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# D7.2 Dissemination, communication and exploitation

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**Horizon Europe**

**101139527**

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# Content

Executive Summary ..... 11
1. Introduction ..... 12
1.1 Purpose of the document ..... 12
1.2 Relation to other project work ..... 12
1.3 Structure of the document ..... 12
2. Stakeholder engagement ..... 13
2.1 Stakeholders preliminary mapping ..... 13
2.2 Stakeholders mapping – next phase ..... 14
2.2.1 The workshops: an overview ..... 14
Workshop #1 – Stakeholders involvement: Introduction to Living Labs (10 March 2025) ..... 14
Workshop #2 – Group Reflections and Synthesis (17 March 2025) ..... 15
Workshop #3 – Aligning Vision and Stakeholder Content (31 March 2025) ..... 15
Workshop #4 – Draft Vision and Usage Scenarios (7 April 2025) ..... 16
Workshop #5 – Finalisation of Usage Scenarios (14 April 2025) ..... 16
Workshop Outcomes and Feedback ..... 16
2.3 Advisory Board ..... 18
2.3.1 Onboarding and role ..... 18
2.3.2 Key takeaways from the first advisory board meeting ..... 18
2.3.3 Next steps ..... 19
3. Communication and dissemination ..... 20
3.1 Tools to reach target groups ..... 20
3.2 Quantitative Results ..... 20
3.3 Project documentation ..... 21
3.4 ExPEDite Newsletter ..... 23
3.5 Web & Social Media ..... 24
3.5.1 ExPEDite Website ..... 24
3.5.2 LinkedIn ..... 25
3.5.3 X (Twitter) ..... 26
3.5.4 YouTube ..... 27
3.6 Events ..... 28
3.6.1 OASC Summit 2024 ..... 28
3.6.2 Cities Mission Conference 2024 ..... 29
3.6.3 ECCE Europe 2024 ..... 30
3.6.4 FIWARE Summit 2024 ..... 31
3.6.5 Cluster Meeting on “Positive Energy Neighbourhoods and Districts” 2024 ..... 32

3.6.6 IEEE International Scientific Conference on Power and Electrical Engineering.....33
3.6.7 Innovation procurement and Horizon Europe City Mission and CL5 brokerage event ..33
3.6.8 Green Building Conference & Expo .....34
3.6.9 Smart City Expo World Congress.....35
3.6.10 FARI Conference – partner day 2024.....36
3.6.11 OASC Conference 2025.....37
3.6.11 Increasing Digitalisation Awareness & Readiness of Slovak Communities .....38
3.6.12 Forum: How is Europe supporting the digitalization of services – and how can you benefit?.....40
3.6.13 Cities Mission Conference 2025 .....40
3.6.14 Horizon Europe Cluster 5 Info Day 2025 .....42
3.7 Publications.....42
3.8 Other activities.....43
4. Exploitation and Financial Sustainability .....44
4.1. European Market for Sustainable Energy Practices .....44
4.1.1 Current Status .....44
4.1.2 Expected Growth.....47
4.1.3 Narrowing the Focus: Market Domains/Sectors of Interest for ExPEDite .....47
4.2. Market Drivers.....49
4.2.1 Relevant Drivers .....49
4.3. Problem setting: stakeholders, current market offering, and gaps to be exploited.....51
4.3.1 Definitive account of the stakeholders.....51
4.3.2 Current Offering.....52
4.3.3 Gaps in the current landscape.....54
4.4. Exploitable Assets – Description and identification of Target Groups for their exploitation ...55
4.5. ExPEDite offering.....59
4.6. Adoption barriers .....60
4.7. Market Analysis Methodologies .....62
4.7.1 Porter's Five Forces .....62
4.7.1.1 Buyers .....63
4.7.1.2 Suppliers.....64
4.7.1.3 Substitutes.....64
4.7.1.4 New Entrants.....65
4.7.1.5 Competition.....66
4.7.2 PESTLE Analysis.....67
4.7.2.1 Political.....68
4.7.2.2 Economic.....68

4.7.2.3 Social....69
4.7.2.4 Technological....70
4.7.2.5 Legal....70
4.7.2.6 Environmental....71
4.7.3 SWOT Analysis....74
4.7.3.1 Strengths....74
4.7.3.2 Weaknesses....74
4.7.3.3 Opportunities....75
4.7.3.4 Threats....75
4.8. Conclusions and Recommendations....77
4.9 Value Proposition....77
4.10 Intellectual Property Rights....78
4.10.1 Expected Knowledge Contributions....78
4.10.2 IP protection and management framework....82
4.10.3 Disputes settlement....86
4.10.4 Next steps: partners' responsibilities....86
5. Clustering and liaising with initiatives....87
5.1 Collaboration with sister R&I projects....87
5.2 Collaboration with the Cities Mission Platform....88
5.3 Collaboration with Scalable Cities....89
5.4 Other initiatives....90
5.5 Outlook....90
6. Conclusion....91
References: Market Analysis....92
Annex 1: ExPEDite Advisory Board Members....94
Annex 2: ExPEDite events participation....95
Annex 3: ExPEDite publications (published and planned)....102
Annex 4: Survey on Expected Knowledge Contributions to the Key Exploitable Assets....104

# Table of Figures

Figure 1: Example output Data and Knowledge Sharing Group of workshop 1 & 2 ..... 15
Figure 2: Feedback internal stakeholders/Living Lab webinars – positive remarks ..... 17
Figure 3: Feedback internal stakeholders-Living Lab webinars – challenges & concerns ..... 17
Figure 4: ExPEDite Rollup at the RTU premises ..... 22
Figure 5: Panoply of available communication tools ..... 23
Figure 6: Part of the ExPEDite Newsletter February 2025 ..... 24
Figure 7: Visitors of the ExPEDite website – channels – 02/2024 - 05/2025 ..... 25
Figure 8: Origin visitors of the ExPEDite website – 02/2024 - 05/2025 ..... 25
Figure 9: ExPEDite LinkedIn channel analytics 21/5/2024-21/5/2025 ..... 26
Figure 10: ExPEDite X account - 23/5/2025 ..... 27
Figure 11: Videos published on the ExPEDite YouTube channel ..... 27
Figure 12: LinkedIn post announcing the session of ExPEDIte ..... 29
Figure 13: ExPEDite and Tips4PED at Cities Mission Conference 2024 ..... 30
Figure 14: ECCE 2024 ..... 31
Figure 15: The Lisbon Council at the FIWARE Summit 2024 ..... 31
Figure 16: ExPEDite at the Cluster Meeting 2024 ..... 32
Figure 17: ExPEDite at Horizon Europe City Mission and CL5 brokerage event ..... 33
Figure 18: ExPEDite at Green Building Conference & Expo 2024 ..... 34
Figure 19: ExPEDite at the Smart City Expo World Congress 2024 ..... 35
Figure 20: ExPEDite and BIPED workshop on the FARI partner day 2024 ..... 36
Figure 21: ExPEDite at the OASC Conference 2025 ..... 37
Figure 22: Increasing Digitalisation Awareness & Readiness of Slovak Communities ..... 38
Figure 23: Arnis Gulbis during the session “Using Local Digital Twins in Practice” ..... 39
Figure 24: How is Europe supporting the digitalization of services – and how can you benefit? ..... 40
Figure 25: Forum: How is Europe supporting the digitalization of services? ..... 41
Figure 26: Horizon Europe Info Day 2025 ..... 42
Figure 27: Percentage of country-level gross final energy consumption derived from renewable sources in Europe in 2022. *Renewable energy statistics, Eurostat, 2023.* ..... 45
Figure 28: Percentage of gross final energy consumption of transport fuels derived from renewable sources in Europe in 2022. *Renewable energy statistics, Eurostat, 2023.* ..... 46
Figure 29: Survey results from the European Commission (2020) showing the sectoral adoption – actual or planned – of AI technologies. *Gailhofer et al (2021).* ..... 48
Figure 30: Geographic distribution of projects with PED ambition in Europe. *Joint Programming Initiative (JPI) Urban Europe, EUROPE TOWARDS POSITIVE ENERGY DISTRICTS. A compilation of projects towards sustainable urbanization and the energy transition, 2020.* ..... 53
Figure 31: Proportion of Lighthouse and Fellow cities experiencing obstacles in replicating project's solutions. *European Court of Auditors, Smart cities Tangible solutions, but fragmentation challenges their wider adoption, Special Report, 2023.* ..... 60
Figure 32: Porter's Five Forces. ..... 63
Figure 33: SWOT Analysis. ..... 76
Figure 34: ExPEDite IP protection and management framework as established in Articles 8 and 9 of the Consortium Agreement (CA) ..... 83

# Tables

Table 1: Quantitative KPIs. ..... 20

**List of Acronyms**

| Acronym | Meaning |
|---|---|
| 3D | Three dimensional |
| AR/VR | Augmented reality/virtual reality |
| ATOS | ATOS IT SOLUTIONS AND SERVICES IBERIA SL |
| AI | Artificial Intelligence |
| BIPED | Building Intelligent Positive Energy Districts |
| CA | Consortium Agreement |
| CBA | Cost Benefit Analysis |
| CINEA | European Climate, Infrastructure and Environment Executive Agency |
| D | Deliverable |
| DATI | SIA DATI GROUP |
| D&C | Dissemination and Communication |
| D&C&E | Dissemination, Communication and Exploitation |
| DEAR | Development Education and Awareness Raising |
| DELOITTE | DELOITTE CONSULTING SRL SOCIETA BENEFIT |
| DSIS | Data Spaces Integration Suite |
| DMP | Data Management Plan |
| DT | Digital Twin |
| EAB | Expert Advisory Board |
| EB | Executive Board |
| EC | European Commission |
| EGD | European Green Deal |
| EO | Expected Outcome |
| EU | the European Union |
| ExPEDite | "Enabling Positive Energy Districts through a Planning and Management Digital Twin", the Project |
| EXUS | EXUS SOFTWARE MONOPROSOPI ETAIRIA PERIORISMENIS EVTHINIS |
| FAIR | Data which meet principles of Findability, Accessibility, Interoperability, and Reusability |
| GA | Grant Agreement |
| GHG | Green House Gas |
| GDPR | General Data Protection Regulation |

| | |
|---|---|
| GO | General Objective |
| ICT | Information & Communication Technology |
| IEA | International Energy Agency |
| IPR | Intellectual Property Rights |
| IT | Information Technology |
| KPI | Key Performance Indicator |
| LAU | LAUREA-AMMATTIKORKEAKOULU OY |
| LC | THE LISBON COUNCIL FOR ECONOMIC COMPETITIVENESS ASBL |
| LL | Living Lab |
| M | Milestone |
| M | Month |
| MG | Mission Goal |
| MIMs | Minimal Interoperability Mechanisms |
| ML | Machine Learning |
| NGO | Non-governmental organization |
| MoU | Memorandum of Understanding |
| NTUA | ETHNICON METSOVION POLYTECHNION |
| OASC | Open and Agile Smart Cities |
| PLEGMA | PLEGMA LABS TECHNOLOGIKES LYSEIS ANONYMOS ETAIRIA |
| PMT | Project Management Team |
| PB | Plenary Board |
| PC | Project Coordinator |
| PED | Positive Energy Districts |
| PMP | Project Management Plan |
| Pub | Public |
| QR | Quality and Risk |
| R | Result |
| RES | Renewable Energy Sources |
| REA | RIGA MUNICIPAL AGENCY "RIGA ENERGY AGENCY" (REA) |
| Rep | Report |
| RIGA | Rīgas pilsētas pašvaldība |
| RTU | Rīgas Tehniskā universitāte |
| SC | Steering Committee |

| | |
|---|---|
| SEN | Sensitive |
| SN | Specific need |
| TECNALIA | FUNDACION TECNALIA RESEARCH & INNOVATION |
| Tips4PEDS | Turning cIties Planning (into) actionS for Positive Energy Districts |
| TM | Technical Manager |
| ToC | Table of Contents |
| TPEB | TECHNOLOGICKA PLATFORMA ENERGETICKABEZPECNOST CR ZS |
| UCP | UNIVERSIDADE CATÓLICA PORTUGUESA |
| UNIPD | UNIVERSITÀ DEGLI STUDI DI PADOVA |
| UPCOM | UPCOM CYPRUS LTD |
| VSB-TUO | VSB - TECHNICAL UNIVERSITY OF OSTRAVA |
| WBS | Work Breakdown Structure |
| WP | Work Package |

## Executive Summary

This deliverable provides an overview of the activities and progress made under Work Package 7 (WP7) – *Impact Creation and Exploitation* – during the first 18 months of the ExPEDite project. WP7 aims to maximize the project's long-term impact by ensuring that its results are visible, replicable, and adoptable by cities, communities, and stakeholders across Europe.

Key focus areas include stakeholder engagement, communication and dissemination, collaboration with sister projects and EU initiatives, and laying the groundwork for exploitation and financial sustainability. Five stakeholder workshops and the establishment of the Expert Advisory Board have supported co-creation, refinement of tools, and preparation for the Living Lab activities. These efforts ensure ExPEDite remains aligned with real-world needs and positioned for replication.

A comprehensive communication strategy—combining digital media, in-person outreach, and print materials—has been deployed to raise awareness of project activities. ExPEDite has also launched strategic collaborations with sister projects (BiPED and Tips4PED) and engaged with major EU initiatives, such as the Cities Mission Platform, Scalable Cities, and the Smart Cities Marketplace. These partnerships have already led to concrete outcomes and provide a strong foundation for future collaboration and visibility.

The deliverable also outlines ExPEDite's strategy for exploitation and financial sustainability. This includes the identification of key exploitable assets, a market analysis of the European sustainable energy sector, and a defined value proposition for stakeholders. These elements support the project's commercial viability and long-term relevance. Additionally, a framework for Intellectual Property (IP) protection ensures that innovations are safeguarded and exploitation rights are clearly defined among partners.

Overall, ExPEDite has made significant strides in setting up a robust foundation for impact, sustainability, and market readiness. Through its integrated approach, the project is well positioned to contribute meaningfully to the development and adoption of Positive Energy Districts across Europe.

# 1. Introduction

## 1.1 Purpose of the document

The present document provides the achievements of the first 18 months of the ExPEDite project in stakeholder engagement (including the expert advisory board), communication and dissemination, exploitation and financial sustainability and collaboration with sister projects and with the Cities Mission Platform based on the plan described in ExPEDite_D7.1 Dissemination, communication and exploitation.

## 1.2 Relation to other project work

The outputs, results and deliverables of the different work packages, for example the ExPEDite Living Lab, the demonstrator of the Digital Twin and its architecture, data governance models and interoperability of the data and the solution, are important inputs for a successful dissemination and communication of the project, connecting with stakeholders and initiatives and assuming the sustainability of project's results.

## 1.3 Structure of the document

This document is structured in 6 major chapters:

**Chapter 2** provides advancements on stakeholder's engagement, including the expert advisory board.

**Chapter 3** elaborates on the results of communication and dissemination activities.

**Chapter 4** goes deeper into the exploitation and financial sustainability of the project's work.

**Chapter 5** provides the plan and activities for clustering and liaising with other initiatives.

**Chapter 6** provides the overall conclusions of the deliverable.

# 2. Stakeholder engagement

Building upon the foundation established in Deliverable D7.1, stakeholder engagement continues to be a core component of ExPEDite's implementation strategy. The project aims to engage a wide range of stakeholders—classified as users, enablers, and influencers—not only to disseminate key findings but also to actively involve them in the co-design of tools, digital twin solutions, and strategies adapted to their specific urban needs. This participatory approach is essential to ensuring both the societal acceptance of sustainable energy solutions and the long-term scalability and replicability of ExPEDite outcomes across European cities.

Stakeholder engagement activities are included in all work packages, but primarily driven through Work Packages 6 and 7, which focus respectively on Living Lab deployment and broader communication and dissemination efforts. These activities are structured to build a well-connected, informed, and invested stakeholder ecosystem that supports the development and adoption of Positive Energy District (PED) solutions. The collaborative nature of these efforts ensures alignment across different actors, contributing to the overarching goals of climate neutrality and energy efficiency.

Key expected outcomes of this stakeholder engagement include enhanced cross-sector collaboration, improved public awareness of PED benefits, and the integration of stakeholder feedback to refine project tools and digital twin functionalities. These outcomes are designed to improve the technical robustness and practical relevance of ExPEDite solutions, ensuring their utility during the project and beyond.

## 2.1 Stakeholders preliminary mapping

A provisional stakeholder list, structured around the Quadruple Helix model (academia, industry, public authorities, and civil society), was initially outlined in the Grant Agreement and further referenced in Deliverable D7.1. In the first six months of the project, the ExPEDite consortium undertook a targeted stakeholder mapping exercise to refine and expand this list, ensuring comprehensive identification of actors relevant to the project's objectives.

This early mapping served as a critical input to the broader stakeholder engagement strategy, guiding consistent and meaningful involvement across the project's work packages. It enabled the consortium to pinpoint key actors—at both national and EU levels—who are positioned to contribute to, or benefit from, the project's outcomes, particularly in the context of urban digital transformation and sustainable energy systems.

Examples of some added key stakeholders:

- **Riga First Hospital**: Identified as a potential pilot site for testing and validating ExPEDite solutions in a healthcare district setting. The hospital's complex infrastructure and energy demands made it a strong candidate for real-world application and demonstration.
- **Educational Institutions in Riga**: Engaged as target users for the ExPEDite mobile application, with the goal of promoting energy awareness and behavioural change among students and staff. These institutions offer a channel for youth engagement and early adoption of energy-efficient practices.
- **Riga Digital Agency**: Approached as a strategic partner for integrating ExPEDite services into the existing GeoRiga municipal platform. This collaboration aims to enhance the visibility, accessibility, and practical utility of project-developed tools via established city-wide digital infrastructure.

This early stakeholder engagement laid a strong foundation for the real-world application of ExPEDite solutions beyond the pilot implementation, helping to align technical development with local needs and expectations.

The results of this mapping laid the groundwork for deeper engagement activities, particularly in anticipation of the launch of Work Package 6. This work package marks a pivotal shift toward the practical implementation of Living Lab activities in Riga, and the stakeholder insights gathered during the mapping phase are expected to play a significant role in shaping and improving the initial version (V1.0) of the project's tools and solutions. These tools, in turn, will facilitate more targeted and effective engagement in subsequent phases of the project.

## 2.2 Stakeholders mapping – next phase

In full coordination with project management, partners LAUREA and LC co-led the design and implementation of a series of five internal workshops, launched in March 2025 (Month 15). The primary objective of these workshops was to refine the end-user facing description of the ExPEDite offerings, clarify stakeholder categories and their roles, and explore the potential of the Living Lab approach as a practical framework to support the development and deployment of ExPEDite solutions.

This initiative was considered essential due to the varying levels of thematic expertise and knowledge distribution across the consortium. By creating a structured space for shared learning and alignment, the workshops aimed to enhance internal coherence and strengthen the project's overall capacity to deliver integrated, stakeholder-oriented solutions.

Ahead of the workshop series, technical partners contributed with non-technical descriptions of the ExPEDite components to ensure that all partners—regardless of their background—could fully understand the intended use and value of the technical solutions. These inputs included descriptions of the solutions' purpose, scope, and practical applications, along with an outline of key "pains," "gains," and benefits for users. Preliminary insights related to the upcoming testing phase and suggested target user groups were also shared. See the gathered details from here: Workshop series preliminary details from technical solutions spring 2025Workshop series preliminary details from technical solutions spring 2025minary details from technical solutions spring 2025

Across all five workshops, a total of 26 project partners participated, as recorded in the official attendee list. These collaborative sessions played a vital role in consolidating a shared understanding of the ExPEDite value proposition and ensuring readiness for the next phases of stakeholder engagement and Living Lab implementation.

### 2.2.1 The workshops: an overview

This series of five internal workshops, co-led by partners LAUREA and LC, was conducted between March and April 2025 and were structured as follow:

***Workshop #1 – Stakeholders involvement: Introduction to Living Labs (10 March 2025)***

The first workshop focussed on the importance of stakeholders' engagement in the development and sustainability of the project and introduced the Living Lab concept, featuring guest speaker Ms. Elena

Deambrogio from the City of Turin — one of Europe's leading Urban Living Lab initiatives. Partners participated in interactive Miro board activities, divided into four thematic groups:

1. Data and Knowledge Sharing
2. Long-Term Analytics and Simulation
3. Short-Term Analytics and Optimisation
4. Visualisation

Each group explored fundamental questions such as:

- *What* should the scope of the ExPEDite Living Lab be?
- *Who* are the key stakeholders (Quadruple Helix actors)?
- *Why* is early stakeholder engagement critical for technical development?

### *Workshop #2 – Group Reflections and Synthesis (17 March 2025)*

Building on the first session, each group presented their key findings, including open questions for follow-up. The group outputs helped distil initial ideas and highlighted areas requiring further exploration. For example, Group 1 (Data and Knowledge Sharing) delivered a comprehensive list of enablers and barriers to data sharing within Living Lab environments.

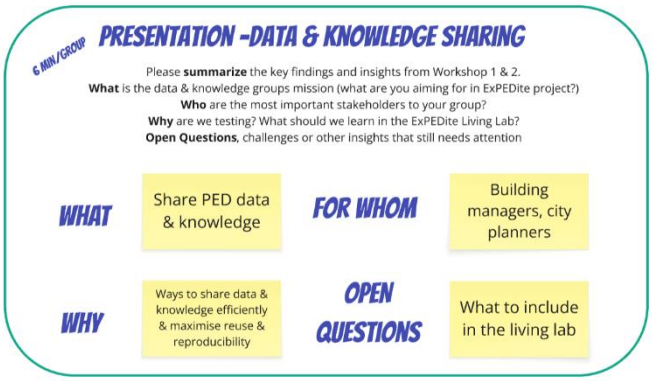


Figure 1: Example output Data and Knowledge Sharing Group of workshop 1 & 2

A summary of the results from Workshops 1 and 2 can be accessed here: Workshop Series Summary – Spring 2025

### *Workshop #3 – Aligning Vision and Stakeholder Content (31 March 2025)*

The third workshop aimed to align the emerging vision of the ExPEDite Living Lab with the overarching goals of the project, building also on insights gained during the WP6 team's study visit to the Centre for Energy and Environmental Technologies (CEET) at VŠB-TUO in Ostrava, Czechia, on 4 March 2025. (See also the ExPEDite blog post: Cooperation for Sustainable Cities – CEET Hosts ExPEDite Partners).

Participants of the workshop were encouraged to move freely between thematic groups to promote cross-pollination of ideas and discuss further the input generated in the first two workshops (especially the identified stakeholders and tools). This third workshop generated a set of draft content items to be

used in future Living Lab co-creation activities and laid the groundwork for refining the project's vision collaboratively. Participants made a significant effort to describe the specific content items to be shared within the Living Lab co-creation sessions. In this workshop, the original composition of the working groups was abandoned, and partners were left free to change from one to another. This, like the previous exercise on visioning, was done on purpose, to promote convergence and alignment of opinions among the different team members.

### *Workshop #4 – Draft Vision and Usage Scenarios (7 April 2025)*

Workshop 4 offered a space for validating and challenging the narrative that emerged in the previous session. A preliminary version of the project vision was presented, revised in real time based on partner feedback. In parallel, seven preliminary usage scenarios were introduced—each derived from project objectives and stakeholder needs—and subjected to group review and refinement.

### *Workshop #5 – Finalisation of Usage Scenarios (14 April 2025)*

The final workshop in the series concluded with the validation and consolidation of the seven usage scenarios, which will be presented to the General Assembly on 6–7 May 2025 in Brussels. These scenarios form the basis for the next phase of stakeholder engagement and Living Lab testing.

All workshop proceedings and interactive session outputs are available online: ExPEDite Miro Workshop Board

### *Workshop Outcomes and Feedback*

The stakeholder engagement workshops for the ExPEDite project successfully brought together participants to co-create a framework for stakeholders' engagement and defining the Living Lab (LL) approach. Four thematic groups were formed to cover key areas: **data and knowledge sharing**, **long-term analytics and simulation**, **short-term analytics and optimisation**, and **visualisation**.

The workshops achieved:

- **Effective within-group collaboration**, fostering productive discussion and idea exchange.
- **Progress towards a common vision** for engaging relevant stakeholders such as urban planners, policy makers, building managers, and citizens.
- **Clarification of aims** for each thematic area, with a focus on knowledge sharing, simulation of future scenarios, short-term data-driven solutions, and meaningful visualisation tools.
- **Identification of open questions** that need to be addressed before moving forward, including what specific knowledge and data to share, readiness of models and tools, and practical plans for stakeholder testing and feedback collection. These open questions were addressed by the end of the workshop series.

