COST Action 19126

Positive Energy Districts European Network

Deliverable 1.3

Report on the challenges, barriers and best practices for PED implementation

“Learning to tackle challenges through Story-telling”

Authors: Francesca Sabatini (University of Bologna), Michal Kuzmič (Czech Technical University in Prague), Tetiana Biloborodova (G.E. Pukhov Institute for Modelling in Energy Engineering), Jannika Aalto (Green Digital Finance Alliance)

Dissemination level: Public
Final delivery date: 8. 3. 2025

This publication is based upon work from COST Action Positive Energy Districts European Network (PED-EU-NET), supported by COST (European Cooperation in Science and Technology).

Executive Summary

This report summarizes the work implemented within the main running task in the third Grant Period 3: Task 1.4 “Identify the challenges and barriers for the uptake of PEDs, capture lessons learned and provide recommendations on socio-technical measures for successful implementation“. Throughout this task, the task team developed a ”PED Storytelling Framework” to deliver insights on drivers and barriers to PED implementation through the observation of case studies and best practices across Europe. The work was part of the Working Group 1 (WG1) PED Mapping, Characterisation and Learning.

The task focused specifically on storytelling as a novel way of presenting results and success (or failure) stories from scientific research, aiming not only at delivering information but at telling a story that is, by virtue of its narrative nature, able to inspire and to call people to action, pointing out to the challenges and enabling factors which the stakeholders of PED cases have faced during the implementation.

This document covers the work within the WG1 on the development of the PED storytelling framework within the period from 06/2023 to 12/2024. The stories await publication through various channels, including the PED Database developed by PED-EU-NET. Among further future steps of the project is a follow-up with the cities of Bilbao and Amsterdam, which will be described in the “Next Steps” session of the present deliverable.

The deliverable is articulated as follows: after an introduction, the first section is dedicated to the challenges, barriers, and best practices for PED implementation as initially identified through desk research. It then introduces the objectives, methods, and steps for the PED storytelling framework implementation; a third section presents the process followed to collect information from a selection of PED cases and illustrates the first results of the storytelling process of those cases. A fourth section discusses the results, limits and next steps of the storytelling framework, and a final section draws conclusions.

Table of Content

Executive Summary 2
Table of Content 3
1. Introduction 4
2. From understanding drivers and barriers to storytelling: the journey of T1.4 5
2.1 The process of T1.4 5
2.2 The storytelling framework: conceptualization and objectives 6
2.3 Methodology 8
2.4 Results 9
3. Storytelling in practice: interviews and workshop 12
3.1 Next steps 14

1. Introduction

Since 2017, when the Positive Energy District (or PED) concept was introduced to the European innovation policy through the SET plan, many European teams struggled to materialize the concept. Dozens and hundreds of PED-inspired projects were started, more or less successfully fulfilling the recognized PED criteria. Name a few: having energy-efficient buildings, achieving a positive energy balance, reaching net-zero greenhouse gas emissions, integrated energy management of groups of buildings, flexible balancing, etc. This chase for multiple rabbits brought about valuable lessons learned that were later picked up by projects without the "PED label".

It turned out to be an absolute necessity to enable learning from past PED cases and many teams started to map challenges and barriers. However, it is one thing to describe those challenges but a completely different exercise to bring about the moment of process learning to the PED newcomers. Therefore, in Task 1.4, influenced by the New European Bauhaus methodologies such as the CrAFt learning framework and drawing from various streams of research, including the "science of marketing," the team decided to follow the proven approach of storytelling.

Thus, the aim of Task 1.4 was to deliver a storytelling framework for PEDs, and specifically, it was articulated to 1) deliver a roadmap and a series of steps to articulate the storytelling and 2) identify the appropriate storytelling architecture by providing a range of options from renowned storytelling techniques. Ideally, the PED-EU-NET website, and specifically the PED database, will host stories from the selected cases. The work on the storytelling was conducted within the broader work on the challenges, barriers, and best practices for PED implementation.

