D1.1 Quality Assurance Plan

WP1, T1.1

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Technical references

Project Acronym	HAPPENING
Project Title	**H**e**A**t **P**um**P**s in existing multi-family buildings for achieving union's **EN**ergy and envIro**N**mental **G**oals
Project Coordinator	Irantzu Urkola Tecnalia irantzu.urcola@tecnalia.com
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Versions

No.	Name SURNAME	Partner	Contribution	Date
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0.2	Irantzu URKOLA	TECNALIA	Chapters: 2.WP1, 2.WP8, 3, 4, 5	2020/11/09
0.3	Jon ITURRALDE	TECNALIA	Contribution to chapter 2.WP4	2020/11/17
0.4	Jon Ander LANDETA	TECNALIA	Review	2020/11/20
0.5	Chiara MANAGO	RINA-C	Contribution to chapter 2.WP6	2020/11/25
	Lorenzo CIVALLERI	TECNOZENITH	Contribution to chapter 2.WP5	
0.6	Roberto FEDRIZZI	EURAC	Contribution to chapter 2.WP2	2020/11/26
	Constanze BONGS	FRAUNHOFER	Contribution to chapter 2.WP3	
	Salomé HERCE Borja IZAOLA	GBCe	Contribution to chapter 2.WP7	
07	Irantzu URKOLA Jon ITURRALDE	TECNALIA	Version of the document to be shared with the Reviewer	2020/11/27
0.8	Roberto FEDRIZZI	EURAC	REVIEW	2020/12/28
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Abbreviations and acronyms

Acronym	Description
BMS	Building Management System
CA	Consortium Agreement
COP	Coefficient of Performance
D	Deliverable
DHW	Domestic hot water
DoA	Description of Action
EC	European Commission
EPC	Engineering, Procurement and Construction
ESCO	Energy Services COmpany
GA	Grant Agreement or General Assembly, on depend on the context
GHG	GreenHouse effect Gases
HVAC	Heating, Ventilation and Air Conditioning
IP	Intellectual / Industrial Property
KER	Key Exploitable Result
M	Month
MS	Milestone
M&V	Measurement and Verification
PE	Primary Energy
PM	Person-month
PMP	Project Management Plan
PSC	Project Steering Committee
PV	Photovoltaics
QAP	Quality Assurance Plan
ST	Subtask
T	Task
WP	Work Package
WPL	Work Package Leader

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Abstract of the HAPPENING project

Currently, **buildings are responsible for 40 % of the energy demand and 36% of the CO_2 emissions in Europe**. Decarbonisation of existing buildings plays a key role in order to reach the overall climate protection targets. However, current renovation rates lie in the order of 1%.

Heat pumps are a key technology in bringing renewable shares into heat supply of buildings; especially their combination with onsite renewable electricity production e.g. by PV allows to bring high renewable shares. Their current installation in existing multi-apartment buildings is however still marginal.

The proposed technological solution is based on decentralized heat pumps, in such a way that it results an easy-to-install solution for installers, low-intrusive for the occupants and easily adaptable to a large number of different building situations. This is flanked by developing near-zero planning, implementation and operation processes, in order to facilitate the work during the planning phase, ensure a high-quality installation and effective operation, and reduce the efforts and costs within the whole retrofitting project. The challenge of cost-competitiveness is addressed by developing new financial and business models. Bringing new players (such as financial experts) and financing models to the renovation market is expected to bring the needed paradigm change and boost investments in the residential retrofitting sector. Dissemination of measured performance and system characteristics from HAPPENING will be one of the key results of the project.

Through **3 demo sites (Spain, Italy and Austria)**, the project will demonstrate a highly versatile, scalable and replicable solution package for buildings energy system retrofitting allowing 70-75% of renewable energy fraction, 30-50% of PE and GHG savings, reduction of planning time by 50% and installation/operation time by 30% and payback time for ESCOs and investors of less than 8 years, compared to best available solution existing today.

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1. Introduction

1.1 Objective of the deliverable D1.1

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 four 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 Ethic issues and gender management
- T 1.4 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 HAPPENING 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

1.3 Contribution of partners

The task T1.1 in WP1 is led by TECNALIA and participated by the WP Leaders, i.e. EURAC, FRAUNHOFER, TECNOZENITH, RINA-C and GBCe.

Being so, TECNALIA, as the lead beneficiary of the project is the main contributor of the content provided in this deliverable. The WP Leader partners are mainly

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contributing to the details concerning the work package they lead and to the general procedures defined.

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.

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2. Detailed Work Plan for each WP

The adequate planification of tasks and resources is key for the quality of the obtained results, and in this document the preliminary Detailed Work Plans corresponding to the different work packages or WPs are included hereafter.

In the next Figure 2.1, the 7 work-packages in the project are exposed:

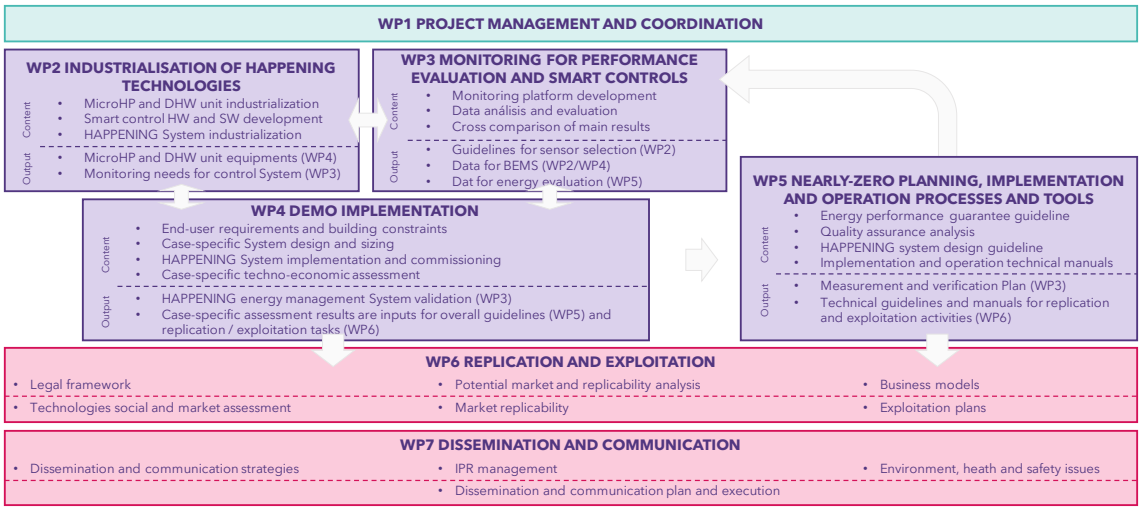

Figure 2.1: WP structure in the HAPPENING project

As it can be seen in the Figure 2.1, 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 seven WPs, 41 **deliverables** will be submitted during the life of the project. (see "*Annex 1: List of deliverables*")

In addition, during the project, 9 **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*")

In the next Figure 2.2, the 9 milestones, in star shape, are presented on the Gannt diagram of the work-packages in the HAPPENING project:

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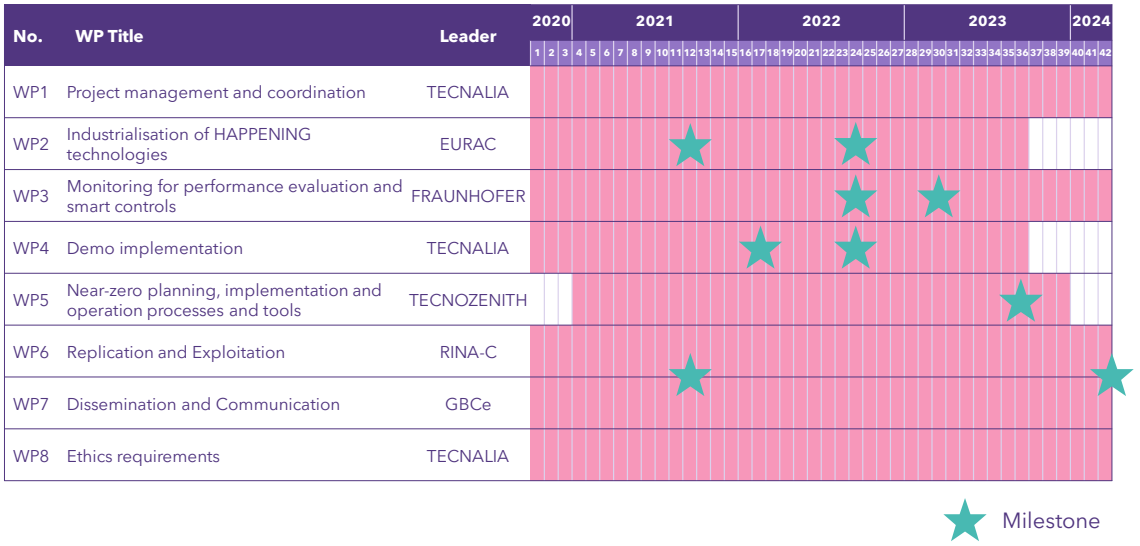

Figure 2.2: Gannt diagram of the work-packages in the HAPPENING project with milestones

Although this document providing quality assurance procedure is not going to be updated after its delivery and acceptance by the EC, the workplans of each WP will be continuously updated (available in the Portal of HAPPENING), so they will be modified as needed throughout the development of the project, and the resources dedication to each task and partners will also be adapted consequently.

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WP1 – Project management and coordination

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

To be more specific, the main goals in WP1 are:

1) 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.
2) The overall **strategic and operational management and steering** of the project, ensuring the accuracy, quality and timelines of deliverables.
3) To carry out smooth and **continuous communication and** high-quality technical and financial **reporting** to the project's progress **to the European Commission.**

The **WP1** is about the management and coordination of the project. This WP is led by TECNALIA and the total efforts dedicated to these tasks are 37PMs.

WP1 – Project management and coordination	**Start**	**End**	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	**1**	**42**	**32**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**0**
T 1.1 Project coordination and quality assurance	1	42	10			1	1				1	1	1	
T 1.2 Communication, reporting and monitoring	1	42	10											
T 1.3 Ethic issues and gender management	1	42	6											
T 1.4 Data management plan	1	42	6											

Table 2.1: PMs distribution among partners and tasks in WP1

T 1.1 Project coordination and quality assurance

The task T1.1, led by TECNALIA and participated by the rest of the WP leaders, which are EURAC, TECNOZENITH, FRAUNHOFER, RINA-C and GBCe, is aimed at establishing the governance model to coordinate, communicate and monitor the progress of the Project. For that, a Quality Assurance Plan and an Innovation Management plan will be defined.