Overall, feedback received from participants across the five internal workshops was highly positive. Attendees particularly appreciated the use of Miro as a collaborative tool, which supported interactive co-creation and effective communication. The process of jointly identifying and shaping the seven preliminary usage scenarios was widely acknowledged as a valuable and necessary step toward meaningful stakeholder engagement in the Living Lab phase.

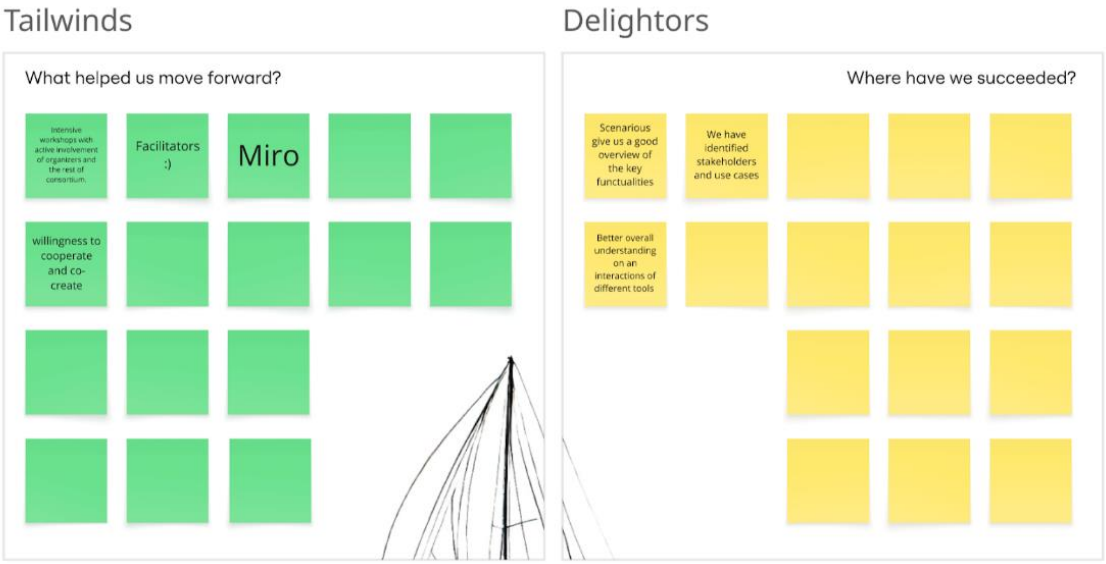


Figure 2: Feedback internal stakeholders/Living Lab webinars – positive remarks

Despite the overall success, several challenges and risks were also identified, particularly concerning the complexity of stakeholder mobilisation and engagement. These insights, as shown in the screenshots below, underscore the importance of proactive planning and ongoing coordination to ensure the Living Lab's effectiveness.

Figure 3: Feedback internal stakeholders-Living Lab webinars – challenges & concerns

ExPEDite partners are fully aware that while stakeholder engagement is essential to the success of the Living Lab approach, it also brings significant challenges that may influence the trajectory of future project activities.

To further consolidate outcomes and align on the way forward, a follow-up workshop was held during the third General Assembly in Brussels (6–7 May 2025). The session aimed to secure partner agreement on the final concept of the ExPEDite Living Lab, recognising that in such collaborative innovation

environments, stakeholder involvement is not just beneficial but essential. A well-functioning Living Lab depends on the meaningful participation of a diverse stakeholder ecosystem to ensure that developed solutions are relevant, socially acceptable, technically sound, and economically viable — while being firmly grounded in local contexts.

During the follow-up workshop, partners were invited to provide final input and agree on the following core elements:

- **Official name**: *ExPEDite Living Lab*
- **Brief description**: Who the Living Lab is designed for and its key functionalities and activities
- **Expected contributions**: How the concept supports solving domain-specific challenges in business, industry, or research
- **Opportunities**: Concrete benefits and use cases for different stakeholder groups
- **Mission statement**: An action-oriented summary defining the overarching goal of the Living Lab
- **Stakeholder value**: A list of added value elements the Living Lab offers to its stakeholders

The consolidated results of this exercise will be presented in a designed Living Lab Concept Leaflet, scheduled for release by August 2025 (M20). This document will serve as both an internal alignment tool and an external communication asset to support further stakeholder engagement and dissemination efforts.

## 2.3 Advisory Board

### 2.3.1 Onboarding and role

The onboarding process for the members of the ExPEDite Expert Advisory Board (AB) was defined in D7.1 and implemented within the first year of the project, under Task 7.1. This included the formalisation of collaboration (letter of cooperation and a non-disclosure agreement) preparation and dissemination of onboarding communication materials, as well as the validation of internal budget transfers to support the engagement process.

Initial communications with selected experts were initiated in the first year of the project and an AB kick-off meeting took place in November 2024. The AB plays a critical role in offering independent, high-level feedback, supporting the alignment of project activities with broader innovation trends and policy developments, and helping to refine approaches at key project milestones. Additionally, the AB contributes to building a wider community of stakeholders around the project.

The AB is fully established, comprising seven distinguished members representing a balanced mix of sectors, including Industry, Research & Academia, private sector actors, as well as individuals actively engaged in EU Mission Cities initiatives (see Annex 1).

This structure ensures that the AB remains a flexible, responsive, and strategically valuable asset throughout the lifecycle of the ExPEDite project.

### 2.3.2 Key takeaways from the first advisory board meeting

The first **online Advisory Board meeting** was successfully held on **26 November 2024**, with a duration of two hours. The session marked the formal launch of the Board's involvement and focused on outlining their expected contributions to the project.

Advisory Board members expressed their willingness to contribute primarily from a **technical and thematic perspective**, offering support in the following areas:

- Assisting in the **definition of project requirements**;
- Providing **internal reviews of selected technical deliverables** (selected by the project coordinator, in consultation with Work Package leaders, who may request such reviews as needed);
- Sharing **best practices related to Positive Energy Districts (PEDs)** and advancing **climate neutrality goals** across Europe, based on their domain expertise;
- Offering **recommendations to enhance stakeholder and policymaker engagement**.

### 2.3.3 Next steps

The Advisory Board members will also be closely involved in the upcoming ExPEDite Living Lab activities.

The next meeting of the Advisory Board is planned for after Month 18 (June 2025), timed to coincide with the first release of key ExPEDite components. This will allow for a more comprehensive review and the collection of targeted expert feedback on the project's technical and strategic direction.

Additionally, Advisory Board members will be closely engaged in the upcoming Living Lab activities, contributing insights and validation to ensure the co-creation process remains aligned with project goals and stakeholder needs.

Preparations for the upcoming on-site stakeholder meeting are progressing at full speed. Coordination is being led by LAUREA and LC, with active support from OASC and close collaboration with ExPEDite consortium members representing Riga City Hall.

# 3. Communication and dissemination

## 3.1 Tools to reach target groups

A variety of tactical measures have been developed (see ExPEDite_D7.1 Dissemination, communication and exploitation) to address the specific needs and interests of ExPEDite's target audience. These measures include online (website, social media, newsletters, etc.), paper-based (articles, reports, papers, etc.), and face-to-face (workshops, presentations, networking meetings, conference panels, etc.) approaches. For each measure, we have defined key performance indicators (KPIs) to monitor progress and, if necessary, implement corrective actions.

## 3.2 Quantitative Results

To capture the results of different tactics deployed during the project lifecycle, several measurements and indicators are set for each of the activities (as stated in the ExPEDite DoA [1]). The table below outlines quantitative targets for tracking and measuring progress and the results so far.

Table 1: Quantitative KPIs.

| Communication & Dissemination Support and Channels | | KPI Target (for 3yrs) | Realisation M18 |
|---|---|---|---|
| **Project documentation** | Leaflet | 1 | 1 |
| | Poster | 1 | 1 |
| | Project presentation | 1 | 1 |
| **Publications** | Newsletter | 9 | 3 |
| | Scientific articles and conference proceedings | >5 journal publications<br>>10 conference proceedings | 1 paper<br>2 literature reviews |
| | Courses | 4<br>>400 trainees in total | 0 |
| | Videos | 3 | 1 |
| | Published data | 2 datasets created<br>2 results on Horizon Results Platform<br>>500 dataset downloads within 5 years of project end | 0 (foreseen at the launch of V1.0 of the ExPEDite solutions and tool) |
| **Web and social media** | Project Website | >500 visitors/month by project end | 188 visitors last 30 days (23/05/2025) |

| | | | |
|---|---|---|---|
| | | | 1,935 unique visitors since 02/2024 |
| | LinkedIn | >900 impressions/month | 4,623 impressions (last 30 days on 21/05/25), average over the last 12 months on 21/05/25 1,146 impressions per month |
| | X/Twitter | >500 followers<br>>6500 impression/month | 31 followers (23/05/25)<br>1,053 impressions (last 30 days on 19/5/25) |
| **Events** | Fairs (booth), workshops and/or conferences attended | 15 events attended<br>>5000 participants in events attended | Participation in 14 events<br>>215,890 attendees |
| | Organized workshops | 2<br>>50 participants per workshop | 1 (30 participants) |
| **Clustering & collaboration (See chapter 5)** | Mission Cities Platform | 1 MoU | 1 MoU |
| | Joint clustering meetings | 3 | 1 |
| | Joint white paper | 1 | 0 |
| | (virtual) public events | 1 | 0 |

## 3.3 Project documentation

The project documentation is available in the project repository within the Kit for Partners. In a dedicated folder, partners (and the advisory board) can access all available materials, such as logos, press releases, presentations, poster graphics, roll-ups, leaflets, and more, to support the promotion of ExPEDite (see also D7.1). Partners are encouraged to use these materials to enhance the project's outreach and, if necessary, print the required items locally.

Figure 4: ExPEDite Rollup at the RTU premises

The communication kit ensures consistent messaging and branding, while also facilitating communication among project partners. The first version of the kit was made available in May 2024 and new items are being added throughout the project, incorporating progress, lessons learned, and the needs of the partners. The kit is accessible in the project's repository.

The following communication materials are available:

- Website
- Press release
- Presentation template
- Project presentation
- Poster
- Leaflet
- Roll-up
- Call-to-action card (for website subscription)
- Images
- Digital banners

Figure 5: Panoply of available communication tools

### 3.4 ExPEDite Newsletter

In December 2024, the first edition of the ExPEDite newsletter was distributed as a communication tool designed to engage stakeholders, share knowledge, and raise awareness about the project's results and impact on a wider scale.

The ExPEDite newsletter plays a key role in enhancing the project's visibility and promoting its outcomes. By providing regular updates with relevant information, it helps expand the project's reach, attracts new audiences, and ensures that its results are recognized across Europe and beyond. Additionally, the newsletter serves as a platform to showcase collaborations with other projects, initiatives, and networks, fostering stronger connections within the European ecosystem. It also facilitates the sharing of findings, tools, and resources that can inspire and support other stakeholders, including potential adopters, municipalities, and communities.

The second edition was distributed in February 2025, followed by the third edition in May 2025. The newsletter currently has 50 subscribers, with an average open rate of 52.3% and a click-through rate of 15.9%. The aim is to release four editions each year.

Figure 6: Part of the ExPEDite Newsletter February 2025

## 3.5 Web & Social Media

ExPEDite has dedicated online channels for the project, including a website, LinkedIn, X, and YouTube account.

### *3.5.1 ExPEDite Website*

The ExPEDite website was launched in February 2024, just prior to the project's kickoff meeting.

The website attracted on May 23, 2025, 1,935 unique visitors, with 56% accessing it directly, 34% via search engines, 4.3% through social media, and the remaining 5.7% coming from partners and other sites referencing the project.

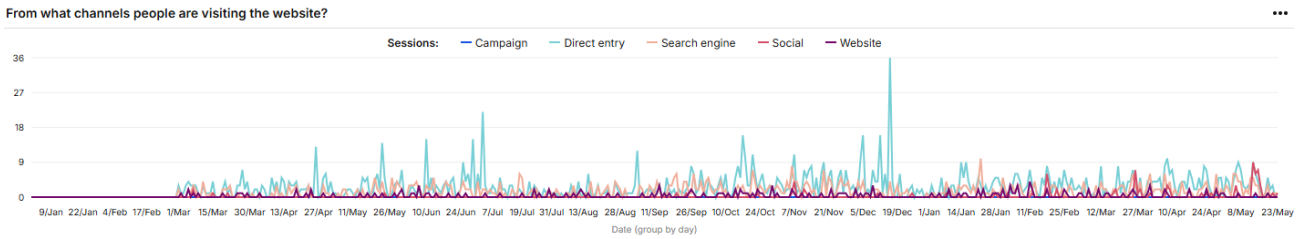


Figure 7: Visitors of the ExPEDite website – channels – 02/2024 - 05/2025

The geographic origin of the project is largely tied to the locations of its partners.

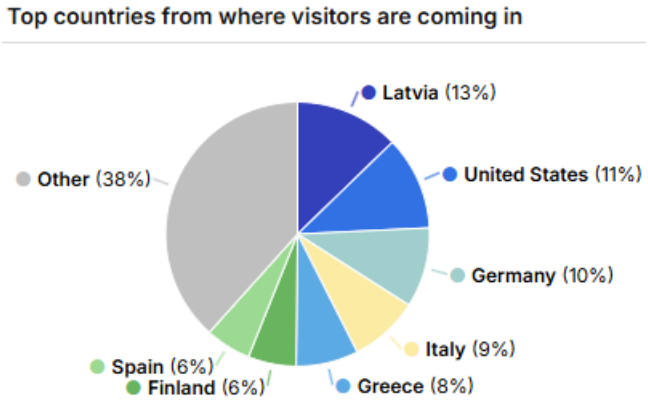


Figure 8: Origin visitors of the ExPEDite website – 02/2024 - 05/2025

The website is being regularly updated with new publications, deliverables (when approved by the European Commission), insights, and news.

### *3.5.2 LinkedIn*

The ExPEDite LinkedIn page was launched in January 2024 (M1 of the project).

As of May 21, 2025, the page has garnered 244 visitors, 207 new followers, and 13,549 impressions over the past 365 days. The majority of followers are located in regions where ExPEDite partners are based.

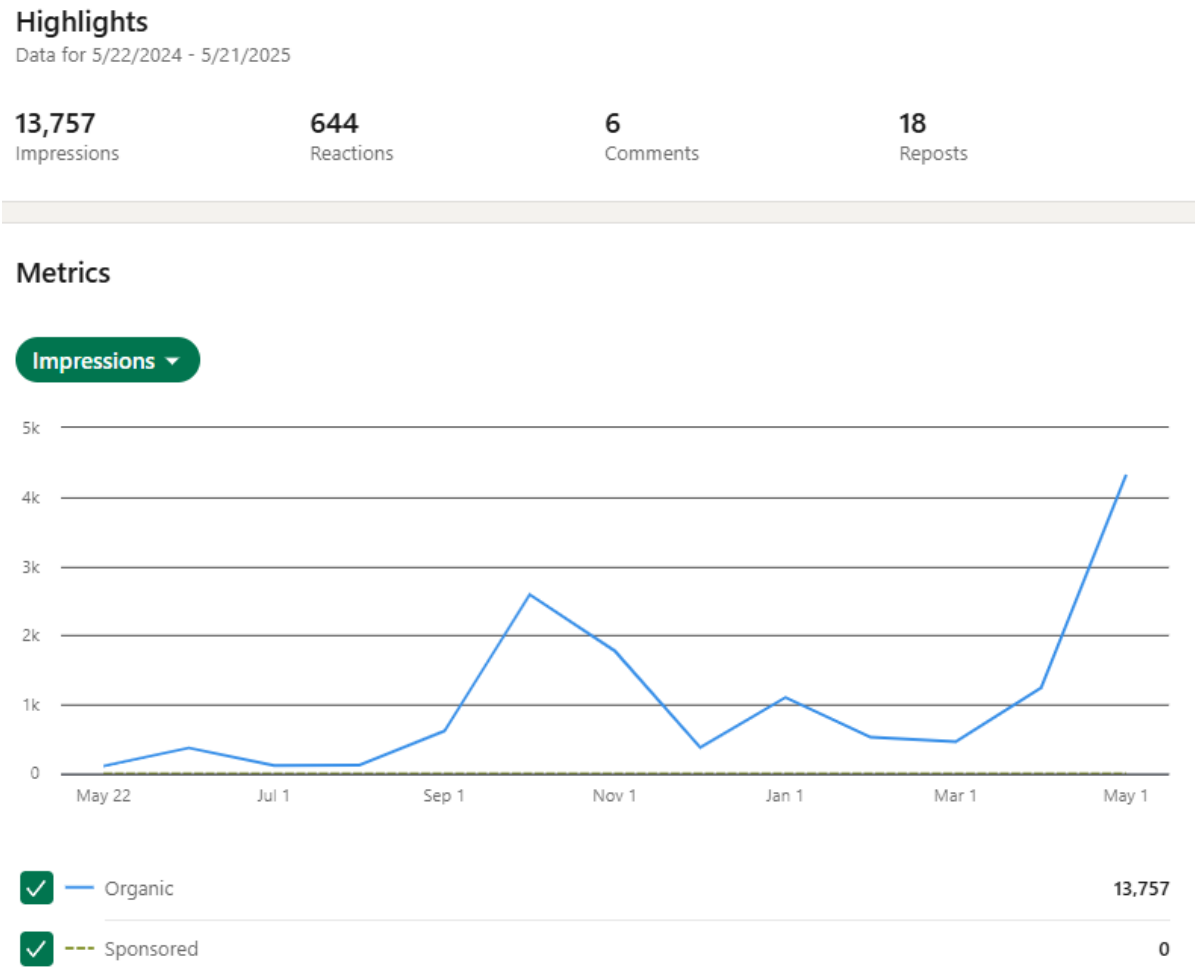


Figure 9: ExPEDite LinkedIn channel analytics 21/5/2024-21/5/2025

### *3.5.3 X (Twitter)*

The ExPEDite X page was equally launched in January 2024, had on May 23, 2025 31 followers and send out 48 tweets. Recent changes in policies, shifts in Twitter/X's approach, and controversy surrounding its owner have led some users to abandon the platform., Twitter/X experienced a 30% drop in usage from 2023 to 2024 (see D7.1), to using more neutral social media tools such as LinkedIn within diverse organisations. Numerous (often conflicting) articles speculate about the future of X but these are mainly focused on the U.S. market. Expectations indicate that the platform is likely to see a continued drop in active users through 2025 (source: https://mashable.com/article/elon-musk-x-declining-user-base-2025 and https://www.euronews.com/my-europe/2024/11/21/are-users-leaving-elon-musks-x-en-masse-and-where-are-they-heading). LinkedIn serves as the primary social media platform for ExPEDite. While the reach from X is still significant, the project continues to leverage it for communication and dissemination activities, primarily by sharing and engaging with content originated from LinkedIn.

Since mid-2024, the analytics feature on X has become a paid service. ExPEDite has chosen not to invest in this feature and to work only with the free available analytics.

Figure 10: ExPEDite X account - 23/5/2025

### *3.5.4 YouTube*

The ExPEDIte Youtube channel (https://www.youtube.com/@ExPEDite-project) contains for the moment 3 videos:

- The video of the workshop on Local Digital Twins for Positive Energy Districts given during the FARI partner day on November 19, 2024 in Brussels, Belgium
- The video of a possible digital twin sandbox that was also presented during the previous mentioned workshop
- The pitch given during the OASC Conference in January 22 and 23, 2025, in Tampere, Finland

Figure 11: Videos published on the ExPEDite YouTube channel

These videos served as supplementary content for our social media outreach.

Additional videos will be added throughout the project, focusing on topics such as building blocks, analytics, key learnings, stakeholder engagement, and more.

## 3.6 Events

As of May 2025 (M17), ExPEDite has been represented at 14 events. The original goal was to participate in five events per year, totalling 15 throughout the project's duration. However, more valuable and relevant opportunities arose than initially anticipated, allowing ExPEDite to reach a diverse audience and nearly achieve the overall target ahead of schedule. The project will continue to share its insights and results during the remaining period.

A brief overview of the events and ExPEDite's involvement is provided below and detailed further in Annex 2.

### *3.6.1 OASC Summit 2024*

The annual summit organized by OASC focuses on fostering collaboration, sharing tools, and exchanging knowledge for cities looking to advance their digital and sustainable transformation. This year's edition was held on June 3-4, 2025, in Rotterdam, Netherlands.

ExPEDite partner OASC actively participated in a dedicated session on digital twins for Positive Energy Districts (PEDs), collaborating with sister projects BiPED and Tips4PEDs. The session provided valuable insights into the role of digital twins in optimizing energy management within PEDs, showcasing innovative approaches and real-world applications.

The session was well-received, attracting around 20 participants from various sectors, including urban planning, cities, and digital technology, all eager to explore how digital twin technologies can enhance the development and management of positive energy districts.

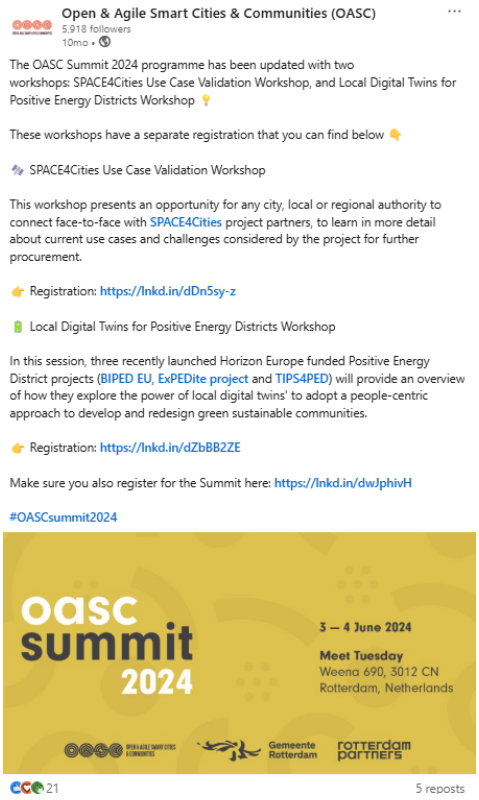


Figure 12: LinkedIn post announcing the session of ExPEDIte

### *3.6.2 Cities Mission Conference 2024*

ExPEDite attended also in its second year the Cities Mission Conference 2024 held on June 25-26 in Valencia, Spain. This event, titled "Empowering Cities – The Climate-Neutral and Smart Cities Mission in Action," brought together a diverse group of stakeholders from across Europe to discuss and explore the challenges and solutions related to climate-neutral urban development.

The conference featured a variety of workshops and policy sessions, which focused on the key challenges faced by cities in their journey towards climate neutrality. A central theme of the program was the transformative journey that Mission Cities are undertaking as they work towards achieving climate neutrality and becoming smart cities. The event provided a platform for cities to share their experiences, challenges, and innovative solutions as they navigate this complex transformation.

Both ExPEDite partners RTU and The Lisbon Council represented the project in the conference. ExPEDite had a booth at the event, positioned next to the Tips4PED project, allowing for a fruitful exchange of ideas and fostering stronger connections with other initiatives working towards similar sustainability and energy transition goals.

