Upgrade Systems	6,00			0,50		0,50	0,50	4,00	1,00		1,00			1,00			1,00	0,70	1,50
WP4	**Monitoring & Performance Data Analysis**	**16,50**	**0,00**	**9,00**	**1,50**	**1,00**	**1,00**	**2,00**	**14,50**	**17,50**	**12,00**	**1,00**	**0,00**	**2,00**	**0,50**	**6,00**	**6,00**	**2,00**	**1,10**	**2,50**
T4.1	Monitoring plan	3,00		1,00	0,50		0,50	0,50	1,00	4,00		0,50			0,25	2,00		0,50	0,20	1,00
T4.2	Monitoring system integration and validation	4,00							5,00	4,00	5,00			0,50				0,25	0,20	1,00
T4.3	Monitoring, performance data analysis	7,50		6,00				0,50	7,50	9,00	5,00			1,50		1,00		0,25		
T4.4	Guidelines for heat upgrade technologies design & integration	2,00		2,00	1,00	1,00	0,50	1,00	1,00	0,50	2,00	0,50			0,25	3,00	6,00	1,00	0,70	0,50
WP5	**Business Models, Life Cycle & Impact Assessment**	**12,00**	**3,00**	**14,00**	**5,25**	**8,00**	**4,00**	**0,00**	**1,00**	**12,00**	**12,00**	**0,00**	**5,00**	**0,00**	**1,50**	**26,00**	**32,00**	**2,00**	**3,20**	**2,00**
T5.1	Business models and contractual agreements		1,00		1,50		0,50				1,50		1,50		1,50	2,00	24,00	1,00	1,60	1,00
T5.2	Replication studies	2,00		14,00					1,00	9,00	6,00					4,00	2,00			
T5.3	Life cycle environmental and cost assessment (LCA/LCC)	8,00																		
T5.4	Scenario-based Impact Assessment at EU level	2,00			0,25	2,00	0,25			3,00	0,25		0,75			6,00	2,00	0,50	1,00	0,50
T5.5	Analysis of barriers and policy recommendations				0,50	6,00	0,25				1,25		0,75			2,00	4,00	0,50	0,60	0,50
T5.6	Heat Upgrade Systems Exploitation Roadmaps		2,00		3,00		3,00				3,00		2,00			12,00				
WP6	**Dissemination, Communication & Exploitation of Project Results**	**4,75**	**5,00**	**2,00**	**1,25**	**24,00**	**1,25**	**2,00**	**2,00**	**2,00**	**2,00**	**2,00**	**1,25**	**2,00**	**2,00**	**2,00**	**2,00**	**2,00**	**1,75**	**2,00**
T6.1	Communication and dissemination: planning and	1,00		0,25	0,25	5,00	0,25	0,25	0,25	0,25	0,25	0,25		0,25	0,25	0,25	0,25	0,25	0,25	0,25
T6.2	Stakeholders' engagement and capacity building:	2,00		1,00	0,25	6,00	0,25	1,00	1,00	1,00	1,00	1,00	0,50	1,00	1,00	1,00	1,00	1,00	0,25	1,00
T6.3	Communication and dissemination activation: creating	1,00		0,25	0,25	6,00	0,25	0,25	0,25	0,25	0,25	0,25	0,00	0,25	0,25	0,25	0,25	0,25	0,25	0,25
T6.4	External Advisory Group: Management and coordination	0,50		0,25	0,25	5,00	0,25	0,25	0,25	0,25	0,25	0,25	0,50	0,25	0,25	0,25	0,25	0,25	0,25	0,25
T6.5	Exploitation of project results: business model	0,25	5,00	0,25	0,25	2,00	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,75	0,25
	Milestones																			
		Beneficiary	Affiliated to TECNALIA	Beneficiary	Beneficiary	Beneficiary	Beneficiary	Beneficiary	Beneficiary	Beneficiary	Beneficiary	Beneficiary	Affiliated to ENERTIME	Beneficiary	Beneficiary	Beneficiary	Associated Partner	Beneficiary	Beneficiary	Beneficiary

3. QUALITY PLAN FOR DELIVERABLES

The Quality plan for deliverables is encompassed by two parts:

- Procedure for Deliverable review
- Templates and formats

3.1. Procedure for deliverables review

The deliverables are one of the main outputs or results, together with the implementations on the demo sites, of the PUSH2HEAT project. A specific procedure is established to review the deliverables and to assure in that way the highest quality of them.

