Guidelines for PEDs' planning, design,

CITIZENS4PED

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Executive summary

Deliverable D7.1 presents the part of the results of Work Package 7 (WP7) of the Citizens4PED project, which aimed to develop context-sensitive, modular guidelines to support the planning, design, implementation, and monitoring of Positive Energy Districts (PEDs). These guidelines are intended as a flexible reference for local authorities, practitioners, and communities engaging in PED development, and they serve as the conceptual foundation for the European Committee for Standardization (CEN) Workshop Agreement proposed in Deliverable D7.2.

The activities of WP7 were structured into six tasks and implemented through a combination of standard review, partner consultations, and cross-WP analysis. Key findings include:

- The absence of PED-specific standards, confirming the need for procedural guidance at the district scale;
- A reconstruction of workflows and integration logics across WPs 3, 4, and 5, based on responses to a structured questionnaire;
- The identification of lessons learned, critical challenges, and enabling conditions for successful PED development;
- The drafting of adaptable, non-prescriptive guidelines organized along four dimensions: planning and scoping, design and co-creation, implementation and integration, and monitoring and learning.

Despite limitations in time and access to qualitative data (e.g., interviews, extended workshops), the deliverable provides a robust synthesis of partner experience and shared knowledge. It highlights the importance of integration, coordination, and responsiveness to local contexts in achieving effective PED transitions.

To ensure transparency and reproducibility, the **original questionnaire template** and the **report on results** have been included as **Appendix 1** and **Appendix 2**, respectively.

1. Introduction

Context and Objectives of WP7

The increasing importance of Positive Energy Districts (PEDs) as enablers of sustainable urban transformation calls for operational tools that can support their planning, design, implementation, and monitoring. Within this framework, **Work Package 7 (WP7)** of the Citizens4PED project aimed to develop cross-disciplinary, context-sensitive guidelines and to initiate a pre-standardization pathway through a **CEN Workshop Agreement (CWA)**.

The core mission of WP7 was to consolidate and integrate the outcomes of WPs 3 (techno-energetic), 4 (socio-economic and citizen engagement), and 5 (institutional and spatial strategies), translating them into a **systemic framework for PED development**. To do so, WP7 structured its activities into six tasks: from the state-of-the-art analysis of existing standards (Task 7.1) to the formulation of reference workflows and identification of lessons learned (Tasks 7.2–7.4), and finally to the drafting of guidelines (Task 7.5) and the proposal of a CWA (Task 7.6).

These guidelines, rooted in both academic knowledge and practical implementation insights, are intended as a **non-prescriptive, adaptable reference** that can support municipalities, practitioners, and local communities in shaping PED initiatives according to local constraints and opportunities.

Structure of the Deliverable

This deliverable is organized to reflect the logical progression of WP7's activities. Each section corresponds to a specific task and illustrates the methods applied, the results obtained, and the contributions to the development of the final guidelines. Due to the exploratory nature of WP7 and the limited possibility to activate all foreseen tools (e.g., interviews or extended

cross-WP workshops), the questionnaire disseminated among partners played a central role in providing substantive insights across multiple tasks.

The structure includes:

- A review of standards and normative frameworks (Section 2),
- An analysis of cross-WP interactions and procedural patterns (Section 3),
- The formulation of a systemic reference process (Section 4),
- The synthesis of lessons learned (Section 5),
- The drafting and presentation of context-sensitive guidelines (Section 6),
- A brief reference to the CWA proposal (Section 7),
- Final remarks and forward-looking recommendations (Section 8),
- Appendices with supporting materials and methodological notes (Section 9).

2. State of the Art on PED Standards (Task 7.1)

Structure Research Methodology

The analysis of existing standards relevant to PEDs was conducted through systematic searches of UNI, ISO, and CEN databases, as well as a review of associated grey literature and project deliverables. The main objective was to identify both direct and indirect standardization efforts that could support the development of PED guidelines. Given the absence of PED-specific standards, attention was paid to normative frameworks at the building level with potential for district-scale adaptation. The methodology included keyword searches (e.g., "Positive Energy Districts," "Energy Communities," "Sustainable Districts"), cross-referencing with technical committees, and consultations with UNI experts.

Results of the Literature Review

The literature review did not identify standards dedicated exclusively to PEDs. However, several families of standards were recognized as highly relevant for energy performance, sustainability, and environmental assessment at the building level, with potential applicability to PED contexts:

- **UNI/PdR 13 series**: Frameworks for environmental sustainability assessment in residential and non-residential buildings[1].
- **UNI EN ISO 52000 series**: Modular structure for assessing energy performance of buildings[2].

[1] UNI, *UNI/PdR 13 series: Frameworks for environmental sustainability assessment in residential and non-residential buildings*. Ente Italiano di Normazione (UNI), Italy, 2019.
[2] UNI, UNI EN ISO 52000 series: Energy performance of buildings – Overarching EPB assessment. Ente Italiano di Normazione (UNI), Italy, 2017.

- **UNI EN 15316 series**: Methodologies for calculating the energy performance of technical systems (heating, cooling, ventilation)[3].
- **UNI/TS 11300 series**: Specific methods for determining energy needs for heating, cooling, lighting, and ventilation[4].

Although building-scale in scope, these standards provide valuable insights and metrics for energy analysis and sustainability evaluation that could be upscaled or adapted to the district level. The review also led to an inquiry with **ISO/TC 268 – Sustainable Cities and Communities[5]**, to verify any ongoing initiatives aligned with PED objectives.

Contribution to the Present Deliverable

The absence of PED-specific standards underscores the importance of developing a structured yet adaptable set of guidelines. The findings of this task informed the design of the WP7 questionnaire and guided the overall orientation of the guidelines proposed in Section 6. By highlighting transferable tools and gaps, this analysis reinforced the need for an integrative, procedural approach that bridges building-scale efficiency and district-scale complexity.

[3] UNI, UNI EN 15316 series: Energy performance of buildings – Methodologies for calculation of system energy requirements and system efficiencies (heating, cooling, ventilation). Ente Italiano di Normazione (UNI), Italy, 2016.
[4] UNI, UNI/TS 11300 series: Energy performance of buildings – Specific methods for the determination of energy needs for heating, cooling, lighting, and ventilation. Ente Italiano di Normazione (UNI), Italy, 2014.
[5] ISO, ISO/TC 268 – Sustainable Cities and Communities. International Organization for Standardization (ISO), Geneva, Switzerland, 2012.

3. Insights Analysis of WP Development and Their Impacts (Task 7.2)

Analysis Methodology

The analysis of WP development was primarily conducted through a structured questionnaire distributed to WP leaders and contributors in April 2025. The questionnaire captured both quantitative and qualitative data and was aligned with the logical flow of WP7. Complementary inputs were collected from mid-term presentations, internal deliverables, and meeting notes.

Documentation of Methods and Logics

The responses from the questionnaire enabled the reconstruction of methods, processes, and reasoning applied in WPs 3, 4, and 5. These included the identification of implicit assumptions, coordination mechanisms, and decision-making approaches. The methodology also helped trace procedural overlaps, temporal misalignments, and mutual requirements among WPs.

Workshops and Contributions

Although direct interviews and cross-WP workshops were not fully realized, structured discussion sessions held during project meetings (Vienna, online workshop, Bari consortium meeting) provided opportunities to triangulate questionnaire findings and validate emerging patterns.

Results of Cross-Impact Analysis

The analysis revealed challenges in data availability, institutional coordination, and workflow integration. While some partners noted effective collaboration, others reported fragmented practices and siloed decision-making. The insights informed the design of integrative elements proposed in the guidelines—such as coordination checkpoints, interoperable tools, and feedback loops.

4. Formulation of a Reference Process (Task 7.3)

Reconstruction of Processes

The WP7 questionnaire helped map out existing workflows and coordination logics, revealing the diversity of approaches adopted across technical, social, and institutional domains. Although originally intended to be based on workshops and interviews, the reference process was reconstructed using a meta-analysis of questionnaire responses and project deliverables.

Integration of Workflows

Commonalities and differences in the sequence, tools, and validation mechanisms adopted in each WP were identified. This led to the formulation of a draft reference workflow that highlights critical decision nodes, data needs, and opportunities for iteration.

Preliminary Validation

The reference process was shared and discussed during internal WP7 meetings and at the final project meeting in June 2025. It served as a foundation for the proposed integration framework presented in the CWA Project Plan and as a narrative backbone for the guidelines in Section 6.