Articulated into three steps, the PED storytelling framework 1) defines the content to be delivered, 2) filters it through the delineation of the addressees of the story, their needs, and their roles, and 3) identifies the appropriate storytelling architecture to be used for the story. Its scope and applicability go way beyond the PED-EU-NET, as it can be used by the stakeholders of the PED cases themselves to produce narratives through which they can communicate success stories and lessons learned to different groups (be them other companies or city representatives, citizens, journalists, etc.), as well as serving as an effective framework for scientific communication in other research domains.

2. From understanding drivers and barriers to storytelling: the journey of T1.4

2.1 The process of T1.4

The task was born to capture the barriers and challenges of PED implementation, and to eventually deliver the understanding of the unlocking and hindering factors in the diverse processes and features of each observed PED case. For this reason, an initial part of the work was conducted to capture the scopes, goals and KPIs of PED implementation; the phases of this implementation; the stakeholders involved and, consequently, their interaction and the collaboration perks and complexities; the unlocking factors, drivers and barriers; and to ultimately designing a roadmap and storytelling of PEDs implementation.

This initial framework was elaborated and presented at the "Energy In Built Environment Conference: Climate-driven Solutions for Next Generation EU Cities" jointly organised by the Portuguese National Laboratory of Energy and Geology (LNEG), COST Action Positive Energy Districts European Network (PED-EU-NET), European Energy Research Alliance Joint Programme Smart Cities (EERA JPSC) on 29th and 30th of June 2023.

What emerged from the conceptualization of this first phase of the work is that PED implementation is not an isolated process: PEDs are conceived as part of a city's sustainability strategy, and their design process, as well as their characteristics, must align with the city's long-term vision; this means, in particular, to guarantee tangible and integrated results that can be implemented and measured coherently with the city's strategy, while also taking into account their stakeholders' perspective, having their possible business interests and societal drivers in mind.

Besides broader embeddedness within the city strategy and the need to understand the stakes of local groups involved in PED implementation, drivers and unlocking factors were observed, and are illustrated in the following table (based on research done in WG3, see D3.1):

Table 1: Driving Factors and Unlocking Factors of PEDs, see Vettorato et al. (2022)

Driving Factors
Climate Change mitigation need (local RES production and efficiency)
Climate Change adaptation need
Rapid urbanization trend and need of urban expansions
Urban re-development of existing built environment
Economic growth need
Territorial and market attractiveness
Improved local environmental quality (air, noise, aesthetics, etc.)
Energy autonomy/independence

Unlocking Factors

Recent technological improvements for on-site RES production
Innovative, integrated, prefabricated packages for buildings envelope / Energy efficiency of building stock
Energy Communities, P2P, Prosumers concepts
Storage systems and E-mobility market penetration
Decreasing costs of innovative materials
Financial mechanisms to reduce costs and maximize benefits
The ability to predict Multiple Benefits
The ability to predict the distribution of benefits and impacts
Citizens improved awareness and engagement on sustainable energy issues (bottom-up)
Social acceptance (top-down)
Improved local and national policy frameworks (i.e. incentives, laws etc.)
Presence of integrated urban strategies and plans
Multidisciplinary approaches available for systemic integration
Availability of grants (from EC or other donors) to finance the PED Lab projects
Availability of RES on site (Local RES)
Ongoing or established collaboration on Public Private Partnership among key stakeholders

2.2 The storytelling framework: conceptualization and objectives

According to marketing research, 90 to 95% of decisions happen at the subconscious level and are driven by emotions (Zaltman 2003). This, however, does not solely have to do with marketing and purchasing choices, but rather with behavioral psychology in general, with wide implications in people's opinions on several levels, including trust in institutions and climate skepticism: in 2019, a study on the radicalization of political opinions unraveled the complex sets of beliefs and emotions underpinning people's political preferences for far-right positions (Hawkins et al. 2019); another recent research showed that climate skepticism is not only associated to, but even caused by distrust of the political class (Huber et al. 2022). While this undoubtedly calls for more scientific evidence to be produced in order to support people in making informed choices (Banerjee and Duflo 2019), it also unveils the urgent need to tap into people's emotional responses with effective communication tools which are too often beyond the reach of researchers and policymakers.