The review procedure uses the official delivery month as a reference date and tracks backwards in time to identify key deadlines for the different reviews for the quality assurance.

The numbers of days indicated below refer to the number of days before the delivery date to the EC. They are natural days (not working days), so the precise dates need to be analysed and agreed between the involved parents in each case. Please note that this review process will only take effect on deliverables due Month 4 (January 2022) or later.

The procedure for deliverables review will consist of the steps below (since the process is still internal, these steps are just indicative):

1. 3 months (90 days) before the submission date of the deliverable, the lead beneficiary partner must send the table of contents (ToC) and the distribution of commitments to the partners involved in the deliverable.
2. During the 90 to 60 days before the submission date, the lead beneficiary partner compiles all the contributions from partners and creates the *first complete version of the deliverable*.
3. 2 months (60 days) before the submission date of the deliverable, this first complete version must be sent to the Reviewer of the deliverable.
    - The Reviewer (responsible partner of the review) of each deliverable is defined in the beginning of the project (see the Reviewer for each deliverable in 'Annex I: List of Deliverables'). In each GA meeting the reviewers of the deliverables to be submitted in the next 6 months will be checked and updated if necessary.

4. During 60 to 30 days before the submission date, the lead beneficiary partner and the reviewer of the deliverable work together to improve the quality of the deliverable and to elaborate the reviewed version of the deliverable.
    - Note: the reviewer's task is not to improve the report, but to check its quality and provide improvement recommendations.
5. One month (30 days) before the submission date, the lead beneficiary partner must send the reviewed version of the deliverable to the WP leader for the last review, last changes if necessary and approval
6. 20 days before the submission of the deliverable, the final version is sent to the Project Coordinator (TECNALIA) for the last check.
    - Note: at this point the quality of the deliverable should be excellent. TECNALIA as Project Coordinator will read it just to verify it.
7. Submission Date: TECNALIA uploads the deliverable to the EC Repository

In the next Figure 0.2, an illustrative example of the procedure for deliverable review in the PUSH2HEAT project is shown:

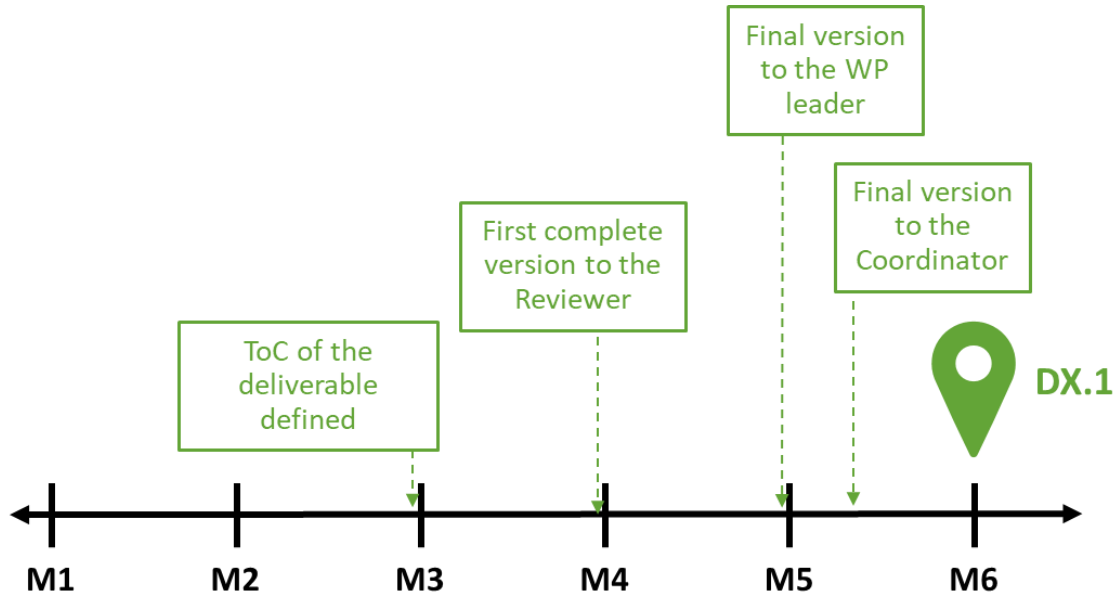

Figure 0.2: Illustrative example of the procedure for deliverable review in the PUSH2HEAT project

The procedure for deliverables review is designed and planned with enough time slots to be able to act in case of unforeseen events or lack of/low quality of a deliverable. Anyway, the following auxiliary steps are established for these cases:

- If low quality of a deliverable is detected in any of the steps of the review procedure, the coordinator will be notified, and a meeting will be called with all the parties involved to determine the scope of the problem and design a corrective plan.
- If any external event or risk is detected that may influence the deliverable (quality, delay in submission, etc.), the coordinator will be notified, and a meeting will be called with all the parties involved to determine a contingency plan.
- The EC Officer will always be kept informed about any deviation that is identified.