Specifically, the goals of this task T1.1 are:

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- to establish the governance structure to coordinate, communicate and monitor the work progress of the project, guaranteeing the achievement of the objectives by an efficient use of resources.
- to define and elaborate the Quality Assurance Plan (QAP) for quality.
- to establish the methodology and planning of the management of innovation within HAPPENING.

The efforts planned for the task T1.1 are distributed as shown in the Table 2.2:

T 1.1 Project coordination and quality assurance	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	1	42	10			1	1				1	1	1	
T1.1.1 Continuous coordination of the project - the work progress of the project	1	42	5			0.5	0.5				0.5	0.5	0.5	
T1.1.2 Define and keep updated the QAP	1	42	3			0.25	0.25				0.25	0.25	0.25	
T1.1.3 Management of the innovation of the project	1	42	2			0.25	0.25				0.25	0.25	0.25	

Table 2.2: PMs distribution among partners in the task T1.1

T 1.2 Communication, reporting and monitoring

In the task T1.2, entitled "communication, reporting and monitoring", fluent communication is set up within the HAPPENING Consortium and with the EC and the required monitoring and quality procedures are determined to produce deliverables and to accomplish the commitments and requirements of the project. This task is led by TECNALIA and participated by all the partners.

The specific objectives of this task T1.2 are:

- to establish and perform a fluent communication within the HAPPENING Consortium and with the EC.
- to perform and facilitate a high quality internal (by the Consortium) and external (by the EC) monitoring of the project, assuring high quality production of deliverables and reports that meet the project objectives and technical / non-technical commitments, as well as the EC requirements on due time and manner.

All the partners in the project will contribute to the communication, reporting and monitoring of the advances of the work plan in the project.

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T 1.3 Ethic issues and gender management

In the task T1.3, led by TECNALIA and participated by all the partners, the appropriate procedures are established to:

- deal with ethical and gender aspects in relation to the project work plan.
- ensure that appropriate procedures conforming to relevant local / national guidelines / legislation are followed in the project.

All the partners in the project will contribute to the management of the ethics and gender issues in the project.

T 1.4 Data management plan

The task T1.4, led by TECNALIA and participated by all the partners, is about the data management and protection. In this task the Data Management Plan (DMP) will be defined, to ensure that scientific research data will be easily discoverable, accessible, assessable and intelligible and useable beyond the original purpose for it which it was collected and interoperable to specific quality standards.

In addition, the Data Protection Impact Assessment (DPIA) will be carried out, a measure devised by the European Union in the General Data Protection Regulation, following the CE Certification and Marking requests.

All the partners in the project will contribute to data management in the project.

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WP2 – Industrialisation of HAPPENING technologies

The main technological progress will be undertaken in **WP2**, in which the technologies involved in the project will be moved from TRL 7-8 to TRL8. This involves mainly heat pumps, as well as sensors, which are needed for the monitoring and control of the system. All the individual devices will be packaged together with the advanced control system, forming a singular system or 'solution pack'.

This WP2 is led by EURAC and the total efforts or resources (PMs) dedicated to these tasks are 64PMs. In the next Table 2.3, the resources distribution among partners and tasks in WP2 is exposed:

WP2 – Industrialisation of HAPPENING technologies	**Start**	**End**	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	**1**	**36**	**13**	**6,5**	**0**	**19**	**0**	**20**	**4**	**0**	**1,5**	**0**	**0**	**0**
T 2.1 Industrialisation of heating, cooling and DHW units	1	24				4		14						
T 2.2 Development of the smart energy management system	6	36	10	4,5		12		4	4		1,5			
T 2.3 Fitting HAPPENING system into existing building stock	19	36	3	2		3		2						

Table 2.3: PMs distribution among partners and tasks in WP2

T 2.1 Industrialisation of heating, cooling and DHW units

The objective of the task T2.1 is to develop the innovative micro-heat pump solutions by INNOVA and make them ready for the installation at the demo cases.

The task T2.1 is structured into the next subtasks:

- T 2.1.1 Analysis of the normative and legislation in reference markets

  The work will start with the analysis of the normative and legal boundary conditions in the countries where the demonstration buildings are located and in the reference markets.

  This will guarantee that the technical drivers to the development will be in line with regulations at the demonstration buildings, and that the unit can smoothly reach its deemed markets at project end.

- T 2.1.2 Industrialisation of micro heat pumps with R290 refrigerant

  Based on the above analysis and the previous demonstration work, INNOVA will proceed with the industrialisation of the micro heat pumps exploiting R290 as a refrigerant. All modifications needed to comply with international

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regulations and to facilitate the manufacturing process will be accomplished in this subtask.

- T 2.1.3 Development of a dwelling DHW storage tank

  The water-to-air configuration addressed in subtask 2.1.2 will be modified in a water-to-water heat pump producing domestic hot water to be stored in a 170 litres water tank. The heat pump will be placed onto the upper part of a slim tank, ideal to be installed in the bathroom or in the kitchen of each dwelling.

- T 2.1.4 Functional mock-ups construction and laboratory tests

  Functional moke-ups will be tested at EURAC to characterise their performance under real-like operation conditions. EURAC will test them at their laboratory under dynamic operation conditions, to verify their energy performance, to validate the numerical simulations and to highlight eventual operation bugs under quasi-real conditions.

The resources available for the task T2.1 are distributed as shown in the Table 2.4:

T 2.1 Industrialisation of heating, cooling and DHW units	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	1	24				4		14						
T 2.1.1 Analysis of the normative and legislation in reference markets	1	6				1								
T 2.1.2 Industrialisation of micro heat pumps with R290 refrigerant	1	12						3						
T 2.1.3 Development of a dwelling DHW storage tank	1	12				1		9						
T 2.1.4 Functional mock-ups construction and laboratory tests	12	24				2		2						

Table 2.4: PMs distribution among partners in the task T2.1

T 2.2 Development of the smart energy management system

In this task T4.2, a smart energy management system will be developed to control the whole installation allowing maximum RES integration and optimum performance.

The task T2.2 is structured into the next subtasks:

- T 2.2.1 Wireless sensors implementation

  This subtask aims to coordinate the selection of suitable Bluetooth sensors to be installed on board of the heating / cooling / DHW units. These will include temperature and humidity sensors to be set up at intake and outlet ducts and pipes of the micro heat pumps, allowing to build a detailed picture of the

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comfort conditions in each dwelling room. Once selected, INNOVA will modify the units in order to communicate with the sensors.

A solution specialised to the system configuration developed by GIROTZE will be also developed.

Temperature, water mass flow and electric consumption meters will be selected in accordance to guidelines from WP3 allowing to continuously gather the actual performance of the units both for monitoring and control purposes and for metering the actual energy consumption in each dwelling.

- T 2.2.2 Smart control hardware architecture development

  The aim of this activity is to adapt the commercial monitoring and control hardware implemented in each of the demo buildings to the new wireless sensors utilised, in coordination with WP3. The infrastructure for the monitoring and control of the heat pump units installed in each dwelling will be defined for each of the three demo buildings. The solution will consist of (1) a central control unit in charge of monitoring, forecasting and predictively controlling all the elements of the building energy system (in coordination with subtask 2.2.4) and (2) a local controller and a gateway in each dwelling.

- T 2.2.3 Modelling and optimization of energy storage capacity

  AEE will use its expertise in designing complex thermal storage tanks to lead the elaboration of accurate numerical models of the thermal storage tanks used in the system and to develop management strategies that maximise the energy stored and minimize thermal losses. Effort will be put on reliably modelling the temperature stratification in different configurations and operating conditions, which is lacking in all models available today, while it is vital to accurate controls elaboration.

- T 2.2.4 Development and implementation of Model Predictive controls

  In this task the software algorithms implementing the predictive control will be developed. This predictive control will anticipate energy building performance for the following hours to make decisions concerning the best strategy for the operation of heating, cooling and DHW systems and thermal and electrical storages. The optimization criteria will be energy bill reduction while maximizing self-consumption rate. Instantaneous and forecasted user consumption, PV generation and electricity prices will also be considered.

  To this end, the most appropriate solution is the optimisation based on model predictive control: neural networks model and predict user behaviour, heating, cooling and DHW system and building envelope performance taking monitoring data as an input and for several set-parameters scenarios. The source code of the model predictive control running in the smart control system (BEMS) will be made available.

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The activity will be elaborated through numerical simulation and laboratory tests by EURAC and TECNALIA.

- T 2.2.5 Remote control application for end-users

  An application will be developed by INNOVA and GIROTZE specifically for residents to control the relevant system parameters inside their dwellings in order to guarantee comfort conditions. The application will use data measured by sensors at dwelling-level and act specifically on the installed heating / cooling units. The building overall energy management system will deal with the integrated energy demand resulting from each dwelling's particular conditions.

The resources available for the task T2.2 are distributed as shown in the Table 2.5:

T 2.2 Development of the smart energy management system	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	6	36	10	4,5		12		4	4		1,5			
T 2.2.1 Wireless sensors implementation	6	18	0.5	0.5		0.5		0.5			0.5			
T 2.2.2 Smart control hardware architecture development	6	18	0.5	1		0.5		0.5			0.5			
T 2.2.3 Modelling and optimization of energy storage capacity	7	15							4					
T 2.2.4 Development and implementation of Model Predictive controls	7	36	7			11								
T 2.2.5 Remote control application for end-users	7	18	2	3				3			0.5			

Table 2.5: PMs distribution among partners in the task T2.2

T 2.3 Fitting HAPPENING system into existing building stock

The objective of this task T2.3 will be to combine the devices and tools developed in the previous tasks into suitable, modular heating and cooling (H&C) systems. Moreover, an assessment of the performance of the systems identified in the current European building stock will be assessed at a general level.

The task T2.3 is structured into the next subtasks:

- T 2.3.1 Reference solution assessment for HAPPENING system installation

  The installation of the HAPPENING system in reference apartment archetypes will be the focus of this subtask. At least 3 reference buildings will be defined, properly representing the current building stock. EURAC will identify meaningful solutions for the installation of the micro heat pumps in the

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available spaces and the integration with existing pipelines. INNOVA will also develop technical details relative to cabling the units with minimum disruption for the inhabitants. TECNALIA and GIROTZE will complement this work with additional system configurations, for instance, the ones based on commercially available water-to-water booster HPs.

In addition to this, INNOVA will develop, in collaboration with other task participants, pre-designed "central heating and cooling plant" configurations, considering different alternatives. Overall system design for the reference buildings will be therefore provided, including the central plant, PV panels field, water thermal storages, electric battery and needed distribution actuators.

As a result of the work, a database of at least 3 integration solutions will be elaborated, including schematics, plans, architectural and technical details.

- T 2.3.2 Numerical analysis of HAPPENING overall system performance

  Starting from the above schematics, EURAC and TECNALIA will perform numerical simulation devoted to assessing the energy performance of the overall HAPPENING system under the reference operating conditions and climates previously defined.