The PED storytelling framework is an original tool that enables PED stakeholders to deliver effective communication on PEDs and PED cases to different targets. This definition is characterized by two components: one concerning effective communication, and the other target choice. Regarding communication, the PED storytelling framework is inscribed in the broader domain of science communication: according to Science Europe, "Science communication is the practice of informing, raising awareness of science-related topics, and also getting involved with audiences that include, at least in part, people from outside the science community." The hiatus between scientific contribution in tackling environmental, societal, and economic issues, on the one hand, and the way this information is conveyed, is at the heart of many challenges: one is that of scientific and information literacy, whose lack has led to a proliferation of fake news and misconceptions about entire bodies of knowledge such as medicine or climate change. The other is uptake: if little information is available to the general public, and knowledge is not disseminated in a clear and transmissible way, the benefits produced by scientific innovation will be largely unknown to most people, making these innovations hard to adopt and mainstream.

This is all the more true when it comes to innovation in the built environment and in the energy sectors, which both converge in the concept of a Positive Energy District. Several studies show that energy literacy levels are low in most countries, including Sweden, Finland, and the US, and that even when these levels appear high, as in Denmark, the adoption of more

energy-efficient solutions is not adequately matched with sufficient knowledge. Not only are these challenging sectors for science communication, being characterized by complex sets of information: PEDs themselves are an emerging, though rapidly evolving, area of research and experimentation, where a standardization of definitions is still in progress, and which makes it even more difficult to effectively communicate their benefits to other stakeholders and to the broader citizenship for their widespread adoption.

The storytelling framework, therefore, was inspired by the increasing need to disseminate to the whole of society and the general public the benefits of the transition, especially in the light of the European Green Deal's commitment to "leave no one behind" and the awareness that only collective behavioral change and widespread adoption of sustainable choices can accelerate and mainstream the transition towards climate neutrality in time to reach EU decarbonization goals and the objectives of the Paris Agreement. These imperatives were reinforced by the New European Bauhaus initiative, asserting values of aesthetics, sustainability, and inclusiveness.

The second component of the definition concerns target choice: according to, once again, Science Europe, "The context in which (science) communication takes place is more and more polarised, diverse, and volatile. Appropriate science communication is key to research-informed policy-making and societal debates. Communication and interaction with various audiences, including other research stakeholders and citizens, should take place at all stages of the research process to contribute to excellent science".

Once again, nothing could be more relevant in the research domain on buildings: the Buildings Performance Institute Europe (BPIE) has observed that "aligning the EU building stock with 2050 carbon-neutrality objectives means buildings must achieve net zero carbon throughout their lifecycle, including development, renovation and operation". This, in turn, implies the need to inform and actively involve all the stakeholders who intervene in the different phases of the life-cycle. Identifying the characteristics, the needs, the drivers and the barriers of these stakeholders is crucial in order to understand how to effectively foster awareness and elicit engagement.

In the case of the energy transition, specifically related to societal and collective change and to changes in energy behaviors, the concept of energy citizenship has emerged, referring to the ways in which people can take an active part in the transition in different ways, from promoting sustainable choices among their friends and family to climate activism, to choosing energy-efficient appliances in their households. The shift from the level of unawareness to awareness to, ultimately, champions of the transition goes through information, engagement, motivation, emotional responses, among other factors, emphasizing once again the importance of targeted communication to specific stakeholders.

In the specific case of PEDs, the matter is further complexified by a change in scale, which is not just the building's, but the district's: the set of involved stakeholders is, therefore, wide and diversified, from investors to policymakers to urban authorities, homeowners and local institutions. With PEDs being at the early stages of their development, the urge is to find effective ways not only to clearly inform, but to enable learning, to inspire, and to call different stakeholders to action for their factual implementation.

Today, many tools, frameworks, and approaches to scientific communication are emerging that have collected this urge and are innovating the way scientific breakthrough is communicated, innovation is conveyed, and technological advancements are mainstreamed at different levels, cross-referencing disciplines such as cognitive psychology, marketing, and design. In the specific case of the PED Storytelling Framework, as the name suggests,