5. Review of Lessons Learned and Evaluation of Key Results (Task 7.4)

Lessons Learned from WP3, WP4, WP5

The questionnaire responses identified key lessons across three domains:

- **Technical**: importance of flexibility in modeling tools and proxy-based assessments.
- **Social**: challenges in engaging vulnerable communities and addressing diverse values.
- **Institutional**: need for clearer governance mechanisms and data protocols.

Document Analysis

Complementary document reviews (deliverables, meeting minutes) supported the triangulation of insights and enriched the interpretation of questionnaire results.

Implications for PED Development

These findings highlight the need for adaptable engagement tools, sufficiency-oriented planning approaches, and the integration of informal knowledge systems. The guidelines aim to embed these insights through modular procedures and alternative decision paths.

6. Guidelines for PEDs (Task 7.5)

Overview and Purpose

The guidelines developed in this deliverable are intended to serve as a flexible and transferable reference for practitioners and municipalities working on Positive Energy Districts (PEDs). They are based entirely on the materials, tools, and processes developed within the Citizens4PED project and aim to synthesize those into an actionable framework. These guidelines are conceived not as a rigid methodology, but as a modular set of approaches adaptable to different urban contexts.

Structure and Dimensions

The guidelines are organized along four functional dimensions:

- **Planning and Scoping**: Understanding the local context, identifying actors and barriers, and defining objectives and constraints.
- **Design and Co-creation**: Integrating stakeholder knowledge, modeling alternatives, and co-defining priorities.
- **Implementation and Integration**: Aligning technical, spatial, and institutional components to deliver effective PED interventions.
- **Monitoring and Learning**: Defining metrics, ensuring feedback loops, and capturing lessons to improve transferability.

Content Sources and Foundations

Each dimension is informed by concrete elements extracted from WPs 3, 4, 5, and 6. These include:

- Technical models (e.g., energy simulations, decision frameworks);
- Social and spatial datasets (e.g., Living Lab profiles, vulnerability analyses);
- Templates and indicators for planning and assessment;
- Narratives and examples drawn from the project's case studies.

The formulation of the guidelines is grounded in a comprehensive analysis of the knowledge and operational tools developed throughout the Citizens4PED project. In particular, the guidelines consolidate methodological contributions, data structures, workflows, and decision-making practices that emerged from the implementation of WPs 3 (techno-energetic modelling), 4 (spatial and social analysis), and 5 (performance evaluation).

To facilitate their operational application and future reformulation in the CEN Workshop Agreement, the guidelines are synthesized into four functional dimensions: *Planning and Scoping*, *Design and Co-creation*, *Implementation and Integration*, and *Monitoring and Learning*. These dimensions reflect the core phases of PED development and enable flexible adaptation to varying urban contexts.

The table 1 below summarizes the main objectives associated with each dimension, the concrete contents drawn from the project's technical deliverables, and the types of tools or outputs that can support practical implementation. This synthesis provides a structured reference that bridges conceptual understanding and procedural application, and will serve as a foundation for the modular components of the future CWA.

Table 1. – Operational Synthesis of PED Guidelines across Four Dimensions

Dimension	Key Objectives	Concrete Elements from WPs	Suggested Tools / Outputs
1. Planning and Scoping	- Understand context (social, spatial, regulatory) - Identify actors and resources	- D4.1: socio-demographic + climatic profiles - D4.3: LLs monographs with institutional mapping	- Stakeholder and asset mapping template - Territorial readiness assessment sheet

Dimension	Key Objectives	Concrete Elements from WPs	Suggested Tools / Outputs
	- Frame constraints and drivers	- D3.1: initial scenario definition	
2. Design and Co-creation	- Co-design scenarios - Balance technical models and participatory inputs - Address equity and inclusion	- D3.5: multi-scenario optimization logic - D4.3: co-design narratives - D3.3: integrated model structure	- Scenario co-definition toolkit - Participation log and decision traceability sheet
3. Implementation and Integration	- Align spatial, technical, and governance tools - Coordinate actors across scales - Manage resources and timing	- D3.1: integration of Arteria modules - D4.3: governance pathways - D5.1: energy performance indicators by case	- Action plan template with roles - Policy–tech coherence checklist
4. Monitoring and Learning	- Define shared metrics - Enable feedback and adaptation - Consolidate lessons learned	- D5.1: indicator tables (building ↔ district) - D4.3: learning loops in Living Labs - WP7 Questionnaire report	- Modular monitoring matrix - Experience capture and feedback loop diagram

Intended Use and Transferability

While these guidelines are not normative in their current form, they offer a robust base for structured decision-making and adaptive planning. Their modular articulation makes them suitable for reformulation into a CEN Workshop Agreement (CWA), without requiring the creation of new content, but through the reorganization of validated project outputs.

A more formal version of these guidelines, including checklists, procedural templates, and illustrative cases, will be developed as part of the CWA drafting process in Task 7.6. This deliverable thus serves as the foundation and raw material for that transformation.

Alignment with the CWA

These guidelines form the substantive core of the CEN CWA proposal. While non-binding, they provide a structured, technically sound, and flexible roadmap for municipalities and practitioners engaging with PED transitions.

On the Relationship Between the Guidelines and the Future CEN Workshop Agreement

The guidelines outlined in this deliverable do not aim to offer a finalized or prescriptive set of tools. Rather, they represent the conceptual and operational synthesis of the project's collective work, articulated in a flexible, modular form to reflect the diversity of PED contexts. These guidelines draw directly from the materials, tools, and reflections produced across WPs 3, 4, 5, and 6, including workflows, conceptual frameworks, templates, and recommendations.

In line with the CEN-CENELEC rules[6] and the intention of the Citizens4PED consortium, the planned CEN Workshop Agreement (CWA) will **not introduce new content**, but will instead **reformulate** the materials already developed during the project. The objective of the CWA is to **translate this existing knowledge** into a structured, technical document that is transferable, accessible, and usable by a broader range of stakeholders—including municipalities, planners, and institutional actors—beyond the project consortium.

The CWA will therefore function as a **normative bridge**: taking the foundational content mapped in these guidelines and recasting it into a coherent framework of operational guidance, including modular templates, flowcharts, adaptable procedures, and narrative

[6] CEN-CENELEC, Internal Regulations – Part 2: Common Rules for Standardization Work. Brussels, Belgium: CEN-CENELEC Management Centre, 2021.

examples. This approach ensures both the technical robustness and contextual flexibility needed to support PED development in varied urban settings.

These synthesized elements form the substantive core of the CWA proposal presented in the following section

7. Project Plan for the Proposal of a CEN Workshop Agreement (Task 7.6)

Collaborative Planning Sessions

WP7 coordinated the drafting of the CWA Project Plan in cooperation with UNI, the Italian standardization body. The content was built progressively from early 2025 onwards, incorporating results from the questionnaire, thematic presentations, and meetings with project partners. This ensured that the CWA proposal would reflect the interdisciplinary and procedural challenges encountered in actual PED implementations.

Consultation with Stakeholders and CEN/TC 465

Discussions with stakeholders and the involvement of UNI allowed the project to align its CWA proposal with existing CEN structures, particularly Technical Committee 465 on Sustainable Cities and Communities. Informal synergies were explored with similar CWA initiatives to avoid overlap and maximize complementarity.

Dissemination Strategy

The CWA Project Plan was submitted to CEN in July 2025. Dissemination actions are planned in coordination with UNI and the Citizens4PED consortium, including dedicated sessions at future events, academic publications, and links with institutional actors involved in PED development.

8. Conclusions and Recommendations

The activities carried out under WP7 demonstrate the feasibility and value of developing cross-cutting, adaptable guidelines for PEDs based on real-world project experiences. Despite some methodological limitations due to time and resource constraints, the use of a structured questionnaire and meta-analytical methods enabled the identification of key challenges and opportunities across technical, social, and institutional dimensions.

The proposed guidelines offer a flexible, procedural support structure for PED actors, emphasizing integration, iteration, and contextual adaptation. As a whole, WP7 represents a bridge between operational experimentation and standardization efforts, setting the stage for the finalization of a CEN Workshop Agreement dedicated to Positive Energy Districts.

9. Appendices: Questionnaire and Analysis Report

In support of the methodological robustness and participatory character of WP7, two documents are provided in the appendices to this deliverable:

- **Appendix 1 – WP7 Questionnaire Template**: This is the original version of the structured questionnaire disseminated to all Citizens4PED partners in April 2025. It was designed to elicit both quantitative and qualitative insights into the working logic, tools, interactions, and criticalities encountered across WPs 3, 4, and 5. The structure of the questionnaire mirrors the analytical framework of WP7 and served as the main data collection tool across multiple tasks.
- **Appendix 2 – Report on Questionnaire Results**: This document presents a synthetic analysis of the responses collected through the questionnaire, highlighting recurring patterns, complementarities, and discrepancies among the WPs. The analysis helped reconstruct internal processes, identify cross-impacts, and distill key lessons learned that shaped the proposed PED guidelines and the associated CWA Project Plan.