  The developed models will be validated with monitoring data (WP3) and additional dynamic tests in subtask 2.1.4.

The resources available for the task T2.3 are distributed as shown in the Table 2.6:

T 2.3 Fitting HAPPENING system into existing building stock	Start	End	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	19	36	3	2		3		2						
T 2.3.1 Reference solution assessment for HAPPENING system installation	19	27		2		1		2						
T 2.3.2 Numerical analysis of HAPPENING overall system performance	25	36	3			2								

Table 2.6: PMs distribution among partners in the task T2.3

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WP3 – Monitoring for performance evaluation and smart controls

The **WP3** will deal with the monitoring of the demo sites required for the demonstration. The same methodology will be defined transversally to all the demo sites, guaranteeing result uniformity and comparability. This methodology will be exhaustively checked by a single transversal partner (FRAUNHOFER), safeguarding data reliability.

This WP3 is led by FRAUNHOFER and the total efforts dedicated to these tasks are 43,2PMs. In the next Table 2.7, the resources distribution among partners and tasks in WP3 is shown:

WP3 – Monitoring for performance evaluation and smart controls	**Start**	**End**	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	**1**	**42**	**4,2**	**4,5**	**2**	**4,5**	**2**	**1,8**	**4**	**3**	**16,2**	**1**	**0**	**0**
T 3.1 Definition of monitoring concept	1	17	1	1	0,5	1	0,2	1	2	1	2,5			
T 3.2 Technical realisation of the monitoring	13	24	1,5	2	1	1,8	1,3	0,8	2	1	3			
T 3.3 Data evaluation and online platform	13	42	0,7	0,5	0,5	0,7	0,2			0,5	6,5			
T 3.4 Cross comparison of main results	32	42	1	1		1	0,3			0,5	4,2	1		

Table 2.7: PMs distribution among partners and tasks in WP3

T 3.1 Definition of monitoring concept

The objective of this task T3.1 is to define the common methodology for the data acquisition for the demonstrators. The task covers the common understanding of the measurement objectives, defining for which scope the data will be used, the collection of master data (general information) on the demonstration cases and the final definition of a comparable monitoring concept for each site. Subject to the task is also the definition of information flow between the partners and the provision of this information to FRAUNHOFER to establish the whole monitoring setup.

Within this task T3.1, the following activities or subtasks will be carried out:

- T3.1.1 Definition of measurement objectives

  FRAUNHOFER will suggest appropriate measurement goals fitting to the approach with decentralised heat pump systems. Besides efficiency values for different balance boundaries, certain values to assess and to optimize the operation behaviour will be recommended. The scientific partners will

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contribute with their individual requirements on the measurement, based on the specific goals to be achieved on each demo site. Those requirements are referring on the assessment and optimization of the heat pump systems but might also focus on deriving suitable data which might be integrated in the systems control. Based on the abovementioned aspects FRAUNHOFER and the scientific partners will define common (e.g. main KPIs to compare the systems, time steps) and individual goals (e.g. certain values, data transfer routines) of the measurement and derive a measurement concept.

- T3.1.2 Collection of master data for the different demo site

  Master data of each demo site has to get collected for the basic description of the use cases, the planning of individual measurement concepts and the data assessment. Therefore, master data should include for instance building age and standard, former energy consumption for space heating, cooling and DHW, the heated surface, the number of dwellings, number of occupants, properties of the components such as COP values, hydraulic schemes of the whole systems as well as the subsystems, wiring diagram. In coordination with the scientific partners, FRAUNHOFER will create and supply lists and forms to collect these data. The collection of the master data will be led by the partners TECNALIA, EURAC, and AEE for their individual demo sites.

- T3.1.3 Definition of the individual monitoring concept

  Mainly based on the defined measurement concept, as well as the individual hydraulic schemes and the wiring diagrams, the scientific partners will suggest detailed measurement concepts for their monitoring object in terms of the foreseen measurement points. FRAUNHOFER will support in terms of consultations to achieve the common, as well as the individual, measurement goals to ensure a comparable measurement.

The resources available for the task T3.1 are distributed as shown in the Table 2.8:

T 3.1 Definition of monitoring concept	Start	End	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	1	12	1	1	0,5	1	0,2	1	2	1	2,5			
T3.1.1 Definition of measurement objectives	1	7	0,3	0,3	0,3	0,3		0,3	0,5	0,3	1			
T3.1.2 Collection of master data for the different demo sites	4	8	0,2	0,2	0,2	0,5		0,2	1	0,5	1			
T3.1.3 Definition of the monitoring concept	8	12	0,5	0,5		0,2	0,2	0,5	0,5	0,2	0,5			

Table 2.8: PMs distribution among partners in the task T3.1

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T 3.2 Technical realisation of the monitoring

The aim of this task T3.2 is the selection and installation of the measurement equipment, its commissioning and the daily transfer of the data a server. It is continually and automatically transferred in raw data format to a central share point, where it can be accessed by FRAUNHOFER for data processing in the task T3.3.

The following activities or subtasks will be executed within this task T3.2:

- T3.2.1 Selection, purchase and installation of the measurement equipment

On basis of the measurement concept developed in task T3.1, the appropriate measurement instrumentation is selected and purchased. The three scientific partners responsible for their respective demonstration site select the heat and electricity meters, as well as temperature and further sensors, to measure the necessary values, which are used for the calculation of the KPIs defined in task T3.1. It is ensured that the sensors function in the respective environment of the three demonstration sites and can record the required values. Additional information for the installation of the sensors in the form of installation instructions are attached to the measurement technology. Important sources of errors are explicitly pointed out. FRAUNHOFER supports the other scientific partners with this issue.

- T3.2.2 Measurement system commissioning

After the installation of the sensors by the installers, all the measurement instrumentation is commissioned and is connected to the data acquisition system under the coordination of the on-site scientific partners. During commissioning, the professional installation and proper operation of the sensors is ensured.

The FRAUNHOFER personnel is attending the commissioning at each demonstration site. This ensures that FRAUNHOFER has detailed knowledge of the demonstration sites, which is the basis for the automatic data evaluation (task T3.3) and the cross comparison described in task T3.4.

The data acquisition system reads out the measured values from all the sensors and stores the measurement data in a daily raw data file on its local hard drive. At this raw data file, no filtering or any aggregation of the measured values is undertaken. The data acquisition system is connected to a server via internet connection. This way, it is ensured that the data acquisition system can be accessed at any time and that the measured raw data files are transferred to the server at least once a day.

- T3.2.3 Raw data transfer to central share point

FRAUNHOFER provides an online platform for the integration of the measurement raw data files into the data analysis environment MONDAS. The data to be integrated in MONDAS must meet certain specifications in terms of data format, header format, measuring interval, missing data and error values. These specifications are communicated by FRAUNHOFER to the partners and are

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considered mandatory. The scientific partners set up a continuous raw data transfer to the online platform.

The efforts planned for the task T3.2 are distributed as shown in the Table 2.9:

T 3.2 Technical realisation of the monitoring	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	13	24	1,5	2	1	1,8	1,3	0,8	2	1	3			
T3.2.1 Selection, purchase and installation of the measurement equipment	13	15	0,5	0,7	0,3	0,8	0,6	0,2	0,7	0,3	0,5			
T3.2.2 Measurement system commissioning	14	16	0,5	0,8	0,3	0,5	0,3	0,2	0,8	0,3	1,5			
T3.2.3 Raw data transfer to central share point	16	18	0,5	0,5	0,4	0,5	0,4	0,4	0,5	0,4	1			

Table 2.9: PMs distribution among partners in the task T3.2

T 3.3 Data evaluation and online platform

The objective of this task T3.3 is the automated processing of the collected data. To this purpose, the raw data has to be checked for quality and be further processed. For data quality check, existing algorithms may be used. For further data analysis, e.g. calculating the defined KPIs, individualized filters need to be developed and integrated in the data evaluation software. Online visualization of collected and processed data is a further goal of this task.

The following activities or subtasks are planned for the task T3.3:

- T3.3.1 Development and implementation of data processing algorithms

FRAUNHOFER creates a script based raw data processing. The raw data provided by the three scientific partners is processed by automatic filtering and analysation scripts. On behalf of this data processing algorithm, the raw data is processed in terms of missing data, error values, faulty data and outliers. Furthermore, an automatic plausibility check is undertaken. As a result of the script based raw data processing, the processed data is stored in a data base. This data base in a second step provides the processed data for the evaluating and visualisation platform MONDAS. This task also includes the analysis of the data itself involving staff with expert knowledge on heat pump systems and ongoing until the end of the project.

- T3.3.2 Setting up the online platform

FRAUNHOFER provides the online platform MONDAS. On behalf of this platform, the processed stored measurement data can be accessed for further data evaluation and data visualisation. The platform provides tools which offer the possibility to evaluate the data regarding the measurement goals and KPIs defined

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in the task T2.1. The other partners have access to the online platform and assist in definition and testing of the desired functionalities.

- T3.3.3 Implementation of data visualization

Besides the evaluation and analysis tools, the online platform provides the possibility to visualize the current status and performance of the plant in the demo sites. Furthermore, energy performance, as a result of the analysis of the data, is visualized using scatter and line plots, as well as bar and carpet plots, etc. FRAUNHOFER is responsible for the online platform. Especially the scientific partners TECNALIA and EURAC give their input in suggesting the design of plots and correlations to be depicted.

The PMs available for the task T3.3 are distributed as shown in the Table 2.10:

T 3.3 Data evaluation and online platform	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	13	42	0,7	0,5	0,5	0,7	0,2			0,5	6,5			
T3.3.1 Development and implementation of data processing algorithms	13	42	0,5	0,3	0,3	0,5				0,3	3			
T3.3.2 Setting up the online platform	20	24									1,5			
T3.3.3 Implementation of data visualization	24	28	0,2	0,2	0,2	0,2	0,2			0,2	2			

Table 2.10: PMs distribution among partners in the task T3.3

T 3.4 Cross comparison of main results

The objective of this task T3.4 is to cross-compare the results of the demo sites in order to assess the strengths and weaknesses of the HAPPENING technological approach in the different sites, as well as improvement potentials. A common approach needs to be followed; thus, this task is mainly performed by a single scientific partner, FRAUNHOFER, but accompanied by the other scientific partners in their role to bring their scientific view to the evaluation.

Within this task T3.4, the following activities or subtasks will be executed:

- T3.4.1 Definition of data applicable for cross-comparison

In order to conduct a cross-comparison of the results, a methodology is to be defined and applied which decides on the applicable data to be used. The evaluation will include for instance the assessment of different efficiency values, main energy flows and the most important temperature levels, as well as ecological numbers, such as primary energy share and CO_2-emissions. It also will consider the question of the scalability of the focused energy supply concept with

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decentralized heat pumps. FRAUNHOFER is in charge of the cross-comparison but will be assisted in methodology definition and plausibility check of the comparison results by the other scientific partners.