storytelling was chosen as an ideal framework for the communication of PEDs. Stories are "facts wrapped in emotions" (Joubert et al. 2019); stories, moreover, are able to 'situate' these emotions in real-life scenarios and cases and to narrate the facts from an informed viewpoint (that of its protagonists). One of the key characteristics of stories is that happenings and plot twists lead to an evolved state of an initial condition. "It is through understanding the reasons for this change that stories impart meaning and can change the way people see the world. Once communicators understand and tap into this aspect of storytelling, stories can become versatile tools to help people make sense of the world around them, including issues and developments rooted in science" (*ibid*.). As a matter of fact, stories are remembered 22 times more than facts alone (Aaker 2019), making them valuable tools to help people relate to the transition and to support researchers and decision-makers in delivering impactful messages.
In light of the issues related to energy literacy and to science communication applied to the transition, storytelling appears as a most fitting tool, especially for PEDs, for which the sensemaking process for many stakeholders is still at the beginning, and which is still far from the experiences and everyday pathways of citizens and of stakeholders in general.

2.3 Methodology

Based on these premises, the PED storytelling framework was developed as a new and original tool, capitalizing on the work done by the other WPs of the PED-EU-NET COST Action and building upon existing storytelling approaches and yet developing specific steps to construct a narrative that is appropriate for PEDs and for the aims of the project. In particular, the PED Database, stemming from T1.1 of WP1 (PED Mapping, Characterization and Learning). While being developed specifically for PEDs, the Storytelling Framework has the potential to be applied to a variety of other domains in science communication, providing a significant contribution to this emerging body of knowledge.

While aiming at learning and inspiration, the storytelling framework primarily serves as a persuasive tool: it is a call to action to engage in PEDs from various angles (either through advocacy, monetary support, citizen engagement, and so forth). For this reason, while drawing from different sources and disciplines, the method for building the storytelling framework was primarily inspired by marketing tools that have been adapted to research and policy needs.

Specifically, the storytelling framework is built on a process that accounts for the challenges and needs outlined in the introduction: the need to properly frame PED definitions and concepts, the need to identify the targets and stakeholders to which the storytelling will be addressed, and the need to create compelling, inspiring stories about PEDs able to elicit learning and to foster the replication of PEDs across different urban contexts.

Therefore, the storytelling framework is articulated into a three-step process:

1. **Content checklist:** the content checklist builds up on the research work conducted within the COST Action and beyond. Specific attention was given to which information is used to describe PEDs in the PED database, but also other frameworks have been applied from other relevant research projects on PEDs. The checklist is designed to be an 'unfiltered' list of characteristics that PEDs share, organized into different thematic clusters of information.
2. **Target identification** supports the organization of information from the content checklist according to the targets of communication (and of the storytelling itself). Target identification is grounded on stakeholder mapping approaches from the design field and marketing techniques such as user personas. The result was a matrix of

personas described by a set of indicators that specify different aspects of the communication targets, from their informational needs to information channels, from their level of previous knowledge on energy matters to their constraints and drivers. This step aims at designing storytelling that contains the necessary information, helps "weigh" the clusters of information of the content checklist, and designs a storytelling architecture that is appropriate to the needs, constraints, drivers, and channels of information of each persona.

3. **Storytelling architecture**: drawing once again from marketing tools, different storytelling techniques have been investigated that serve different communicative purposes and can fit different targets according to the indicators identified in the matrix of the previous step. The storytelling has a codified structure which is common to all techniques, with an initial condition being altered by a more or less long sequence of happenings, leading to a new condition; another common characteristic is the centrality of a character, which is the subject of the story and creates empathy in the recipient. Still, the structure and the phases of the storytelling, as well as a varying focus on the character, allow for the design of different storytelling architectures. The most commonly used storytelling frameworks in the marketing field are eight, and all of them have been inspected with respect to their potential applicability to PEDs.

2.4 Results

2.4.1 Content checklist

The content checklist is intended as an 'unfiltered' account of all the necessary information for PED implementation. The way PEDs are classified and illustrated within the Database was designed precisely with this aim, and for this reason, it was taken as the main reference for the sub-task of creating this information checklist. Other projects and the relevant literature were scouted in order to enrich the content checklist. A simplified version of the checklist is illustrated in the following table and will be the object of a forthcoming scientific publication.

general information (e.g. geographic and climatic coordinates, development stage of the PED)
social information (e.g. sociodemographic characteristics of the area of implementation)
local context (e.g. number of buildings, land use after restoration)
economic information (e.g. ownership, economic targets, estimated costs)
Energy information (e.g. initial GHG emissions, intial share of RES)
PED technical specifications (e.g. fields of application, application of standards such as ISO52000, technical aspects)
Governance and legal aspects (stakeholders, governance model)