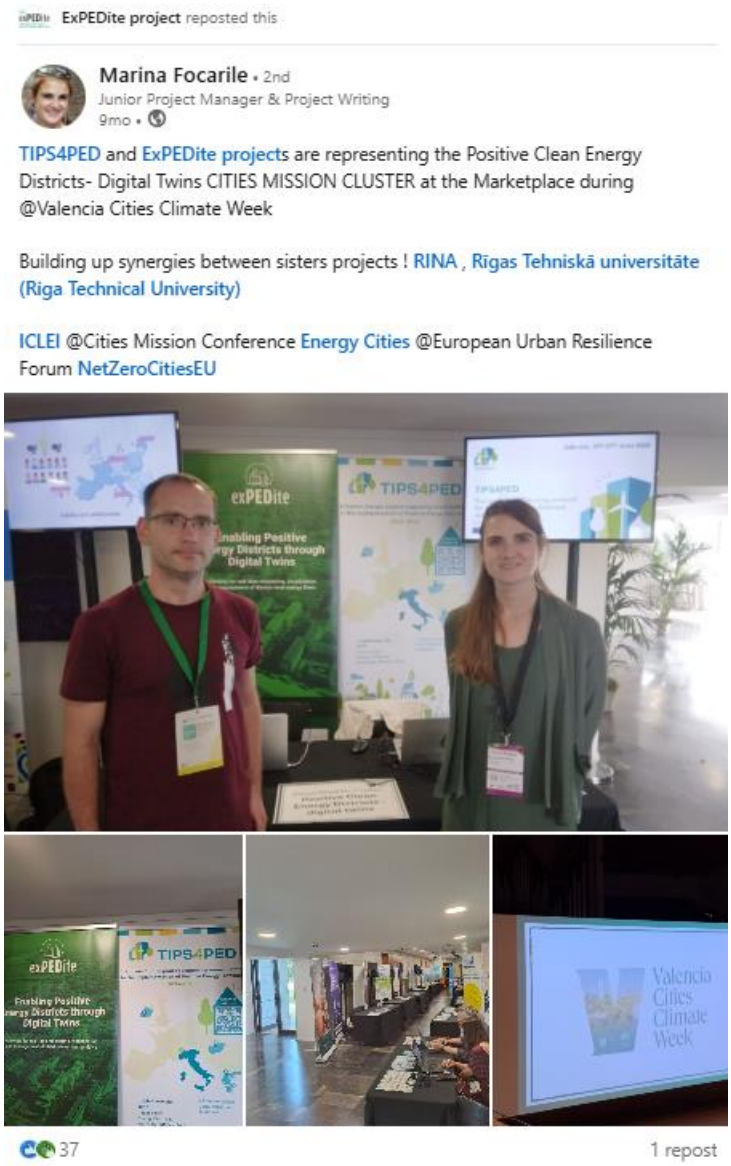


Figure 13: ExPEDite and Tips4PED at Cities Mission Conference 2024

### *3.6.3 ECCE Europe 2024*

The 16th edition of the ECCE 2024 Conference (Electrical and Electromechanical Energy Conversion) took place from September 2-6, 2024, in Darmstadt, Germany. This international event, which attracted approximately 2,400 attendees, focused on the latest advancements in electrical and electromechanical energy conversion. It featured both industry-driven technical sessions and an exhibition highlighting cutting-edge applications in the field.

During the conference, ExPEDite partner RTU took an active role by moderating sessions and providing detailed explanations about the ExPEDite project to participants during the breaks. 20 ExPEDite leaflets were distributed to attendees, helping raise awareness of the project and its objectives within the broader energy community.

Figure 14: ECCE 2024

### *3.6.4 FIWARE Summit 2024*

Twice a year, the FIWARE open source community organizes a summit dedicated to exploring digital transformation through open-source technology. The summit covers a wide range of topics that are key to the future of urban development, industry, and energy. Key themes include Digital Twins, Data Economy, Data Spaces, and Smart Data Models, with a particular focus on Smart Cities, Smart Energy, Smart Industry, and other related fields. These summits serve as important platforms for sharing innovative solutions and best practices, promoting collaboration, and advancing the adoption of open-source technologies in various sectors.

This year's FIWARE Summit took place on September 18-19, 2024, in Naples, Italy, bringing together thought leaders, developers, and professionals from around the world. The event had over 400 attendees and featured a variety of sessions, workshops, and presentations that explored the latest trends and technological advancements driving digital transformation.

At the summit, ExPEDite partner The Lisbon Council was present in the expo area, where they set up a booth that showcased the ExPEDite project. The booth provided an opportunity to engage with attendees, share insights on the project's objectives, and discuss how ExPEDite's digital twin technology is advancing the development of Positive Energy Districts (PEDs).

Figure 15: The Lisbon Council at the FIWARE Summit 2024

### *3.6.5 Cluster Meeting on "Positive Energy Neighbourhoods and Districts" 2024*

Organized by CINEA – the European Climate, Infrastructure, and Environment Executive Agency, this event took place on September 23-24, 2024, in Brussels. It brought together 14 EU-funded projects from various funding programs to discuss the development of Positive Energy Neighbourhoods (PENs) and Positive Energy Districts (PEDs).

The event featured project presentations and active participation in a workshop with around 40 participants. During this gathering, we had the opportunity to meet with other EU-funded projects such as BiPED EU, TIPS4PED, and SPARCS EU, along with key stakeholder organizations working on the implementation of PENs and PEDs.

The discussions focused on exchanging progress updates, exploring the latest policies and initiatives related to PENs and PEDs, identifying challenges and solutions being addressed by current projects, and finding areas for further collaboration. This event provided a valuable platform for fostering partnerships and driving forward the development of sustainable, energy-efficient urban solutions.

ExPEDite partner RTU gave a presentation about the project and participated actively in the workshops. A poster provided the key elements of the project.

Figure 16: ExPEDite at the Cluster Meeting 2024

### *3.6.6 IEEE International Scientific Conference on Power and Electrical Engineering*

From October 10 to 12, 2024, Riga Technical University (RTU) hosted the 65th International Scientific Conference on Power and Electrical Engineering in Riga, Latvia. This conference provided a platform for scientists, engineers, manufacturers, and doctoral students from around the world to come together and exchange knowledge, share recent developments, and present their achievements in the field of power and electrical engineering.

ExPEDite was featured during the opening session of the conference. To raise visibility for the project, the ExPEDite roll-up banner was displayed, and approximately 110 informational leaflets were distributed throughout the event.

### *3.6.7 Innovation procurement and Horizon Europe City Mission and CL5 brokerage event*

The event was held on October 10 and 11, 2024, in Valencia, Spain, bringing together around 100 participants for two days of engaging keynote speeches, panel discussions, and valuable networking opportunities. Key activities included the Innovation Marketplace and targeted matchmaking sessions, with a focus on the upcoming City Mission and city-related Cluster 5 Horizon Europe calls.

ExPEDite was featured at a dedicated booth, where a poster highlighting the pilot project, an overview of the initiative, and information about the Kipsala district were on display. A poster session specifically dedicated to ExPEDite was organized, alongside side meetings with municipalities to explore opportunities for future collaboration.

Approximately 15 ExPEDite leaflets were distributed during the event.

Figure 17: ExPEDite at Horizon Europe City Mission and CL5 brokerage event

### *3.6.8 Green Building Conference & Expo*

This event served as a major gathering point for innovators in the region, providing a dynamic platform to explore and shape the future of the construction sector. It took place on October 22 and 23, 2024, in Venice, Italy, and attracted over 185,000 visitors.

On the second day, ExPEDite partner UNIPD took part in the session titled *"Digitalization: Projects and Case Studies – Smart Buildings & Cities"*, where they presented how Digital Twin technology can contribute to the creation of Positive Energy Districts. The ExPEDite project was also featured in the event's official programme booklet, the ExPEDite poster was visible and ExPEDite leaflets were distributed to attendees.

Figure 18: ExPEDite at Green Building Conference & Expo 2024

### *3.6.9 Smart City Expo World Congress*

The world's largest annual expo and conference for smart cities and communities, with a strong emphasis on energy, brought together over 25,000 visitors from around the globe to drive urban transformation toward a more sustainable future. The event took place from November 5 to 7, 2024, in Barcelona, Spain.

As an event partner, OASC featured ExPEDite at their booth and hosted a dedicated sessions focused on innovation and data use for cities. During one of these sessions, the City of Riga presented the ExPEDite project, showcasing its role in advancing smart and sustainable urban development.

Figure 19: ExPEDite at the Smart City Expo World Congress 2024

### *3.6.10 FARI Conference – partner day 2024*

This annual event, renowned for its focus on fostering collaboration and driving innovation in AI, data, and robotics, offers a vibrant platform for networking, knowledge-sharing, and the exchange of ideas.

On November 19, 2024, during the event's Partner Day, ExPEDite, in collaboration with sister project BIPED, organized an interactive workshop on Local Digital Twins, aimed at cities, knowledge institutions, and companies. The session encouraged active participation, with audience members sharing questions and experiences throughout. Call-to-action cards to have participants register for the ExPEDite newsletter were distributed. This event welcomed around 450 participants, 30 persons attended this session.

Recordings of the presentations are available on the ExPEDite YouTube channel via this link: https://youtu.be/kdYDeeUpyOY

Figure 20: ExPEDite and BIPED workshop on the FARI partner day 2024

### *3.6.11 OASC Conference 2025*

This annual Europe-based global event focuses on local data ecosystems and interoperability, bringing together cities, communities, businesses, researchers, and policymakers to exchange best practices and explore the latest developments in the green and digital transition. Organized by OASC, the event fosters dialogue and collaboration around building smarter, more connected communities.

The 2025 edition took place on January 22 and 23 in Tampere, Finland, under the theme *"Artificial Intelligence for Smarter Communities?"*. The conference explored how AI can support the development of more sustainable, resilient, and intelligent local and regional environments. At the same time, it addressed the complex challenges AI presents, including concerns around sustainability, ethics, and the fair distribution of limited resources — making AI a central topic of this year's discussions.

As a sponsor of the event, the ExPEDite project had a booth in the coffee area hosted by ExPEDite partners LAUREA and OASC to engage with attendees. In addition, the project was pitched on stage to an audience of over 200 city representatives, research institutions, and companies. You can watch the pitch here: https://youtu.be/EseYg2wl7ms

Figure 21: ExPEDite at the OASC Conference 2025

### *3.6.11 Increasing Digitalisation Awareness & Readiness of Slovak Communities*

This European Commission initiative aims to support the development of comprehensive digital strategies and action plans — aligned with the goals of the Digital Decade — that empower municipalities to achieve their green and digital transformation objectives.

Organised by the EU Support Services, this event took place on April 7, 2025, in Bratislava (Slovakia) was designed to equip municipalities of all sizes and levels of digital maturity with the necessary skills to address the complex challenges of digitalisation.

As an introductory event, it offered valuable insights into key European digital topics, featuring expert presentations delivered in a clear and accessible manner. It was specifically tailored for local government representatives, helping them build the foundational knowledge needed to advance their digital initiatives.

Figure 22: Increasing Digitalisation Awareness & Readiness of Slovak Communities

The primary goal of the event is to raise awareness among the target audience and lay the groundwork for more hands-on, practical training sessions in the future.

Arnis Gulbis, Director of the Riga Digital Agency, spoke during the session *"Using Local Digital Twins in Practice,"* where he presented the ExPEDite project as a real-world example. The event welcomed approximately 60 attendees.

Figure 23: Arnis Gulbis during the session "Using Local Digital Twins in Practice"

### 3.6.12 Forum: How is Europe supporting the digitalization of services – and how can you benefit?

In the same format as the event mentioned in 3.6.13, this forum took place in Riga (Latvia) on April 15 and was focussed on Latvian cities.
The event welcomed around 70 attendees. The municipality of Riga provided also a session during this event and explaining the aim of the ExPEDite project and how it helps the municipality on its way to climate neutrality.

Figure 24: How is Europe supporting the digitalization of services – and how can you benefit?

### 3.6.13 Cities Mission Conference 2025

The ExPEDite project was showcased at the Positive Energy District (PED) Cluster booth together with its sister projects during the Cities Mission Conference 2025, taking place from 6–8 May in Vilnius, Lithuania.
Under the conference theme "Harnessing City Successes: Advancing Climate Action for 2030," this high-level event showed the progress of Mission Cities and their partners as they push toward the ambitious goal of climate neutrality by 2030. An estimation of nearly 1,000 city leaders, policymakers, and urban innovators came together on this conference for three days of knowledge-sharing and collaboration.

Riga received during the conference, on May 7, a recognition at European Union level - the Mission Label - for its climate plan under the European Mission "100 Climate Neutral and Smart Cities".

Figure 25: Forum: How is Europe supporting the digitalization of services?

### *3.6.14 Horizon Europe Cluster 5 Info Day 2025*

On May 6, 2025, the Horizon Europe Cluster 5 Info Day took place in Brussels, gathering a diverse group of over 500 onsite participants, including researchers, innovators, and key stakeholders from across Europe. The event, which also offered online attendance options, provided comprehensive insights into funding opportunities available under the 2025 work programme, with a strong focus on climate, energy, and mobility topics. This year's edition highlighted the twin green and digital transitions necessary to achieve climate neutrality in Europe by 2050.

ExPEDite lead partner Riga Technical University (RTU) was represented at the event, actively identifying relevant funding calls for the potential future exploitation of ExPEDite project results.

Following the Info Day, participants had the opportunity to engage in the GREENET brokerage event, designed to foster collaboration through bilateral meetings. Held in two smaller rooms, the brokerage event welcomed 300 confirmed participants. Due to the one-on-one meeting format, the number of meaningful engagements was inherently limited; however, valuable contacts were established. Several researchers expressed strong interest in ExPEDite's work and requested to stay updated through the project's newsletter and LinkedIn page.

Figure 26: Horizon Europe Info Day 2025

## 3.7 Publications

3 publications related to ExPEDite have been made available:

1. **Designing a multi-objective energy management system in multiple interconnected water and power microgrids based on the MOPSO algorithm (05/2024)**

   In this paper, a method of the energy management system (EMS) in multiple microgrids considering the constraints of power flow based on the three-objective optimization model is presented. The studied model specifications, the variable speed pumps in the water network as

well and the storage tanks are optimally planned as flexible resources to reduce operating costs and pollution (link to the document: https://www.sciencedirect.com/science/article/pii/S2405844024073110?via%3Dihub)

2. **Utilizing Digital Twins for Urban Planning: An Integrated Approach to Sustainable and Smart City Development (11/2024)**
   This report presents an exhaustive literature review within the domain of urban planning, with a particular emphasis on the integration of digital twin technology. The review is a critical component of Work Package 2 of the Expedite project, aiming to consolidate existing knowledge and insights pertinent to the field. Digital twins, as virtual counterparts of physical entities, have emerged as a pivotal innovation in urban planning, offering the potential to revolutionize the way cities are designed, monitored, and managed. By simulating urban environments in a digital space, planners can test scenarios, optimize decision-making, and enhance the sustainability and liveability of urban areas. (link to the document: https://expedite-project.eu/wp-content/uploads/2025/01/65210132-SWE-WP2-XX-T-X-0001_UrbanPlanningAndDigitalTwins.pdf)
3. **Advancements and Methodological Frameworks in Building Stock Modelling for Positive Energy Districts (03/2025)**
   This literature review explores the critical role of building stock modelling in understanding and predicting energy consumption, carbon emissions, and overall building performance across various scales, from individual structures to entire cities. The review highlights the significance of building stock modelling in addressing climate change and investigates the existing methodological frameworks for building stock modelling and their role in facilitating the design of Positive Energy Districts (PEDs), particularly in the context of the ExPEDite project, which aims to develop a digital twin for real-time energy management at the district level. (Link to this document: https://expedite-project.eu/wp-content/uploads/2025/03/65210132-SWE-WP4-XX-T-X-0001_BuildingStockModellingReview_Rev04.pdf)

   These publications can also be accessed via the ExPEDite website, via the section Interesting readings and reports (https://expedite-project.eu/readings/interesting-readings-and-reports/).

   8 other publications are in the pipeline of becoming available during the duration of the project (see annex 3).

### 3.8 Other activities

In March 2025, a learning visit was organized to Ostrava, Czech Republic, to explore the local Living Lab. This visit aimed to deepen understanding of the Living Lab's operational structure, digital tools, and stakeholder engagement strategies. The ExPEDite partners observed how local authorities, businesses, academic institutions, and community members collaborate to co-create and pilot innovative solutions for urban transformation and energy transition.

This visit formed part of broader ExPEDite project activities, which include stakeholder engagement, implementation of a Living Lab, development of a gamified mobile application for public engagement, and replication of project solutions in other districts of Riga and across European cities.

Special focus was placed on the methods used by the Ostrava Living Lab to foster inclusive, user-centered innovation. Participants had the opportunity to examine practical examples of stakeholder collaboration, exchange insights with local facilitators, and discuss how open innovation principles are applied in real-world urban development scenarios.

# 4. Exploitation and Financial Sustainability

What follows in this chapter is the result of the activities performed as part of ExPEDite's Exploitation and Financial Sustainability. Sections 4.1 – 4.8 report the analysis of the European market for sustainable energy practices and its domain of interest for the project. From its conclusions, ExPEDite's Value Proposition has been developed in 4.9. Finally, Section 4.10 describes the Intellectual Property (IP) protection and management framework within ExPEDite.

## 4.1. European Market for Sustainable Energy Practices

### *4.1.1 Current Status*

From a general perspective, the relevant market to be analysed consists in the broader EU market for sustainable energy practices. Then, the focus will be shifted on the specific market domains concerned by ExPEDite's outputs, namely advanced technological solutions for sustainable energy development, digital components for monitoring and management of energy supply/utilisation and citizen engagement solutions on sustainable energy practices. This subsection considers the current situation in the broader market and starts introducing the key stakeholders involved. The next one will shed light on its expected growth and development. Subsection 4.1.3 will restrict the focus onto the specific market domains listed above.

Sustainable energy practices represent a broad concept, encompassing several different aspects related to sustainability. For the sake of coherence with the scope of ExPEDite, the present analysis is going to focus on four aspects: renewable energy sources (RES) uptake, stock energy efficiency, energy flexibility and urban e-mobility and sustainable transport. These four categories allow to build a solid overview of the status of sustainable energy practices, while at the same time representing the main components of Positive Energy Districts.

Sustainability in general is a concept that is gaining increasingly more attention and development worldwide, with countries and administrations working on plans to reduce greenhouse gas (GHG) emissions, and the EU being at the forefront of this movement.

Regarding the uptake of renewable energy sources, figures from Eurostat (*Renewable Energy Statistics*, Eurostat, 2023) show that, in 2022, 23% of the EU's gross final energy consumption derived from renewables. The next year, 44% of EU's electricity has been produced from RES, representing a new all-time high in terms of sustainable electricity production in the continent, with 27% of it deriving from solar and wind generation (S. Brown, D. Jones, European Electricity Review 2024, Ember). While this represents an important step forward, it is nonetheless an intermediate milestone in the wider ongoing EU transformation process, as it is true also for the other components of sustainable energy. In fact, EU institutions and Member States, being the two stakeholders at the macro level, are committed to reach far more ambitious figures in the next years. Centrally ambitious targets have been set with the aim to strengthen the ongoing trend. As an example, the *"REPowerEU plan foresees 72% of power generation coming from renewables by 2030"* (S. Brown, D. Jones, *European Electricity Review 2024*, Ember). The uptake from different Member States, though, varies substantially. Data from 2022 show countries such as Sweden, Finland, Latvia, and Denmark leading the way with shares of gross final energy consumption derived from RES spanning from about 40% to more than 60%, while others such as Ireland and Malta lagging below 14% (Figure 27).

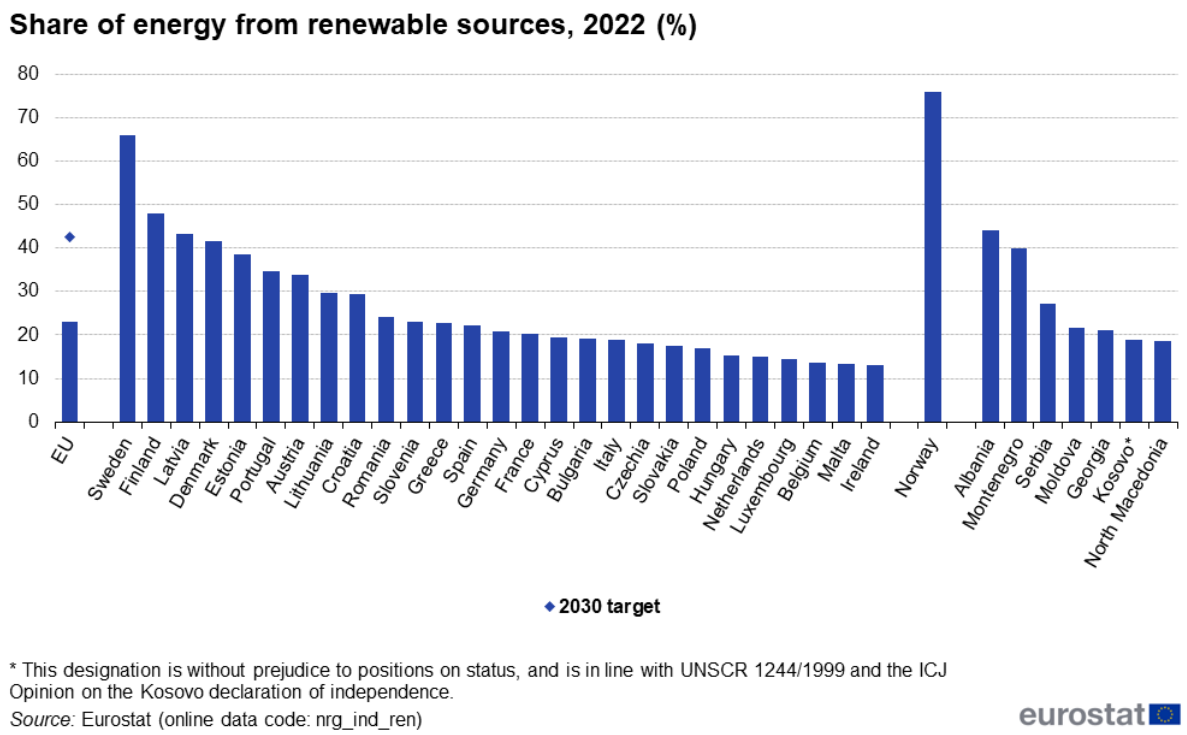


Figure 27: Percentage of country-level gross final energy consumption derived from renewable sources in Europe in 2022. *Renewable energy statistics, Eurostat, 2023.*

Additionally, regarding energy efficiency of the building stock, recent data from the EU Commission give an idea of the sensitivity of the issue. Currently 75% of the building stock in the EU is energy inefficient (i.e., more energy is used to fulfil a need than what would be optimal, with the result of producing a significant waste of energy), with about 35% of buildings all over the Union being older than 50 years old (The Energy Performance of Buildings Directive, European Commission, 2019). On this, the whole EU is lagging. However, as underlined by the European Environment Agency *"the EU's renovation wave aims to at least double the annual energy renovation rate of residential and non-residential buildings by 2030 and initiate deep energy renovations that could reduce buildings' energy consumption by at least 60%"* (*Accelerating the energy efficiency renovation of residential buildings – a behavioural approach*, EEA, 2023). Also in this case, Member States represent crucial actors. They, in fact, *"must establish national building renovation plans, aimed at decarbonising national building stocks by 2050, with indicative milestones for 2030, 2040 and 2050"* (A. Widuto, *Energy Transition in the EU*, EPRS | European Parliamentary Research Service, 2023 Briefing).

Energy flexibility, in turn, is strictly linked to this process of development in sustainable energy. The more RES are brought into the system, the higher the need for flexibility (i.e., the ability of the system to respond to changes in demand without generating instability). The development of grids and of storage technologies is crucial to face this challenge. EU institutions, indeed, are pushing investments and uptake of flexibility-enhancing components. In particular, the *"European Commission estimates that a €584 billion investment in grids is required by 2030"*. Notably, these investments will require not only the involvement but also the cooperation of Member States. In fact, part of this investment must be destined to cross-border interconnectors. At the same time estimates have been reported indicating the need of the EU for *"200 GW of storage by 2030 to enable efficient integration of renewables into the electricity grid"* (S. Brown, D. Jones, *European Electricity Review 2024*, Ember).

Finally, developments in mobility and transport represent another important topic in the general sustainability framework of the EU. Again, the picture denotes an ongoing process with much progress still required. As reported by Eurostat *"The average share of energy from renewable sources in transport increased from 1.6 % in 2004 to 9.6 % in 2022"*. Figure 28 shows the share of renewable energy in transport fuel consumption among Member States in 2022. As for RES, we can see the high disparity between EU countries with Sweden having already reached the 29% target for 2030, while Croatia still shows a share below 3%.