- T3.4.2 Application of the methodology and report on cross-comparison

The second step is the application of the methodology and the report on its results. This will be enriched by the detailed data evaluation of each demo site performed by the scientific partners responsible for the demonstrators. The results will be documented in a report and in a scientific publication.

The resources of task T3.4 are distributed as exposed in the Table 2.11:

T 3.4 Cross comparison of main results	Start	End	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	32	42	1	1		1	0,3			0,5	4,2	1		
T3.4.1 Definition of data applicable for cross-comparison	32	36	0,2	0,2		0,2					1,5	0,2		
T3.4.2 Application of the methodology and report on cross-comparison	36	42	0,8	0,8		0,8	0,3			0,5	2,7	0,8		

Table 2.11: PMs distribution among partners in the task T3.4

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WP4 – Demo implementations

The demonstration activities will take place in **WP4**, which is the core of the project and strongly linked to the rest of WPs. The technical solutions developed in WP2 will be applied to the 3 different demo buildings for their practical demonstration.

To guarantee the quality of the work, all the activities related to each of the demo sites will take place under the coordination of each local demo team. This will also enable a close contact with the building owners / tenants, ensuring their satisfaction both in terms of comfort and with the retrofitting project in general.

Each local demo team will be responsible for addressing case-specific issues throughout the development of WP4 tasks, ensuring an optimum adaptation to local particularities. Then, WP4 coordination will guarantee a good overall progress.

Similarly, for the results to be highly comparable and thus contributing to the replication demonstration aimed at the project, a standardized monitoring methodology will be applied, developed in WP3 and supervised by FRAUNHOFER.

This WP4 is led by TECNALIA and the total efforts dedicated to these tasks are 77,2PMs. The resources distribution among partners and tasks in WP4 is detailed in the next Table 2.12:

WP4 – Demo implementations	**Start**	**End**	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	**1**	**36**	**13,5**	**9**	**8,5**	**9**	**10,2**	**2**	**10**	**12**	**2**	**1**	**0**	**0**
T 4.1 End-user requirements and building constraints	1	9	1	1	2	0,5	0,7	0,5	2	2				
T 4.2 Case-specific system design	4	17	4	3	2	2	1	0,5	2	3				
T 4.3 Implementation and commissioning	13	24	2,5	4	4	2	8,2	0,5	4	5	1,5			
T 4.4 Techno-economic assessment	19	36	6	1	0,5	4,5	0,3	0,5	2	2	0,5	1		

Table 2.12: PMs distribution among partners and tasks in WP4

T 4.1 End-user requirements and building constraints

The objective of this task T4.1 is to identify and define the boundary conditions for the system design (T4.2) in each demo site.

Within this task T4.1, the following activities will be carried out:

- Form local demo teams for the **coordination** of all the works corresponding to each demo.

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- Identify requirements and constraints at different levels:
    - **Technical** constraints: existing (and potentially reusable) equipment in the building, available room, etc.
    - **Regulatory/legal** issues: required procedures for installation works, etc.
- **Social**: communication with residents. Gather information on initial comfort conditions, specific constraints, and project presentation.
- **Preliminary assessment** of collected data and initial conceptual plans on building renovation possibilities.

The resources available for the task T4.1 are distributed as shown in the Table 2.13:

T 4.1 End-user requirements and building constraints	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	1	9	1	1	2	0,5	0,7	0,5	2	2				
T4.1.1 Local demo teams - **coordination**	1	9	0.25	0.1	0.3	0.1	0	0	0.5	0.1				
T4.1.2 Identify demo specific **requirements and constraints**: - Technical constraints - Regulatory/legal issues	1	6	0.55	0.55	0.75	0.3	0.3	0.2	1	0.8				
T4.1.3 **Social**: communication with residents	1	9	0.1	0.05	0.75		0.3		0.25	1				
T4.1.4 **Preliminary assessment** of collected data and initial plans	5	9	0.1	0.3	0.2	0.1	0.1	0.3	0.25	0.1				

Table 2.13: PMs distribution among partners in the task T4.1

T 4.2 Case-specific system design

The goal of task T4.2 is to design the HAPPENING solution adapted to each demo, allowing the local implementation of the HAPPENING concept and meeting the case-specific conditions identified in the task T4.1.

The design of the HAPPENING solution for each demo site will be aimed at:

- Maximizing RES integration
- Facilitating retrofitting works
- Minimizing impact on residents

The following activities will be executed within this task T4.2:

- **Detailed assessment** of all the boundary conditions gathered in T4.1. (technical, regulatory, social, etc.).

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- **Detailed analysis** of the technical particularities of thermal equipment developed in task 2.1 (WP2).
- **System** overall conceptual design: selection of key / main components (kind of heat emitters, type of HPs, etc.) and basic sizing. Particularization of the HAPPENING solution to be applied in each case.
- **Component** detailed selection and sizing: selection of all auxiliary components (circulating pumps, valves, etc.) and corresponding sizing. Hydraulic design (including piping characteristics).
- Conceptual design for **monitoring integration** aimed at system monitoring and control (link with WP3). Preparation for the implementation of the energy management system (EMS) developed in T2.2.

The PMs of the task T4.2 are distributed as shown in the Table 2.14:

T 4.2 Case-specific system design	Start	End	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	4	17	4	3	2	2	1	0,5	2	3				
T4.2.1 Detailed assessment of data from T4.1.	4	9	0.2		0.5	0.2	0.5		0.2	0.75				
T4.2.2 Detailed analysis of equipment from T2.1	8	12	0.3	0.25		0.4	0.2		0.3	0.75				
T4.2.3 System conceptual design	6	9	0.5	0.25	0.3	0.2	0.1	0.1	0.5	0.3				
T4.2.4 Component selection and sizing	9	14	1	2	0.2	0.4		0.2	0.7	0.2				
T4.2.5 Conceptual design for monitoring / EMS (link with WP3)	14	17	2	0.5	1	0.8	0.2	0.2	0.3	1				

Table 2.14: PMs distribution among partners in the task T4.2

T 4.3 Implementation and commissioning

The objective of this task T4.3 is the implementation of the HAPPENING solution based on the developments from previous tasks T4.1 and T4.2. The implementation and commissioning works will be organized in phases to keep minimum impact on residents.

In this task the main developments from WP2 (several thermal equipment and systems) and WP3 (the monitoring concept developed therein) will be implemented for the demonstration of the HAPPENING concept as a whole.

The plan includes the execution of the following tasks:

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- **Planning** of implementation and commissioning works in phases to keep minimum impact on residents.
- **Installation** of the specific HAPPENING solution in each demo site, at all levels (dwelling level, central distribution units, photovoltaics, etc.).
- **Commissioning**:
    - Test all the elements to verify that they work according to design
    - Fine-tune control algorithms, EMS optimization
- Resident satisfaction (corresponding to renovation process activities and final state) assessment – confirmation of implementation works successful **finalisation**

Similarly, to other tasks in this WP4, the aforementioned plan will be specially adjusted to the case-specific requirement present in each of the demo buildings.

The available resources distribution of the task T4.3 is shown in the Table 2.15:

T 4.3 Implementation and commissioning	Start	End	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	13	24	2,5	4	4	2	8,2	0,5	4	5	1,5			
T4.3.1 Planning of implementation works	13	13		0.25	0.5	0.25	0.5		0.5	0.5				
T4.3.2 Installation of the specific HAPPENING solution in each demo site	14	23		3	2		7		1	3.8				
T4.3.3 Commissioning - component proper performance analysis	23	24	1	0.75	0.75	0.25	0.25	0.5	1.25	0.25	0.5			
T4.3.4 Commissioning - Fine-tune control algorithms	23	24	1.5		0.5	1.5	0.25		1.25	0.25	1			
T4.3.5 Resident satisfaction assessment – work finalisation	24				0.25		0.2			0.2				

Table 2.15: PMs distribution among partners in the task T4.3

T 4.4 Techno-economic assessment

The main objective of the task T4.4 is to carry out a detailed analysis of the techno-economic performance of the HAPPENING solutions implemented in each demo site. The performance of the system will be exhaustively analysed and compared to the expected values from the design phase, ensuring that the overall benefits from the HAPPENING solution are obtained.

This analysis will be very detailed (performance assessment both at component and system scale) and will take place separately for each demo, ensuring that all the case-

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specific particularities are properly considered (a cross-comparison of these individual results will then be carried out in task 3.4)

In addition, a social assessment will also be done gathering feedback from residents in terms of the new comfort status and overall satisfaction with the HAPPENING system.

The following activities will be executed within this task T4.4:

- Comprehensive **technical** assessment of the performance both at device and system scale.
- **Economic** assessment both at component and system scale, based on technical performance. Consider expected figures estimated in design phase as a reference.
- Find any deviations from expected figures from design phase and, if needed, **optimize** the system accordingly.
- **Social** assessment – ensure resident overall satisfaction (specifically on new comfort conditions).

The available resources distribution of the task T4.4 is shown in the Table 2.16:

T 4.4 Techno-economic assessment	Start	End	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	19	36	6	1	0,5	4,5	0,3	0,5	2	2	0,5	1		
T4.4.1 Technical assessment	19	25	3	0.8		2		0.5	0.75	0.5	0.4			
T4.4.2 Economic assessment	22	28	2		0.2	2			1	1	0.1	0.75		
T4.4.3 System performance optimization	28	36	1	0.2	0.1	0.5	0.15		0.25	0.25				
T4.4.4 Social assessment	19	36			0.2		0.15			0.25		0.25		

Table 2.16: PMs distribution among partners in the task T4.4

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WP5 – Near-zero planning, implementation and operation processes and tools

The **WP5** will take as input the results of the WP4 to develop tools and resources for replication. In WP5 tools will be developed to support different stakeholders and decision-makers and facilitate the implementation of the HAPPENING system. For example, guidelines on energy performance guarantees will be created to reduce uncertainty and thus risk, highly improving the decision-making process. Similarly, technical manuals and instructions will be developed to support installers during implementation phase.