2.4.2 Storytelling personas

Storytelling personas were inspired by the marketing notion of *persona*, a semi-fictional representation of a product/service/campaign target, specific and detailed. The rationale for the identification of personas is that every potential addressee of the storytelling has a different viewpoint, composed of their interests, their position within their organization/context, their sources of information, their drivers, and their informational needs. For this reason, relevant examples were sourced from known projects in the field of energy transition to first identify the methodology. The first reference was the Energy Efficiency and Renewable Energy Silhouette Personas by the U.S. Office for Energy Efficiency and Renewable Energy (EERE 2012). Personas are classified according to their positioning with respect to the energy sector: specifically, it identifies innovators, investors, ambassadors/advisors, enterprise implementers, and interested public categories; each of them is accompanied by a quote shortly illustrating their motivation, followed by their goal and a breakdown of the actions they carry out to achieve it. A second section classifies other aspects related to the persona according to degrees of intensity: namely, the number of topics they visit, whether they visit the EERE website, what are their knowledge levels, and their info needs. Table 2 is withdrawn from the EERE website, and it illustrates the matrix.

The PED-ID project similarly offers valuable insights into the construction of personas according to different indicators. The project aspires to create a "knowledge-based stakeholder process for PED areas and assessment methods to use the information for the stakeholder process, by which decision-makers are provided at an early stage with improved information about how best to achieve Positive Energy District status, the options and the impacts." The framework they build is based on the following indicators: the impact that the object of communication has on them, what is important to them, the influence they have over the project and how they could contribute to it, and how, conversely, they could block the project.

The GRETA project also served as a reference: it aimed at investigating the drivers and barriers for the emergence of energy citizenship behavior; for this reason, it developed an 'energy citizenship ladder' that illustrates the different attitudes of citizens at the occurrence of specific changes in conditions (enabling factors or constraints). The ladder identifies energy citizens who are increasingly involved, ranging from "unaware" to "aware," shifting then to "involved," "active," and, eventually, an "advocate" of the energy transition. Potential deviances are identified for each step which generates other types of attitudes: the "involved" citizen can transition into "denial" or member, while an "active" citizen can shift to leadership roles in their community or to NIMBYism. Table 2 illustrates the energy citizenship ladder.

A matrix was thus structured to identify different storytelling personas: persona typologies were listed in the first row; the first column listed the characteristics that need to be taken into account to define storytelling personas.

Figure 1: Energy Efficiency and Renewable Energy Silhouette Personas by the U.S. Office for Energy Efficiency and Renewable Energy. Credits: EERE 2012.