3.2. Templates and formats

The templates for Deliverables, Meetings Agendas and Minutes, and Presentations, are designed within the "WP7– Dissemination and Communication". The templates aim at:

- creating a common visual identity of the project.
- structuring the content to be reported in a coherent way.

All the partners in the PUSH2HEAT project agree to use the templates that are available in SharePoint repository.

On regard to the common image / brand of the project, this is being developed and will be fully finalized by M4 (January 2023) to ensure an immediate recognition of the project. The logo, as the visual messenger of the project, will be used by all templates, reports, and dissemination activities throughout the project.

The official PUSH2HEAT logo was selected to represent the project via an online poll by the majority of the voting partners.

Push2Heat

Table 0.1: Official PUSH2HEAT logo

4. INTERNAL COMMUNICATION CHANNELS

The continuous communication between all the partners of the Consortium is one of the keys that guarantees the success and the accomplishment of the ambitious objectives of the PUSH2HEAT project.

On regard to the QAP, several internal communication channels and tools will be on disposal to the whole Consortium. In this chapter, the following tools and procedures are explained:

- SharePoint repository
- Contact list and emails
- Project meetings

4.1. SharePoint repository

To facilitate and to ensure an efficient project communication, the Consortium has set up a collaborative workspace, a SharePoint repository more specifically, which will be used to store and exchange all relevant documents, considering the dissemination level of documents and the access rights of different user groups.

The SharePoint collaborative workspace includes the following contents:

- Major documents and reports as:
    - Grant Agreement (GA) and Consortium Agreement (CA)
    - Periodic Reports (both internal and official ones)
    - Other documents requested by the PO or the EC
    - Other documents suggested and / or approved by WPLs
    - Other documents requested and /or approved by the GA
- Key information on the project:
    - GA meeting minutes and supporting documentation from project meetings and conference calls
    - Workplan of the project and of each WP
    - Contacts list
    - Templates to be used in the project (deliverables, Workplan excel, meeting & minutes, presentations, internal WP progress (technical and financial) reports, etc.)
    - Any other document / file considered useful by the Coordinator, the WPLs or TL
- Key information of each WP
    - Deliverables
    - Meetings (minutes and supporting documentation of the WP)
    - Other key documents / files related to each WP

The collaborative workspace is a cloud platform that helps to securely store, share, manage, view and comment on any kind of document, and is structured into the folders exposed in the next Figure 0.3 (to be updated as far as necessary):

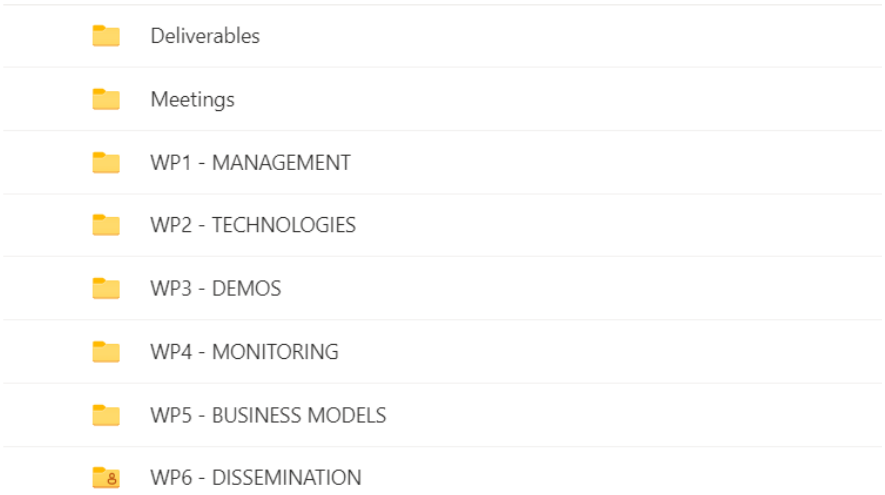

Figure 0.3: Folders structure in the SharePoint repository of PUSH2HEAT (screenshot)

4.2. Contacts list and emails

It is important to identify the relevant contact points required for each specific kind of tasks during the execution of the project.