This WP5 is led by TECNOZENITH and the total efforts dedicated to these tasks are 34,6PMs. The PMs distribution among partners and tasks in WP5 is exposed in the next Table 2.17:

WP5 – Near-zero planning, implementation and operation processes and tools	**Start**	**End**	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	**7**	**39**	**9**	**5,6**	**3**	**4**	**5**	**1**	**2**	**2**	**0**	**1**	**0**	**2**
T 5.1 Energy Performance Guarantee planning & implementation guide	7	18	3	0,5	0,5	0,5	0,5		2	1		1		1,5
T 5.2 Quality assurance analysis of HAPPENING system	19	36	3	0,5	1	1	1,5							0,5
T 5.3 HAPPENING system design guideline development	31	39	2	2	0,5	2	2	1		0,5				
T 5.4 Technical manuals and instructions for installers and end-users	31	36	1	2,6	1	0,5	1			0,5				

Table 2.17: PMs distribution among partners and tasks in WP5

T 5.1 Energy Performance Guarantee planning & implementation guide

The task 5.1 is led by ANESE and participated by the rest of the partners involved in WP5, except for INNOVA. The aim of this task is to define a standard measurement and verification system to evaluate HAPPENING solutions in other buildings. Moreover, guidelines for ESCOs will be create, to help them on EPC contracts and energy and economical evaluation of retrofitting processes.

Within this task T5.1, the following activities or subtasks will be carried out:

- To define a proper measurement and verification plan for retrofitting operation, a series of procedures and parameters to take into account in the different phases of the project.

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- To define a scheme to consider the M&V procedures designed, describing and documenting them, writing a document helping ESCOs to check a building retrofitting process.
- To write a guideline on Energy Performance Guarantee, containing information on energy models, uncertain analysis and the M&V plan as defined, with its application on demo case buildings.

The resources available for the task T5.1 are distributed as shown in the Table 2.18: PMs distribution among partners in the task T5.1:

T 5.1 Energy Performance Guarantee planning & implementation guide	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	7	18	3	0,5	0,5	0,5	0,5		2	1		1		1,5
T5.1.1 Definition of M&V Plan	7	12	1.5	0.5	0.5		0.5		0.5					0.25
T5.1.2 Guideline on M&V Plan implementation	7	15	0.5						1	0.5				1
T5.1.3 Guideline on Energy performance Guarantee plan	10	18	1			0.5			0.5	0.5		1		0.25

Table 2.18: PMs distribution among partners in the task T5.1

T 5.2 Quality assurance analysis of HAPPENING system

The task 5.2 regards the monitoring of the demo case buildings, reading and checking data coming from the various sites. These data are taken over a period of a year, verifying continuously their validity respect of the prevision of the EPC contract.

The task T5.2 is structured into the following activities or subtasks:

- To collect data continuously from the buildings in the demo sites, verifying the communication with partners and demo sites on data record.
- To analyse the data collected and to check them with the energy performance of demo cases foreseen in the EPC contract, highlighting the improvements or pejorative deviations.

The resources available for the task T5.2 are distributed as shown in the Table 2.19:

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T 5.2 Quality assurance analysis of HAPPENING system	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	19	36	3	0,5	1	1	1,5							0,5
T5.2.1 Collect and store data from demo cases	19	36	1		0.5		0.5							
T5.2.2 Analyse data verifying congruence with EPC values	19	36	2	0.5	0.5	1	1							0.5

Table 2.19: PMs distribution among partners in the task T5.2

T 5.3 HAPPENING system design guideline development

The goal of this task T5.3 is to define a scheme for companies dealing with activities, such as the planning, design and installation of systems. The results of this task will be guidelines, with different tools, helping these companies to evaluate the operation costs, the environmental results and the availability of the integration of the new system in existent buildings different from demo cases. Guidelines will be tested on demo cases first.

The following activities or subtasks will be executed within the task T5.3:

- To create a guideline with proper tools to evaluate the economic costs and environmental impact of the HAPPENING solution on a building to be retrofitted.
- To define a guideline to evaluate the feasibility to apply the HAPPENING hydraulic and monitoring systems on existent building.
- To test guidelines on existent demo cases to evaluate their goodness.

The resources available for the task T5.3 are distributed as shown in the Table 2.20:

T 5.3 HAPPENING system design guideline development	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	31	39	2	2	0,5	2	2	1		0,5				
T5.3.1 Guideline for economic and environmental evaluation	31	36	1	0.5	0.5	1	0.5							
T5.3.2 Guideline for systems integration	31	36	1	0.5		0.5	0.5	1						
T5.3.3 Test of the guidelines on demo cases	35	39		1		0.5	1			0.5				

Table 2.20: PMs distribution among partners in the task T5.3

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957007

T 5.4 Technical manuals and instructions for installers and end-users

This task T5.4 aims at settling the manuals and other guides to help replication of the HAPPENING solution in other buildings, by helping installers and end-users, providing these subjects with manuals for the installation, maintenance and correct use, as well as description of the new system and how it works. Manuals will contain information about systems implemented in demo cases.

Within this task T5.4, the following activities or subtasks will be carried out:

- To create a guideline for HVAC and BMS systems installation company, to help them in retrofitting system changing generators and terminals of the buildings.
- To define a guideline for maintenance company, including controls to be done to make the system work correctly and the measurement parameters to be visualized to have a view of the goodness and correct operation.
- To create a guideline for end-users, to explain to them how the new systems work, how they can see how effective they are and how to control their equipment and use it correctly.

The resources available for the task T5.4 are distributed as shown in the Table 2.21:

T 5.4 Technical manuals and instructions for installers and end-users	Start	End	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	31	36	1	2,6	1	0,5	1			0,5				
T5.4.1 Guideline for installers	31	36		0.6		0.5	0.5			0.5				
T5.4.2 Guideline for maintenance			0.5	1	0.5		0.5							
T5.4.3 Guideline for end-users			0.5	1	0.5									

Table 2.21: PMs distribution among partners in the task T5.4

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957007

WP6 – Replication and exploitation

The **WP6** will take as input the results of the WP4 to develop the exploitation of the results of the project. In a similar manner than the WP5, WP6 will deal with the replication and exploitation, but tackling other non-technical aspects, such as environmental issues, regulatory framework, business models, bankability, etc.

This WP6 is led by RINA-C and the total efforts dedicated to these tasks are 65,5PMs. In the next Table 2.22, the distribution of the efforts among partners and tasks in WP6 is shown:

WP6 – Replication and exploitation	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	**1**	**42**	**3,5**	**3,5**	**3,3**	**3**	**3**	**2**	**2**	**5,5**	**3**	**23**	**2**	**11,7**
T 6.1 Environmental and social benefit of the solutions	12	42	1	1		0,5	0,5	0,5		1	1	6	0,5	2,5
T 6.2 Business(-ESCO) models, bankability and contractual arrangements	12	42	0,5	0,5	1,5	0,5	0,5			2		6		6,8
T 6.3 Guidelines for replication addressing potential stakeholders	30	42	1	0,5	0,3	1	1	0,3	1	1	1	4	0,5	
T 6.4 Regulatory and non-technical Framework	18	42	0,5	0,5	0,5	0,5	0,5	0,2	0,5	0,5		2	0,5	1,2
T 6.5 Exploitation strategy definition and agreements between partners	1	42	0,5	1	1	0,5	0,5	1	0,5	1	1	5	0,5	1,2

Table 2.22: PMs distribution among partners and tasks in WP6

T 6.1 Environmental and social benefit of the solutions

This task T6.1 aims at assessing the environmental and social benefits of the HAPPENING solution. The T6.1 information feeds directly into the task T6.3, as they are key aspects for business promotion and business models, like such ones related to municipalities with clear objectives for improving the air quality in the city, which has a deep impact on its building refurbishment strategy.

Within this task T6.1, the following activities or subtasks will be carried out:

- The environmental performance of the technologies will be calculated for GHG-emissions and other relevant air emissions.
- The environmental performance of the heating and cooling systems will be compared with relevant conventional technologies for heating and cooling.

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- A life cycle inspired approach will be applied when evaluating the GHG-emissions (direct emissions and indirect emissions) also capitalizing such outcomes to evaluate societal benefits.
- Social and market acceptance of innovations.
    - This activity will be based on outputs coming from the task T6.2, such as market data and business models to evaluate stakeholders' needs. A combination of theoretical (literature review) and experimental (surveys and interviews) methods will be used, including information from the demo sites.

The resources available for the task T6.1 are distributed as shown in the Table 2.23:

T 6.1 Environmental and social benefit of the solutions	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	12	42	1	1		0,5	0,5	0,5		1	1	6	0,5	2,5
T6.1.1 Calculation of environmental performance of the technologies	12	42	0,5	0,5						0,5	0,5	2		
T6.1.2 Comparison with conventional technologies for heating and cooling	19	42	0,5	0,5		0,5	0,5	0,5		0,5	0,5	1	0,5	
T6.1.3 Life cycle inspired approach for social benefits evaluation	25	42										2		
T6.1.4 Social and market acceptance of innovations	25	42										1		2,5

Table 2.23: PMs distribution among partners in the task T6.1

T 6.2 Business(-ESCO) models, bankability and contractual arrangements

To enhance the market introduction of decentralised HPs coupled with low-temperature circuit and related project technological outcomes, this task T6.2 assesses the market potential of the HAPPENING solution.

The following activities or subtasks will be executed in the task T6.2:

- To elaborate conceptual business models that will address the following issues:
    - suitable contractual arrangements for the demonstrated technological solutions.
    - target market.
    - business model adjustments.
    - team required for market introduction of the technology.

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- Finance.
- environmental and social aspects (directly linked to task 6.1).
- final selection of the most suitable business model to be further investigated by the development of an ad-hoc "Business Plan".

- To study a Business Plan by integrating of social and marketing aspects for the work going forward, in order to take it into commercial exploitation.
- To evaluate, analyse and identify the most appropriate business models towards the proposed concept widest replication.

The resources available for the task T6.2 are distributed as shown in the Table 2.24:

T 6.2 Business(-ESCO) models, bankability and contractual arrangements	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	12	42	0,5	0,5	1,5	0,5	0,5			2		6		6,8
T6.2.1 Elaboration of conceptual business model	12	36	0,5	0,5	1	0,5	0,5			1		2		
T6.2.2 Study of business plan	32	42			0,5					1		3		
T6.2.3 Evaluation, analysis and identification of the most appropriate business models	18	36										1		6,8

Table 2.24: PMs distribution among partners in the task T6.2

T 6.3 Guidelines for replication addressing potential stakeholders

The aim of this task T6.3 is to capitalize demonstration results to guidelines for replication considering technical and non-technical aspects. The target here is the decision-making and planning phase, in contrast to the tasks T5.3 and T5.4, in which more specific and technical guidelines are provided for subsequent steps of the value chain, such as design and implementation phases.

Hence, the action in the task T6.3 is to provide guidance to social housing, ESCOs, construction companies and municipalities about ways of adopting the solutions at the initial stage, going from demo-site design to value engineering and installation.