Together, these appendices provide essential background for understanding the rationale behind the recommendations and integration strategies proposed in the present deliverable.

Questionnaire for WP7 Tasks

This questionnaire aims to gather the necessary information to meet the requirements of the various tasks in WP7, actively involving project partners and collecting valuable feedback to support the progress of activities. The objective is to identify useful and generalizable lessons to support the creation of guidelines for the transition to Positive Energy Districts (PEDs).

Each participant is encouraged to complete the questionnaire multiple times if they perform multiple roles or functions within the WP, submitting one response for each role or

function. It is important to focus on the substantive aspects of the activities carried out, avoiding references to specific issues related to project management.

Section 1: General Information

1. Name:
2. Organization:
3. WP number:
4. Function within WP:

    - Leader
    - Contributor
    - Other (specify)

Section 2: Task 7.1 - State of the Art on PED Standards and Guidelines

2.1 Overview of Literature Review Findings The literature review on Positive Energy Districts (PED) and Renewable Energy Communities (REC) did not yield specific results from the databases of key standardization bodies (UNI, CEN, ISO). However, the analysis highlighted several families of standards that, while primarily offering a supportive framework at the building scale, can still provide useful lateral guidance. These standards are not centered on the urban district level, which is more than just a simple aggregation of many buildings. These include:

- **UNI/PdR 13**: Focuses on environmental sustainability in construction.
- **UNI EN ISO 52000**: Provides a framework for assessing the energy performance of buildings.
- **UNI EN 15316**: Covers the energy performance of technical systems in buildings.
- **UNI/TS 11300**: Offers specific methods for calculating energy needs for heating, cooling, ventilation, and lighting.

1. Are you aware of any additional standards or guidelines (national or international) that may be relevant to the development and implementation of PEDs, particularly at the district level and across the dimensions: techno-energetic, socio-economic, institutional/policy, or environmental?

    - **Response Type**: Open-ended

Section 3: Task 7.2 - Analysis of WP Development and Impacts

1. Have you observed any interdependencies or interactions between the dimension you worked on (WP3/WP4/WP5) and the others? (E.g., how techno-energetic

modeling informed socio-economic planning, or how policy constraints influenced technical decisions).
    - **Response Type:** Open-ended

2. What potentials and obstacles did you encounter in aligning or integrating your WP's perspective with the other two dimensions?
    - **Response Type:** Open-ended

3. What external factors affected your ability to address the transition theme effectively in your WP? Please rate the impact of each on a scale of 1 to 5.
    - **Response Type**: Open-ended and rating scale
    - Examples of contexts (please specify and rate each one):
        - Regulatory frameworks (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Market conditions (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Climatic factors (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Technological advancements (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Social commitment and engagement (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Institutional endorsement (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Lack of data (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Others (pls. specify and rate)

4. What internal factors affected your ability to address the transition theme effectively in your WP? Please rate the impact of each on a scale of 1 to 5.
    - **Response Type**: Open-ended and rating scale
    - Examples of contexts (please specify and rate each one):
        - Communication challenges (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Resource availability (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)

        - Team dynamics (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Leadership effectiveness (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Information accessibility or proper use (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Organizational support (1: No impact, 2: Low impact, 3: Moderate impact, 4: High impact, 5: Very high impact)
        - Others (pls. specify and rate)

5. What obstacles have you encountered in addressing the specific dimension of the transition you worked on (e.g., techno-energetic, socio-economic, institutional/policy)?

- **Response Type**: Open-ended

6. What strategies, tools, or approaches did you find helpful in dealing with these challenges and supporting the development of the transition dimension (WP) you focused on?

- **Response Type**: Open-ended

Section 4: Task 7.3 - Formulation of a Reference Process

1. Have there been any deviations from the established work plan in terms of rescheduling activities or timelines? For example, have you used proxies instead of data, postponed activities or modified their structure? If yes, please describe.
    - **Response Type**: Open-ended
2. Can you identify and list the decision nodes that emerged during the development of your WP?
    - **Response Type**: Open-ended
3. For each decision node, please specify if it is a local-level decision or inter-WP coordination to be discussed with project partners.
    - **Response Type**: Open-ended
4. For each decision node, can you please identify the explicit and implicit mechanisms of reasoning and decision-making? Please select one or more mechanisms from the list below and provide details on how and why the choices were made.
    - **Response Type**: Multiple choice with an open-ended option
        - Explicit mechanisms:
            - Formal meetings
            - Written protocols and guidelines
            - Decision-making matrices

        - Regular reporting and reviews
    - Implicit mechanisms:
        - Informal discussions
        - Tacit knowledge sharing
        - Unwritten norms and practices
        - Intuitive decision-making
    - Others (specify)
5. Have feedback systems been implemented in your WP to evaluate process feasibility and effectiveness?
    - **Response Type**: Multiple choice with an open-ended option
        - Yes, periodic reviews
        - Yes, stakeholder feedback sessions
        - Yes, performance metrics analysis
        - Yes, peer reviews
        - No
        - Others (specify)
6. If feedback systems have been implemented, was the evaluation conducted internally or externally?
    - **Response Type**: Multiple choice
        - Internally
        - Externally
7. If feedback systems have been implemented, was the evaluation qualitative or quantitative with reference targets?
    - **Response Type**: Multiple choice
        - Qualitative
        - Quantitative
8. Do you think that the integration between the different dimensions of the transition (techno-energetic, socio-economic, institutional/policy) was effectively addressed in the project? Why?

- **Response Type**: Open-ended

9. Do you have any reflections or recommendations on how to better structure a coherent and integrated workflow among these three dimensions in future PED initiatives?

- **Response Type**: Open-ended

10. Based on your experience, what suggestions would you offer to improve the integration between the techno-energetic, socio-economic, and institutional/policy dimensions into a single and coordinated process for the planning and implementation of PEDs?

- **Response Type**: Open-ended

Section 5: Task 7.4 - Review of Lessons Learned and Challenges

1. What were the main milestones or turning points in your work on the transition dimension you contributed to (techno-energetic, socio-economic, or institutional/policy)?

- **Response Type:** Open-ended

2. What were the most relevant activities or analyses for addressing the transition toward PEDs in your dimension?

- **Response Type:** Open-ended

3. What concrete results (outputs, findings, insights) did you achieve? How do you think these can support future PED initiatives?

- **Response Type:** Open-ended

4. What procedural or methodological learnings emerged from your work? (e.g., ways of structuring the analysis, forms of collaboration, stakeholder engagement strategies)

- **Response Type:** Open-ended

5. Were there planned activities or analyses that were not carried out or that produced limited results? Why?

- **Response Type:** Open-ended

6. Were there other analyses or actions that you had hoped to include, but couldn't? What were the reasons?

- **Response Type:** Open-ended

7. What challenges or limitations did you face in addressing your dimension? How could they be mitigated in future projects?

- **Response Type:** Open-ended

8. What tools, data sources, or methods were particularly useful in carrying out your activities?

- **Response Type:** Open-ended

9. How could the documentation and sharing of lessons learned across the different transition dimensions be improved?

- **Response Type:** Multiple choice
    - Periodic reports
    - Internal workshops
    - Online sharing platforms
    - Others (specify)

Section 6: Task 7.5 - Development of PED Guidelines

1. Based on your experience, what elements would you recommend to include in future guidelines for PED development?

   Multiple choice with open-ended option

    - Technical aspects
    - Socio-economic aspects
    - Policy/institutional aspects
    - Cross-dimensional integration
    - Contextual sensitivities (e.g., data access, community engagement)

2. Which technical aspects do you consider most critical for the development of PED guidelines?
    - **Response Type**: Open-ended
3. What socio-economic aspects should be prioritized?
    - **Response Type**: Open-ended
4. What institutional/policy aspects are essential to be included in the guidelines?
    - **Response Type**: Open-ended
5. Which aspects of the Citizens4PED project development do you find will be the most important to implement into an actual PED development?
    - **Response Type**: Open-ended
6. How can case studies inform context-sensitive guidelines?
    - **Response Type**: Open-ended
7. What strategies, tasks, or improvements would you recommend to ensure that the guidelines are applicable and replicable across diverse contexts?
    - **Response Type**: Multiple choice with open-ended option

    - Local adaptation
    - Community involvement

- Developing practical examples
- Others (specify)

8. In a PED project development, which tasks would you consider essential, and which would you exclude?
    - **Response Type**: Open-ended
9. What tasks, activities, or elements do you feel were missing—either at the beginning or throughout the project—that should be considered in future PED-related initiatives to enhance impact and effectiveness?
    - **Response Type**: Open-ended
10. What challenges do you anticipate in a future PED project development, and how could they be addressed?
    - **Response Type**: Open-ended

Section 7: Task 7.6 - Proposal of CEN Workshop Agreement

Introduction

The CEN Workshop Agreement (CWA) is a pre-standardization deliverable published by the European Committee for Standardization (CEN). It is based on consensus among stakeholders and is developed through an open workshop process. Within Citizens4PED, the CWA aims to consolidate the project's results and propose replicable reference guidelines for Positive Energy Districts (PEDs) development. Your input is essential to ensure the CWA reflects both scientific and practical insights.