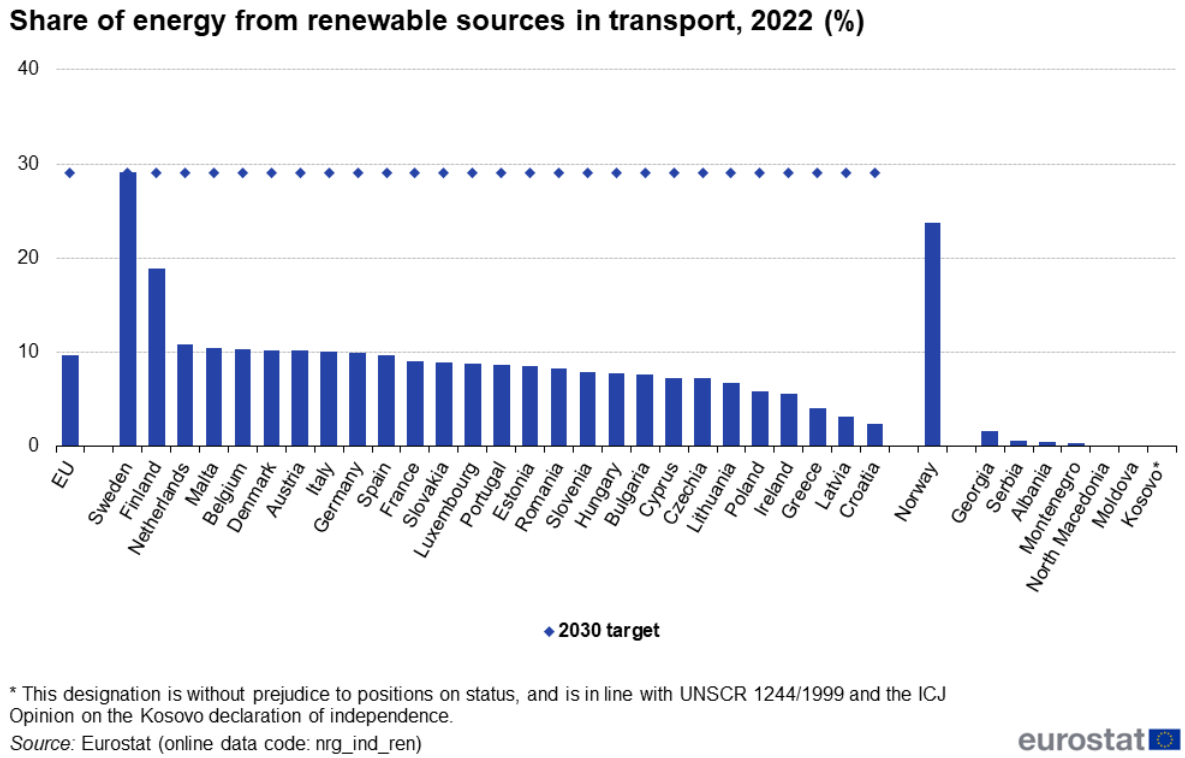


Figure 28: Percentage of gross final energy consumption of transport fuels derived from renewable sources in Europe in 2022. *Renewable energy statistics, Eurostat, 2023.*

A similar scenario characterizes electric mobility. Disparities between countries in terms of uptake are significant and represent a major obstacle to face in the following years. Despite this fact, general statistics provide a positive view of the current market for electric vehicles. In 2023, battery-electric vehicles (BEVs) have surpassed diesel cars in terms of sales for the first time, registering an increase of 37%. This trend is expected to grow in the next years, with BEVs' sales surpassing those for internal combustion engine vehicles by 2025 (M. Rika, *E-Mobility Europe: An Overview of Europe's Latest Electric Vehicles Data*, Statzon, 2024).

All the figures above are even more important considering the role of sustainable energy practices in the bigger picture of EU's cities development. Indeed, they are crucial to reach the target of having 100 climate-neutral and smart cities by 2030, which should act as frontrunners in innovation and good practices to allow all the other cities to follow by 2050 (European Commission, Directorate-General for Research and Innovation, *EU missions, 100 climate-neutral and smart cities – Cities on a journey to climate neutrality*, Publications Office of the European Union, 2024). The same is true regarding the Programme for the creation of Positive Energy Districts and Neighbourhoods, to which ExPEDite belongs. This implies that, at the local level, cities' administrations and policymakers are another key stakeholder of the EU's sustainable energy practices framework. In fact, cities represent one of the pillars of Europe's green transition. They are responsible for two-thirds of the energy consumption and

70% of EU's CO2 emissions (Positive Energy Districts (PEDs), JPI Urban Europe, [no date]). As such, they need to be at the forefront of change towards climate-neutrality. To manage being active participants, then, local administrations need to cooperate with businesses and research institutes - for the technology and know-how in the deployment and management of the sustainable solutions - and to incentivise citizen's participation. The role and importance of these groups of stakeholders will be discussed more thoroughly in later Sections.

### *4.1.2 Expected Growth*

The general positive trend in the market just discussed is expected to continue, and even to accelerate over the next decades. As already hinted in 1.1, EU institutions have committed and are heavily investing in medium- and long-term renovation plans centred on sustainability.

The EPRS' 2023 briefing "Energy Transition in the EU" provides a well-rounded view of the EU's commitment. Goals have been set for 2030 and 2050, introduced through several policies from the European Green Deal of 2019 to the Renewable Energy Directive, revised in 2023. These goals need to be reached by Member States with the aid of funding mechanisms, Programmes, and of *"the EU budget's 30 % spending target for climate action"*. For this purpose, Member States have designed their own national recovery and resilience plans. Importantly, *"almost all countries are financing measures in the two main categories of energy efficiency (€54.85 billion, i.e. 62 % of the total) and clean energy, including investment in renewable energy sources and energy infrastructure and networks (€33.64 billion, i.e. 38 % of the total)"* (A. Widuto, *Energy Transition in the EU*, EPRS | European Parliamentary Research Service, 2023 Briefing). This last sentence, together with the statistics discussed in 1.1, provides clear evidence of the EU-wide efforts aimed at boosting and supporting growth in the sustainable energy practices considered in this analysis. This is further reinforced when considering that among the funding programmes and facilities activated by the EU, several target actions precisely in these areas. For example, Horizon Europe finances research projects related to *"energy supply, energy systems, energy storage, clean transport and buildings, and industrial facilities in energy transition"*. Also, the EU renewable energy financing mechanism sustains *"the installation of a renewable energy production facility or the actual production of renewable energy in sectors such as electricity, heating and cooling, and transport"* (A. Widuto, *Energy Transition in the EU*, EPRS | European Parliamentary Research Service, 2023 Briefing).

Finally, growth expectations rise even higher considering official calculations and projections on future spending. Indeed, analyses from both the IEA and the EC highlight that despite the current economic effort from both central institutions and individual countries, *"EU annual investment in clean energy will have to rise to €530 billion a year by 2030 from €330 billion in 2022 in order to align with the [...] 2050 scenario"* (A. Widuto, *Energy Transition in the EU*, EPRS | European Parliamentary Research Service, 2023 Briefing).

So, it is clear how sustainable energy practices represent a growing market, which is expected to grow even higher in the next decades thanks to a strong push from political and economic interventions. The focus will now be narrowed to consider the specific domains of interest for ExPEDite.

### *4.1.3 Narrowing the Focus: Market Domains/Sectors of Interest for ExPEDite*

Since ExPEDite will make a prominent use of AI and Machine Learning together with augmented and virtual reality tools, an examination is needed of the adoption of advanced technological solutions in the market for sustainable energy development. As analysed in Gailhofer et al. 2021, *"AI already plays a significant role"* relative to sustainability. Figure 29 shows the results of multi-sectoral EU-level surveys on the current and planned use of AI. The results indicate the prominent use or planning to adopt one or more AI technologies in *"sectors with key relevance for the EGD"*.

| Sector (Part I) | At least one AI technology | At least two AI technologies | Plans to use |
|---|---|---|---|
| Agriculture, forestry and/or fishing | 39% | 24% | 18% |
| Manufacturing | 47% | 27% | 16% |
| Construction | 36% | 23% | 16% |
| Oil and gas | 38% | 19% | 6% |
| Waste management | 31% | 21% | 27% |
| Water and electricity supply | 45% | 28% | 17% |
| Trade, retail | 38% | 22% | 20% |
| Transport | 36% | 22% | 20% |
| Food | 36% | 26% | 20% |

Figure 29: Survey results from the European Commission (2020) showing the sectoral adoption – actual or planned – of AI technologies. *Gailhofer et al (2021).*

Particularly, AI is applied or being studied for adoption for each component of sustainable energy practices considered in the present analysis. Even though reportedly its use is still limited with respect to energy and resource consumption, AI has already been adopted for the optimization of renewable energy production in solar and wind installations. Regarding stock energy efficiency, then, these technologies can facilitate *"energy profiling and demand estimation"*, while *"artificial neural networks have been broadly utilised for building energy estimation"*. They have also been described as highly relevant for energy efficiency, being exploited for grid and load management and forecasts. Moreover, in terms of e-mobility and sustainable transport, many different applications are currently being studied. They span from transport and mobility planning to storage optimisation for EVs. Finally, the suitability of Artificial Intelligence for actions such as pollution and climate change projections and big data analytics have brought researchers to make the case for its importance in the design and planning of smart cities (T. Yigitcanlar and F. Cugurullo, 2020). However, it appears that this is still an area of research in the EU and that ExPEDite's products may improve the current State of The Art. Similarly, in the sectors analysed, current AI applications do not seem to have the completeness envisioned by ExPEDite, which plans to apply the technology for many of the aspects above at once. More on this will be analysed in Section 4.3.

Another relevant domain for the scope of the project is that of the digital components for monitoring and management of energy supply/utilization – more specifically, smart meters and grids. The importance of these digital technologies for energy flexibility enhancement is already well established in the EU. Their utilisation has been sponsored by central institutions since 2009 with the "Third Energy Package", aiming at serving a minimum of 80% of consumers by 2020. From then, further legislations have been tailored to help those countries that had not completed this roll-out. Currently, a recent study by Vitiello et al (2022) has shown that there is still a huge disparity in uptake by Member States. Countries such as Sweden and Italy already show a level of uptake of 100%, while Germany and many East European countries are still below 20%. The same study, however, underlines how in the last decades there have been about 256 R&I projects aimed at sparking innovation and adoption of these

solutions. Among other things, several have focused on the integration of distributed generation, large scale RES, storage, and the application of smart meters and grids for smart cities and e-mobility. Once again, none of these projects seems to be as potentially complete and technologically advanced to represent a direct threat for ExPEDite. Contrarily, innovations and studies on smart meters' emissions detection and energy optimisation and smart grids' efficient management of district- or city-level energy may be important for generating synergies and further improvements of ExPEDite's outputs.

Lastly, it is worth considering citizen's engagement solutions on sustainable energy practices. These solutions are already being used in many other PEDs projects. Indeed, citizens' participation and awareness are considered crucial factors for having effective smart and sustainable cities and districts. Bossi et al (2020) have surveyed 61 PED and PED-related projects across Europe. Results suggested that *"involvement processes (urban stakeholders, citizens) can be seen as defining elements for the success or failure of a project"*, with stakeholders' involvement being one of the top responses both considering success factors and implementation challenges.

Since such solutions usually entail access to apps and digital platforms, to understand their current potential digital habits of EU citizens must also be considered. Based on Eurostat, in 2023 internet has been used at least once a week by more than 90% of citizens. In addition, using access to e-government platforms as a proxy for participation, it is relevant to notice that *"45% of EU people who used the internet in the previous 12 months used it to obtain information from public authorities' websites"* (*Digitalisation in Europe – 2024 edition*, Eurostat, 2024). The evidence above might be important for ExPEDite since it will involve gamification, which may be expected to attract higher participation levels than governments' websites. In turn, this would guarantee a solid stakeholder involvement process, with the consequential positive outcomes already described.

Based on the analysis so far, the status of the market is overall favourable to ExPEDite. All data indicate increasing growth and development. The disparities in Member State-level uptake of the various sustainability-enhancing solutions may represent an opportunity for a higher success of the project's outputs. Moreover, the specific sectors of interest appear as positive environments for innovation and development, potentially welcoming new solutions and able to create synergies with existing ones.

The next Section is going to consider the main drivers in the areas of interest for the project.

## 4.2. Market Drivers

### *4.2.1 Relevant Drivers*

The main market drivers in the areas of interest for ExPEDite are the following:

1. **Push from technological advancements**

   A crucial role for the development of the general market and of the interested domains analysed above is played by research institutions. As anticipated, they have an important role as stakeholders at the local level. In fact, since the market analysed is still highly developing, as shown in Section 4.1, technological advancements evolve with it. Therefore, there is the need of applied research to test solutions and to identify paths for further development.

   A solid account of the research in the field has been given by Giuzio et al (2024). Regarding stock energy efficiency and flexibility, technological solutions are being studied for the development of improved building energy modelling tools and of smart sensors designed to control heating, ventilation and air conditioning in buildings adopting integrated PV systems. In terms of renewable energy production, the focus is on advancements in design and

performance especially for PV panels and wind turbines. Finally, there is a strong commitment to connect the technological solutions above for the optimal design of smart cities and PEDs. The trend here shows a continuous process of new digital-based integrated sustainable solutions being advocated to allow communities to work together towards a net-zero future. Importantly, this means that the market is being driven towards an increasing demand for the types of products offered by ExPEDite.

2. **Development of more efficient and cheaper sustainable energy solutions**

Renewable energy is becoming cheaper. This makes RES-based energy even more desirable since economic viability is now being added to environmental reasons. According to Roser (2020), this fact is strongly linked with the process of technological advancements just described and is favoured by the political efforts to boost investments in the sector. Indeed, the reason for this trend appears to be the learning curve of renewable energy technologies, which makes their price inversely proportional to increases in cumulative installed capacity. To get a sense of the numbers, it is worth mentioning that in the ten years up to 2020 the prices of electricity from PV panels and onshore wind turbines declined respectively by 89% and 70% worldwide [15]. As stated in the same article, the result of the process described here is that RES have become the most financially sustainable option for investments in energy capacity. Ultimately, this implies that growth expectations in the market and sectors of interest are further reinforced.

3. **Strong EU commitment to R&I in sustainable energy**

This topic has been anticipated in Section 4.1, and especially in 4.1.2. However, to give a more complete sense of the level of political commitment, this subsection presents a list of relevant alternative EU funding to those previously mentioned targeting development in sustainable energy practices (A. Widuto, 2023):

- InvestEU Fund, initial budget guarantee: EU 26.2 billion.
- Modernisation Fund, estimated budget: over EU 48 billion for 2021-2030.
- Innovation Fund, projected budget: EU 40 billion.
- Cohesion Policy, total budget: EU 392 billion for 2021-2027.
- Social Climate Fund, budget: up to EU 86.7 billion.
- Connecting Europe Facility, budget: EU 5.84 billion for 2021-2027.
- LIFE Clean Energy sub-programme, approximate budget: EU 1 billion for 2021-2027.

With such a display of economic resources planned over the current decade and beyond, added to the already mentioned global need to halt the increase of GHG emissions, there is no reason to expect a stop or an inversion of the current trend.

4. **Higher demand and attention of the public towards sustainability**

The value attributed by citizens to sustainability practices and initiatives has increased in recent years. This is shown in the 2024 survey “Attitudes of Europeans towards the environment” [16]. Most Europeans believe that the promotion of the circular economy is the best way to tackle climate change. This openness to sustainability issues is connected to a shift in tastes as consumers. In fact, six out of ten respondents report a higher willingness-to-pay for sustainable products. This positive attitude may have been influenced by targeted top-down EU initiatives such as the DEAR Programme and other local projects developed in the last decade [17] designed to raise citizens’ awareness on this and other topics. In the end, also in this case the

implied trend points towards an increasingly favourable environment for the adoption of sustainable energy practices.

Thus, it can be concluded that the market drivers are all pointing towards a market environment even more prone to the adoption of ExPEDite's outputs in future years.

## 4.3. Problem setting: stakeholders, current market offering, and gaps to be exploited

### *4.3.1 Definitive account of the stakeholders*

As already made clear in chapter 2, the constitution of a smart and Positive Energy District requires involving multiple stakeholders. EU institutions and national governments, city- and district-level administrations and planners, research and academia, and citizens are all relevant stakeholders whose importance has been discussed in the previous sections.

In addition to the above categories, it is crucial to discuss the central role of businesses – public and private – in the energy sector. In particular, reference is made here to energy providers, distribution system operators (DSOs), and public utilities. Their involvement, in fact, represents the necessary condition to guarantee the production and the flexible and efficient distribution of renewable energy which define PEDs. This is also confirmed by the literature: Jayansena et al (2019) report these actors in the results of their literature review aimed at identifying the stakeholders in the broader concept of smart cities development. The authors refer to energy suppliers, highlighting the necessity of involving third-parties able to guarantee the supply of sustainable energy. This represents a crucial first step for effective energy policy in the context of cities' development. In this perspective, it is also important to underline the potential role of businesses offering energy-related services, such as the installation and maintenance of energy-related products. Indeed, their technical know-how projects may represent an important asset for the effective implementation of positive-energy solutions in different contexts. This, as discussed in previous Sections, represents one of the main goals for PED projects.

Another important role for PEDs is that of companies and professionals in the building industry. The relevance of the energy efficiency of buildings in PEDs has already been largely discussed. It becomes even more evident when considering findings in Bossi et al. (2020). Indeed, among the European PED projects considered in their analysis, *"66% of them combine newly built with existing neighborhoods, 28% of them are newly built districts, and only 7% are developed from existing neighborhoods"*. Thus, it can be concluded that PED projects are highly dependent from the direct involvement of actors managing the design and construction of buildings. Even in case of projects based on existing structures, then, such companies and professionals are needed for renovation works. Additionally, owners and of buildings and land shall not be disregarded. On the contrary, they are key stakeholders throughout the entire lifespan of such projects, from the preparation phase to the day-to-day management and control of the structures.

Furthermore, tech companies and solution providers play a crucial role in the context of smart and sustainable cities. Referring again to Jayansena et al (2019), the study identifies ICT sector representatives as important contributors in the initiation and operational stages of development. The present analysis has already touched upon the role of advanced technologies for sustainable energy and the importance of academic research for pushing the boundaries of existing knowledge. The importance of businesses' involvement lays once again in the technical know-how, both for the efficient design of innovative solutions and for their subsequent improvements.

Finally, NGOs focusing on environment and sustainability should also be mentioned. These organizations may both provide operational support for the design and implementation of solutions and represent a source for gathering additional funding. Moreover, NGOs' advocacy activities may increase

the effectiveness of the dissemination process, increasing third parties' interest towards the adoption and replication of solutions, and facilitating the diffusion of best practices.

### *4.3.2 Current Offering*

The best way to analyse the current offering is to focus on Positive Energy Districts and smart cities. In fact, it is at the local level that efficient and scalable solutions for sustainable development are devised and applied. So, this context provides a solid overview of the present setting.

Two key references provide a depiction of PED projects started in the past years. These are the JPI's "*EUROPE TOWARDS POSITIVE ENERGY DISTRICTS. A compilation of projects towards sustainable urbanization and the energy transition"* (2020) – from here on also referred to as the Booklet of Positive Energy Districts in Europe - and the already cited Bossi et al (2024). In these publications 29 such projects have been identified, distributed across 13 European countries (also including some non-EU nations). For sake of precision, when referring to PEDs the analysis presented here focuses on projects with actual PED ambition, disregarding other PED-related initiatives. However, the conclusions drawn in the following paragraphs remain valid also on a larger perspective. In particular, since the concepts of Positive Energy Districts and of smart cities are deeply interrelated, key features and trends are common between the two.

In terms of geographical distribution, Northern European countries are the frontrunners for PED initiatives. As also shown in Figure 30 Norway (8), Finland (4), The Netherlands (3) and Sweden (1) alone account for more than half of the projects. In Southern Europe, instead, Italy (3) is the major contributor, followed by Austria (2) and Spain (2). Regarding the current state of the projects, then, only a few are reported as already realised (3%) or in operation (3%), with all the others still being in the planning (24%) or implementation stage (69%) (Bossi et al, 2024). This statistic underlines once again the developing nature of the market and domains of interest for ExPEDite.

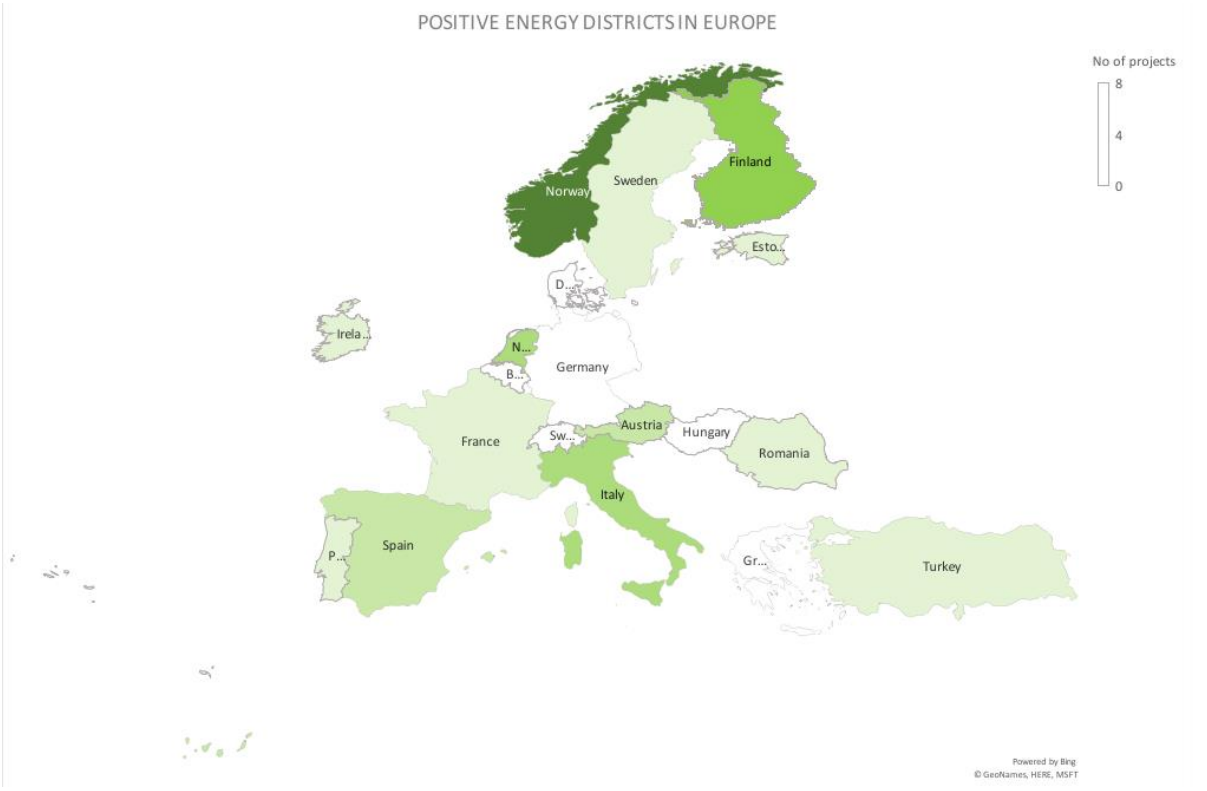


Figure 30: Geographic distribution of projects with PED ambition in Europe. *Joint Programming Initiative (JPI) Urban Europe, EUROPE TOWARDS POSITIVE ENERGY DISTRICTS. A compilation of projects towards sustainable urbanization and the energy transition, 2020.*

An overview of these projects provides several relevant insights on common features and key elements of smart and sustainable local initiatives in Europe. First, digital solutions for the monitoring and management of the energy flows such as smart meters and grids are widely used. They, in fact, serve different functions, all deemed essential for the effectiveness of the projects. On the one hand, these solutions improve the flexibility of the systems, allowing to digitally adjust energy flows from various sources. On the other hand, they guarantee the timely monitoring of the energy performance of buildings, thus enhancing energy efficiency. Additionally, they also provide the same information to consumers, allowing them to be active participants in minimising energy waste. Finally, the pairing of these flexibility-enhancing solutions with RE installations on buildings allows individual consumers to enter excess clean energy into the distribution system. By doing so they become *prosumers* (i.e., both producers and consumers) of renewable energy, thus gaining even more centrality for the functioning of districts and cities.

Another key feature is represented by engagement solutions for citizens. Apps and platforms used to inform and empower citizens have been adopted in several initiatives, sometimes using gamification to increase the level of engagement. Other tools for a more direct participation in the decision-making processes have also been mentioned in more than one project, such as Living Labs and 'Innovation Playgrounds' – which represent participatory hubs allowing different stakeholders to contribute by sharing innovations, ideas, preferences, etc. – (JPI, *EUROPE TOWARDS POSITIVE ENERGY DISTRICTS. A compilation of projects towards sustainable urbanization and the energy transition*, 2020). Importantly, as remarked in the EC's 2024 publication "*The State of European Smart Cities. Exploring and showcasing models, solutions, and financing for European replication to achieve climate neutrality*", such solutions are also being widely applied in larger city-level projects throughout Europe.

The reason is that direct involvement of citizens in innovation projects makes changes more desirable and rewarding for the inhabitants, boosting sensibilisation and participation.

A further crucial aspect is that of partnerships. Indeed, to realise smart and sustainable local solutions there is the need to put together administrative and legal powers, public and private financing, sector-specific expertise – from real estate to engineering and energy production and distribution – and scientific innovation. For this reason, it is common for smart cities and PEDs to present a heterogeneous array of partners including cities, universities, and private and public firms, and to concentrate both public funds and private investments. Partnerships including multiple cities are also widespread. This responds to the already mentioned 2030 and 2050 targets for the uptake of smart and sustainable initiatives throughout Europe. Such a solution, in fact, creates channels for the distribution of theoretical and practical knowledge between cities posing the basis for projects' replication already from the planning stage. These inter-city partnerships have been sponsored directly by the EU, particularly through the Horizon Programme thanks to which Europe currently counts 48 so-called lighthouse cities (frontrunners in the application of innovative solutions) and 72 fellow cities (replicating the outputs of their lighthouse partner) (European Court of Auditors, *Smart cities Tangible solutions, but fragmentation challenges their wider adoption*, Special Report, 2023).