The efforts of the task T6.3 are distributed as exposed in the Table 2.25:

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T 6.3 Guidelines for replication addressing potential stakeholders	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	30	42	1	0,5	0,3	1	1	0,3	1	1	1	4	0,5	
T6.3.1 Elaboration of guidance to social housing, ESCOs, construction companies and municipalities	30	42	1	0,5	0,3	1	1	0,3	1	1	1	4	0,5	

Table 2.25: PMs distribution among partners in the task T6.3

T 6.4 Regulatory and non-technical Framework

There is a need for more detailed investigations to find out people's perceptions about decentralised HPs connected to a low-temperature loop as potential turnkey technologies of the building-retrofitting sector. The goal of this task T6.4 will be that of evaluating the numerous questions marks that potential customers may have regarding the proposed systems to give them an in-depth understanding which shall lead them to adopt it into the design and engineering of energy supply systems in their buildings.

Within this task T6.4, the following activities or subtasks will be carried out:

- To develop online questionnaire.
- To organize a dedicated workshop, webinar, survey and phone interviews.
- To elaborate interviews, workshop and webinar and to develop the standard recommendations.

The resources available for the task T6.4 are distributed as shown in the Table 2.26:

T 6.4 Regulatory and non-technical Framework	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	18	42	0,5	0,5	0,5	0,5	0,5	0,2	0,5	0,5		2	0,5	1,2
T6.4.1 Development of online questionnaire	18	24										0,5		
T6.4.2 Organization of dedicated workshop/webinar/survey and phone interviews	25	36	0,5	0,5	0,5	0,5	0,5	0,2	0,5	0,5		0,75	0,5	0,7
T6.4.3 Development of the standard recommendations	37	42										0,75		0,5

Table 2.26: PMs distribution among partners in the task T6.4

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T 6.5 Exploitation strategy definition and agreements between partners

This task T6.5 aims at evaluating periodically that the exploitation potential of the project remains the highest, both at partners' and at the Consortium's level. This activity will be carried out in close collaboration with all technical WPs and the stakeholders' group. The "Plan for Use and Dissemination of Foreground" (PUDF) will be periodically updated to address the evolution of the project results and the progress achieved by partners in the foreground protection actions at the end of the HAPPENING project.

The following activities or subtasks will be executed within this task T6.5:

- To set-up templates and procedures for the identification of Key Exploitable Results (KERs).
- To identify and characterize the KERs.
- To prepare guidelines for the monitoring of IP issues along the project duration.
- Two workshops will be held with all HAPPENING partners dedicated to the identification of potential exploitation routes at project level as well as at individual level.

The PMs available for the task T6.5 are distributed as shown in the Table 2.27:

T 6.5 Exploitation strategy definition and agreements between partners	Start	End	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	1	42	0,5	1	1	0,5	0,5	1	0,5	1	1	5	0,5	1,2
T6.5.1 Setting up templates and procedures for the identification of key exploitable results	1	12										1		0,7
T6.5.2 KER identification and characterisation	7	42	0,5	1	1	0,5	0,5	1	0,5	1	1	2,5	0,5	0,5
T6.5.3 Preparation of guideline for IP monitoring	1	12										1		
T6.5.4 Organization of exploitable strategy seminar 1	15	18										0,25		
T6.5.5 Organization of exploitable strategy seminar 2	38	42										0,25		

Table 2.27: PMs distribution among partners in the task T6.5

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WP7 – Dissemination and Communication

In **WP7**, dissemination and communication activities will be carried out throughout the whole project. This work will raise awareness of the potential benefit for retrofitting the built stock, the replicability potential of the system, ultimately leading to a higher impact of the positive results.

This WP7 is led by GBCe and the total efforts dedicated to these tasks are 42,9PMs. The distribution of PMs among partners and tasks in WP7 is detailed in the next Table 2.28:

WP7 – Dissemination and Communication	**Start**	**End**	*TECNALIA*	*GIROTZE*	*BARRIZAR*	*EURAC*	*TECNOZENITH*	*INNOVA*	*AEE*	*GWS*	*FRAUNHOFER*	*RINA-C*	*GBCe*	*ANESE*
TOTAL PMs	**1**	**42**	**3,6**	**3,6**	**3**	**4,5**	**2**	**1,9**	**3**	**2,6**	**3**	**1,5**	**13**	**1,2**
T 7.1 Communication strategy	1	12	0,3	0,3	0,2	0,4	0,2	0,2	0,4	0,3	0,3	0,3	1	0,2
T 7.2 Dissemination strategy	1	12	0,3	0,3	0,2	0,4	0,2	0,2	0,4	0,3	0,3	0,2	1	0,2
T 7.3 Development and execution of dissemination and communication activities	1	42	3	3	2,6	3,7	1,6	1,5	2,2	2	2,4	1	11	0,8

Table 2.28: PMs distribution among partners and tasks in WP7

T 7.1 Communication strategy

The Communication strategy will be developed within the first months of the project, including:

- Branding and Project Identity.
- Communication Guidelines and Templates.
- Channel, Impact and Metrics definition.
- Key messages for specific stakeholders.

A coherent and assessed project identity will be defined in the very beginning of the project. This will require an initial assessment of the target audience and groups, and the image the project will need to transmit to reach potential stakeholders. The guidelines and strategy for a powerful Communication will be elaborated, with the definition of the required materials, activities, channels and deadlines that will be employed to launch effective communication campaigns.

Within this task T7.1, the following activities or subtasks will be carried out:

- T7.1.1 Create branding and project visual identity, communication guidelines and templates.

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- T7.1.2 Impact and Metrics definition.
- T7.1.3 Key messages for specific stakeholders.
- T7.1.4 Identify stakeholders to launch a survey / interview, define contents and launch the survey / interview.

The resources available for the task T7.1 are distributed as shown in the Table 2.29:

T 7.1 Communication strategy	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	1	12	0,3	0,3	0,2	0,4	0,2	0,2	0,4	0,3	0,3	0,3	1	0,2
T7.1.1 Branding & visual identity	2	3	0,075	0,075	0,05	0,1	0,05	0,05	0,1	0,075	0,075	0,075	0,25	0,05
T7.1.2 Impact and Metrics definition	2	3	0,075	0,075	0,05	0,1	0,05	0,05	0,1	0,075	0,075	0,075	0,25	0,05
T7.1.3 Key messages	6	6	0,075	0,075	0,05	0,1	0,05	0,05	0,1	0,075	0,075	0,075	0,25	0,05
T7.1.4 Survey / interview	6	7	0,075	0,075	0,05	0,1	0,05	0,05	0,1	0,075	0,075	0,075	0,25	0,05

Table 2.29: PMs distribution among partners in the task T7.1

T 7.2 Dissemination strategy

The Dissemination Strategy will be focused on designing the activities to disseminate the project results related to its techno-economic response, financial, legal and policy requirements. It will also aim at overcoming the barriers related to the ESCO model, which stands on the lack of awareness, maturity and information about its concept. Dissemination will be dedicated to specific target audiences which work in this sector, such as ESCOs, policy makers, facility managers, planners, installers, technology providers, and so on.

Within this task T7.2, the following activities or subtasks will be executed:

- T7.2.1 Identify specific target audiences in this sector.
- T7.2.2 Define the dissemination strategy according to the Communicative objective with each target and key messages.

The resources available for the task T7.2 are distributed as shown in the Table 2.30:

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T 7.2 Dissemination strategy	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	1	12	0,3	0,3	0,2	0,4	0,2	0,2	0,4	0,3	0,3	0,2	1	0,2
T7.2.1 Identify specific target audiences in this sector	5	5	0,1	0,1	0,06	0,14	0,06	0,06	0,14	0,1	0,1	0,06	0,4	0,06
T7.2.2 Define the dissemination strategy according to the Communicative objective with each target and key messages	5	12	0,2	0,2	0,14	0,26	0,14	0,14	0,26	0,2	0,2	0,14	0,6	0,14

Table 2.30: PMs distribution among partners in the task T7.2

T 7.3 Development and execution of dissemination and communication activities

This task T7.3 focuses on carrying out the dissemination and communication activities, that arise to put into place the defined strategy (tasks T7.1 and T7.2).

The following activities will be carried out within this task T7.3:

- Project website
- Launching of press releases
- Digital newsletters
- Social media channels (Twitter, LinkedIn and YouTube)
- Participation in events, conferences, webinars, meetings…
- Open day events
- Scientific publications
- Overall dissemination material (flyers, brochures, posters)

The resources available for the task T7.3 are distributed as shown in the Table 2.31:

T 7.3 Development and execution of dissemination and communication activities	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
TOTAL PMs	1	42	3	3	2,6	3,7	1,6	1,5	2,2	2	2,4	1	11	0,8
T7.3.1 Project website	1	42	0,55	0,55	0,47	0,67	0,3	0,27	0,4	0,36	0,44	0,18	2	0,14
T7.3.2 Press releases	1	42	0,4	0,4	0,35	0,5	0,22	0,2	0,3	0,28	0,33	0,14	1,5	0,12

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T 7.3 Development and execution of dissemination and communication activities	Start	End	TECNALIA	GIROTZE	BARRIZAR	EURAC	TECNOZENITH	INNOVA	AEE	GWS	FRAUNHOFER	RINA-C	GBCe	ANESE
T7.3.3 Digital newsletter	4	42	0,27	0,27	0,24	0,34	0,14	0,14	0,2	0,18	0,215	0,09	1	0,07
T7.3.4 Social media channels	5	42	0,27	0,27	0,24	0,34	0,14	0,14	0,2	0,18	0,215	0,09	1	0,07
T7.3.5 Events & meetings	5	42	0,42	0,42	0,35	0,5	0,22	0,2	0,3	0,28	0,33	0,14	1,5	0,12
T7.3.6 Open day events	12	42	0,27	0,27	0,24	0,34	0,15	0,14	0,2	0,18	0,215	0,09	1	0,07
T7.3.7 Scientific publications	12	42	0,27	0,27	0,24	0,34	0,14	0,14	0,2	0,18	0,215	0,09	1	0,07
T7.3.8 Overall dissemination material	12	42	0,55	0,55	0,47	0,67	0,29	0,27	0,4	0,36	0,44	0,18	2	0,14

Table 2.31: PMs distribution among partners in the task T7.3

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WP8 – Ethics requirements

The objective of the WP8 is to ensure **compliance with the 'ethics requirements**' set out in this work package led by TECNALIA and participated by all the partners.

The required and detailed data protection policy will be established for the project in this WP8. And in addition, the specification of the technical and organizational measures (anonymization / pseudonymization, policies and methodologies about the data acquisition, data management and data access, encryption techniques, etc.) to safeguard the rights and freedoms of the data subjects/research participants (GA) will be determined.

The 'ethics requirements' that the project must comply with are included as deliverables in this work package. Specifically. the main output of this WP8 will be the deliverable (type: "Ethics") "**D8.1 POPD – Requirement No. 2**", to be submitted in month 6 (i.e. March 2021), a confidential document only for members of the consortium including the Commission Services.