1. What key elements do you consider fundamental for the success of the CEN Workshop Agreement proposal?
    - **Response Type**: Open-ended
2. How can we best involve experts, local communities, and administrations in the development of the CWA?
    - **Response Type**: Multiple choice with open-ended option
        - Workshops
        - Public meetings
        - Online consultations
        - Collaborations with local entities
        - Others (specify)
3. What dissemination strategies would be most effective for promoting the CEN Workshop Agreement and its results?
    - **Response Type**: Multiple choice with open-ended option
        - Academic publications
        - Conferences and seminars
        - Social media campaigns
        - Others (specify)

Report on Questionnaire Results

Developing PED Guidelines: A Cross-Dimensional Analysis Based on WP7 Partner Contributions

This report consolidates the responses collected through the WP7 questionnaire as part of the Citizens4PED project. This report consolidates and interprets the results of a structured questionnaire circulated among the partners of the Citizens4PED project as part of Work Package 7 (WP7). The questionnaire was designed to collect reflective and procedural insights from each partner regarding the implementation, coordination, and integration of the three core transition dimensions: techno-energetic, socio-economic, and institutional/policy. Thus, this report serves as a coherent synthesis of a collective reflection, grounded in empirical insights and enriched by lived experience. It aims to support the elaboration of the CEN Project Plan and future guidelines in a way that is both rigorous and inclusive, capturing the lessons, tensions, and innovations that emerged across work packages.

The questionnaire consisted of seven thematic sections corresponding to WP7 tasks:

1. **Section 1** – Scope and purpose of the questionnaire
2. **Section 2** – References to existing standards and normative frameworks
3. **Section 3** – Reflections on WP implementation and interdependencies
4. **Section 4** – Analysis of decision-making and reference processes
5. **Section 5** – Lessons learned and critical challenges
6. **Section 6** – Recommendations for future PED guidelines
7. **Section 7** – Reflections on the proposed CEN Workshop Agreement (CWA)

The responses were collected between March and May 2025. Nine partners submitted written contributions:
Alessandra Ricciardelli, Arsida Duro, Olivier Gilmont, Grégoire Wallenborn, Laura Grassini, Svitlana Alyokhina, Xavier May, Sandro Bonifazi, Vincenzo Basile, **and Julien Blondeau.**
All contributions have been fully integrated and analysed with equal weight.

Each section of the report is structured into two parts:

- **Part A** synthesizes the key insights for workshop discussion.
- **Part B** extracts relevant elements to inform the future development of the **CEN CWA Project Plan** and the **PED Guidelines (D7.1 and D7.2)**.

This document served as the basis for the WP7 online workshop held in May 2025 and has since been updated to reflect shared reflections. It constitutes a foundational step toward the formulation of the **Project Plan Proposal** to be submitted to **CEN** for the launch of the Workshop Agreement process.

SECTION 1 – Contributors

Name	Role / WP	Affiliation
Alessandra Ricciardelli	Contributor WP4	Comune di Bari
Arsida Duro	Leader WP3	Arteria Technologies
Olivier Gilmont	Co-Coordinator WP3	Resolia & VUB
Grégoire Wallenborn	Leader WP4	ULB
Laura Grassini	Leader WP5	Politecnico di Bari
Svitlana Alyokhina	Contributor WP3	UAS Technikum Wien
Xavier May	Contributor WP4	ULB
Vincenzo Basile	Contributor WP3	Comune di Bari
Alessandro Bonifazi	Contributor WP5	Politecnico di Bari
Julien Blondeau	Contributor WP3	VUB

SECTION 2 – References to Existing Norms

Part A – Summary for the WP7 Workshop

Section Focus

This section aimed to gather additional references on existing standards and guidelines, technical, socio-economic, or institutional/policy-related, that participants consider relevant for the development of Positive Energy Districts (PEDs), beyond those already identified in the literature review. This section helped us recognize a key gap in the field: the limited familiarity with existing standards among several partners. While a few well-known standards were cited, like ISO 50001 or klimaaktiv, the overall response reveals that many urban stakeholders still lack tools to orient themselves in the evolving landscape of PED-related guidelines. This indicates an opportunity to make standardization more usable, visible, and aligned with local practice.

Summary of Responses

Contributor	Response Summary
Alessandra Ricciardelli	Not informed about standards
Arsida Duro	Cited ISO 37120, ISO 50001, CEN/TC 371, EU RED II, and ICLEI guidelines as relevant to PEDs
Gilmont Olivier	No
Grégoire Wallenborn	No
Laura Grassini	No
Svitlana Alyokhina	Cited klimaaktiv Standards (Austria) on energy efficiency and ecological quality

Contributor	Response Summary
Xavier May	No
Sandro Bonifazi	Cited **LEED for Communities**, **BREEAM Communities**, **Protocollo ITACA a scala urbana**, **GBC Quartieri**
Vincenzo Basile	Referred to **GSE and Italian national guidelines (2024)** on energy communities (CER), and **regional laws** (e.g. L. 34/2019); highlighted the need for **operational standards** for municipal energy data interoperability and integration with urban planning tools (e.g. PAESC)
Julien Blondeau	No

Part B – Elements for the Project Plan and CEN CWA Proposal

Task 7.1 – Identification of Additional Standards and Frameworks

Objective: To identify external standards, guidelines, and policy frameworks relevant to PED development, particularly those that can complement or inform the CEN CWA initiative.

Main Insights

- Contributions were limited but confirmed the relevance of key standards such as **ISO 50001** (energy management), **ISO 37120** (city indicators), and **klimaaktiv protocols**.
- Additional frameworks were proposed by new respondents, including:
    - **LEED for Communities**, **BREEAM Communities**, **Protocollo ITACA a scala urbana**, and **GBC Quartieri** as integrated neighborhood-scale rating systems;
    - **GSE/Ministry guidelines** and **regional laws** on energy communities and support schemes for energy transition.
- Some respondents showed unfamiliarity with existing standards, suggesting the need for enhanced dissemination and capacity-building on the role of standards in PED planning.
- A **lack of harmonized operational standards** for handling energy data at municipal level was also flagged (Basile).

Recommendations for Future Guidelines or Standardization

- Include an **annex or section in the CWA listing reference standards** by category (technical, socio-economic, policy).
- Provide **summaries and links** to selected standards (e.g. ISO, national, local) with examples of application in PED-related initiatives.
- Highlight national and **regional standards** (e.g. klimaaktiv, GBC Quartieri, CER guidelines) that offer **context-sensitive operational frameworks**.
- Promote **interoperability standards** for urban energy data and integration with tools like PAESC, SECAP, and local zoning plans.

Type of Output to Be Proposed in the CWA

- Informative summary (annex format) of relevant **international, national, and regional standards**.
- Descriptive list of **policy and regulatory frameworks** used in PED planning, including CER-related laws and local-level protocols.
- No normative content, but inclusion as **reference background material**.

Target Audiences and Tailored Dissemination

- **Urban planners and energy consultants** may benefit from reference lists and **practical guidance** on aligning with energy and planning standards.
- **Policy officers and city representatives** should be made aware of **national and European standardization frameworks** shaping PEDs and CERs.
- **Academic and technical partners** can integrate standardization content into capacity-building, municipal staff training, and dissemination.
- **Regional energy agencies and municipal offices** can use this section as an orientation to locate and compare applicable regulatory and technical benchmarks.

From this section, it becomes clear that the CWA will need to act not only as a recommendation tool, but also as a **translator,** bridging formal frameworks and practical needs. Including a curated reference section, or even visual summaries of relevant norms, could boost the capacity of cities and stakeholders to align their efforts with broader technical and policy expectations.