To avoid sending / receiving emails on topics outside the role of each individual person involved in the project, each partner must define within their team the specific responsibilities of each team-member. Thus, each partner must distribute the following roles / responsibilities among the people within their own PUSH2HEAT-team:

- A project leader / coordinator within the entity, to be in charge of all the issues related to the Coordination (such as, General Assembly (GA) and Project Steering Committee (PSC)).
- A person in charge of administrative or financial issues.
- The person leading the WP for the partners that are leader of a WP (TECNALIA, FRAUNHOFER, POLIMI, OST, EHPA)
- At least a person in each of the WPs (WP2 – 6) participated by the entity
    - In the case of the "WP3 Demo Implementation", Demo Coordinator partner and person will be appointed for each demo site
- A person to participate in the Communication & Dissemination Team (WP7).

In order to manage all the information about contacts in an easy and collaborative way, and Excel file of contacts is created [PUSH2HEAT_Contacts.xlsx] and uploaded to the SharePoint repository. All the partners have the responsibility for keeping always updated the list of contacts of their own entity and the role of each contact. The WP leaders are responsible to update the own mailing lists corresponding to their WPs and to contact to the appropriate person in each entity in each communication or email.

4.3. Project meetings

The meetings calendar in PUSH2HEAT is managed by the Coordinator and the WPLs, who will send the agenda and invitations as defined in the Consortium Agreement. Organizers of WP meetings should send the corresponding invitations to the corresponding targets, and the Project Coordinator should be included in CC, in order to give an overview of these meetings and the possibility to take part.

On regard to the Official meetings, the next Table 0.2 summarizes the planned meetings in the project:

Meeting	When	Who	What
Kick-off Meeting (KoM)	Project start-up	All partners	Project start-up
GA Meetings	Every 6 months	All partners	To control the whole project commitment to the final objectives, costs and deadlines. To control the progress regarding the final goal of the project.
PEB Meetings	Every 6 months	PC, WP leaders	To coordinate and monitor the work of different WPs, discussing the project work progress and coordination, outstanding actions, and ad-hoc issues.
PC & WP leaders *Coordination*	Every 2 months	PC, WP leaders	To coordinate and monitor the progress of different WPs
WP & task meetings *Technical*	When needed, at least every 2 months	WP leaders, Task leaders, Task participants (when required)	To focus the technical work within a WP/task
Project Review Meetings	As required by the EC	All partners and EC	To review the project progress within the different reporting periods.
Final Meeting	Project end	All partners and EC	To discuss results and research highlights of the project (open to interested stakeholders)

Table 0.2: Official meetings in the PUSH2HEAT Project

The PEB Meetings and GA Meetings are planned to be held face-to-face meetings every 6 months. As general rule, at the end of each GA&PSC meeting, the next place and dates will be decided.

The Project Review Meetings are estimated to be held in month 19-20 (April-May 2024), month 37-38 (November-December 2025) and in month 48 (October 2026). Ideally, we will try to make the GA&PEB meeting in the same dates of the Review.

The WP leaders coordination meetings (with the PC) will be done online and in principle every 2 months. If the situation requires to do them more frequently more meetings will be scheduled.

Technical meetings at WP level will be done at least every 2 months. The WP leader will decide if more frequent meetings are necessary. Task level meetings will be scheduled by task leaders as far as necessary.

In case of unexpected and / or urgent meetings, if possible, a doodle form will be used to agree on the date. Anyway, for urgent issues, the WP leaders can use email / phone to contact the required partners and solve the problem as soon and better as possible.

The minutes of the meetings must be elaborated and distributed (SharePoint & email) within the 15 days after the meeting and the partners will have 7 days to review and validate the minutes. If no comment is received from partners during this period, the minutes are automatically approved.

5. INNOVATION MANAGEMENT

Innovation management is the key for boosting competitiveness and sustainable growth in Europe. The effective innovation management system needs to include the innovation from the idea generation to the market results.

The innovation management procedure (IMP) is established as the methodology and planning of the management of innovation within PUSH2HEAT, understood as a process for maximizing the capability of project outputs of being successful in the form of future products, services or processes, by combining creativity and a technical and market wise perspective.