Other underlying elements of PEDs and smart cities are instead more varied and are largely dependent on the nature of individual projects. As an example, though buildings' energy efficiency remains a generalised goal, this can be achieved in different ways. As shown in Bossi et al (2024), projects may mix existing and new neighbourhoods but also focus on newly built areas or on the renovation of existing structures. The same is true regarding RES, where both the type and the number of energy sources adopted is highly variable. Finally, another highly variable feature are the funding strategies adopted at the project-level. This happens because currently no clear framework has been defined for the attraction and management of funding sources by such projects. As reported again by the European Commission (2024), the cities of London, Manchester, Milan, and The Hague have collaborated to create a blueprint for the formation of city investment funds which can be exploited by local administrations to finance one or more projects by attracting large external investments. Other cities have been reported to adopt different strategies, such as investment platforms to manage the allocation of financing to multiple stakeholders or to adopt social investment systems, thus relying on citizens' participation.

The overview above has identified common features and key elements of the environment where ExPEDite's outputs will be collocated. The next subsection is going instead to look at possible gaps to be exploited for an effective introduction of the project.

### *4.3.3 Gaps in the current landscape*

As far as described in the JPI's Booklet of Positive Energy Districts in Europe (2020), no project seems to have the degree of technological advancement which ExPEDite aims to offer. Though presenting innovations, the documented projects seem to have focused more, among other aspects, on the actual design of energy efficient districts and of distribution systems able to homogenise the different energy sources and to effectively link them to the wider local or regional grids. Instead, projects focusing mainly on the exploitation of new disruptive technologies for the design and management of PEDs appear to be absent. Even in the case of projects adopting comparable technological solutions, these do not seem to have the scope of ExPEDite's, which also represent the core of the project's idea and design. A prominent example of this is the SPARCs project in Espoo, Finland. In fact, in this case the use of a visualisation tool has been explicitly stated. Nonetheless, as can be read on the project's official website, it has the aim to permit *"the calculation and the evaluation of KPI's"*, *"to quantify the level of achievement of the milestones"*, and *"to act as an additional Communication and Dissemination means*

*of the project"* (*D1.06 Visualization framework for assessing city performance*, SPARCs, 2021). So, here the digital tool is used for monitoring the project's performance, allowing for an easier understanding of potential adjustments and for informative use-cases for replication in other contexts. ExPEDite's technological products, instead, serve multiple functions in addition to monitoring. They allow to make projections on the future development of the district and to identify the most energy- and cost-efficient pathways, provide calculations for investments and present an embedded methodology for the Cost-Benefit Analysis (CBA) of the project. As such, these technological solutions seem to potentially represent a more powerful tool for the design and development of PEDs than those already devised. A further confirmation of this comes from considering the importance of the above-mentioned CBA. As a matter of fact, it is a key step when dealing with projects, which need to guarantee the economic viability of investments. Some explicit reference to it is also found in JPI's Booklet of Positive Energy Districts in Europe (2020). However, in the publication no evidence has been found of specific technological tools aimed at performing a timely and precise CBA in previous initiatives.

Another relevant gap can be found considering again "*The State of European Smart Cities. Exploring and showcasing models, solutions, and financing for European replication to achieve climate neutrality*" (2024). There explicit reference is made to the need of new use-cases for an efficient use of digital twins in smart cities. Specifically, what currently needs to be addressed in the market is the lack of a solid understanding of *"their added value in the decision-making"* and of how this technology can combine data from different sources and exploit them for cities' management and development. As will be discussed in Section 4.4, the digital twin is part of ExPEDite's assets, and it will be used exactly for the purposes above starting from a district-level application.

In addition, progresses are being made concerning local administrations' ability to gather and use data. Some cities, for example, *"have started implementing a city-operating system aiming to optimise public services such as mobility, energy, or waste"* (European Commission, *The State of European Smart Cities. Exploring and showcasing models, solutions, and financing for European replication to achieve climate neutrality*, CINEA, 2024). However, the current scenario is still largely incomplete, with cities having very different levels of development and uptake of digital solutions. As reported again in the Commission's 2024 publication: *"Almost half of the cities surveyed are starting to explore urban data platforms, but only a third are using them operationally. This leaves plenty of ground for improvement in the coming years"*.

From the analysis above, two main conclusions can be drawn. First, the lack and the limited understanding of the potential of advanced multi-functional technologies represent gaps in the current setting that could be filled with ExPEDite's introduction. Second, local administrations' ability to deploy digital-based sustainable services for their communities is still incomplete and unevenly distributed across Europe. Assets developed by new projects capable of addressing such issue may be able to spread quickly to multiple cities.

## 4.4. Exploitable Assets – Description and identification of Target Groups for their exploitation

The definition of ExPEDite's Exploitable Assets aims to provide a clear overview of the assets and outputs expected from the project, together with the definition of the market and business lines of exploitation for each of them. Hence, it allows to build a solid basis for the discussions to follow in sections 4.5, 4.6, 4.7. The following tables represent the 6 assets as stated in the project's Proposal inside the Grant Agreement, together with their respective Target Groups and potential routes for their exploitation. The Key Exploitable Assets here presented have also been subsequently validated by the Consortium partners during M6 of the project. In total, 16 responses have been gathered through an online form as part of Task 7.4.1. All of them have confirmed the following list:

| Exploitable Asset | Connector to EU Data Spaces |
|---|---|
| **Description** | The Data Spaces Integration Suite (DSIS) is a tool devised to create access and connections to EU data spaces, allowing to integrate district-level and external data in a single framework responding to the principles of Findability, Accessibility, Interoperability, and Reusability (FAIR). |
| **Target Groups** | • Research and academia.<br>• Policymakers. |
| **Business Lines of Exploitation** | • Scientific exploitation.<br>• Political exploitation. |

| Exploitable Asset | Digital Twin Visualisation |
|---|---|
| **Description** | Tool that allows to create a virtual 3D replica of the physical system based on near real-time data for purposes of testing, simulation, and analysis. |
| **Target Groups** | • Cities.<br>• Energy providers.<br>• Businesses.<br>• Policymakers.<br>• Citizens and public. |
| **Business Lines of Exploitation** | • Creation of a software package for potential commercialisation.<br>• Production of standards for the data models to be adopted and applied. |

| Exploitable Asset | Reusable models and software components (BSM, RES, District heating, M&T, energy flexibility) |
|---|---|

| | |
|---|---|
| **Description** | Models and software components for simulation and analysis of different aspects of the physical system:<br>• **Building Stock Modeling**: comprehensive and systematic approach to track the energy performance of the building stock (i.e., its energy efficiency).<br>• **RES Modeling**: analytical methodology to identify optimal sites and combinations of RE and storage technologies for the development of the local energy system towards positive energy.<br>• **District Heating**: model for the digital representation, simulation and analysis of the district heating network.<br>• **Mobility and Transport**: data-driven approaches to assess the impact of future solution on the local environment and energy consumption.<br>• **Energy Flexibility**: predictive tool to forecast RE generation and consumer demand. |
| **Target Groups** | • Research and academia.<br>• Policymakers, urban planners, government agencies and local administrations.<br>• Cities and communities.<br>• Energy providers and Distribution System Operators.<br>• Building owners and construction companies.<br>• Transit operators.<br>• District managers and urban planners. |
| **Business Lines of Exploitation** | • Creation of a software package for potential commercialisation.<br>• Practical application for demonstration of use and capabilities. |

| **Exploitable Asset** | **Cost-benefit Analysis (CBA)** |
|---|---|
| **Description** | Methodologies to conduct an economic impact assessment of the project's implementation. |
| **Target Groups** | • Decision makers (i.e., administrations).<br>• Urban planners. |

| | |
|---|---|
| | • Academics. |
| **Business Lines of Exploitation** | • Scientific exploitation.<br>• Exploitation by policymakers. |

| **Exploitable Asset** | **Mobile app for citizen engagement** |
|---|---|
| **Description** | Mobile application consisting of 3 main elements:<br>• **Presentation of the Digital Twin analysis results** in a simplified form to make them easily understandable by the public.<br>• **Gamification elements** to engage and motivate citizens towards energy conservation.<br>• **User forum/messaging capabilities** to allow citizens to express their opinion. |
| **Target Groups** | • Citizens and public (schools/ educators).<br>• Cities and communities. |
| **Business Lines of Exploitation** | • Creation of a software package for potential commercialisation.<br>• Development of a demo version for dissemination and potential commercialisation. |

| **Exploitable Asset** | **Training material and Practical guidelines for PEDs** |
|---|---|
| **Description** | Materials and activities to engage targeted stakeholders, allowing for the dissemination of the results. |
| **Target Groups** | • Cities and city planners.<br>• Policymakers. |
| **Business Lines of Exploitation** | • Engagement of stakeholders through Living Lab activities for the potential generation of further developments. |

| | |
|---|---|
| | • Dissemination of practices and results through the organisation of events and workshops (more than 2).<br>• Production of a whitepaper for dissemination purposes. |

The identified exploitable assets are thus pertinent to the wider context of the EU market for sustainable energy practices. Some of them serve a narrower purpose, such as the Mobile app for citizen engagement. Others (i.e., Reusable models and software components and Digital Twin visualization) target a larger set of stakeholders. Furthermore, the assets are aligned with the sectors of interest discussed in 4.1.3. In this perspective, they appear as highly useful to fill the gaps identified in 4.3.3. This is going to be discussed more thoroughly in the following Section.

### 4.5. ExPEDite offering

Based on the analysis presented on the general market and interested sectors, the gaps in the current landscape and the exploitable assets, the present section aims to position ExPEDite's outputs within the market and define its offering and strengths.

First, the Digital Twin Visualization tool directly tackles the lack of use and understanding of Digital Twins' potential. In the context of ExPEDite it will represent the main tool provided to planners and policymakers. Such stakeholders will be empowered with a State-of-The-Art tool for the day-by-day monitoring of the district's performance and the analysis of its needs and optimal development pathways. This will also serve the purpose of refining and upgrading the tool based on users' feedback thanks to the co-creation activity in the Living Lab. In addition, as already discussed in 4.3.3, the novelty and complexity of both the Digital Twin and the Cost-Benefit Analysis (CBA) seem to represent a step forward in terms of the centrality of advanced technological tools and of their functionalities in PED projects.

Also, the reusable models and software components and the connector to EU Data Spaces represent relevant additions to the current setting. The former, indeed, allows to have an embedded system of models directly connected to district-level data. The latter serves the purpose to make this digital system accessible by interested parties throughout the EU and to provide planners and administrations with a much larger data pool. So, these assets target the current gap in urban data platforms pointed out in 4.3.3.

The Mobile app for citizen engagement and the Training material and Practical guidelines for PEDs, then, serve further key purposes highlighted in previous Sections. Respectively, citizens direct involvement in sustainable energy practices at the district-level, and dissemination for diffusion of best practices and replication.

Given the considerations above, it can be stated that the identified market domains seem to be distinctly suitable to ExPEDite's assets. It appears that ExPEDite has the right features to potentially play an important role in the interested sectors, bringing advancements in the practical application of AI and digital tools for energy management, while creating synergies with other projects and diffusing new knowledge in the stakeholder community. Moreover, it has been shown that the project could close the gaps found in the current setting. Even considering the timing for its introduction, the above expectations do not change. On the contrary, they appear to be confirmed by the analysis of the market drivers developed in Section 4.2. The time span to be considered before ExPEDite's market entrance is currently of two years. Since the relevant market is constantly developing in a highly favourable direction, there is no foreseeable reason to expect the above considerations to change in the next years. Then, if the regulatory framework is added to the picture, the evidence becomes even stronger. Indeed,

Sections 4.1 and 4.2 have been largely dedicated to show the EU-wide commitment towards sustainable energy practices. EU institutions are strongly pushing towards a sustainable future, to be realised through investments, regulations, and policies. Considered this and the amount of funds already deployed, a constantly increasing demand can be expected for projects like ExPEDite and for the diffusion and uptake of their solutions. Certainly, this means that new innovative projects will be introduced in the future. However, taking in consideration the time necessary for their deployment, it appears from the present discussion that the project could manage to gain a competitive advantage after its market entrance. The potential influence of other PED projects which are currently developing will be analysed in Section 4.7.

It is now time to discuss the potential barriers to ExPEDite adoption.

## 4.6. Adoption barriers

Despite the considerations above, several barriers appear to be present in the context of Positive Energy and smart Districts. A solid overview is provided by the European Court of Auditors (2023). The paper discusses the success, challenges and obstacles of the projects in the Lighthouse programme, financed by Horizon Europe. Figure 28 shows the percentage of 'lighthouse' and 'fellow' cities (i.e., initial and subsequent adopters of projects' solutions, respectively) experiencing specific obstacles. The lack of funding appears to be the main issue, especially severe for later adopters. Regulatory barriers, the lack of political commitment and the lack of internal expertise also appear to be significant obstacles.

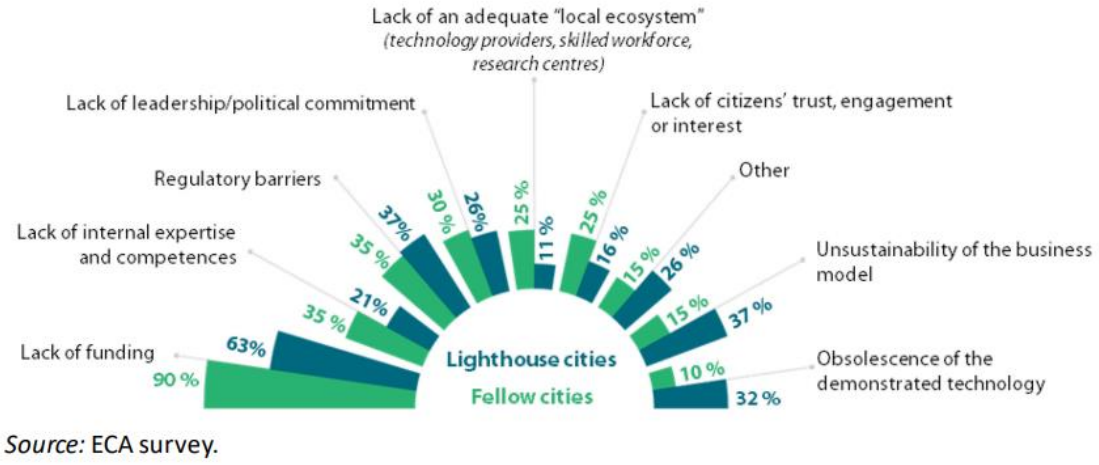


Figure 31: Proportion of Lighthouse and Fellow cities experiencing obstacles in replicating project's solutions. *European Court of Auditors, Smart cities Tangible solutions, but fragmentation challenges their wider adoption, Special Report, 2023.*

Based on the discussion in the previous Section, it appears that ExPEDite tackles some of the barriers shown above right from its design. First, citizen's engagement represents one of the building blocks of the project through the development of the Mobile application as one of its Key Exploitable Assets, as seen in Section 4.4.

In addition, Sections 4.3 – 4.5 have shown the innovative nature of the Digital Twin visualisation tool. This, together with the Reusable models and software components – allowing for modelling and forecasting for future development – and the feedback and adjustments in the context of the Living Lab mitigate the possible obsolescence of the technology. The presence of the Living Lab among the Exploitable Assets also represents a potential guarantee in terms of two other barriers: lack of internal

expertise and lack of an adequate "local ecosystem". Indeed, it represents at the same time an important centre for research and co-creation, and a hub for knowledge sharing and development of expertise. Also, the Training materials and practical guidelines envisioned by ExPEDite imply that cities and consortia willing to adopt the solution in the future will be provided with the necessary knowledge to implement and operate the solution efficiently.

Concerning political commitment, then, the analysis conducted so far has shown the strong push at the central level to increase the spread, scope and impact of Renewable Energy Projects in the Union. Nonetheless, issues may still arise at the micro-level. In fact, city administrations may be reluctant to adopt the technologies. This may be due to different reasons, from ideology to budgetary constraints. However, the current market trajectory shows that the uptake of innovative projects dealing with energy transformation will be even more incentivised in the future. Moreover, the spread of a technology is a gradual process, meaning that its adoption happens at different times in different places. The successful implementation of the project in a small number of cities may facilitate its uptake by other administrations. These considerations together imply that the lack of political commitment does not appear as a major barrier for the adoption of ExPEDite's assets.

The lack of funding and the potential presence of regulatory barriers represent instead more relevant obstacles in the context of ExPEDite. As seen above, funding often represents an attention point for such projects. Clearly, the presence of funding programs managed by the EU institutions has proven to be crucial for the existence and success of these initiatives. However, their adoption and spread are also largely dependent on their potential to attract investors. PED projects are complex endeavours which require a high level of commitment, planning, social participation, resources and skills. This level of complexity entails a considerable risk of failure, which may disincentivize many investors. In its 2020 White Paper (*White Paper on Reference Framework for Positive Energy Districts and Neighbourhoods - Key lessons from national consultations*, Joint Programming Initiative (JPI) Urban Europe, White Paper, 2020), JPI Urban Europe stressed the importance of having economically viable underlying business models to attract the necessary finance. The development of business models for ExPEDite is already planned as one of the next steps in the exploitation strategy. Given that the unsustainability of business models is a further adoption barrier shown in Figure 31, a sound, robust and diversified exploitation strategy is expected to allow the project to overcome both barriers by the time of its entrance into the market.

In terms of regulatory barriers, then, the scenario is even more complex. Indeed, these barriers can be of various nature. The European Court of Auditors (2023) distinguished among the following: procurement policies and norms, privacy and data protection regulations, construction permits, other regulatory issues. For ExPEDite, the respect of the EU-level data protection regulations is a fundamental step in the design of the DSIS. However, the other types of regulatory barriers appear to be largely dependent on exogenous conditions. This means that the regulatory framework in each place of adoption of the project's assets represents a relevant factor. Clearly, the commitment of local administrations, national- and regional-level policies directed to make such projects more accessible, as well as effective public-private cooperation are all potential mitigating factors. So, regulatory factors represent an attention point for ExPEDite's adoption. However, the development trajectory of the EU market for sustainable energy practices is expected to create more incentives for national, regional and local administrations to reduce such barriers and to increase the level of cooperation with the private sector.

Further adoption barriers have not been currently identified.

## 4.7. Market Analysis Methodologies

So far, we have analysed the broader market and the specific domains of interest, their trends, as well as ExPEDite's offering and barriers. The present Section is intended to exploit methodologies allowing to conduct a deeper examination of the factors shaping the market and affecting the project's positioning.

Three different methodologies have been selected for this purpose: Porter's Five Forces Analysis, PESTLE Analysis and SWOT Analysis. The use of these approaches together allows to gain a thorough understanding of the market, thanks to their complementarity.

Porter's Five Forces Analysis is a framework that helps businesses understand the competitive forces in their industry and how they can create a competitive advantage. It looks at the threat of new entrants, the bargaining power of buyers and suppliers, the threat of substitute products or services, and the intensity of competition. By understanding these forces, ExPEDite can identify potential competitive advantages and areas where the offering may need to be differentiated.

PESTLE Analysis, instead, focuses on external factors. It considers Political, Economic, Social, Technological, Legal, and Environmental conditions and the way they are expected to affect present and future market conditions.

SWOT Analysis, then, is a strategic planning tool that helps businesses identify their internal strengths and weaknesses, as well as external opportunities and threats. It is a useful tool for evaluating a company's current position and determining the best course of action moving forward.

### *4.7.1 Porter's Five Forces*

The reason for applying Porter's Five Forces first lies in the fact that it is considered a valid starting point for strategy formulation, allowing to understand the competitive landscape and thus to cement competitive advantage (*Porter's Five Forces: The Ultimate Competitive Strategy Blueprint*, The Strategy Institute, April 2024).

ExPEDite aims to bring a new State of The Art to the market. So, based on the analysis produced so far, the current environment and competition are going to be assessed to determine whether the project's exploitable assets can produce a competitive advantage in the domains of interest. Figure 32 provides a visual description of this methodology.

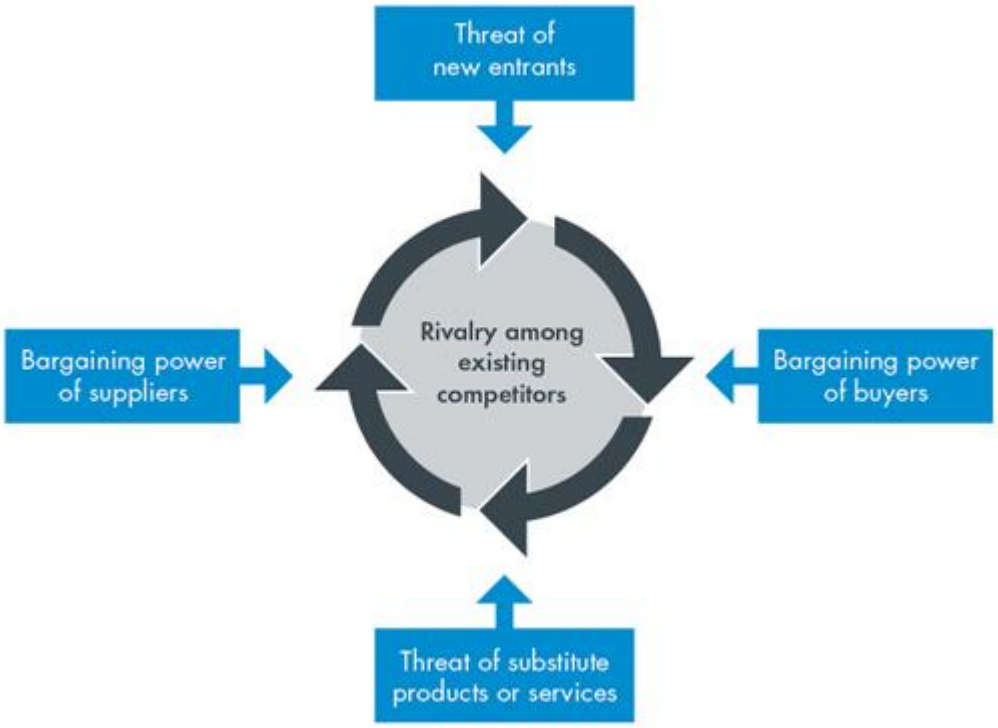


Figure 32: Porter's Five Forces.

#### 4.7.1.1 Buyers

To determine the bargaining power of buyers, it is logical to start from the number of buyers in the market. In section 4.4 a first depiction of the interested actors has already been given. Buyers can be categorised as follows: administrations (decision makers, policymakers, city planners), research and academia, citizens and public, energy providers and Distribution System Operators, and other businesses (tech companies, actors operating in the building industry, NGOs). Surely, given the scope of the application of ExPEDite's exploitable assets, it is likely to expect buyers to be consortia composed by actors from different categories. Even with this perspective, considering that this is an EU-wide market, the number of potential buyers remains significant.

Inside consortia, administrations can be regarded as the main buyers. In fact, considering that the project's assets are designed for the deployment, management and development of Positive Energy districts and cities, local decision-makers represent the most directly targeted stakeholders. To determine the level of bargaining power that they can leverage, it is important to stress the role of public finances. At the current stage of development of PED projects, in fact, not all EU cities dispose of or are able to raise the economic means necessary to implement such initiatives. Since, as said, ExPEDite is designed to be applied specifically to cities, they could leverage their position to demand more favourable conditions. However, the fact that ExPEDite's design comprises multiple exploitable assets represents a solution to this issue. Indeed, based on budgetary needs, buyers can be offered different solutions, spanning from practical guidelines to the Digital Twin visualisation. In other words, the project's outputs appear to be flexible to adapt to the demands and needs of its main buyers.

Another important consideration concerns the level of need for ExPEDite's outputs. In fact, in case of a low level of need, buyers could still be more interested in choosing less innovative but cheaper solutions. As highlighted in the first two Sections, however, the demand for innovative and viable solutions allowing to accelerate the EU's energy transition keeps growing, sustained by the strong

commitment of central institutions. If to this market trajectory the preliminary conclusions of Section 4.5 are added - i.e., that ExPEDite's offering appears as a State of The Art solution which could close the gaps identified in the current market setting – a considerable level of need for the project's asset can be expected.