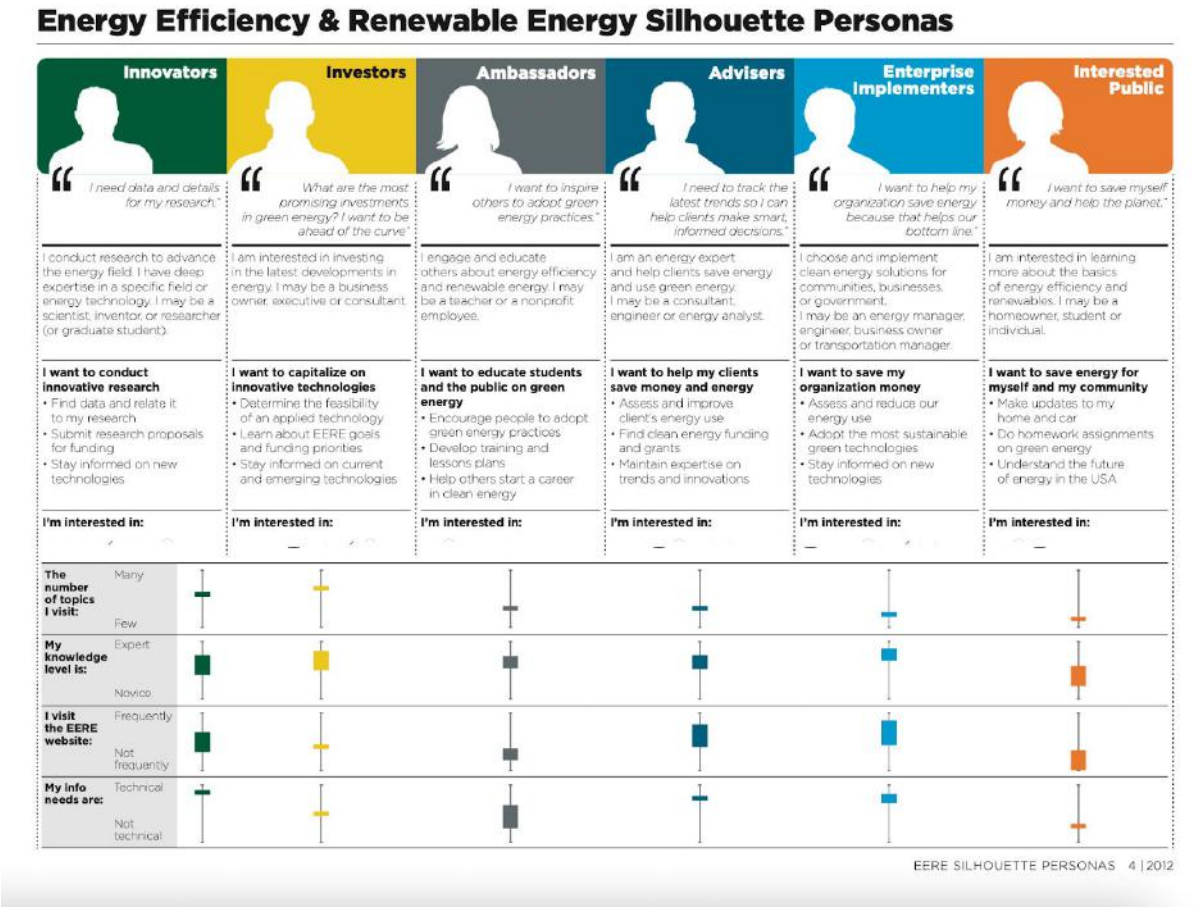
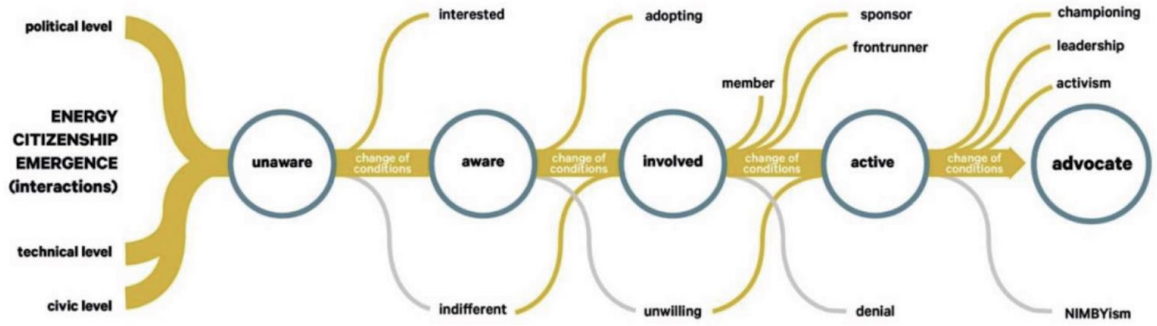


Figure 1: Energy citizenship ladder as conceptualized in the GRETA project as in Ruggieri et al. (2022).



2.4.3 Storytelling architecture

The storytelling architecture is the final step of the storytelling framework; once the content checklist is prepared and the target audience for the storytelling is identified through storytelling personas, allowing for selection and prioritizing information clusters and delivery them through storytelling.

The different storytelling architectures are, once again, withdrawn from the marketing literature and practice. Storytelling varies in length and articulation (number of steps), viewpoint (the perspective from which the story is told), aim (each storytelling architecture has its own specific purpose or serves a given objective), and preferable domain of application. Here, the most common frameworks, withdrawn from different sources, are presented.