An effective innovation management system needs to include the innovation from the idea generation to the market results, especially on a project like PUSH2HEAT, where the emerging sector of high temperature heat pumps will bring important opportunities for market-ready innovative products at short-term.

PUSH2HEAT will implement TECNALIA's Standard Innovation Management Process ISAMPE, a derivative of ISAEP model 1. The ISAMPE process comprises:

I	Identification Improving the mechanisms for finding, capturing and communicating information about technologies (both internal and external) which may affect product development, production processes, opportunities and threats.
S	Selection Determining the portfolio of products and services and the associated production process technologies and their impact on environmental sustainability.
A	Acquisition (and Development) Technologies can be acquired either by internal development, external acquisition or co-development with partners.
M	iMpulse to innovation learning and improvement

	The culture of learning expands to become a culture of continuous improvement with a focus on results.
P	Protection The effective protection of early stage technologies (freedom to operate, patent, industrial secret…) is an important part of the innovation management system.
E	Exploitation (and Transfer) Technologies need to be effectively exploited if they are to deliver long-term growth. It can also be the case that new technologies might themselves lead to previously unforeseen product or market opportunities and could potentially change the business strategy.

Figure 0.4: Description of ISAMPE - TECNALIA's Standard Innovation Management Process

The identification and selection of the exploitable results has been done during the proposal stage and the partners will continue working on deeper details on the replication and exploitation of the results within the WP6. A first version of Communication, Dissemination and Exploitation strategy including stakeholders analysis will be available by M4 (D6.1) and an updated report will be delivered annually (D6.2). The final exploitation report, including key results, project innovations and post project strategy will be delivered by the end of the project.

6. PROJECT MANAGEMENT PLAN

This deliverable "D1.1 Quality Assurance Plan" is complemented with the deliverable "D1.2 Project Management Plan" (PMP), in which the management and working model to be followed in the PUSH2HEAT project are defined and all the procedures / methods / tools for assuring the well-advances of the workplan of the project are described in detail.

Annexes

Annex 1: List of deliverables

No.	Deliverable Title	Related WP	Lead Beneficiary	Reviewer	Type	Diss. level	Due date	
							month	Deadline
D1.1	Quality Assurance Plan	1	TECNALIA	-	R	PU	M3	31/12/2022
D1.2	Project Management Plan	1	TECNALIA	-	R	PU	M3	31/12/2022
D1.3	Research Data Management Plan	1	FRAUNHOFER	POLIMI	R	PU	M6	31/03/2023
D2.1	Full-scale development of vapor compression heat pumps with piston compressors	2	SPH	TECNALIA	R	SEN	M15	31/12/2023
D2.2	Full-scale development of vapor compression heat pumps with turbocompressors	2	ENER	UPV	R	SEN	M15	31/12/2023
D2.3	Full scale development of absorption heat pumps	2	BSNOVA	VITO	R	SEN	M15	31/12/2023
D2.4	Full scale development of thermochemical heat pumps	2	QPINCH	TUB	R	SEN	M15	31/12/2023
D2.5	Process integration and steam production in industrial processes	2	TECNALIA	BONO	R	PU	M15	31/12/2023
D2.6	Techno-economic map of heat upgrade technologies	2	TECNALIA	OST	R	PU	M15	31/12/2023
D2.7	Optimized heat upgrade technologies	2	TUB	FRAUNHOFER	R	PU	M48	30/09/2026
D3.1	Demonstration site at STC – system design	3	FRAUNHOFER	TECNALIA	R	PU	M12	30/09/2023
D3.2	Demonstration site at CDG – system design	3	POLIMI	FRAUNHOFER	R	PU	M12	30/09/2023
D3.3	Demonstration site at CAPSA – system design	3	TECNALIA	POLIMI	R	PU	M12	30/09/2023
D3.4	Demonstration site at STC – completed installation and first performance tests	3	FRAUNHOFER	TECNALIA	R	SEN	M30	31/03/2025