As a secondary buyer, businesses - especially tech companies operating in the interested markets - could possess a higher bargaining power. Indeed, they could already possess technological solutions which would make them less in need of the project's assets. This reasoning clearly applies also to the case of consortia including one or more of such companies. However, not accessing ExPEDite's assets would imply for them to be able to upgrade their own technologies. Even when possible, this may not be the most financially efficient solution.

Finally, based on the discussion developed in Section 4.3, it is worth highlighting here that cities which have already applied solutions such as smart grids linked to Renewable Energy Sources in certain districts or neighbourhoods, may be less interested in ExPEDite's offering. In other words, despite having adopted way less efficient and pervasive solutions, such cities may consider the project's assets not to be a priority and thus devote budget to other needs.

Further considerations on the potential threat of solutions perceived as substitutes will be developed later on in the analysis.

#### 4.7.1.2 Suppliers

The next factor in the Porter model addresses how easily suppliers can drive up the cost of inputs. It is affected by the number of suppliers of key inputs of a good or service, how unique these inputs are, and how much it would cost a company to switch to another supplier. The fewer suppliers to an industry, the more a company would depend on a supplier.

ExPEDite is being designed involving partners from multiple areas of expertise: from academia, to industry, to NGOs. Their work combined allows to build and make operational all the envisioned Exploitable Assets, without the need for external suppliers who would drive the costs and prices upwards.

This said, what ExPEDite aims to provide is mainly a powerful infrastructure and a framework allowing for a near real time, interactive monitoring, management and planning of the energy system at the district or city level. To be operationally effective, this infrastructure must interact with the system locally in place. For example, the Building Stock Modelling, which is part of the reusable models and software components and tracks the energy performance of the building stock – as seen in section 4.4 – needs to interact with sensors in the building stock at the district- and city- level to produce its output. This, however, cannot be considered as an input necessity for ExPEDite. In fact, this represents an external factor for the project, and a condition to be considered by local administrations when deciding to adopt its technologies.

#### 4.7.1.3 Substitutes

ExPEDite's innovation lies in the combination of AI, visualization tools, analytic software and models for planning of a cities' development, while also providing tools and guidelines to implement the solutions.

As anticipated in previous sections, such a wide and digitally advanced offering appears to represent a new State of The Art compared to other PED projects. It is, in particular, the combination of these diverse assets what is expected to differentiate ExPEDite from existing solutions. Many of its individual

assets, in fact, such as visualization tools, Living Labs and citizen engagement apps have already been implemented in other local contexts. Such solutions, however, appear to have lacked a perspective of planning and continuous development, which is instead at the core of ExPEDite's design. This implies that what actually exists in the market are only *indirect* substitutes that do not seem to offer the full spectrum or features of ExPEDite's assets. This appears to be true even when moving away from PEDs and considering solutions in specific sectors of interest. As shown in 4.1.3, for example, current AI applications for sustainable energy practices are mainly focusing on energy efficiency estimation and profiling, as well as monitoring and management of the grid, with further purposes still under study.

What emerges, thus, is the need to communicate appropriately how the project's offering differentiates from existing solutions and their application. Furthermore, the assistance provided through the Training material and Practical guidelines enhances the value of all the resources that stakeholders can mobilize for the creation of PEDs.

The above considerations must be taken explicitly into account when approaching stakeholders for the take-up of the outputs, along with their technical expertise. Stakeholders with lower technical capacity and expertise may not be up to date with all the developments in the field, but nevertheless may be interested in implementing ExPEDite's solutions if the benefits and added value compared to products that are more dated or limited is clearly shown. This would also likely help mitigating the issue highlighted in 4.7.1.1, concerning administrations which have already applied less innovative solutions.

#### 4.7.1.4 New Entrants

To effectively analyse the threat posed by new entrants, both the attractiveness of the market and entry barriers need to be considered.

Section 4.2 has clearly depicted a market which is expected to maintain its growth trajectory, thanks to the momentum created by technological development and reinforced by political commitment and social demands. This situation is likely to attract new entrants in the design and implementation of PED projects, and more generally in the domains of interest for ExPEDite's solutions. Potential entrants in this sense are companies offering advanced AI solutions with expanded possibilities and applications in the context of sustainable energy practices (i.e., sustainable transport and e-mobility planning, optimization of electricity storage solutions). Consortia involving such companies, as well as energy producers/ providers and local administrations are expected to increase as the market grows.

However, the presence of high barriers would represent a serious issue for new entrants. First, multi-stakeholder collaboration is required. Even though some tech companies could still be able to produce and sell their solutions individually in the market, the spread and applications of such products would risk being limited without strong partnerships and the network offered by consortia. In case of more complex solutions, then, sufficient expertise of the involved stakeholders is necessary. To this, the cost and time of Research & Development for a directly competitive offering must be added. Section 4.6 has discussed additional relevant barriers. Variable regulatory barriers, depending on the local context, represent a considerable risk factor for projects both in terms of time and costs. Moreover, the more complex the legal context, the more difficult may be to attract the necessary funding due to high uncertainty.

Therefore, the threat of new competitors is mitigated for two main reasons. On the one hand, the potential number of new entrants could be limited by the high barriers. On the other, entering solutions would risk being fragmented and lacking the completeness offered by ExPEDite's thorough design. In addition, ExPEDite could gain a first-mover advantage with its technological solutions by the time new comparable solutions will be ready to enter. The network effect created by the implementation of a

pilot, as well as by the Living Lab activities and the exploitation and communication strategy represents an additional factor in keeping its competitive advantage on new entrants.

#### 4.7.1.5 Competition

Existing competitors inside the market could be distinguished in two main categories: consortia in international - EU-funded - projects, and private companies offering advanced technological sustainable energy solutions.

The latter will likely be able to impose only a limited level of competition to ExPEDite. This is linked to the considerations proposed above, in subsection 4.7.1.4. Still, private competitors may pose some issues to the spread of ExPEDite's assets in case of strong partnerships with public administrations. Public-private partnerships, in fact, are at the heart of smart city development in EU. Already in 2014, the EU Parliament's Report "Mapping Smart Cities in the EU" defined a smart city as *"a city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership"* (C. Manville et al., *Mapping Smart Cities in the EU*, European Parliament, Directorate General for Internal Policies, Policy Department A: Economic and Scientific Policy, 2014). This is entailed by the very nature of smart projects. Initiatives envisioning the application of IT solutions in urban contexts imply that administrations contract with private companies for the provision of the necessary technology. However, no arguments have been found concerning threats to competition caused by these arrangements. To this, the conclusions of 4.7.1.3 need to be added: correctly framing the advantages of ExPEDite's offering in its communication strategy will likely reduce the competitive threats of solutions which may be perceived as substitutes.

Taking into account consortia in international projects, instead, different considerations arise. The analysis so far has already widely shown that PED projects currently implemented do not seem to present levels of innovation and complexity in line with those of ExPEDite – factor clearly mitigating the threat of competitors. So, here is more important to discuss ExPEDite's potential synergies with existing initiatives, both in the context of PEDs and of R&I projects in general. In particular, considering EU-funded projects where the spread and uptake of effective solutions is strongly incentivised, exploiting synergies may allow to generate further innovation. Importantly, ExPEDite has planned to incorporate synergies with other initiatives right from its design. This has been possible thanks to the high involvement of the consortium Partners in EU-projects, mainly funded through HORIZON EUROPE and H2020 Programmes. Solutions and ideas in some projects presenting similarities or connections to ExPEDite have been incorporated in its design and adapted to the project's goals. Relevant examples are:

- The knowledge in data fusion approaches, AI/ML techniques, decision support and standardization methods produced in S4AllCities.
- The experience in integrating Building Management Systems in a Digital Twin developed in SmarteeStory – HORIZON.
- Links with the Energy Data Spaces of OMEGA-X.
- The lessons learnt through development of PEDs in 8 ATELIER cities.
- The integrated quarter renovation approach piloted within SUPERSHINE.
- The mobility models developed for the Digital Twin in ACUMEN.

Other initiatives potentially suited to the creation of synergies have also been identified. In this sense, ExPEDite Grant Agreement makes direct reference to the following HORIZON EUROPE projects: MAKING-CITY, MAtchUP, LocalRES, NEURALPATH.

In addition, three initiatives not funded by central EU Programmes have been acknowledged by ExPEDite for the creation of synergies and added value:

- **WasteHeatSES – Nordic Energy Research**: An ongoing Nordic Energy Research funded project valorising waste heat sources in the Baltic-Nordic region through an in-depth national potential assessment, technical simulation, and cost-benefit analysis. Relevant for the district heating and storage simulation platform in ExPEDite.
- **Energy Equilibrium – Interreg Baltic Sea Region**: "Energy Equilibrium" develops an interactive and easily applicable platform to support municipalities and energy suppliers in decision-making related to the development of efficient action plans to accelerate local RES utilization, focusing on the development of sufficient energy storage infrastructure.
- **INREBEMD – ERD**: A project that develops a cloud-based, adaptive and artificial intelligence driven power management platform for ensuring smart distribution of electricity at the user and higher connection levels. Relevant for developing the Digital Twin in ExPEDite.

Finally, a major role for synergies creation and exploitation is covered by ExPEDite's sister projects: BIPED and Tips4PED. These are parallel projects related to ExPEDite in terms of scope and types of solutions which are being developed. BIPED, which also involves one of ExPEDite's Consortium Partners – Open & Agile Smart Cities & Communities (OASC) – is building intelligent PEDs through the deployment of a Digital Twin with AI-driven optimisation tools for enhancing urban planning capabilities. Collaboration between these two projects will allow to fine-tune the functioning of the Digital Twin and to learn from potential issues to come up with efficient solutions benefitting both initiatives in terms of implementation and future exploitation. Moreover, this cooperation between parallel projects coming up with common solutions testifies the importance attributed to synergies also for optimizing projects' development. Tips4PED, instead, will focus on designing, developing, and testing the effectiveness and the techno-economic viability of a Digital Twin-based Platform for the implementation of PEDs. This initiative is expected to provide valuable technical, practical and financial information to enhance the functioning and adoption of the Digital Twin.

No concrete examples have been currently found of synergies with private solutions.

Finally, further projects may bring to market additional solutions which could create synergies in the future and provide new ways for additional development of ExPEDite's solutions.

To sum up, the competitive landscape currently appears to offer limited threats for competition and a high potential for providing added value through synergies among EU-level projects.

The Five Forces model is a helpful methodology, but the changes in these forces must be continuously monitored, as ExPEDite is a part of a dynamic competitive landscape, in a market that is growing and developing. The consortium will continue to monitor the market, since it has already been deemed a necessity due to the high development in the market analysed in Section 4.2.

The following subsection will consider the influence of external factors through the PESTLE Analysis.

### *4.7.2 PESTLE Analysis*

Porter's Five Forces as an analytical tool does not place enough emphasis on how the broader environmental influences will affect ExPEDite and its market of interest. The PESTLE analysis fulfils the need to look beyond the industry boundaries to the macro-environment. It identifies forces in the macro-environment that are affecting the market currently and are likely to continue to do so in the future. The PESTLE factors will be analysed on the EU level, taking into consideration their potential interrelation with factors at the national and local level. By auditing the external environment, the

analysis will detect and understand broad, long-term trends and will be incorporated into an ongoing process for monitoring changes in the macro-environment until the project's end and the finalization of its business exploitation plan.

#### 4.7.2.1 Political

The analysis of the Political factors presented in this section focuses on the political priorities and trends eventually leading to EU legislation and its transposition in national legislation. This is particularly relevant since ExPEDite's approach and rationale derive from the strategic priorities set by the EU's legislative framework.

As discussed especially in Sections 4.1 and 4.2, the political commitment of central EU institutions appears as the key driving force of the current upward trend in the market and of future growth expectations. What is important here is to determine whether such a low uncertainty around future development is justified by the external Political forces in place. Clearly, the intensity of the EU's political activity, which starting from the European Green Deal of 2019 has leveraged on legislative, policy and financing instruments at an unprecedented pace, reinforces this idea.

In addition, exogenous shocks and international trends in the last years have gone in the same direction, with the effect of speeding up the transition. A relevant example is represented by the ongoing war in Ukraine. This is clearly stated in A. Widuto's 2023 Briefing for the EU Parliament. As reported: *"In its resolution on the UN COP28 conference, adopted in November 2023, Parliament highlighted the way in which Russia's invasion of Ukraine had added urgency to the need to transform the global energy system"*. This shock, in fact, and the subsequent energy crisis have underlined the Union's need for a fast reduction of the dependence on Russia's energy reserves and, in general, on fossil fuels.

Also considering the Member State level, though not currently presenting a homogeneous degree of investment in sustainable energy practices – as seen already in Section 4.1 -, they are nonetheless directly involved with development plans, national programmes, and local initiatives in their territory.

Given this scenario, a change in political priorities in the near future appears extremely unlikely. The political commitment towards sustainable energy has become stronger year after year and has already reached levels of penetration and investment which do not seem reversible.

No risk has thus been detected for ExPEDite in relation to political forces, which contrarily appear to confirm the high favourableness of the current setting towards the project.

#### 4.7.2.2 Economic

Economic factors include current and projected growth, inflation and investor's behaviour.

Clearly, not only market driven factors, but also the political priorities as analysed above may affect the economic environment, through public spending, fiscal measures, and funding programs. Thus, the starting point here is the growingly favourable environment influenced by public intervention.

However, in the analysis of Economic forces, other factors are in place, which should be acknowledged. Inflationary pressures in the last year have surely constituted an issue. A significant impact has been reported on research projects across Member States. This reflects primarily into higher personnel costs, thus affecting the real output achievable with the given budget (M. Gökten et al., *Recent inflation developments and the EU budget. Country-specific impacts and policy options*, Policy Department for Budgetary Affairs, Directorate-General for Internal Policies. PE 767.094 - November 2024). Thus, the

current setting will need to be kept under monitoring for an up-to-date evaluation of this factor and of the impact it will have on ExPEDite over the next months.

Another relevant factor in this context is represented by the availability of funding. A first analysis of the issue has already been provided in Section 4.6. Also in this case, a subsequent evaluation of this threat will be needed, especially in relation to the development of business models for the project's exploitation. To this, an additional consideration needs to be made. As initially discussed in 4.3.3, ExPEDite's design represents a further value added in this context. The embedded CBA, in fact, which is one of the Key Exploitable Assets of this project, provides the means to produce an economic impact assessment. In other words, ExPEDite already envisions an instrument which allows to keep the stakeholders informed on the economic impact and financial viability of the project, thus mitigating the threats from the Economic sphere.

#### 4.7.2.3 Social

Social factors include demographics and socio-cultural changes such as citizen's awareness on sustainability and climate change.

From the analysis in Sections 4.1.3 and 4.2, in fact, some positive factors have already emerged concerning social trends and behaviours in the domains of interest for ExPEDite. The increasing social awareness on "green" issues, together with the expected positive impact on citizens engagement - thanks to gamification -, provide a solid basis for citizen's involvement as active stakeholders after ExPEDite's introduction.

The current demographic trends in the European Union, however, still need to be considered. First, it is important to determine whether the current ageing population trend may be expected to exert some influence on ExPEDite's citizen participation outcomes. In 2023 Eurostat (*Demography of Europe – 2023 edition*, Eurostat, 2023) has provided further insights on this demographic trajectory. The data show that in the period 2002 – 2022 the percentage of people aged 65 or over at the EU-level increased from 16% to 21%. At the same time, the share of young people below 20 decreased from 23% to 20%. Concerning the potential influence of this phenomenon on ExPEDite, relevant insights have been provided by Poortinga et al. (2023). In particular, the paper has investigated potential differences between age groups in terms of perceptions concerning sustainability and climate change. Through multiple surveys in the UK, the authors have concluded that *"age is of little relevance for climate change scepticism"*, though it appears true that younger people show more emotional engagement in climate change issues. Given these findings, it can be concluded that the risk that an older population can significantly affect the level of citizens' engagement due to a lower interest in sustainability is currently low.

A further demographic factor to consider is increasing population. Positive figures in this sense have been reported by Eurostat for 2024 (*EU population increases again in 2024*, Eurostat, July 2024), also due to the impact of migration towards the EU. A growing population translates into a higher pressure on cities, which is likely to cause higher levels of pollution. Such a trend may have the effect to further underline the need of EU cities to find new and efficient ways to adopt sustainable energy practices and solutions, thus reinforcing the need for ExPEDite's outputs.

Digital literacy, then, could also influence ExPEDite's outcomes. Indeed, the effective participation of citizens depends not only on their preferences, but also on their basic skills in the use of the project's interactive engagement tools. Eurostat data show that in 2023 55% of Europeans aged 16 to 74 had at least basic overall digital skills (*Digital skills in 2023: impact of education and age*, Eurostat, February 2024). Importantly, the same article underlines how younger age groups present significantly higher levels of digital literacy. Being exposed from a young age to pervasive digital technologies, in fact,

makes easier for younger generations to develop such skills. So, in the current environment of constant technological advancement it comes logical to expect a higher average digital literacy in the future. This expectation is also confirmed by explicit EU goals. The Digital Decade policy programme has set, among others, the goal to reach a minimum of 80% of the EU's population with basic digital skills by 2030 (*Europe's Digital Decade: digital targets for 2030*, European Commission website, [no date]).

Overall, it seems that social factors and trends can be expected to have a positive impact on ExPEDite's outcomes.

#### 4.7.2.4 Technological

To properly address the technological scenario in the EU and its current trends, it is once again necessary to connect this discussion to the political scenario. Indeed, in addition to the downward trend in the costs of "green" technology and the continuous effort in academic and applied research – topics already analysed in the first Sections – the legislative framework of the Union is playing a crucial role in this sense. A relevant example is represented by the New Leipzig Charter – The transformative power of cities for the common good, adopted in 2020. Inside the Charter, which provides a key policy framework for sustainable urban development in Europe, urban digitalisation is regarded as a major factor: *"European digital sovereignty is key to the future competitiveness of the EU. Cities, with their power to scale up digital solutions and to adapt them to local conditions can significantly contribute to this"* (*The New Leipzig Charter - The transformative power of cities for the common good*, Directorate-General for EU regional and urban policy, European Commission, 08 December 2020). At the same time, this framework clearly sets the need for this digital transformation to be, among other features, environmentally sustainable.

The setting described above contributes to increase the importance of the investments in technological R&I for the sustainable development of cities. A proof of this can be retrieved in the fact that in May 2024, the European Urban Initiative (EUI) – Innovative Actions has opened new Calls for Proposals in line with the New Leipzig Charter. In particular, the topic "Technology in cities" is going to contribute to the objectives of multiple policies and initiatives such as the EU Green Deal and the EU Mission on Climate-neutral and Smart Cities. Technologies such as IoT sensors, AI, Digital Twins, and AR/VR are expected to be introduced with functionalities suited to the urban context (*Technology in cities*, European Urban Initiative, 2024). Although this may appear as a potential threat for ExPEDite, actually this can represent an opportunity. The importance of synergies in the current market has already been analysed in the Porter's model. The entrance in the market of projects exploiting similar technologies could represent an asset for a future development of ExPEDite through new synergies. This is especially true if we consider that these projects will likely enter the market after ExPEDite, which will therefore have a first mover advantage. This mitigates even further the potential downsides of this trend.

#### 4.7.2.5 Legal

To properly address the legal context of the EU on matters related to ExPEDite, it is necessary to consider once again the regulatory framework of the Union. Regulations on sustainable energy practices and green investments have already been widely addressed. The same is true concerning the development and adoption of new technologies. In addition to these, however, there are other legislations which still need to be analysed.

A central theme in the European digital development is constituted by data. The European strategy for data – COM(2020) 66 final (*A European strategy for data*, *COM(2020) 66 final*, European Commission, 2020)– was introduced to achieve a single data market in the EU. In this context, multiple key enablers were identified: investments in data and strengthening Europe's capabilities and infrastructures for hosting, processing and using data, interoperability. The objective to build EU-wide, common and

interoperable data spaces – aiming at overcoming legal and technical data sharing barriers - is particularly relevant for ExPEDite. The project, in fact, fits inside the data spaces and interoperability framework in two ways. First, as seen in Section 4.4, the "Connector to EU Data Spaces" is among the Key Exploitable Assets. It is aligned with the EU objectives by integrating data in a single framework responding to the FAIR principles. Second, ExPEDite is designed to follow and implement the Minimum Interoperability Mechanisms (MIMs). These are capabilities which provide the technical foundation for procurement and deployment of urban data platforms and end-to-end solutions in cities and communities worldwide. In other words, these Mechanisms ease and speed-up the replicability of the project's digital solutions in different contexts.

The above assessment of the European legislative framework shows that not only no EU-level Directive has been detected creating potential obstacles to ExPEDite, but the latter is designed to fit inside the Union's legal context and to respond to its targeted needs and objectives.

Nonetheless, as stated in Section 4.6, legal barriers at the local level may still affect ExPEDite's dissemination strategy. "Red tape" in procurement mechanisms and procedures for construction permits may represent relevant factors. These, however, can change according to the specific Member State, region, or city. Thus, ExPEDite will need to take this into account in formulating assessing its dissemination and exploitation strategy. Moreover, the market will need to be monitored to assess if future developments may bring to some degree of harmonisation of such legal procedures among countries.

#### 4.7.2.6 Environmental

The environmental goals of the EU are at the core not only of the external factors and trends analysed in the present Section, but also of the market for sustainable energy practices itself. Even more so, the rationale behind Positive Energy Districts is to lower the environmental burden of cities. Indeed, as stated in ExPEDite's Proposal, Section 1.1.1: *"Developing Positive Energy Districts (PEDs), as introduced in the Strategic Energy Technologies Plan [SET Plan], is a breakthrough way to deal with the issue of urban emissions and applying adaptation and mitigation strategies to climate change"*. The SET Plan, which ultimately pushes towards the development of low-carbon technologies, is in turn an instrument inside the wider Energy Union Strategy of 2015 (COM/2015/080) (*Strategic Energy Technology Plan*, European Commission website, [no date]). This, which aims at providing EU consumers with secure, sustainable, competitive and affordable energy, has in renewable energy and low-carbon technologies some of its key dimensions and instruments (Energy union, European Commission website, [no date]).

In this context of intense environmental commitment, not only no obstacles to ExPEDite are foreseen, but an increasingly favourable setting for its adoption can also be expected.

The following subsection is going to complement the assessment presented so far by carrying out a SWOT analysis.

Table 2: PESTLE Analysis

| | Political | Economic | Social | Technological | Legal | Environmental |
|---|---|---|---|---|---|---|
| **Factors** | Political commitment of central EU institutions | Public spending, fiscal measures, and funding programmes at the EU-level, incentivizing sustainable energy practices and PEDs | Increasing social awareness towards "green" issues | New Leipzig Charter: digitalization in cities is a crucial factor for urban development in the EU | European strategy for data pushing towards higher interoperability | Environmental pressures at the core of Europe's commitment towards sustainability |
| | The war in Ukraine has underlined the EU's need for a fast reduction of the dependence on fossil fuels | Recent upward trends in inflation | Demographic factors: ageing and growing population. The latter could cause higher pressure on cities and pollution | New Calls for Proposals on R&I development concerning "Technology in cities" | Variable legal barriers at the local level | SET Plan and Energy Union Strategy: high demand for low-carbon technologies and renewable energy |
| | Development plans, national programmes and local initiatives in Member States | Scarce availability of private sector funding for PED and smart city projects | Digital literacy expected to rise in the EU over the next years | - | - | - |
| **Impact on ExPEDite** | Expectations of increasingly higher needs of the market | Further evidence of growingly favourable | Social awareness coupled with ExPEDite's citizen engagement strategy | ExPEDite strongly aligned with EU policy on | DSIS and MIMs: ExPEDite fits inside EU's requirements on | EU's environmental needs strongly linked with political commitment: highly |

| | | | | | | |
|---|---|---|---|---|---|---|
| | for ExPEDite's solution | market shaped by public interventions | and the identified trend in digital literacy: high citizen involvement outputs are expected | technological development | data and interoperability | favourable for ExPEDite |
| | - | Inflation and funding availability represent obstacles to effective implementation and require monitoring. The embedded CBA, however, mitigates negative effects | Low relevance of population age for citizen involvement, while demographic growth strengthens the urgency towards ExPEDite's solutions | New push on R&I projects may create additional opportunities for ExPEDite to improve by exploiting synergies | Local legal barriers require monitoring and to be addresses in the exploitation strategy | - |

### 4.7.3 SWOT Analysis

The SWOT analysis is another tool used to analyse and make strategic decisions. Companies, analysts, and investors apply it to look more deeply within an organisation to analyse its internal potential. Therefore, to complement the methods utilised thus far and achieve a well-rounded perspective, the SWOT analysis was carried out and led to the identification of the factors discussed in the following subsections.