SECTION 3 – Task 7.2: Analysis of WP Development and Impacts

Part A – Summary for the WP7 Workshop

Section Focus

This section aimed to explore how each transition dimension (techno-energetic, socio-economic, institutional/policy) was developed, how they interacted with one another, and which external and internal factors affected the capacity to align methods and processes across WPs. This section offers a candid reflection on how integration across WPs was attempted, and where it struggled. While many respondents recognized interdependencies among technical, social, and institutional elements, translating these links into synchronized workflows proved challenging. What we see here is both a strong desire for alignment and a set of very real structural barriers—timing, resources, and differing epistemologies.

Summary of Responses

- **Interdependencies identified**: Multiple contributors (e.g., Arsida, Laura, Gregoire, Olivier, Xavier, Julien) confirmed interdependencies between technical, socio-economic, and policy WPs (e.g., WP3 modeling shaped by WP5 data and WP4 social behavior assumptions). Julien Blondeau specifically emphasized the role of stakeholder engagement in defining boundary conditions, selecting scenarios, and interpreting results within WP3, illustrating strong cross-dimensional interaction.

Sandro Bonifazi also recognized the value of integration but expressed difficulty in tracking how contributions circulated between WPs, suggesting the need for clearer procedural scaffolding. Vincenzo Basile noted the importance of policy-WP alignment and flagged difficulties in accessing and sharing municipal-level energy data as a limiting factor in integration across technical and policy efforts.

- **Obstacles**: Many reported challenges in aligning work due to timeline mismatches, resource limitations, inconsistent communication, and a lack of formal protocols. Julien confirmed these limitations, highlighting the need for better direct access to stakeholder information and improved communication among project actors.
- **Collaboration gaps**: While year one featured regular meetings, partners noted reduced interaction over time. This weakened cross-WP coherence.
- **Key challenges**:
    - *External*: regulatory complexity, data gaps, social engagement.
    - *Internal*: communication, team coordination, and availability.
      Blondeau emphasized the difficulty of modeling with insufficient or indirect data, and the need for early stakeholder engagement by multidisciplinary teams.

Other contributors echoed concerns about regulatory misalignments and the lack of shared data protocols (Basile), as well as the absence of a structured methodology to connect modeling outputs with policy and community-based reflections (Bonifazi).

- **Tools & strategies**: Optimization tools, stakeholder interviews, and interdisciplinary feedback loops were noted as effective strategies (Arsida, Laura, Gregoire).
  Julien added that flexibility, open dialogue, and multidisciplinary workshops were among the most helpful strategies.
  Bonifazi emphasized the need for better visibility of internal tools and methods across WPs and a central “inter-WP translator” to support integration.

Questions for Workshop Discussion

- What mechanisms best support continuous WP integration?
- Can structured templates or shared platforms enable better alignment?
- How do local adaptations affect the generalization of methods?
- Should we define formal coordination checkpoints in future PED projects?

Diverging Perspectives or Conflicting Views
While several contributors (e.g., Arsida, Laura, Gregoire) acknowledged important interdependencies across technical, socio-economic, and institutional domains, their perceptions of integration effectiveness differed significantly.

- Arsida reported a highly constructive experience of cross-dimensional alignment, stressing the value of joint scenario development and regular coordination.

- Gregoire, Laura, and Olivier pointed to structural difficulties in aligning WP perspectives—such as lack of time, fragmented workplans, and missing shared protocols—as key limitations to integrated action.
- Xavier emphasized that institutional and legal misalignment (e.g., incentive schemes in Brussels) created additional obstacles, with little room for cross-WP synthesis.
- Svitlana noted a peripheral or support role in WP3, limiting her ability to contribute meaningfully to integration.
- Contributors such as Bonifazi and Basile also highlighted these divergences:
    - Bonifazi stressed the lack of clear mechanisms to "connect the dots" between policy design, scenario modeling, and community engagement.
    - Basile noted how fragmented data and misaligned local planning tools hinder coherent multi-dimensional planning.
- Julien added a further layer of insight by stressing the importance of early multidisciplinary engagement and direct contact with stakeholders. He argued that indirect chains of communication reduced the quality and relevance of technical modeling and suggested that no "one-size-fits-all" methodology can apply—flexibility and collaboration are key.

These perspectives reveal not only technical or procedural mismatches, but also epistemological frictions, differences in how WPs define priorities, feasibility, and legitimacy. A future project might benefit from:

- An early shared definition of concepts and boundaries (e.g., what constitutes a transition "dimension");
- Greater use of participatory co-design tools for joint scenario setting;
- Formalized feedback mechanisms to foster learning and negotiation across disciplines.

Part B: Elements for the Project Plan and CEN CWA Proposal

Lessons for Methodological Structuring

- Cross-WP alignment should occur early via common language, shared indicators, and joint use-case definitions.
- Scenario co-development should involve policy, social, and technical actors, especially when modeling impacts or simulating sufficiency.
- Feedback systems (peer reviews, stakeholder reactions) can help track assumptions and decisions across WPs.
- Basile proposed shared governance tools and the need for formal protocols that enable the integration of municipal data in energy transition planning.

- Bonifazi suggested a lightweight "coherence tool", e.g., a dashboard or decision tree, that traces how WP outputs affect each other.
- Julien stressed the importance of case-by-case adaptation and the need for multidisciplinary teams to interact directly with stakeholders to ensure relevance and accuracy.

Recommendations for Future Guidelines or Standardization

- Include an integration protocol between PED planning dimensions.
- Encourage living document approaches to adjust plans as WPs evolve.
- Create structured evaluation templates for comparing the effects of social, technical, and regulatory inputs.
- Include examples of data-sharing agreements or regional tools that facilitate inter-institutional collaboration (Basile).
- Provide meta-guidance on how PED concepts can be embedded in city governance cycles (Bonifazi).
- Highlight the importance of case-specific modeling practices, and stakeholder co-definition of relevant boundary conditions (Julien).

Open Gaps / Issues to Address in CWA

- Uneven integration post-year-one: insufficient formal interaction led to siloed outputs.
- Case study heterogeneity hindered general comparability.
- Lack of shared criteria for evaluating PED potential in relation to sufficiency and equity.
- Missing tools to visualize cross-WP interlinkages (Bonifazi).
- Data interoperability challenges between modeling, planning, and citizen engagement (Basile).
- Risk of limited value from generic tools without tailoring to specific stakeholder needs and data contexts (Julien).

Type of Output to Be Proposed in the CWA

This section highlighted how interdependencies among technical, social, and institutional dimensions shaped project workflows. The CWA should thus include:

- A structured integration framework with checkpoints across transition dimensions;
- Templates for co-development workshops, particularly useful for aligning WP timelines and assumptions;
- Evaluation grids to assess how policy, social engagement, and technical design influence each other in practice;

- Guidelines for inter-WP feedback tools, and examples of procedural mechanisms for integration in transdisciplinary projects;
- Case-based illustrations on how to tailor modeling tools based on stakeholder feedback (Julien).

Target Audiences and Tailored Dissemination
The recommendations on integration processes and methodological structuring are particularly relevant for:

- Project coordinators and WP leaders, who need to plan and align multi-WP workflows;
- Researchers and consultants, especially those working on modeling and policy interactions;
- Public program designers interested in funding or managing transdisciplinary projects;
- Local administrators and energy agencies managing multi-level coordination in city planning (Basile);
- Interdisciplinary research teams in need of integration templates and shared vocabularies (Bonifazi);
- Technical experts engaged in modeling, who need guidance on collaborative data elicitation and communication formats (Julien).

To maximize impact, dissemination should include:

- Technical briefs on integration frameworks;
- Webinars or coordination handbooks targeted to EU-funded consortia;
- Academic articles documenting methods for cross-WP alignment;
- Illustrated use cases of how integration challenges were overcome.

These insights suggest that the CWA should do more than list “dimensions” to coordinate—it must propose a process logic: when, how, and through which shared formats teams can interact. Practical suggestions like structured decision checkpoints, shared assumptions at kickoff, and cross-review loops could offer essential scaffolding for future transdisciplinary efforts.

SECTION 4 – Task 7.3: Formulation of a Reference Process

Part A – Summary for the WP7 Workshop

Section Focus
This section explored how decisions were made during the implementation of each Work Package (WP), which decision nodes emerged, the role of feedback systems, and the perceived quality of integration across the techno-energetic, socio-economic, and institutional/policy dimensions of the project. This section gave us a closer look at how decisions were made in the project, both formally and informally. What stands out is the mix of pragmatic adaptation, tacit knowledge, and occasional

fragmentation. While some teams reported proactive feedback loops, others moved forward in relative isolation, especially when facing local complexity or evolving constraints.