D3.5	Demonstration site at CDG – completed installation and first performance tests	3	POLIMI	FRAUNHOFER	R	SEN	M30	31/03/2025
D3.6	Demonstration site at CAPSA – completed installation and first performance tests	3	TECNALIA	POLIMI	R	SEN	M30	31/03/2025
D3.7	Assessment report on the commissioning of the heat upgrade technologies	3	FRAUNHOFER	CARTIF	R	PU	M36	30/09/2025
D4.1	Monitoring planning and implementation	4	FRAUNHOFER	CARTIF	DEM	SEN	M27	31/12/2024
D4.2	Performance data analysis of demonstration sites	4	POLIMI	OST	R	PU	M48	30/09/2026
D4.3	Guidelines and tool for heat upgrade technologies design & integration	4	OST	STC	R	PU	M48	30/09/2026
D5.1	Report on promising business models & contractual agreements	5	OST	ENCI	R	PU	M48	30/09/2026
D5.2	Report on PESTEL & SWOT analysis covering environment & economic business barriers	5	EHPA	OST	R	PU	M48	30/09/2026
D5.3	Replication studies	5	UPV	OST	R	PU	M48	30/09/2026
D5.4	Assessment of the environmental and economic performance of heat upgrade technologies based on the demonstration sites	5	TECNALIA	POLIMI	R	PU	M48	30/09/2026
D5.5	PUSH2HEAT techno-economic and environmental impacts at EU scale	5	CARTIF	TUB	R	PU	M48	30/09/2026
D5.6	Final PUSH2HEAT Exploitation Action Plan	5	CARTIF	EHPA	R	SEN	M48	30/09/2026
D6.1	Communication, dissemination and exploitation strategy including stakeholder analysis	6	EHPA	TECNALIA	R	PU	M4, M16, M28, M40	31/01/2023
D6.2	First annual report on communication, dissemination and exploitation	6	EHPA	TECNALIA	R	PU	M12	30/09/2023
D6.2	Second annual report on communication, dissemination and exploitation	6	EHPA	TECNALIA	R	PU	M24	30/09/2024
D6.2	Third annual report on communication, dissemination and exploitation	6	EHPA	TECNALIA	R	PU	M36	30/09/2025
D6.2	Final annual report on communication, dissemination and exploitation	6	EHPA	TECNALIA	R	PU	M48	30/09/2026
D6.3	Exploitation report: Key results, project innovations and post project strategy	6	TECV	EHPA	R	PU	M48	30/09/2026

Annex 2: List of milestones

Milestone number	Milestone title	Related WP	Lead beneficiary	Means of verification	Due date
MS1	Techno-economic map of heat upgrade technologies	WP2	TEC	Tecno-economic map of all technologies agreed, suitable for contrast with each other	M15
MS2	Demo sites requirements	WP3	FRA	Demo sites requirements contrasted and agreed	M6
MS3	Completed installation for demo site 1 (Germany)	WP3	STC	Installation of heat upgrade system done at demo site	M24
MS4	Completed installation for demo site 2 (Italy)	WP3	CDG	Installation of heat upgrade system done at demo site	M24
MS5	Completed installation for demo site 3 (Spain)	WP3	CAPSA	Installation of heat upgrade system done at demo site	M24
MS6	Commissioned demonstration site 1 (Germany)	WP3	STC	Demo site ready to run	M30
MS7	Commissioned demonstration site 2 (Italy)	WP3	CDG	Demo site ready to run	M30

Milestone number	Milestone title	Related WP	Lead beneficiary	Means of verification	Due date
MS8	Commissioned demonstration site 3 (Spain)	WP3	CAPSA	Demo site ready to run	M30
MS9	Monitoring planned	WP4	POLIMI	Common monitoring strategy customized for all demo sites	M18
MS10	Monitoring system deployed	WP4	POLIMI	Monitoring system up and running, data handling infrastructure validated	M27
MS11	LCA/LCC of heat upgrade technologies	WP5	TEC	LCA/LCC customized for all the technologies involved	M24
MS12	LCA/LCC of PUSH2HEAT systems, replication and impact assessment	WP5	TEC	LCA/LCC customized for all PUSH2HEAT systems, impact assessment contrasted	M42
MS13	Demonstration of business models and analysis of barriers completed	WP5	OST	Business models and barriers analysis completed and agreed (OST)	M42
MS14	All impact assessment results prepared for dissemination	WP5	CARTIF	Results from impact assessment ready	M42
MS15	Website and PUSH2EAT's unique visual identify (including project templates)	WP6	EHPA	PUSH2HEAT website accessible for partners and external users	M4

Milestone number	Milestone title	Related WP	Lead beneficiary	Means of verification	Due date
MS16	Comprehensive list of External Advisory Group members, their respective expertise and organisations	WP6	EHPA	External Advisory Board deployed	M18