#### 4.7.3.1 Strengths

**Interoperability**: ExPEDite's offering is designed to integrate seamlessly with existing systems and to be adapted to different contexts. The DSIS allows to connect ExPEDite with EU data spaces. The MIMs ensure the replicability of the solutions, constituting a key component to guarantee a solid dissemination strategy.

**Flexibility**: The project is also suited to adapt to different budgetary needs. The wide portfolio of assets offered by ExPEDite guarantees that both necessities and constraints of local administrations can be met. The CBA is a further instrument which allows to evaluate the financial sustainability and the benefits of interventions. Thus, this Key Exploitable Asset allows the owners to act effectively while respecting their budgetary constraints.

**Beyond the SoTA**: The Digital Twin visualization tool is integrated with AR/VR, allowing a more immersive UX, and with AI and ML algorithms, which provide the system with the ability to perform predictive analytics and decision-making. This aims to represent in itself a new State of The Art. However, an additional innovation consists in the combination of the visualization suite with the Reusable model and software components for the management of the district. The near-real time geospatial visualisation and analysis of the energy efficiency of the building stock and the heating network will be integrated with methods allowing to understand how to exploit new technologies for sustainable and efficient energy production. AI and data fusion techniques will allow to produce energy forecasts. Mobility and transportation will also be modelled and digitalised. To sum up, ExPEDite poses itself as a highly innovative project in the context of PEDs through the combination of its assets.

**Thorough Dissemination Plan**: ExPEDite is designed to maximize its dissemination potential. The Training material and guidelines for PEDs represent a primary instrument to provide administrations with the necessary knowledge to adopt ExPEDite's solutions. This is coupled with the Living Lab to directly involve stakeholders in practical activities, allowing for knowledge sharing and system development through co-creation.

**Targeted Solutions**: ExPEDite's offering appears to directly address the needs for innovative solutions for smart cities and can fill the gaps in the sectors of interest, as identified in Section 4.3.

**Citizen Engagement**: The engagement of citizens through the Mobile app and gamification and is a key asset for the project. Social participation has indeed proven to be an essential element for the success of PED projects. Moreover, involved and up-to-date citizens will guarantee higher efficiency by keeping administrations accountable.

#### 4.7.3.2 Weaknesses

**Administrative Burdens**: The granularity of the local regulatory frameworks throughout Europe may create unexpected issues in local implementation during the dissemination and exploitation phase. "Red

tape", obstacles in procurement, issues with construction permits are a potential challenge both currently and in the next future. A strong exploitation strategy can minimize risks, but these factors will likely change depending on the local context.

**Local Uptake**: The level of local administrative participation may vary, impacting the project dissemination. In particular, administration which have already intervened in city areas with suboptimal solutions may consider further investments in this sense as lower priorities.

**Risk of obsolescence**: With the current fast-paced technological development, the risk for ExPEDite's solutions to become obsolete in a relatively small amount of time must be accounted for. The iterative process of co-creation and feedback in the Living Lab, as well as potential future synergies aim to mitigate this factor. However, a periodic monitoring of the market setting – particularly of technological trends and competitors' solutions – is needed to keep this risk low.

#### 4.7.3.3 Opportunities

**Political commitment**: As seen in the PESTLE analysis, the strong commitment of the EU towards a green, sustainable and digital development - with their focus on the role of cities – is at the core of all the exogenous factors currently shaping the interested market. This is a massive opportunity for ExPEDite since the latter is expected to keep growing, investing higher attention and resources in cities' development, and demanding innovative solutions.

**Technological Advances and Exploitation of Synergies**: The strong push in technological development and the high pace of academic research on the topic creates a flourishing environment for innovations to circulate. This represents a twofold opportunity for ExPEDite. On one side, given the level of innovation offered by this project, its potential for a fast spread rises even higher. On the other hand, such a growing environment is expected to incentivize new innovative projects to enter the market. This may allow ExPEDite to further develop its solutions by exploiting synergies.

#### 4.7.3.4 Threats

**Implementation Challenges**: Among these, the most prominent seems to be the potential for attracting private funding. As discussed during the analysis, the development of sound business models can represent a minimizing factor. Moreover, the current market development may attract a higher number of private investors. However, their confidence may change based on the local context and on exogenous shocks. Political changes in Member States may also constitute obstacles for the project's spread, even though the macro-level political perspective – as seen – goes in favour of ExPEDite's adoption. Finally, despite the project offers several solutions to increase the skill and knowledge of public sector actors in the use of its innovative solutions, some local administrations could be disincentivised to uptake ExPEDite's assets due to the advanced level of technical proficiency required.

**Private Sector Cooperation**: Given the high level of technical competences mentioned above, as well as the wide range of knowledge required – from technological components to RES production and distribution – the cooperation between the public and private sector is necessary for ExPEDite's adoption. The ability of local administrations to form Consortia with private companies is crucial for the project's success.

Figure 33: SWOT Analysis.

## 4.8. Conclusions and Recommendations

The application of the three Market Analysis methodologies has confirmed the preliminary conclusions set out in section 4.5. The EU market for sustainable energy practices, as well as the domains identified seem highly favourable to ExPEDite's market entrance. The project's wide offering, its degree of technological innovation, the strong alignment with EU's sustainability aims and its timing – in a period of strong and sustained market expansion – positively influence current expectations on ExPEDite's positioning inside the market.

Porter's 5 Forces, PESTLE and SWOT analysis have helped to highlight ExPEDite's main strengths and its potential obstacles. Through them, it is now possible to have a clear overview of the most relevant factors which can allow ExPEDite to fully achieve its potential and maximise market share capture.

- **New State of The Art**: the level of technological novelty and the potential impact of ExPEDite's solutions need to have a prominent role when framing the project inside the market. It responds to cities' digital and environmental needs and enhances administrations' capabilities towards sustainable transformation, offering solutions for planning, implementing, and managing the transition to positive energy, while engaging entire communities.
- **Flexibility and adaptability**: emphasis must be put on ExPEDite's flexibility, which allows an effective implementation of the project's solutions in different local contexts. This is a fundamental factor to increase the project's adoption throughout the EU.
- **Synergies**: maximise development and learning potential through synergies with sister projects and other initiatives in the current market. Monitor future market entrance to identify opportunities for the enhancement of ExPEDite's solutions thanks to additional synergies.
- **Stakeholders' engagement**: the engagement of multiple groups of stakeholders through the Living Lab and the Mobile Application for citizens needs to be sustained over time to allow for the following effects:
    - Further development of the project's solutions through feedback, co-creation and information sharing.
    - Reinforcement of citizen involvement allowing for higher social acceptance of future developments and greater accountability of policymakers.
    - Easing dissemination through direct involvement and speeding-up the learning process.
- **Monitoring of obstacles**: administrative and bureaucratic barriers in national regulatory frameworks must be kept monitored to understand if particularly relevant obstacles arise and how to tackle them.

This comprehensive assessment has currently set high expectations on ExPEDite's future role in the context of PEDs.

This analysis will need to be updated over time to capture and correctly evaluate potential changes in the market which could affect the project's positioning.

## 4.9 Value Proposition

ExPEDite is expected to represent a transformative advancement in the development of Positive Energy Districts (PEDs) through its innovative use of digital technologies and data integration. The project's offering can provide a comprehensive, state-of-the-art solution for monitoring, management, and planning of urban energy systems. Moreover, the flexibility guaranteed by ExPEDite's wide suite of assets potentially allows to capitalise on opportunities within the EU market for sustainable energy

practices and to address the pressing need for sustainable and digital urban development. More specifically:

- The **Digital Twin visualisation suite** can enable policymakers, city planners, and energy providers to plan future energy investments and urban development sustainably and efficiently.
- The **Reusable Models and Software Components** can help cities and communities develop robust energy strategies, focusing on renewable energy sources and energy flexibility.
- The **Connector to EU Data Spaces** is designed to ensure data interoperability, accessibility, and reusability.
- The embedded **Cost-benefit Analysis Methodology** is expected to help attract investments and support from both public and private sectors, facilitating the implementation of innovative energy solutions.
- The **Mobile App for Citizen Engagement** promotes public awareness and provides feedback to policymakers and planners, while potentially increasing administrations' accountability.
- The **Training Material and Practical Guidelines for PEDs** have the purpose to facilitate the effective adoption and replication of PEDs across Europe.

Hence, through the ambitious design of its solutions, ExPEDite can achieve a pivotal role in the transition towards positive energy and smart cities.

## 4.10 Intellectual Property Rights

The present section is intended to provide a framework for the protection and management of Intellectual Property (IP) in ExPEDite.

The key reference document behind this Task is the Consortium Agreement (CA). In fact, the rules relative to the ownership and use of IP Rights (IPR), the rights and freedom of parties to transfer (assign) IP, the freedom to publish, and the transfer of technology, have been already defined inside this document. Once all the project's IPs will be generated and partners' rights and responsibilities fully defined, the consortium partners will write down an IPR agreement. There each partner's exploitation responsibilities will be set, together with the way profits and IPR will be split.

Currently, our purpose is to define the rules of the CA in relation to the Key Exploitable Assets that the project will generate and to provide an overview of the expected future steps and responsibilities of the partners.

### *4.10.1 Expected Knowledge Contributions*

The starting point for the IP protection and management framework is to determine the extent to which each partner is contributing – or expects to do so – to the production of the project's assets.

This has been done through an online survey directed to all the Consortium partners. Each of them has been asked to declare their **expected knowledge contributions** to the Key Exploitable Assets. For this purpose, three different types of knowledge contributions have been identified:

- **Background Knowledge**: a partner has Background Knowledge on a Key Exploitable Asset if they contribute (or plan to contribute) to it using pre-existing data, know-how or information - whatever its form or nature - they own or control. This information must come from their prior work in the same or a related field as the research project and be relevant to the asset's development or use. To claim Background Knowledge, it is required that the partner has made a specific remark in the relevant section of the Consortium Agreement (Attachment 1 of the

CA). Contrarily, the claim will be subject to the scrutiny of the Consortium partners, which will be entitled to accept it or reject it.

- **Foreground Knowledge**: a partner has Foreground Knowledge on a Key Exploitable Asset if they either plan to augment and further develop previously existing knowledge, or to create novel knowledge. To claim Foreground Knowledge, it is necessary that a partner has a task(s) in the project related to the respective asset.

**Assistive Contribution**: a partner provides Assistive Contribution on a Key Exploitable Asset if they contribute (or plan to contribute) to some parts/sections/tasks of its development. Their claim will then need to be substantiated by easily provable results/efforts (e.g. contributions in Deliverables).

The claims from all 19 partners have been collected and organized in Table 3. Responses to the survey have been codified as follows:

- **B** indicates Background Knowledge
- **F** indicates Foreground Knowledge
- **C** indicates Assistive Contribution
- "N/A" has been reported when no knowledge contribution has been declared by a partner for a given asset.

Table 3: Expected Knowledge Contributions to the Key Exploitable Assets

| Key Exploitable Asset | RTU | NTUA | UNIPD | UCP | TUO | LAU | EXUS | ATOS | PLEG | TEC | SWECO | UPCOM | DEL | TPEB | RDA | REA | LC | OASC | DATI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Connector to EU Data Spaces** | N/A | **C** | N/A | **F** | N/A | N/A | N/A | **B** | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **C** | N/A |
| **Digital Twin Visualization** | **F/B** | **C** | N/A | N/A | N/A | **C** | **F** | N/A | N/A | **C** | **F** | N/A | N/A | N/A | N/A | **C** | N/A | N/A | N/A |
| **Reusable models and software components** (BSM, RES, District heating, M&T, energy flexibility) | **F** | **C** | N/A | N/A | **C** | N/A | N/A | N/A | **F** | **B** | N/A | N/A | N/A | N/A | **C** | **F** | N/A | N/A | N/A |
| **Cost benefit Analysis** | N/A | **C** | **C** | **C** | N/A | N/A | N/A | N/A | N/A | N/A | **C** | N/A | N/A | N/A | N/A | N/A | **C** | N/A | N/A |
| **Mobile app for citizen engagement** | N/A | N/A | N/A | N/A | N/A | **C** | N/A | N/A | N/A | N/A | N/A | **F** | **C** | N/A | **C** | **C** | N/A | N/A | N/A |
| **Training material and Practical guidelines for PEDs** | N/A | N/A | **C** | **F** | **C** | **C** | **C** | N/A | N/A | N/A | **C** | N/A | **C** | N/A | **C** | **F** | **C** | **C** | N/A |

Table 3 shows that the Training material and Practical guidelines for PEDs, the Digital Twin Visualisation and the Reusable models and software components are the Key Exploitable Assets that present the highest concentration of expected knowledge contributions from the Consortium partners. From the total of 19 partners, 11 have reported expected contributions for the Training material and Practical guidelines for PEDs, and 7 for both the Digital Twin Visualisation and the Reusable models and software components.

The Digital Twin Visualisation and the Reusable models and software components also represent the assets where the highest concentration of Foreground Knowledge is expected to be created – in both cases **F** has been indicated by 3 partners. Contrarily, the Cost benefit Analysis is the only Key Exploitable Asset where no partner currently expects to provide a Foreground contribution – 5 Assistive Contributions have been reported for this asset.

A total of 5 knowledge contributions is expected also for the Mobile app for citizen engagement - 4 of which being **C**, and 1 **F**.

Finally, the Connector to EU Data Spaces, is the asset for which the lowest concentration of knowledge contributions is expected – **C** has been reported twice, while both **B** and **F** have been indicated by only 1 partner.

Each knowledge contribution declared by a partner represents an IPR. The overview of each partner's IPRs presented in the table is crucial to allow them to further discuss and agree on the ownership of the project's Key Exploitable Assets, as well as on their respective exploitation responsibilities and on how profits will be shared. It is expected that partners who offered more on specific assets will be the ones with greater commercialization responsibilities and will be receiving a larger portion of the shared profits from them.

Background Knowledge is expected to remain property of the original owners but if a partner needs to utilize the IP for the implementation or exploitation of the corresponding asset, the owner of the IP has to allow the use of it in accordance with the requirements laid down in Attachment 1 to the CA.

Foreground Knowledge is expected to be owned by the partner that developed it, with a part of it (which will need to be agreed), owned by the partners that substantially contributed (**C**) to its development. If a partner different from the owner needs the Foreground Knowledge developed for commercial exploitation purposes, the owner is required to allow him its use in accordance with the rules laid down in the CA.

In the case of the Cost benefit Analysis, for which no partner expects to provide a Foreground Knowledge contribution, it is expected that the commercialization responsibilities and profits will be shared among the partners that contributed to its development in a way that will need to be agreed between them.

In addition to what described above, the survey has also served the purpose of re-confirming the list of Key Exploitable Assets included in the Technical Proposal and first validated in M6 through Task 7.4.1. Partners, in fact, have been asked whether they foresaw any other Key Exploitable Assets to be added to the list and, if so, to indicate a rationale for their inclusion, as well as the type of knowledge contributions expected. The results show that no addition to the list of Key Exploitable Asset has been proposed by the partners.

The complete list of survey questions has been reported in Annex 4.

### *4.10.2 IP protection and management framework*

This section serves the purpose of presenting an overview of the main features of the IP protection and management framework within ExPEDite, which is anchored on the principles established in Articles 8 and 9 of the CA. These principles represent the key elements which allow the safeguarding and exploitation of the Key Exploitable Assets.

For sake of coherence with what written in the CA, in the rest of the Section the term "Results" will be used to indicate all the products resulting from ExPEDite. The Key Exploitable Assets identified by the Consortium Partners correspond to the project's Results.

Figure 34 provides a visual description of the framework.

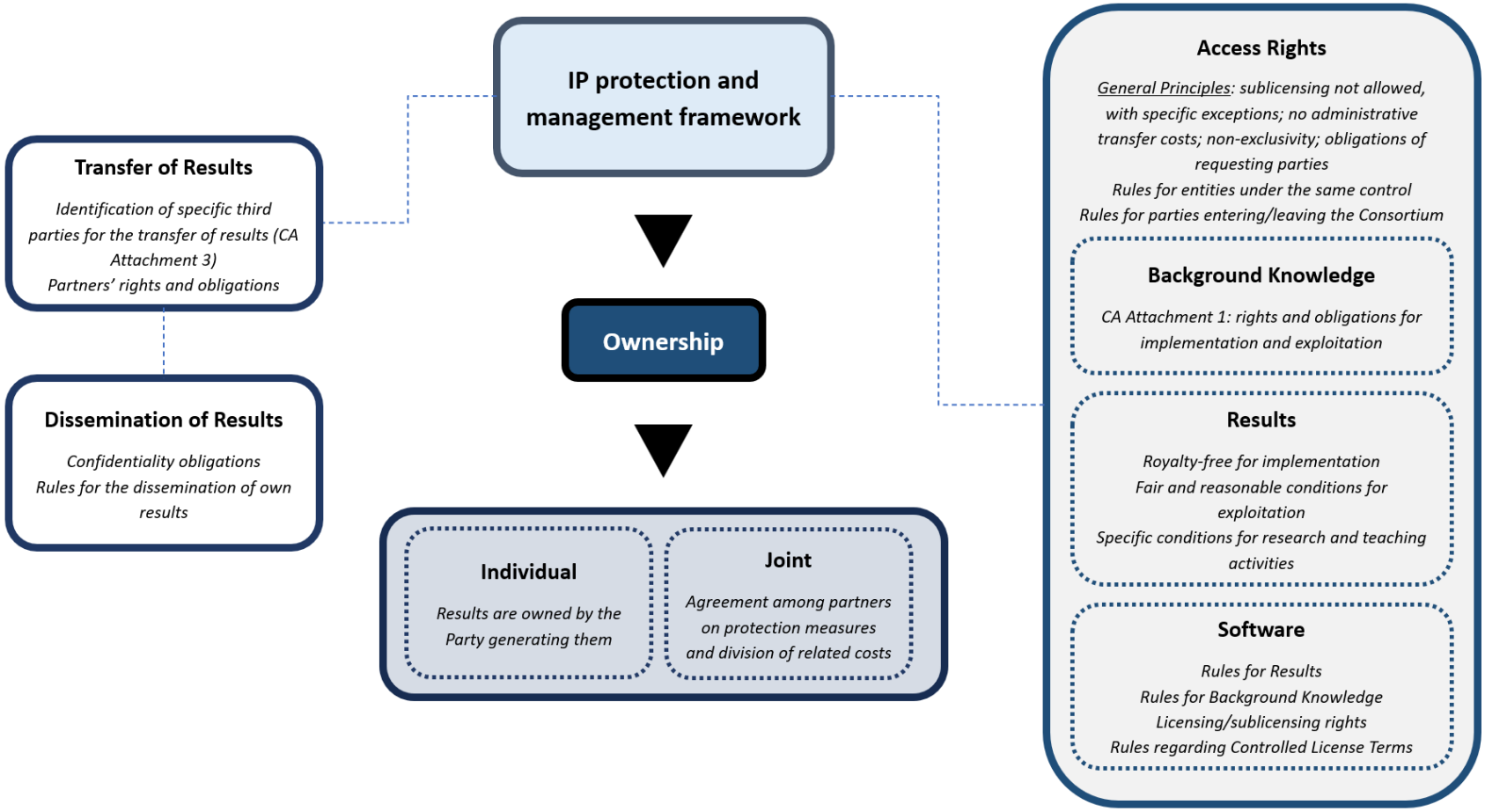


Figure 34: ExPEDite IP protection and management framework as established in Articles 8 and 9 of the Consortium Agreement (CA)

**Ownership** represents a central concept for the protection and management of IP. As specified in the previous Section, ownership of the Results will be defined based on the responses to the Expected Knowledge Contributions Survey. Indeed, as established in Article 8.1 of the CA: *"Results are owned by the Party that generates them"*. Through the survey answers it is now possible to track the partners' contributions to the generation of each asset and, thus, to determine the Party/Parties responsible for it.

Ownership terms based on the survey may be reviewed if the actual generation of Results does not correspond to the survey answers, upon decision of the Plenary Board. Further details will be provided in Subsection 4.10.4.

For those Results that will be generated by multiple partners – without possibility to separate their contributions into distinct assets for the purpose of applying for, obtaining or maintaining their protection - joint ownership will occur. The involved Parties will need to sign a Joint Ownership Agreement. Joint ownership will follow the rules established in the Grant Agreement (GA) and in the CA.

The **transfer of ownership and dissemination** of results is governed by structured processes to maintain the integrity and confidentiality of the IP, as per Articles 8.3 and 8.4 of the CA. Partners may transfer ownership of their Results, provided that the rights and obligations of other Parties remain unaffected. This flexibility facilitates the strategic exploitation and commercialization of the project findings. As reported in Figure 34, ExPEDite partners have also been given the right to indicate specific third parties to which transfer the ownership of their results. The list is reported in Attachment 3 to the CA.

Dissemination activities, including publications and presentations, require prior notice to other partners, allowing for objections to protect Confidential Information and the legitimate proprietary interests of the Parties.

**Access Rights** associated with Background Knowledge and Results are the object of Article 9 of the CA. These rights are essential for the implementation and exploitation of the project outputs:

- **Access Rights to Background Knowledge**: Defined in Attachment 1, these rights are subject to legal restrictions or limits noted by each Party. Access Rights must be granted on fair and reasonable conditions, ensuring that necessary data, know-how, or information is available for the implementation and exploitation of Results.
- **Access Rights to Results**: These are granted on a royalty-free basis for implementation purposes, and on fair and reasonable conditions when needed for the exploitation of a Party's own Results. This provision ensures that all Parties can utilize the collective project outputs to further their own research and commercial endeavours.

The CA, then, also establishes specific provisions on Access Rights concerning software:

- **Access to Software**: Article 9.8.3 of the CA establishes the following: *"Access Rights to Software that is Results shall comprise:*
    - *Access Rights to the Object Code; and,*
    - *where normal use of such an Object Code requires an API, Access Rights to the Object Code and such an API; and,*
    - *if a Party can show that the execution of its tasks under the Project or the Exploitation of its own Results is technically or legally impossible without Access Rights to the Source Code, Access Rights to the Source Code to the extent necessary.*

  *The Background shall only be provided in the Object Code unless otherwise agreed between the Parties concerned."*

The relevant definitions are included in Article 9.8.1 of the CA:

- Object Code: *"Software in machine-readable, compiled and/or executable form including, but not limited to, byte code form and in form of machine-readable libraries used for linking procedures and functions to other software"*.
- API: *"The application programming interface materials and related documentation containing all data and information to allow skilled Software developers to create Software interfaces that interface or interact with other specified Software"*.
- Source Code: *"Software in human readable form normally used to make modifications to it including, but not limited to, comments and procedural code such as job control language and scripts to control compilation and installation"*.

- **Licensing terms:** Access Rights to software include the right to make an agreed number of copies of Object Code and API and to distribute, make available, market, sell and offer for sale such Object Code and API as part of or in connection with products or services of the Party having the Access Rights.
- **Sublicensing**: The CA allows for sublicensing of object code to end-users, to the extent necessary for normal use, maintenance, and interoperability within the framework of European legal standards. Source code sublicensing is limited to adaptation, error correction, maintenance, and support. Sublicensing in other cases is not allowed unless specifically agreed among the Parties.
- **Controlled License Terms**: The CA establishes that the introduction of Software under Controlled License Terms in the Project requires the prior approval of the Plenary Board. Approved Controlled License Terms may be deemed void and null if no sufficient information is provided to substantiate the acceptability of restrictions or when additional information available at a later stage implies additional or different restrictions. Controlled License Terms may also be changed upon approval of the Plenary Board. Currently, no such terms have been established within ExPEDite.

  Article 9.8.1 of the CA defines Controlled License Terms as: "*Terms in any license that require that the use, copying, modification and/or distribution of Software or another work ("Work") and/or of any work that is a modified version of or is a derivative work of such Work (in each case, "Derivative Work") be subject, in whole or in part, to one or more of the following:*

  *- (where the Work or Derivative Work is Software) that the Source Code or other formats preferred for modification be made available as of right to any third party on request, whether royalty-free or not;*
  *- that permission to create modified versions or derivative works of the Work or Derivative Work be granted to any third party;*
  *- that a royalty-free license relating to the Work or Derivative Work be granted to any third party*".

In essence, IP protection and management framework within ExPEDite is designed to create the right conditions to exploit the project's Results effectively, while safeguarding the interests of all the partners through clear guidelines on ownership, transfer, dissemination, and access.

### *4.10.3 Disputes settlement*

To reinforce the framework described in the previous Section, rules need to be in place allowing for the protection of partners' rights and interests in case disputes arise between them.