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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 (of different types) are one of the main outputs or results, together with the implementations on the demo sites, of the HAPPENING 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 2021) 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, or even earlier, 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 proposed by the WP Leader in at least 6 months of advance in the Workplan Excel (the deep explanation of the Workplan Excel is provided in the deliverable D1.2).

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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.
5. One month (30 days) before the submission date, the lead beneficiary partner must send the reviewed version of the deliverable to the Project Coordinator for the last review.
6. During the last month (30 days) before the submission of the deliverable, the lead beneficiary of the deliverable works together with the Project Coordination Team (TECNALIA) in the last details to make a high-quality deliverable.
7. Submission Date: TECNALIA uploads the deliverable to the EC Repository

In the next Figure 3.1, an illustrative example of the procedure for deliverable review in the HAPPENING project is shown:

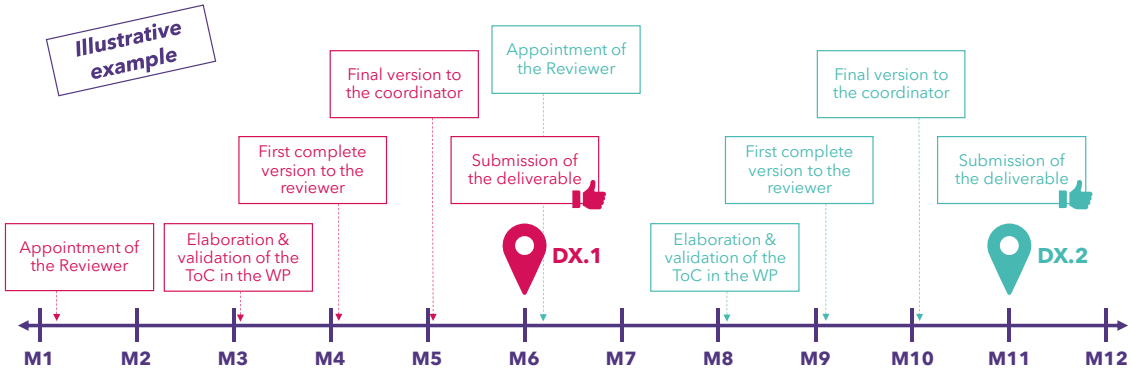

Figure 3.1: Illustrative example of the procedure for deliverable review in the HAPPENING project

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 or 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 the situation and expectations for this deliverable.

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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 HAPPENING project agree to use the templates that are available in SharePoint repository (explained in chapter 4.1).

On regard to the common image / brand of the project, the following formats (colours, style, typography) and the logos have been created:

Logos / tagline	
Demo logos	
Colours	Main colours: **CMYK:** 79 - 85 - 1 - 15 **RGB:** 81 - 54 - 128 **#513680** **CMYK:** 10 - 99 - 43 - 2 **RGB:** 212- 17- 88 **#D41158** Secondary colours: **CMYK:** 0- 59 - 94 - 0 **RGB:** 239 - 127 -26 **#EF7F1A** **CMYK:** 67 - 0 - 36 - 0 **RGB:** 72 - 185 -178 **#48B9B2**
Typo style	**Ag** Maven Pro Regular, Medium & Bold Utilizada para titulares y frases cortas para destacar textos. Utilizada en minúsculas y con un padding de -25 en las versiones Regular y Medium y -20 en Bold. Ag Quicksand Light, Regular, Italic & Bold Utilizada para cuerpos de texto, principalmente en Light (para medios impresos) y Regular (medios digitales), con un interlineado aproximadamente un 20% superior al cuerpo de texto. Regular

Table 3.1: Visual identity of the HAPPENING project

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Regarding the structure of contents, these are the main tables of content of different deliverables and outputs in the project:

Type of output	*Table of contents (ToC) or index*
Deliverable	*Technical references* *Table of content and figures, tables* *Versions* *Abbreviations and acronyms* Abstract of the HAPPENING project 1. Introduction (Objective of the deliverable, description, contribution of partners, relation with other activities in the project) 2-N. SPECIFIC CONTENT OF THE DELIVERABLE Annexes
Agenda - WP Leaders meeting	• General overview of the Project – PC [10-15 min] (Gantt, deliverables, milestones, risks / problems, communication with the PO, etc.) • Status of the advances in the workplan of each WP – WP Leaders [5-10min each WP] (Review of the status of the workplan and advances of each WP, based on the Excel file (previously updated)) • Questions – All [10-15min]
Agenda - WP meetings	• General overview of the WP – WP Leader • Advances and next steps in each task – Task Leader • Questions – All [10-15min]
Minutes of the meetings	• Agenda • Minutes of the meeting • Key ideas to highlight and next meeting date • Annexes

Table 3.2: Structure of contents of different output in the project

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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 HAPPENING 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 technical and financial 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.)

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  - Any other document / file considered useful by the Coordinator or the WPLs
- 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 4.1:

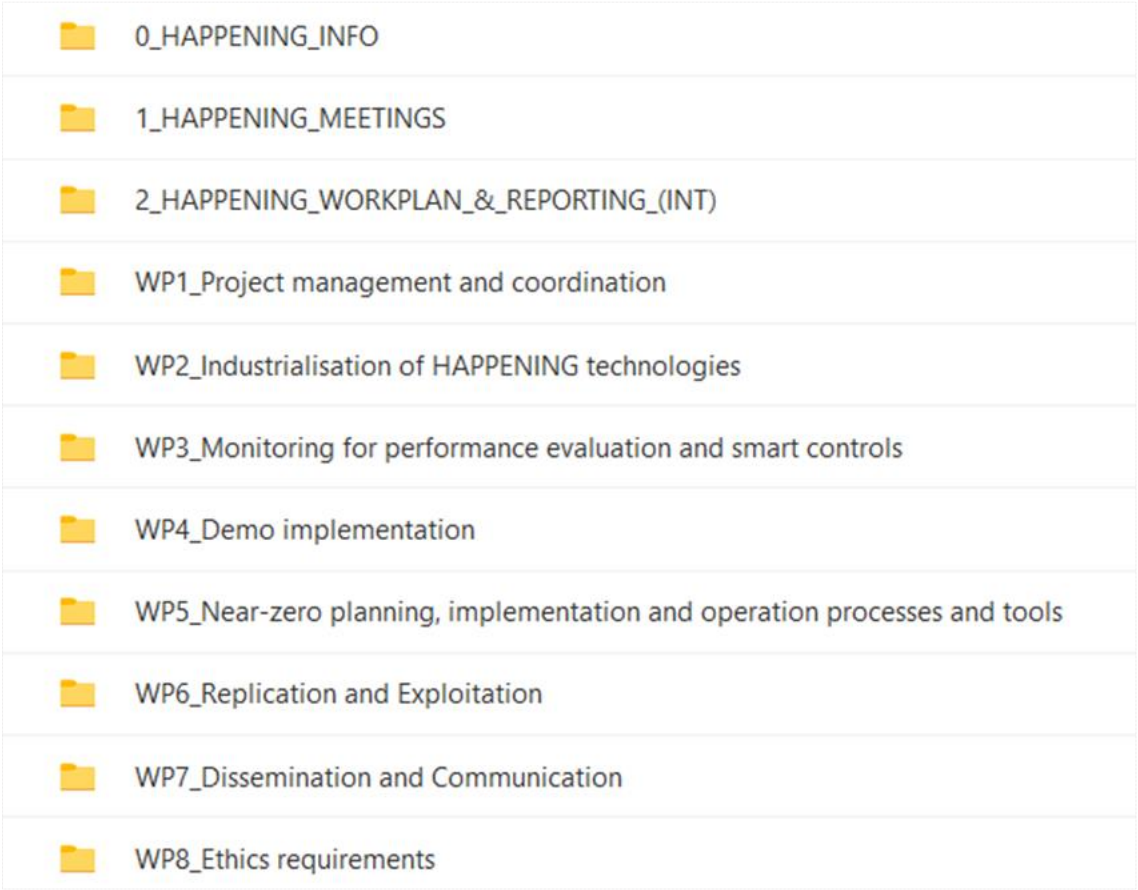

Figure 4.1: Folders structure in the SharePoint repository of HAPPENING (screenshot)

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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 HAPPENING-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.
- If the partner is the leader of a WP (i.e. EURAC, FRAUNHOFER, TECNALIA, TECNOZENITH, RINA-C, GBCe), a WP leader and a Deputy WP leader must be appointed.
- At least a person in each of the WPs (WP2 – 6) participated by the entity
    - In the case of the "WP4 Demo Implementation", a person from the teams of the Local Demo Groups is appointed as leader or coordinator of 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 [HAPPENING_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 HAPPENING is managed by the Coordinator and the WPLs, using the Workplan Excel. The agenda and invitations will be distributed as defined in the Consortium Agreement and in the deliverable "D1.2 Project Management Plan" in further detail.

On regard to the **Official meetings**, the next Table 4.1 summarizes the planned meetings in the project:

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Meeting	When	Who
Kick-off Meeting (KoM)	Project **start-up** (online, due to COVID)	All partners
PSC Meetings	Every **6 months** (face to face) and conference calls every 3 months.	PM, WP leaders, EM, DM and IM
GA Meetings	Every **6 months** in conjunction with PSC meetings	All partners
Project Review Meetings	As **required** by the EC	All partners and EC.
Project Final Meeting	Project **end** (face to face)	All partners

Table 4.1: Official meetings in the HAPPENING Project

The PSC Meetings and GA Meetings are planned to be held face-to-face meetings every 6 months. At the submission date of this deliverable (December 2020), the COVID-19 situation affects to the format of the face-to-face meetings and the decision about the first GA & PSC meeting of the project expected for April 2021 will be make considering the evolution of the situation. 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 21 (June 2022), month 33 (June 2023) and in month 45 (June 2024). Ideally, we will try to make the GA&PSC meeting in the same dates of the Review.

About the **WP Leaders meetings** and the **WP** (or task, if necessary) **audio-meeting**, they will be **every 2 months as minimum**, and depending on the needs / objectives of the project or of the WP in the semester (risks, problems, etc.), they may be more frequently.

Every 6 month, the schedule of meetings for the next semester will be shared by the Project Coordinator (organizer of the WPL Meetings) and the WP Leaders (organizers of the WP meetings), through the Workplan excel in SharePoint and sending invitation by email to all the participants, including in copy (CC) the Project Coordinator.

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 15 days to review and validate the minutes. If no comment is received from partners during this period, the minutes are automatically approved.

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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 HAPPENING, 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. In HAPPENING, due to the demonstrative nature of the project, it is important to define the steps to integrate the developed innovations into the industrialisation of devices & systems (HAPPENING solution - optimized combination of devices and control) and into the market.