Deviations from the Work Plan
Most respondents reported deviations from the original work plan:

- Several partners (e.g., Arsida, Laura, Bonifazi, Blondeau) mentioned the use of proxies or alternative data due to missing or inaccessible official datasets.
- Others (e.g., Alessandra, Xavier, Basile) highlighted the postponement or reconfiguration of activities due to limited stakeholder engagement or shifts in WP responsibilities.
- Scope extensions were noted by Olivier and Bonifazi, particularly to better align the technical activities with citizen engagement needs.
- Laura reported reduced deliverable scope due to evolving inter-WP dependencies.
  Svitlana remained the only participant to explicitly report no deviation.

Decision Nodes and Coordination
Decision-making within WPs primarily involved local-level choices, including methodological framing, data interpretation, and engagement strategies. However, inter-WP coordination was often required for aligning scenario design (Arsida, Gregoire), stakeholder interactions (Laura, Bonifazi), and deliverable structures (Olivier).
Bonifazi highlighted the lack of standardized approaches across partners in defining local priorities, while Basile emphasized the importance of aligning technical decisions with community readiness and socio-institutional contexts.
Blondeau reinforced this view, noting that coordination was especially difficult when methodological steps were not fully harmonized across partners and when some pilot areas lacked the conditions to replicate decision structures applied elsewhere.

Reasoning and Decision-Making Mechanisms
Decision processes reflected a combination of explicit mechanisms (e.g., formal meetings, planned reviews) and implicit mechanisms (e.g., informal discussions, intuitive planning, tacit knowledge). This hybrid logic was widely reported by Gregoire, Laura, Olivier, and Alessandra.
Bonifazi emphasized that decision-making was often situationally driven, requiring flexible reasoning and local mediation. Basile noted that stakeholder needs and field dynamics sometimes overrode formal procedural steps, underlining the relevance of informal mechanisms.
Blondeau confirmed the importance of informal coordination, especially in the early phases of the work plan, and observed that decisions were often made reactively, in response to time constraints or lack of complete data.

Feedback Systems
The use of feedback systems varied significantly across WPs:

- Implemented by Arsida, Gregoire, Olivier, Bonifazi, Alessandra, and Blondeau—primarily via internal reviews, peer consultations, or field-based feedback.
- Not implemented or not explicitly reported by Laura, Svitlana, Xavier, and Basile.

Where applied, feedback was mostly qualitative and iterative, focusing on feasibility and adaptability rather than strict evaluation metrics.

Integration Across Dimensions
Contributors expressed divergent experiences regarding cross-dimensional integration:

- Arsida and Bonifazi reported positive experiences, emphasizing iterative exchanges and co-definition of modeling parameters and stakeholder expectations.
- Gregoire, Laura, and Olivier identified siloed working structures and difficulties in maintaining alignment throughout the project.
- Xavier and Basile noted the lack of supportive regulatory and administrative frameworks as major obstacles to horizontal integration.
- Alessandra and Svitlana were more cautious, indicating that project completion was needed to fully assess integration results.
- Blondeau, while acknowledging efforts toward integration, noted that in many cases the lack of aligned timelines and differences in WP pacing prevented deeper cross-WP interactions.

Recommendations for Future Integration
Participants provided several valuable insights for future PED projects:

- Early and regular cross-WP workshops to harmonize assumptions and languages (Arsida, Bonifazi, Blondeau).
- Adoption of cross-sectoral templates and shared protocols (Laura, Gregoire).
- Integration of community-facing feedback loops to balance institutional and technical priorities (Olivier, Basile).
- Greater use of digital tools to manage collaboration and updates (Alessandra).

Diverging Perspectives or Conflicting Views
Perceptions on integration success varied across respondents. While some (Arsida, Bonifazi) perceived high added value in interdisciplinary coordination, others (Gregoire, Olivier, Xavier, Blondeau) underlined fragmentation, lack of shared frameworks, and epistemological misalignments.
The need for a clear governance model, including explicit integration checkpoints and common language across WPs, emerged as a recurring theme. Participants emphasized that technical, social, and institutional priorities often operate on different temporal and procedural logics, and reconciling them requires not just co-design but intentional mediation processes.

Questions for Workshop Discussion

- How can we design workflows that are both locally adaptable and interoperable across different PED dimensions?
- What minimum decision-making mechanisms (formal/informal) should be recognized and made explicit in future PED methodologies?
- How can feedback loops be better structured, tracked, and shared across work packages?

Part B – Contribution to the Project Plan and CEN CWA Proposal

Key Insights

- Partners adopted varied procedural logics, ranging from standardized internal coordination to ad hoc, field-based adaptations.
- Feedback systems were inconsistently applied but recognized as valuable learning mechanisms where implemented.
- The integration of the three transition dimensions was uneven, constrained by temporal, regulatory, and disciplinary boundaries.
- Blondeau emphasized that integration was sometimes de-prioritized in favor of keeping pace with local deliverables and managing internal WP deadlines.

Recommendations for Future PED Guidelines

- Define flexible governance frameworks with structured decision checkpoints.
- Include shared criteria and templates for evaluating decision nodes and stakeholder contributions.
- Embed field-responsive feedback systems (e.g., informal loops, rapid feedback cycles) across technical and institutional WPs.

Implications for the CWA

The CWA should:

- Provide a reference workflow adaptable to local and institutional contexts.
- Include a taxonomy of decision-making logics (formal/informal; technical/social/institutional).
- Offer examples of feedback mechanisms for different project configurations and actor constellations.

Type of Output to Be Proposed in the CWA

- A flexible workflow diagram with optional branches and iterative loops.
- Annotated templates for stakeholder engagement and proxy decision-making.
- Case-based illustrations of how procedural governance was applied across the project.

Target Audiences and Tailored Dissemination

- Project managers, interdisciplinary coordinators, and public innovation teams.
- European and local institutions designing PED governance structures.
- Researchers exploring procedural governance in transdisciplinary contexts.

Dissemination channels should include:

- Digital toolkits and guides on workflow governance.
- Comparative case-based learning materials.
- Public webinars on how to structure integrated PED decision-making processes.

This reinforces the idea that the CWA should codify not only "what" to decide, but also how, defining typologies of decision-making, use of proxies, and mechanisms for mid-course adjustments. In doing so, we can help future PED implementers embrace complexity without getting lost in it.

SECTION 5 – Task 7.4: Review of Lessons Learned and Challenges

Part A – Summary for the WP7 Workshop

Section Focus

This section gathers reflections from partners on key lessons, milestones, procedural learnings, missed or modified activities, and practical insights from the implementation of each transition dimension (techno-energetic, socio-economic, institutional/policy). The goal is to inform collective reflection on how these dimensions contribute to the effective planning and realization of Positive Energy Districts (PEDs). Here, the richness of lived experience comes to the fore. Partners described successes and limitations across all transition domains, from modeling scenarios to engaging vulnerable communities. What's striking is the ingenuity used to overcome barriers, through proxies, schools, parishes, and adaptive tool use. These lessons give us a grounded view of what PED development looks like on the ground.

Cross-Cutting Themes Identified

1. Transition-Specific Activities and Results

• WP3 partners (Arsida, Olivier, Svitlana, Bonifazi, Julien) emphasized modelling, simulation, and optimization of district energy systems, including the integration of sufficiency scenarios and iterative scenario refinement. Bonifazi noted the need to better reflect lived experiences and user behaviors in technical choices. Julien underlined the effort to incorporate sufficiency conditions and constraints into the modeling process, despite limited data granularity.
• WP4 contributors (Gregoire, Xavier, Alessandra, Basile) focused on community engagement, behavioral practices, and the challenge of addressing energy inequalities through inclusive and participatory approaches. Basile emphasized the mismatch between planning ambitions and the socio-cultural conditions of residents.
• WP5 (Laura) highlighted institutional mapping, proxy development in data-poor environments, and the construction of relational knowledge. Basile further supported the importance of aligning regulatory frameworks with real-world vulnerabilities.

2. Methodological Learnings

• Stakeholder engagement emerged as a central theme, noted for both its importance and difficulty (Laura, Gregoire, Alessandra, Basile). Julien reinforced this, arguing that the effectiveness of modeling was directly proportional to the quality of engagement and the ability to tailor

assumptions to specific user groups.
• Flexibility in modelling and iterative feedback were noted as effective (Arsida, Bonifazi, Julien), especially when responding to changing constraints or community inputs.
• Tensions between WPs and lack of alignment on methodologies or data availability were repeatedly cited (Laura, Olivier, Gregoire, Xavier). Julien pointed out that indirect communication and asynchronous timing often disrupted cross-WP coherence.