This is guaranteed by Article 11.8 of the CA, which establishes the following:

*"The Parties shall endeavour to settle their disputes amicably.*

*All disputes arising out of or in connection with this Consortium Agreement, which cannot be solved amicably, shall be finally settled by the courts of Brussels".*

Thus, Article 11.8 complements the structure of the IP protection and management framework established through Articles 8 and 9 with a fair legal mechanism for disputes settlement harmonized at the EU level.

### *4.10.4 Next steps: partners' responsibilities*

As stated at the beginning of Section 4.10, each partner's final responsibilities for the exploitation and commercialization of the Results are going to be agreed in a future meeting where the final IPR agreement will be signed. The Expected Knowledge Contributions Table developed as part of this Task is expected to have a central role, providing guidance for the definition of ownership and the establishment of the rights and duties coming from it.

Furthermore, as anticipated in 4.10.2, since ExPEDite's assets are still being developed and the IPR agreement is going to be signed at a later stage in the project, it will be possible for the partners to revise their responses to the survey based on changes in their contributions for the creation of the Key Exploitable Assets. In case of modifications to the survey responses an updated overview of knowledge contributions will be shared with all the Consortium partners, and the recorded modifications will need to be approved at the subsequent Plenary Meeting.

# 5. Clustering and liaising with initiatives

As part of its commitment to fostering synergies and maximizing impact, the ExPEDite project actively collaborates with related EU-funded initiatives, particularly those under HORIZON MISS-2023-CIT-01-02 and HORIZON-MISS-2021-CIT-02-04, with a shared focus on Positive and Clean Energy Districts (PEDs). These clustering activities also involve engagement with the Climate-Neutral and Smart Cities Mission Platform, as well as other relevant initiatives where collaboration contributes to added value for the project, its stakeholders, or the long-term sustainability of its outcomes.

A comprehensive overview of these initiatives is available in Deliverable D7.1.

## 5.1 Collaboration with sister R&I projects

Sister R&I projects are projects funded under similar calls or with closely aligned objectives, typically within the same thematic area. They often collaborate to exchange knowledge, align strategies, and accelerate progress toward shared goals.

ExPEDite is currently engaging with two sister R&I projects identified in D7.1:

- **BiPED**
- **Tips4PED**

Established communication channels with these projects have led to active collaboration since April 2024, including participation in quarterly online meetings to exchange updates and coordinate on critical topics such as:

- Technical development
- Stakeholder engagement
- Standardization
- Replication strategies
- Outreach activities

To date, four joint meetings have taken place on the following dates:

- April 4, 2024
- November 9, 2024
- November 22, 2024
- February 27, 2025

Beginning in May 2025, these coordination meetings are scheduled to occur monthly, reflecting a strengthened commitment to ongoing collaboration.

Key outcomes so far:

- **Joint Session on Local Digital Twins for PEDs**
  Held with BiPED and Tips4PED during the **OASC Summit**, June 2024, in **Rotterdam, NL** (see also Section 3.6.1).

- **Workshop on Local Digital Twins**
  Co-organized with BiPED at the **FARI Conference – Partner Day 2024**, November 2024, in **Brussels, BE** (see also Section 3.6.10, also for the link to recording of the session). This workshop on *Digital Twins for Cities and Communities* facilitated cross-project exchange and knowledge sharing on emerging digital twin technologies and their application in urban contexts.

These joint efforts are instrumental in promoting alignment, reducing duplication, and enhancing the collective impact of EU-funded PED initiatives.

Upcoming activities include targeted sessions for the sister project, focusing on the technical developments within ExPEDite (scheduled for end of 2025) and the outcomes of the living lab design (planned for March 2026). In parallel, efforts will be made to define a shared thematic focus for a publication (white paper or other), that will serve to disseminate key insights from the project and support the broader adoption of tools and methods aimed at accelerating and strengthening Positive Energy Districts (PEDs).

## 5.2 Collaboration with the Cities Mission Platform

The European Commission has launched the EU Mission for 100 Climate-Neutral and Smart Cities by 2030 (the *Cities Mission*) to support a select group of over 100 pioneering cities in achieving climate neutrality by 2030, serving as innovation hubs to inspire broader urban transformation across Europe by 2050. The Cities Mission Platform, managed by NetZeroCities, provides these cities with tailored guidance, tools, and support to advance this ambitious agenda.

The **ExPEDite** project is strategically aligned with this initiative. Notably, the **Municipality of Riga**, a key partner in ExPEDite, is among the cities selected to participate in the Cities Mission and partners Tecnalia and OASC are involved within NetZeroCities.

To formalize and strengthen this alignment, the ExPEDite project coordinator, Riga Technical University (RTU), signed a Memorandum of Understanding (MoU) with the Mission Platform on 6 March 2025. Building on this, a **collaboration agreement** has been developed and submitted to the Mission Platform for review. This agreement outlines opportunities for cooperation, focusing on knowledge exchange, policy alignment, and mutual support for Positive Energy Districts (PEDs).

Key outcomes so far:

- **Mission Cities Conference 2024 (Valencia, Spain):**
  ExPEDite participated with a dedicated exhibition booth, showcasing the project's approach to Positive Energy Districts.
- **Mission Cities Conference 2025 (Vilnius, Lithuania):**
  ExPEDite participated in the joint **Positive Energy District Cluster booth**, fostering dialogue and synergies with related initiatives.

Through this collaboration, ExPEDite aims to amplify its impact, contribute to the broader Cities Mission objectives, and accelerate the adoption of scalable and replicable solutions for climate-neutral urban development.

While the current NetZeroCities programme is set to conclude in the second half of 2025, discussions are underway regarding its continuation in a new form. ExPEDite will closely monitor developments and explore opportunities to remain actively engaged in the evolving framework.

### 5.3 Collaboration with Scalable Cities

The ExPEDite project has initiated and continues to strengthen its collaboration with the Scalable Cities Initiative, coordinated by the Scalable Cities Secretariat. This initiative, supported by the European Commission, aims to identify and promote scalable, integrated solutions and business models for the development of sustainable urban districts across Europe.

Scalable Cities represents a community of 124 cities involved in 20 Smart Cities and Communities (SCC) projects, funded under Horizon 2020 and Horizon Europe. These projects work in close collaboration with academia, industry, associations, and research organisations to support city-led innovation and climate neutrality.

Since February 2024, representatives from the Riga Energy Agency (REA) and the Open & Agile Smart Cities & Communities initiative (OASC) have actively participated in several key activities within the Scalable Cities ecosystem, including:

- **Board of Coordinators Meetings**:
  Regular participation, including project presentations and updates on ExPEDite milestones.
- **Joint Communication and Dissemination Meetings**:
  Monthly meetings with the projects communities to coordinate outreach, visibility, and knowledge sharing.

These meetings serve as a platform to provide in-depth updates on project progress, share insights, and align communication efforts across related initiatives.

Key outcomes so far:

- **EU Week of Regions and Cities 2025**:
  A proposal has been submitted for a dedicated session, highlighting ExPEDite's approach to Positive Energy District (PED) implementation.
- **Smart City Expo World Congress 2025**:
  The project intends to submit a proposal for an Agora session, focused on fostering peer learning and international dissemination of project results.
- **Enhanced Social Media Visibility**:
  Ongoing reinforcement of the project's digital communication strategy, aligned with Scalable Cities' outreach efforts.
- **Stakeholder Engagement Visibility**:
  Integration of ExPEDite's stakeholder engagement methodology into the Ascend and Scalable Cities Community newsletters (April 2025), supporting cross-project learning and adoption.

Through this engagement, ExPEDite contributes to the broader Scalable Cities community while gaining visibility, support, and opportunities for replication of solutions across Europe's smart and climate-neutral urban initiatives.

The Scalable Cities programme is currently scheduled to conclude in August 2025. However, discussions – particularly with NetZeroCities and other key stakeholders – are underway to explore

options for continuing the programme's work and maintaining the established community network. ExPEDite will actively follow these developments and seek opportunities to remain engaged within the evolving framework.

### 5.4 Other initiatives

In December 2024, the ExPEDite project has been integrated into the Smart Cities Marketplace, an initiative of the European Commission's Directorate-General for Energy (DG Energy).

The Smart Cities Marketplace is a dynamic platform that brings together a wide array of European smart city initiatives. It serves as a catalyst for innovation by facilitating collaboration between cities, industry stakeholders, financial institutions, and citizens. Its goal is to accelerate the adoption of integrated solutions in the fields of energy, mobility, and information and communication technologies (ICT) – all essential pillars of the urban transition toward climate neutrality.

As part of this ecosystem, ExPEDite showcases its work on Positive Energy Districts (PEDs), with a particular focus on the Kipsala pilot site in Riga, Latvia.

Through its participation, ExPEDite joins a community of forward-looking projects dedicated to delivering real-world impact. The Marketplace supports the development and dissemination of scalable and bankable solutions that contribute to key EU policy objectives – enhancing energy efficiency, promoting sustainable mobility, supporting local job creation, and enabling new market opportunities.

By integrating with the Smart Cities Marketplace, ExPEDite not only gains increased visibility and access to a broad network of peers and investors, but also reinforces its alignment with the EU's long-term goals for smart, inclusive, and sustainable urban development.

The Smart Cities Marketplace can be visit here: https://smart-cities-marketplace.ec.europa.eu/

### 5.5 Outlook

Collaboration with sister projects and related initiatives is becoming increasingly structured and will be further strengthened during the second half of the project. As ExPEDite progresses, it will have more concrete results, tools, and insights to contribute to these joint efforts.

Ongoing engagement with the Mission Cities initiative and the Scalable Cities initiative remains a priority. The project team is closely monitoring the future direction of both frameworks to ensure continued alignment and to identify opportunities for sustained collaboration and knowledge exchange beyond the project's duration.

# 6. Conclusion

This deliverable summarized progress under the impact creation and exploitation work package during ExPEDite's first 18 months. The project has built a strong foundation for stakeholder engagement through targeted mapping, internal workshops, and the establishment of the Expert Advisory Board—fostering a collaborative, user-driven ecosystem. This participatory approach has refined ExPEDite's tools and use cases, setting the stage for effective Living Lab deployment in Riga in the second part of the projects' lifecycle.

A comprehensive communication strategy – combining digital channels, events, and printed materials – has enhanced visibility, while active collaboration with sister projects (BiPED, Tips4PED) and EU initiatives (Cities Mission, Scalable Cities, Smart Cities Marketplace) has amplified impact and knowledge exchange and helped to build an ever-growing community, as dutifully described in previous sections.

Market analysis confirms ExPEDite's relevance in addressing current gaps in sustainable urban energy. Identified exploitable assets, a solid value proposition, and alignment with EU policy trends support its long-term sustainability. Adoption challenges such as funding, regulation, and capacity gaps have been proactively addressed through design features like co-creation, training materials, and business model development.

Finally, the IP strategy ensures fair and effective management of project results. With its integrated approach and strong foundations, ExPEDite is well positioned to shape the future of Positive Energy Districts across Europe.

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## Annex 1: ExPEDite Advisory Board Members

| Full name | Organization name/Country | LinkedIn link (or other online profile if applicable) |
|---|---|---|
| Mr. Matteo Lorenzetti | Gruppo Astea, Italy | https://www.linkedin.com/in/matteo-lorenzetti/?original_referer=https%3A%2F%2Fwww%2Egoogle%2Ecom%2F&originalSubdomain=it |
| Mrs. Elena Patatouka | Trikala, Greece | https://www.linkedin.com/in/elena-patatouka-1b731957/ |
| Mrs Dovile Sulciene | Vilnius, Lithuania | https://www.linkedin.com/in/dovil%C4%97-%C5%A1ulcien%C4%97-01226111b/?originalSubdomain=lt |
| Mrs. Beril Alpagut | Demir Enerji, Turkey | https://www.linkedin.com/in/berilalpagut/ |
| Ms. Guna Soloveja | Tet, Latvia | https://www.linkedin.com/in/guna-soloveja-6a3026b6 |
| Prof. Ralf-Martin Soe | FinEst Centre for Smart Cities, Estonia | https://www.linkedin.com/in/ralf-martin-soe-1a7ba829 |
| Ms. Kaisa Spilling | Forum Virium Helsinki, Finland | https://www.linkedin.com/in/kaisaspilling/?originalSubdomain=fi |

## Annex 2: ExPEDite events participation

| Event Name | Description | Date | City/country | ExPEDite partner(s) involved | Activity at the event | Reach | Links |
|---|---|---|---|---|---|---|---|
| OASC Summit | Annual summit organised by OASC on collaboration and needs/tools for cities, communities, businesses, researchers and policymakers to exchange best practices | 3-4/06/2024 | Rotterdam (the Netherlands) | OASC | Session on digital twins for PEDS in collab with BiPED | 20 attendees | https://www.linkedin.com/posts/open-%26-agile-smart-cities_oascsummit2024-activity-7199767808019161088-Krsn?utm_source=share&utm_medium=member_desktop |
| Cities Mission Conference | Empowering cities – The Climate-Neutral and Smart Cities Mission in Action, includes workshops and policy sessions addressing both the Mission's key challenges and the practical aspects for the effective implementation of Climate City Contracts. The programme particularly highlights the Mission Cities' transformative journey towards climate neutrality and offers a significant opportunity to celebrate progress, | 25-26/06/2024 | Valencia (Spain) | RTU and LC | Booth | estim 150 attendees | https://www.linkedin.com/feed/update/urn:li:activity:7211282869199998976 |

| Event Name | Description | Date | City/country | ExPEDite partner(s) involved | Activity at the event | Reach | Links |
|---|---|---|---|---|---|---|---|
| | join forces, and share inspiration. | | | | | | |
| ECCE Europe 2024 | 16th edition of this international conference and exposition event on electrical and electromechanical energy conversion field. ECCE 2024 Conference will feature both industry-driven and application-oriented technical sessions, as expositions. | 2-6/09/2024 | Darmstadt (Germany) | RTU | Comm material | 2400 visitors, 20 leaflets distributed | |
| FIWARE Summit | Twice a year FIWARE organises a summit on digital transformation based on open source technology. Topics on Digital Twins, Data Economy, Data Spaces and Smart Data Models in the field of Smart Cities, Smart Energy, Smart Industry etc. | 18-19/09/2024 | Naples (Italy) | LIsbon Council | Booth | 400 partipants, 120 speakers | https://www.linkedin.com/posts/expedite-project_fiware summit24-opensource-digitaltransformation-activity-7242813842555113472-q_uq?utm_source=share&utm_medium=member_desktop |

| Event Name | Description | Date | City/country | ExPEDite partner(s) involved | Activity at the event | Reach | Links |
|---|---|---|---|---|---|---|---|
| cluster meeting on 'Positive Energy Neighbourhoods and Districts' | objective is to bring together 14 projects from different EU funding programmes (H2020, Horizon Europe and the Cities Mission) to discuss Positive Energy Neighbourhoods and Districts. | 23-24/09/2024 | Brussels (Belgium) | RTU | project presentation, active participation in the workshop | approx 40 participants | https://www.linkedin.com/feed/update/urn:li:activity:7245045246672125952 |
| IEEE 65th International Scientific Conference on Power and Electrical Engineering | give an opportunity to scientists, engineers and manufacturers as well as to doctoral students from all over the world to meet and discuss recent development and their achievements in the area of power and electrical engineering. | 10-12/10/2024 | Riga (Latvia) | RTU | Rollup & comm material (110 leaflets were handed out) during this event and project is mentionned in opening | approx 900 participants | |
| Innovation procurement and Horizon Europe City Mission and CL5 brokerage event | 2 days of inspiring keynote talks, panel discussions, and networking opportunities through the Innovation Marketplace and targeted matchmaking for the upcoming City Mission and city-related CL5 Horizon Europe calls. | 10-11/10/2024 | Barcelona (Spain) | RTU | Poster with description of the pilot, slidedeck of project and Kipsala district and around 15 Expedite leaflets were distritbuted.<br>Event homepage | approx 100 participants | https://leitat-cities.b2match.io/ |

| Event Name | Description | Date | City/country | ExPEDite partner(s) involved | Activity at the event | Reach | Links |
|---|---|---|---|---|---|---|---|
| | | | | | https://leitat-cities.b2match.io/ | | |
| GREEN BUILDING CONFERENCE & EXPO | a meeting point in the territory for innovators. An event that allows us to discuss the present but above all to imagine the future of construction together. | 22-23/10/2024 | Venice (Italy) | UNIPD | Participation in session - incl expedite presentation: 23 October at 14h30 on Digitalization: projects and case studies smart buildings & cities. about how a Digital Twin can foster Positive Energy Districts | approx 185.000 | https://www.linkedin.com/feed/update/urn:li:activity:7255511837037809665 |
| Smart City Expo World Congress | The annual world's largest expo and conference for smart cities & communities, with strong energy focus, brings +25.000 visitors from around the world to move | 5-7/11/2024 | Barcelona (Spain) | OASC | OASC is partner of the event. integrate ExPEDite in booth. | approx25.700 | https://www.linkedin.com/feed/update/urn:li:activity:7259861949683838976 |

| Event Name | Description | Date | City/country | ExPEDite partner(s) involved | Activity at the event | Reach | Links |
|---|---|---|---|---|---|---|---|
| | cities towards a better future.<br>Period: November. Location: Barcelona | | | | | | |
| FARI Conference (partner day) | Annual event, known for its commitment to fostering collaboration and innovation in technology and research on AI, Data and Robotics, promises to provide a platform for networking, learning, and idea exchange. | 19/11/2024 | Brussel (Belgium) | OASC | Workshop on Local Digital Twins with sisterproject BIPED | 450 visitors, 30 in the session | |
| OASC Conference | Annual European-based global event on local data ecosystems and interoperability, organised by OASC with cities, communities, businesses, researchers and policymakers to exchange best practices and the latest developments in the green-digital transformation. | 22+23/01/2025 | Tampere (Finland) | OASC | Booth and pitch session | 200 attendees | https://www.linkedin.com/feed/update/urn:li:activity:7288213899475066880 |

| Event Name | Description | Date | City/country | ExPEDite partner(s) involved | Activity at the event | Reach | Links |
|---|---|---|---|---|---|---|---|
| Increasing Digitalisation Awareness & Readiness of Slovak Communities (EU Support Services) | The main objective of this European Commission initiative is to support the development of comprehensive digital strategies and plans (in line with the Digital Decade) that will help municipalities achieve their green and digital objectives. | 7/4/2025 | Bratislava (Slovakia) | RDA | Riga Digital agency director Arnis Gulbis was a speaker in the session Using Local Digital Twins in Practice - including ExPEDite as example | 60 | |
| How is Europe Supporting the Digitalization of Services – and How Can You Benefit? | Organised at the Ministry of Smart Administration and Regional Development in Rīga, for a deep dive into the tools and strategies driving digital transformation across Europe. Focus on the implementation of digital tools, digital twin technologies, and the support mechanisms available to cities and regions. | 15/04/2025 | Riga (Latvia) | RDA | Riga Digital agency director Arnis Gulbis and Inga Barisa were speaker in the session Digital Twins - presenting ExPEDite | 70 | |

| Event Name | Description | Date | City/country | ExPEDite partner(s) involved | Activity at the event | Reach | Links |
|---|---|---|---|---|---|---|---|
| Cities Mission Conference | The fourth edition of the Cities Mission Conference 2025 has a theme "Harnessing City Successes: Advancing Climate Action for 2030", to spotlight the progress and ambition of Mission Cities and their partners as they strive to achieve climate neutrality by 2030. | 6-8/05/2025 | Vilnius (Lithuania) | OASC | Booth with sister projects on the PED Cluster section | estimation of 1000 attendees | |
| Horizon Europe Info Day 2025 | This key (hybrid) event will highlight research and innovation topics under the Horizon Europe Work Programme 2025 – Cluster 5: Climate, Energy and Mobility, with a total budget of €1.2 billion. It's a great opportunity to explore funding options supporting the green and digital transitions essential for achieving climate neutrality in Europe by 2050. | 6/5/2025 | Brussels (Belgium) | RTU | RTU will represent ExPEDite | | |

## Annex 3: ExPEDite publications (published and planned)

| No. | Title | Title of the journal or equivalent | Month and Year of publication | Link to publication | ISSN or eISSN |
|---|---|---|---|---|---|
| 1 | Designing a multi-objective energy management system in multiple interconnected water and power microgrids based on the MOPSO algorithm | Heliyon | 05/2024 | https://www.sciencedirect.com/science/article/pii/S2405844024073110?via%3Dihub | 2405-8440 |
| 2 | related to the systematic literature review performing for Task 2.1 | | | | |
| 3 | planned after the intermediate deliverable of Task 4.6 with a book chapter dedicated to the evaluation guidelines developed in this project. | | | | |
| 4 | a case study related to the economic evaluation of the use of DT for PED from the experience of this project, but we need to see how the project will grow and it is premature for us to define expected times. | | | | |
| 5 | a journal publication along the lines of T2.1, focusing on a literature review on PED and Digital Twins. (ready beginning 2025) | | | | |
| 6 | Utilizing Digital Twins for Urban Planning: An Integrated Approach to Sustainable and Smart City Development (11/2024) | | Nov-24 | https://expedite-project.eu/wp-content/uploads/2025/01/65210132-SWE-WP2-XX-T-X-0001_UrbanPlanningAndDigitalTwins.pdf | |

| No. | Title | Title of the journal or equivalent | Month and Year of publication | Link to publication | ISSN or eISSN |
|---|---|---|---|---|---|
| 7 | Advancements and Methodological Frameworks in Building Stock Modelling for Positive Energy Districts | | Mar-25 | https://expedite-project.eu/wp-content/uploads/2025/03/65210132-SWE-WP4-XX-T-X-0001_BuildingStockModellingReview_Rev04.pdf | |
| 8 | together with NTUA a research paper (on building stock modelling) | | | | |
| 9 | Expedite results in https://vilniustech.lt/370230 | | | | |
| 10 | potential journal publication | | | | |
| 11 | White paper sister projects | | | | |

**Annex 4: Survey on Expected Knowledge Contributions to the Key Exploitable Assets**

# Expected knowledge contributions - Survey

This survey aims at mapping partners' expected contributions to each of the Key Exploitable Assets.
We refer to 'expected' contributions since ExPEDite's assets are currently being developed. Thus, a complete overview will only be available at the end of the project.
The survey will categorise knowledge contributions into three types, defined as follows:

- **Background Knowledge**:

A partner has Background Knowledge on an exploitable asset if they contribute (or plan to contribute) to it using pre-existing data, know-how or information - whatever its form or nature - they own or control. This information must come from their prior work in the same or a related field as the research project and be relevant to the asset's development or use. To claim Background Knowledge, it is required that the partner has made a specific remark in the relevant section of the Consortium Agreement (Attachment 1 of the CA).

- **Foreground Knowledge**:

A partner has Foreground Knowledge on an exploitable asset if they either plan to augment and further develop previously existing knowledge, or to create novel knowledge. To claim Foreground Knowledge on an exploitable result, it is necessary that a partner has a task(s) in the project related to that very result.

- **Assistive Contribution**:

A partner provides Assistive Contribution on an exploitable asset if they contribute (or plan to contribute) to some parts/sections/tasks of the Asset development. Their claim will then need to be substantiated by easily provable results/efforts (e.g. contributions in Deliverables).

Please note that responses to this survey are ***mandatory for all partners***.

This survey is part of sub-task T7.4.4: Intellectual Property Management. Its results will be included in the Deliverable D7.2 as part of the chapter on Exploitation and Financial Sustainability

Please, provide the **name of your organisation** *

La tua risposta

Please indicate your **expected knowledge contributions for each of the Key Exploitable Assets** *

| | Background Knowledge | Foreground Knowledge | Assistive Contribution | No knowledge contribution expected |
|---|---|---|---|---|
| Connector to EU Data Spaces | ○ | ○ | ○ | ○ |
| Digital Twin Visualization | ○ | ○ | ○ | ○ |
| Reusable models and software components (BSM, RES, District heating, M&T, energy flexibility) | ○ | ○ | ○ | ○ |
| Cost benefit Analysis | ○ | ○ | ○ | ○ |
| Mobile app for citizen engagement | ○ | ○ | ○ | ○ |
| Training material and Practical guidelines for PEDs | ○ | ○ | ○ | ○ |

If needed, please **provide a rationale for your answers to the previous question**

La tua risposta

**Do you foresee any other Key Exploitable Assets** to be added to the list validated in M6? If so, please indicate them together with a short description and the rationale for their inclusion. If not, just write "Current list confirmed" *

La tua risposta

In case you foresee any other Key Exploitable Assets to be added to the current list, please indicate below **what type of contribution do you expect to provide for it/them**. Otherwise, just write "Current list confirmed" *

La tua risposta