HAPPENING 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 5.1: Description of ISAMPE - TECNALIA's Standard Innovation Management Process

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The identification and selection of the exploitable results has been done during the proposal stage and the partners will be continue working on deeper details on the replication and exploitation of the results on the WP6. A plan will be defined for the use and the dissemination of foreground (D6.7 in first version and D6.8 in final version), considering, among others, the social and market acceptance technologies (D6.1), the impact of technologies on terms of emissions (D6.2), the business models and plans of ESCOs (D6.3, D6.5), the integration of the solutions in public & private and tertiary and residential buildings (D6.4) and standardization and non-technical barriers for HAPPENING replication (D6.6).

In addition, in the HAPPENING project, a deeper study and work will be executed to develop tools and resources for replication, supporting different stakeholders and decision-makers and facilitating the implementation of the HAPPENING system. For example, guidelines on energy performance guarantees will be created to reduce uncertainty and thus risk, highly improving the decision-making process (D5.1, D5.2, D5.3). Similarly, technical manuals and instructions will be developed to support installers during implementation phase (D5.4, D5.5).

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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 HAPPENING project are defined and all the procedures / methods / tools for assuring the well-advances of the workplan of the project are described in detail.

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Annexes

Annex 1: List of deliverables

Number	Deliverable Title	WP number	Related tasks	Lead Beneficiary		Type	Reviewer	Dissemination level	Due date	
				n°	short name				month	deadline
D1.1	Quality Assurance Plan	WP1	T1.1	1	TECNALIA	Report	EURAC	Public	3	31/12/2020
D1.2	Project Management Plan	WP1	T1.1	1	TECNALIA	Report	TECNOZENITH	Public	3	31/12/2020
D1.3	Ethic and gender issues consideration report	WP1	T1.3	1	TECNALIA	Report	FRAUNHOFER	Public	3	31/12/2020
D1.4	Data Management Plan	WP1	T1.4	1	TECNALIA	ORDP[1]	RICA-C	Public	6	31/03/2021
D2.1	Review of normative and legislation	WP2	T2.1 - ST2.1.1	4	EURAC	Report		Public	6	31/03/2021
D2.2	Industrialised heating, cooling and DHW units	WP2	T2.2, ST2.1.2 & ST2.1.3	6	INOVA	Demonstrator		Confidential[2]	12	30/09/2021
D2.3	Results of the laboratory tests	WP2	T2.2, ST2.1.4	4	EURAC	Report		Confidential[2]	24	30/06/2022
D2.4	Energy storage modelling and capacity optimization	WP2	T2.2 - ST2.2.3	7	AEE	Report		Public	15	31/12/2021

[1] ORDP: Open Research Data Pilot

[2] Confidential, only for members of the consortium (including the Commission Services)

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Number	Deliverable Title	WP number	Related tasks	Lead Beneficiary		Type	Reviewer	Dissemination level	Due date	
				n°	short name				month	deadline
D2.5	Smart control hardware architecture	WP2	T2.2 - ST2.2.2	6	INOVA	Demonstrator		Confidential[2]	18	31/03/2022
D2.6	Model Predictive Control strategies	WP2	T2.2 - ST2.2.4	4	EURAC	Other		Confidential[2]	24	30/06/2022
D2.7	Results of numerical analysis of HAPPENING system performance	WP2	T2.3	4	EURAC	Report		Public	36	31/12/2022
D3.1	Monitoring concept definition of HAPPENING system	WP3	T3.1	9	FRAUNHOFER	Report		Public	17	28/02/2022
D3.2	Monitoring methodology implementation	WP3	T3.2	9	FRAUNHOFER	Report		Public	24	30/06/2022
D3.3	Overall results analysis	WP3	T3.4	9	FRAUNHOFER	Report		Public	42	31/03/2023
D4.1	End-user requirements and building constraints-Spanish demo	WP4	T4.1	2	GIROTZE	Report		Public	9	30/06/2021
D4.2	End-user requirements and building constraints-Italian demo	WP4	T4.1	5	TECNOZENITH	Report		Public	9	30/06/2021
D4.3	End-user requirements and building constraints-Austrian demo	WP4	T4.1	7	AEE	Report		Public	9	30/06/2021
D4.4	System design-Spanish demo	WP4	T4.2	1	TECNALIA	Report		Public	17	28/02/2022
D4.5	System design-Italian demo	WP4	T4.2	4	EURAC	Report		Public	17	28/02/2022
D4.6	System design-Austrian demo	WP4	T4.2	7	AEE	Report		Public	17	28/02/2022
D4.7	Techno economic assessment - Spanish demo	WP4	T4.4	1	TECNALIA	Report		Public	36	31/12/2022
D4.8	Techno economic assessment - Italian demo	WP4	T4.4	4	EURAC	Report		Public	36	31/12/2022

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Number	Deliverable Title	WP number	Related tasks	Lead Beneficiary		Type	Reviewer	Dissemination level	Due date	
				n°	short name				month	deadline
D4.9	Techno economic assessment - Austrian demo	WP4	T4.4	7	AEE	Report		Public	36	31/12/2022
D5.1	Measurement and Verification (M&V) Plan of Happening system	WP5	T5.1	12	ANESE	Report		Public	15	31/12/2021
D5.2	Energy performance Guarantee planning & implementation guideline	WP5	T5.1	12	ANESE	Report		Public	18	31/03/2022
D5.3	Quality assurance analysis of HAPPENING system	WP5	T5.2	1	TECNALIA	Report		Public	36	31/12/2022
D5.4	HAPPENING system design guideline	WP5	T5.3	1	TECNALIA	Report		Public	39	28/02/2023
D5.5	Technical manuals and instructions	WP5	T5.4	2	GIROTZE	Report		Public	36	31/12/2022
D6.1	Technologies social and market acceptance	WP6	T6.1	10	RINA-C	Report		Public	18	31/03/2022
D6.2	Technologies benefit impact in terms of emissions	WP6	T6.1	1	TECNALIA	Report		Public	18	31/03/2022
D6.3	Business and ESCO Model	WP6	T6.2	10	RINA-C	Report		Confidential[2]	42	31/03/2023
D6.4	E-Handbook with guidelines for integration of the solutions in public and private, tertiary and residential buildings	WP6	T6.3	10	RINA-C	Report		Public	42	31/03/2023
D6.5	Business and Plan involving social/market aspects	WP6	T6.1, T6.2	10	RINA-C	Report		Public	42	31/03/2023
D6.6	Report on current standardization and non-technical barriers for HAPPENING replication	WP6	T6.4	12	ANESE	Report		Public	42	31/03/2023

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Number	Deliverable Title	WP number	Related tasks	Lead Beneficiary		Type	Reviewer	Dissemination level	Due date	
				n°	short name				month	deadline
D6.7	First version of the plan for use and dissemination of foreground and exploitation strategy seminar outcomes	WP6	T6.5	10	RINA-C	Report		Public	24	30/06/2022
D6.8	Final version of the plan for use and dissemination of foreground	WP6	T6.5	10	RINA-C	Report		Public	42	31/03/2023
D7.1	Communication strategy and results of the first activities	WP7	T7.1	11	GBCe	Report		Public	12	30/09/2021
D7.2	Dissemination strategy and results	WP7	T7.2	11	GBCe	Report		Public	12	30/09/2021
D7.3	HAPPENING dissemination and communication work and results	WP7	T7.3	11	GBCe	Report		Public	24	30/06/2022
D7.4	HAPPENING dissemination and communication work and results 2	WP7	T7.3	11	GBCe	Report		Public	42	31/03/2023
D8.1	POPD - Requirement No. 2	WP8	NA	1	TECNALIA	Ethics	GBCe	Confidential[2]	6	31/03/2021

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Annex 2: List of milestones

Milestone number	Milestone title	Lead beneficiary	Due date	Means of verification	Related WP
MS1	Prototypes of heat pumps manufactured by INNOVA, ready to be shipped to demo sites	6 - INNOVA	12	Prototypes of heat pumps manufactured by INNOVA, ready to be shipped to demo sites. Means of verification: Prototypes manufactured	WP2
MS2	Communication, dissemination and exploitation strategy defined	11 - GBCe	12	Communication, dissemination and exploitation strategy defined Means of verification: D6.7, D6.8, D7.1 & D7.2 performed and approved by EDT	WP6, WP7
MS3	System design of demo sites	1 - TECNALIA	17	System design of demo sites. Means of verification: System design of demo sites fully finished. All the technical details defined, ready to start interventions. D4.4., D4.5. and D4.6. performed and approved by PSC.	WP4
MS4	Measurement technology installed and commissioned. Online platform for the integration of the measurement raw data is set up	9 - FRAUNHOFER	24	Measurement technology installed and commissioned. Online platform for the integration of the measurement raw data is set up. Means of verification: Measurement technology installed and commissioned. Online platform for the integration of the measurement raw data is set up. Means of verification: Monitoring platform operational	WP3
MS5	New energy supply technologies, including storages, commissioned on the three demo sites	1 - TECNALIA	24	New energy supply technologies, including storages, commissioned on the three demo sites. Means of verification: New energy supply technologies, including storages, commissioned on the three demo sites Means of verification: Commissioning tests performed, and results meet expectations (D4.7, D4.8 & D4.9 performed and approved by PSC)	WP4
MS6	Model predictive controls programmed, ready to be implemented in the demo sites' BEMS hardware	4 - EURAC	24	Model predictive controls programmed, ready to be implemented in the demo sites' BEMS hardware. Means of verification: Model predictive controls programmed, ready to be implemented in the demo sites' BEMS hardware Means of verification: D2.5 performed and approved by PSC	WP2

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Milestone number	Milestone title	Lead beneficiary	Due date	Means of verification	Related WP
MS7	Data processing scripts developed and integrated. Data analysis platform MONDAS set up, operational and accessible by partners. Visualisation of the performance accessible	9 - FRAUNHOFER	30	Data processing scripts developed and integrated. Data analysis platform MONDAS set up, operational and accessible by partners. Visualisation of the performance accessible. Means of verification: Data processing scripts developed and integrated. Data analysis platform MONDAS set up, operational and accessible by partners. Visualisation of the performance accessible Means of verification: Data analysis platform MONDAS operational. Access tested by partners and successful operation confirmed.	WP3
MS8	Quality assurance process of the HAPPENING validated	1 - TECNALIA	36	Quality assurance process of the HAPPENING validated. Means of verification: Quality assurance process of the HAPPENING validated Means of verification: D5.3 performed and approved by PSC	WP5
MS9	Dissemination, exploitation and communication plan successfully executed	11 - GBCe	42	Dissemination, exploitation and communication plan successfully executed. Means of verification: Dissemination, exploitation and communication plan successfully executed Means of verification: D5.3 performed and approved by PSC	WP6, WP7

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