3. Challenges and Limitations
• Several respondents reported difficulty engaging vulnerable populations, due to mistrust, cultural distance, or lack of institutional support (Alessandra, Laura, Xavier, Basile).
• Time and resource constraints limited the ability to iterate or co-develop scenarios deeply (Gregoire, Xavier, Bonifazi, Julien).
• Fragmentation of datasets and frameworks made comparison and standardization difficult. Proxies helped but were not uniformly applied (Laura, Arsida, Basile, Julien). Julien observed that, in some contexts, scenario inputs had to rely on broad assumptions that reduced the technical relevance of outcomes.

4. Concrete Results and Tools
• The district heating optimization tool and scenario-based modelling developed in WP3 (Arsida, Bonifazi, Julien).
• Community engagement initiatives that activated schools, parishes, and informal associations (Alessandra, Laura).
• Stakeholder mappings and interview-based data collection, particularly in complex urban contexts (Gregoire, Xavier, Basile).
• Reflections on equity and sufficiency as non-technical but essential PED pillars (Basile, Gregoire, Julien).

Preferred Methods for Sharing Lessons Learned

Method	**Selected by (n)**
Periodic Reports	4
Internal Workshops	5
Online Sharing Platforms	4

Selected Quotes
“This model of community-driven engagement can be a valuable reference for future PED initiatives.” – *Alessandra*
“Sufficiency and resilience should be enhanced to develop a PED… starting from the needs of people.” – *Gregoire*

"Our optimization tool made it possible to deliver results regarding PED goals." – *Arsida*
"More attention should be paid to the lived conditions of vulnerable households… not just to technical feasibility." – *Basile*
"The value of modeling is determined by how clearly stakeholders' needs are translated into design assumptions." – *Julien*

Questions for Workshop Discussion
• How can we build effective engagement models for vulnerable communities?
• Should the CWA include minimum procedures for data proxy development in data-poor contexts?
• What forms of internal learning (reports/workshops) should be embedded in the PED process?

Diverging Perspectives or Conflicting Views
While some contributors (Arsida, Alessandra, Bonifazi) described the project as a successful space for cross-disciplinary experimentation and real-world testing, others (Gregoire, Olivier, Laura, Basile, Julien) emphasized persistent difficulties in coordination, methodological harmonization, and data compatibility.
• Alessandra and Bonifazi highlighted the emergence of trust-based local communities of practice.
• Gregoire, Basile, and Laura drew attention to unresolved systemic issues—such as the challenge of integrating sufficiency into engineering culture or the insufficient reflection of local vulnerabilities in regulatory design.
• Julien added that the modeling outputs risked becoming too generic when not paired with strong stakeholder anchoring or when based on indirect feedback chains.

These differences suggest that lessons learned are context-sensitive and that future PED guidelines must not only codify success but also openly address structural limitations and institutional frictions.

Part B – Elements for the Project Plan and CEN CWA Proposal

Link to WP7 and Deliverables
• This section directly informs Task 7.4 and provides foundational input to Deliverables D7.1 (PED Guidelines) and D7.2 (CWA Project Plan).
• It consolidates collective experiences into lessons learned, operational challenges, and transferable strategies.

Input for Section 3.2 – Scope of the CWA
Topics to include:
• Participatory engagement methods in data-poor or vulnerable areas.
• Integration of sufficiency and equity into PED design.
• Use of proxies and local knowledge frameworks to address data scarcity.

• Identification and navigation of institutional and regulatory barriers.
• Clarification of the links between stakeholder feedback and modeling parameters (Julien).

Topics to avoid generalizing:
• Internal team dynamics or coordination tools specific to this consortium.
• Variations in funding schemes or pilot-specific timeframes.

Input for Section 4.2 – Schedule and Work Content
• Schedule should include dedicated reflection checkpoints and shared learning milestones.
• A task could be included for mapping community entry points and data substitution strategies (e.g., proxies, local indicators).
• Encourage iterative scenario design informed by stakeholder consultations at multiple stages (Julien).

Input for Section 7 – Dissemination & Participation
• Share engagement practices and scenario-building protocols as replicable methods.
• Include vulnerable group representation and municipal actors in the validation of recommendations.
• Disseminate through multi-level governance channels (e.g., Eurocities, ICLEI).
• Consider dissemination formats that highlight the role of community-informed modeling logic (Julien).

Type of Output to Be Proposed in the CWA
This section consolidates a wide range of lessons and calls for tools that bridge experiential learning with structured guidance:
• A catalogue of cross-cutting learnings, including barriers, successes, and failed assumptions.
• Templates for reflection, such as lessons-learned logs or WP review tables.
• Guidelines for applying sufficiency and community engagement in different regulatory and social contexts.
• Illustrations of how stakeholder anchoring improved the relevance of scenario design (Julien).

Target Audiences and Tailored Dissemination
The outputs and recommendations of this section are most relevant for:
• Municipal governments and city managers, designing inclusive transition plans.
• Community and civic organizations, seeking to interpret and use PED concepts locally.
• Research institutions and regulatory bodies, aiming to refine methodological protocols.
• Technical actors and consultants using stakeholder-informed models (Julien).

Recommended formats:
• Policy briefs for cities focused on equity, engagement, and procedural learning.
• Field handbooks on participatory modelling, proxy use, and sufficiency dialogue.

• Integration into urban knowledge platforms such as EUKN, JPI Urban Europe, and Smart Cities Marketplace.

These accounts are not just anecdotes, they are a reservoir of method, warning, and inspiration. The CWA should make room for this "tacit expertise", offering not just ideal workflows, but strategies for imperfection—what to do when data is missing, trust is low, or time is tight.

SECTION 6 – Task 7.5: Development of PED Guidelines

Part A – Summary for the WP7 Workshop

Section Focus

This section focused on collecting suggestions for the development of future PED Guidelines, identifying which technical, social, and policy elements should be prioritized, and how to ensure replicability across different urban, regulatory, and cultural contexts. This section brings together what contributors believe a good guideline should contain: integration, flexibility, sufficiency, and usability. It also clarifies that a guideline is not a recipe, but a way to equip actors with navigational tools. There is consensus that future PED guidelines must reflect both systems logic and community realities.

Key Elements for Future PED Guidelines

There was broad consensus across respondents on the need for multi-dimensional guidelines that account for:

• Technical aspects, including system scalability, resilience, modularity, and interoperability;
• Socio-economic dimensions, including affordability, equity, participation, and behavioral change;
• Institutional and policy frameworks, including regulatory alignment, clarity of responsibilities, and governance consistency;
• Cross-dimensional integration, ensuring workflow coherence across disciplines;
• Contextual sensitivity, allowing local adaptation and inclusion of vulnerable groups.

Several contributors (e.g., Olivier, Laura, Xavier, Bonifazi, Julien) emphasized that energy sufficiency must become a transversal principle—not only in discourse but also embedded in technical protocols and scenario planning. Julien also highlighted the importance of stakeholder-informed modelling to ensure that technical proposals reflect not only theoretical optimization but also user needs and constraints. Basile added that real social behaviors and vulnerability profiles must shape the practical applicability of guidelines, especially in historically neglected districts.

Most Critical Technical Aspects

• Data availability at neighborhood scale (Laura);
• Flexibility in design and modular systems (Arsida);
• Resilience of infrastructure and energy supply (Svitlana);

• Lowering system sizing thresholds and reconsidering mechanical ventilation requirements (Xavier);
• Recognition that technology alone is insufficient without behavioral alignment (Olivier);
• Translation of sufficiency into operational planning parameters (Bonifazi);
• Scenario generation processes that actively integrate feedback from stakeholders and territorial constraints (Julien).

Most Critical Socio-economic Aspects
• Inclusion of vulnerable communities and active co-participation (Alessandra, Laura, Xavier, Basile);
• Creation of local employment and development of skills (Arsida, Alessandra);
• Cultural change around consumption and sufficiency (Gregoire, Olivier, Laura);
• Overcoming cognitive and procedural barriers to participation (Basile);
• Connecting guidelines to lived experiences and trust-building practices (Bonifazi);
• Emphasizing practical usability and tailoring of tools to different user profiles, including technical and non-technical actors (Julien).