The story-brand framework: articulated into a sequence where 1. A character 2. Has a problem, 3. Meets a guide 4. Who gives them a plan 5. And calls them to action that results in 6. Success or 7. Failure.

The hero's journey framework: the narration is divided by the threshold between known and unknown, exemplifying a learning journey. It is articulated into three steps which are, in turn, broken down, i.e. Act 1 – The Departure (articulated in the ordinary world, the adventure, refusal – or call – meeting with the mentor) Act 2 – The initiation, where the character crosses the threshold into the unknown (articulated into tests, allies, enemies, approach to the inmost cave, ordeal) and Act 3 – The Return, with a reward, the road back and the resurrection leading to a return with an elixir into the world the character used to know.

Freytag's Pyramid Framework: Beginning with an "exposition" of the initial situation, an inciting incident leads to rising action, climax, and, ultimately, falling action and resolution.

The story-cycle framework: starting with a backstory, it then introduces a hero, the values at stake for them ("stakes"), a disruption, an antagonist and a mentor, a journey, a victory, the moral, and the turning of this story into a ritual.

The 3-act structure framework: Articulated into acts like the hero's journey, the acts are named Setup, Confrontation and Resolution, and start from an introduction and a plot point (Act 1), continue with a rising action and another plot point (Act 2), and end up with a climax and a falling action (Act 3).

The problem-agitate-solve framework: the three steps coincide with problem identification and the creation of empathy with the audience, and they show the consequences of not addressing the problem and introduce the solution as the ideal way to address the problem.

The context-action-results framework: the context illustrates the audience's position and their current challenges. The action explains the direct challenge that can be addressed by the proposed solution. The result ultimately gives the audience a call to action and invites them to a transformation to positively transform their relationship with the challenge.

3. Storytelling in practice: interviews and workshop

In June 2024, the Urbis Smart Cities Meetup was held in Brno, Czech Republic. Panels and workshops were held that concerned smart city solutions and the implementation of PED, and the occasion was used to arrange interviews with representatives of the different PED cases. The aim was to gather information using the content checklist and the storytelling personas as a guiding framework for the interviews in order to then draft storytelling on these cases. The interviews were conducted with the following representatives from different entities and positions, each discussing the PED case of a single municipality.

- Dr. Nadja Riedel, Municipality of Leipzig (DE)
- Dr. Maxime Valentin, Municipality of Lyon (FR)
- Dr. Fernando Gomes, Municipality of Maia (PT)
- Dr. Bernhard Klassen, Municipality of München (DE)
- Dr. Helene Scheller, Municipality of Vienna (AT)

Interviews ranged from 20 to 35 minutes and were recorded upon obtaining oral consent from the participants. The following week an interview was conducted with Dr Omar Shafqat for the Amsterdam Municipality.

The inputs gathered during this phase were then used to conduct a workshop in September 2024 in Linz, at the PED-EU-NET final conference. The workshop was articulated according to these three steps.

Folders had been prepared for each of the three cases. Each contained three documents:

1. Sources on cities: in order to design the storytelling, information was gathered from multiple sources which build up the three cases. A document with links to these resources was provided.
2. Interviews: Interviews from the Brno Urbis Smart Cities Meetup were transcribed and shared with workshop participants.
3. Prompts for ChatGPT: the tool used to design storytelling drafts was ChatGPT. This approach was tested beforehand by providing a series of inputs to ChatGPT that progressively led to the creation of storytelling for the three cases that were provided; these inputs were provided to participants to use.

First, an overview of the aims and the articulation of the storytelling framework was presented to participants, who were then divided into groups. They were then asked to feed ChatGPT with the sources from the first document in order for the AI tool to organize it into clusters of information.

The following prompt required the AI to generate a story utilizing a tripartite storytelling framework (participants were advised to use the context-action-result framework, the 3-act framework, and the problem-agitate-solve framework).

Once a first, generic story was generated, participants were asked to work in groups to the elaboration of a storytelling persona using the matrix which was elaborated during the deployment of T1.5. They were then required to re-write the story, using ChatGPT, using another storytelling architecture – one which is pivoted around a character, like Freytag's pyramid framework or the Hero's journey.

What emerged from the workshop was, ultimately, what follows:

- it is crucial to filter and refine the content that AI is fed in order to create stories with a certain degree of specificity; otherwise, generic information will produce generic stories.
- AI proves to have biases when reading the story as much as humans do: in the Amsterdam case, the focal point chosen by ChatGPT was the energy community, while the interview conducted at the Smart Cities Meetup was pivoted around the technical challenges of grid congestion and how they were overcome, which appears to be a good selling point for the Amsterdam case. Therefore, corrections had to be applied.
- Filtering stories through personas is necessary in order to refine the story and make it meaningful for a target. It provides focus and framing to the story. Especially in the Maia case, where the persona was Maria, a tenant of the Sobreiro social housing district whose primary urge was to reduce the cost of her bills, the story appeared to be prominently oriented towards persuading the target that the PED project would respond to this urge.
- Stories tend to be written with a strong rhetorical emphasis which would require corrections. Again, when provided with a viewpoint, the register of the stories changed: in the Leipzig case, where AI was asked to write a story for investors, the language and tone changed to adapt to this input.

AI-generated stories can, therefore, only be considered a draft, and not the final state of the story. Human interaction and process iterations obviously need to be embedded in the process; the viewpoint of the people involved in the PED process is crucial in order to frame the story and steer its aims. Still, a storytelling framework embedding an AI tool can provide stakeholders with guidance on how to design a story for their PED case and can set the baseline for a storytelling process.

3.1 Next steps

This deliverable is the first comprehensive publication describing the process of developing and applying the story-telling framework to practical case studies. There is more to unpack, and future steps will focus on integrating the stories themselves into the PED database as well as validating the findings in practical collaborations. For instance, the Atelier project, implementing PEDs in Amsterdam and Bilbao, has required a consultancy activity for the development of PED stories, which will involve the two Municipalities and the related stakeholders in a process leading, in February 2026, to the co-design of two PED stories.

4. References

Aaker, J. (2019). *Harnessing the power of stories.* VMWare Women's Leadership Innovation Lab. Stanford University. Available at https://womensleadership.stanford.edu/node/796/harnessing-power-stories

BPIE (Buildings Performance Institute Europe) (2022). Roadmap to climate-proof buildings and construction – How to embed whole-life carbon in the EPBD. Available at https://www.bpie.eu/publication/roadmap-to-climate-proof-buildings-and-construction-how-to-embed-whole-life-carbon-in-the-epbd/

Demodia (nd). *Storytelling Frameworks for b2b.* Available at https://demodia.com/storytelling-frameworks-for-b2b#freytags-pyramid

Energy Efficiency and Renewable Energy (2012). Energy Efficiency & Renewable Energy Silhouette Personas. Available at https://www.energy.gov/sites/prod/files/2015/09/f26/eere_personas_overview.pdf

Joubert, M., Davis, L., & Metcalfe, J. (2019). Storytelling: the soul of science communication. *Journal of Science Communication*, *18*(5), E.

PED-ID Project (2022). D2.2 Holistic Stakeholder Model for early PEDs. Available at https://sustainableinnovation.se/app/uploads/2022/05/PED-ID_D2.2_StakeholderEngagementProcess_v3_220415.pdf

Ruggieri, B., Coleandro, G., Van Ooij, C., Kantel, A., Annala, S. (2021). Vision document on energy citizenship-based Energy Union (persons, essays, scenarios, winners and losers of energy transitions). D1.2 of the Horizon 2020 project GRETA, EC grant agreement no. 101022317, Bologna, Italy.

Science Europe (nd). *Science communication*. Available at https://scienceeurope.org/our-priorities/science-communication/

Vácha, Tomáš et al. Deliverable 4.1 NEB-Inspired Learning Framework. 31.12.2022. *CrAFt Cities*. URL: https://craft-cities.eu/wp-content/uploads/2023/01/D4.1-NEB-inspired-learning-framework.pdf

Vettorato, Daniele. Deliverable 1.3 Review of existing urban laboratories (Review existing concept, projects and facilities that are relevant to PED Labs). 07.03.2022. *PED-EU-NET*. URL: https://pedeu.net/wp-content/uploads/2022/10/D3.1_Review_existing-urban-laboratories.pdf

Zaltman, G. (2003). *How customers think: Essential insights into the mind of the market*. Harvard Business Press.