Institutional and Policy Considerations
• Alignment of multi-level governance instruments, planning rules, and subsidy schemes (Svitlana, Arsida);
• Clarification of institutional roles and coordination mechanisms (Laura);
• Identification and resolution of regulatory contradictions, especially in the incentive and retrofitting domain (Gregoire);
• Equitable targeting of subsidies and incentives, avoiding regressivity (Xavier, Basile);
• Design of adaptive implementation rules for historically underserved territories (Basile);
• Encouragement of institutional learning loops that integrate technical development with regulatory reform (Julien).

Valuable Practices from the Citizens4PED Project
Respondents highlighted several transferable practices:
• Living Lab approaches and context-specific co-design efforts (Laura, Svitlana);
• Iterative scenario testing across three dimensions (Arsida, Bonifazi);
• Inclusion of sufficiency as a normative and methodological principle (Olivier, Gregoire);
• Adaptation of processes based on pilot-specific constraints and opportunities (Laura, Bonifazi);
• Mapping and dialoguing with informal actors to reduce institutional blind spots (Basile);
• Integration of user knowledge into system design to bridge the gap between modelled behavior and actual user practices (Julien).

Case Study Value
Case studies were seen as essential to produce grounded and flexible guidance:
• Illustrating how methodologies were adapted to local constraints (Laura);
• Exposing contradictions between planning tools and user needs (Xavier, Bonifazi);

• Providing actionable illustrations of success and failure (Arsida);
• Framing guidelines as learning tools rather than prescriptive blueprints (Basile);
• Highlighting how direct engagement informed scenario assumptions and refined energy targets (Julien).

Challenges to Replicability and Implementation

Respondents cited recurrent challenges:
• Institutional fragmentation and limited capacity to coordinate actors;
• Regulatory inconsistencies and weak enforceability of existing instruments;
• Chronic underfunding, especially for participatory components or post-project maintenance;
• Cultural resistance and low engagement from stakeholders, particularly in deprived areas;
• Poor adaptability of tools to vulnerable and informal contexts;
• Risk of overly complex tools that cannot be used autonomously by local administrations or actors with limited capacity (Julien).

Suggested strategies:

• Phased implementation models, allowing staged adaptation (Svitlana);
• Early and continuous stakeholder engagement, with specific roles for municipalities and utilities (Alessandra);
• Clear procedural workflows and shared platforms for monitoring and learning (multiple respondents);
• Inclusion of local mediators and place-based intermediaries in all guideline stages (Basile);
• Usability testing and simplification strategies to make technical tools understandable to non-specialist audiences (Julien).

Diverging Perspectives or Conflicting Views

Despite overall alignment on the need for integrated and adaptive guidelines, tensions emerged around priorities:
• Some contributors (e.g., Arsida, Svitlana) stressed the need to balance all dimensions equally;
• Others (e.g., Gregoire, Olivier, Xavier, Bonifazi) emphasized the urgency of shifting from technical specification toward a people-centered and sufficiency-driven logic;
• Basile questioned whether the current institutional landscape is ready to receive and act on guidelines without a broader reflection on governance legitimacy and trust;
• Julien added that guidelines should include differentiated pathways and tool configurations to accommodate varying levels of technical maturity and administrative capacity across cities and regions.

These tensions suggest that future guidelines may require a modular and layered architecture, enabling diverse users to navigate and appropriate recommendations according to their role, capacity, and contextual needs.

Questions for Workshop Discussion

• What criteria should guide the balance between technical precision and social adaptability in PED guidelines?
• How can we ensure that energy sufficiency becomes a transversal and accepted component of technical guidance?
• In what ways can guidelines support diverse entry points for actors (e.g. municipalities, citizens, planners) without becoming too generic?

Part B – Elements for the Project Plan and CEN CWA Proposal

Task 7.5 – Guidelines for PED Development

Objective:

To deliver a comprehensive set of guidelines supporting the planning, design, implementation, and monitoring of Positive Energy Districts (PEDs), based on comparative insights from the Citizens4PED project across the techno-energetic, socio-economic, and institutional/policy dimensions.

Main Outcomes

• Integrated recommendations reflecting lived challenges and cross-cutting cases;
• Dimension-specific guidance structured by tools, methods, and real-world applicability;
• Diagnosis of common barriers to replication and suggestions for procedural resilience;
• Flexible frameworks for tailoring PED implementation to different governance settings;
• Differentiated toolkits for municipalities with varying levels of expertise and capacity (Julien).

Suggested Content Structure of the Guidelines

1. Introduction – PED definition, use cases, and intended audiences;
2. Methodology – Co-creation process, data sources, and WP insights;
3. Chapters by Domain – Technical, socio-economic, institutional;
4. Cross-Domain Integration – Procedural bridges and coordination strategies;
5. Case Highlights – Real-world examples of failure, adaptation, and innovation;
6. Application Tools – Templates, roadmaps, self-assessment tools adapted for user types (Julien).

Strategic Recommendations for the CWA

• Integrate energy sufficiency not only as a concept but in tools and processes;
• Define core and optional tasks, depending on local constraints;
• Provide checklists and role maps for implementers and facilitators;

• Ensure alignment between stakeholder engagement protocols and institutional mandates;
• Include simplified planning sequences and operational guidance for low-capacity cities (Julien).

Type of Output to Be Proposed in the CWA
Given the convergence of feedback, the CWA should include:
• A modular structure, allowing different entry points and sector-specific paths;
• Self-assessment checklists and scenario planning templates;
• A section for localized adaptations, grounded in case-based reflections;
• Protocols for participatory inclusion, sufficiency translation, and behavior change;
• Multiple tool formats (e.g. simplified vs. advanced) to match the diversity of local technical capacities (Julien).

Target Audiences and Tailored Dissemination
Outputs are relevant for:
• Technical teams and PED planners, seeking reference tools and workflows;
• Municipalities and energy authorities, who require operational guidance and accountability pathways;
• Civic networks and education bodies, interested in translating technical content into civic knowledge;
• Local governments with limited planning capacity and need for step-by-step procedural aids (Julien).

Recommended formats:
• Modular PDF chapters and printed kits;
• Digital toolkits with walkthroughs and editable templates;
• Explainer videos and narratives, especially for community-level actors.

Rather than a fixed formula, the CWA should adopt a modular guideline structure, a toolbox, not a rulebook. If each chapter empowers a different actor (technical, social, political), then the whole document becomes a platform for common effort and contextual adaptation.

SECTION 7 – Task 7.6: Proposal of CEN Workshop Agreement

Part A – Summary for the WP7 Workshop

Section Focus
This section gathered partner reflections on how to structure the CEN Workshop Agreement (CWA), including its key success factors, participatory process, and dissemination strategy. Special attention was given to how the CWA could consolidate methodological learning and enable future application and standardization of PED design processes. This section is where the project turns its collective knowledge into a shared proposal. Contributors envisioned a CWA that is actionable,

interdisciplinary, and inclusive—able to travel across contexts without flattening differences. They also emphasized the need for open co-design and targeted communication strategies.

Key Success Factors for the CWA

Respondents widely agreed that the success of the CWA will depend on the following principles:

• Grounding in real cases and tested methodologies (Alessandra, Arsida, Bonifazi, Blondeau), to ensure that outputs reflect empirical feasibility rather than abstract design;

• Interdisciplinary collaboration among technical, social, and institutional actors (Arsida, Svitlana, Basile), leveraging the full spectrum of WP knowledge;

• Inclusivity of expertise and stakeholder perspectives, from engineering models to community experience and policy constraints (Laura, Gregoire, Basile);

• Clarity of terminology and conceptual alignment, supporting common language across actors and contexts (Gregoire, Bonifazi);

• Framing the CWA within broader energy transition values, such as equity, participation, and responsibility (Gregoire, Basile);

• Recognition of situated practices and institutional diversity, acknowledging that different regulatory or governance contexts may call for different entry points (Xavier, Laura);

• Avoiding overly rigid frameworks and maintaining the ability to adapt tools and recommendations to different administrative capacities and levels of technical maturity (Blondeau).

Engagement Strategies for Stakeholders

The following mechanisms were identified as essential for developing a participatory and credible CWA:

• Workshops, both national and cross-national, were seen as essential for collective authorship and iterative design (Alessandra, Laura, Bonifazi);

• Public meetings and local collaborations, particularly with municipalities, social housing providers, and citizen groups (Xavier, Gregoire, Basile);

• Online consultations and open comment sessions, to enable broader and more transparent feedback (Svitlana, Arsida);

• Deliberative co-design methods, to mediate between competing priorities and epistemologies (Bonifazi);

• Involvement of domain-specific experts (e.g., planners, engineers, municipalities) early in the drafting process to validate technical relevance (Blondeau).

Dissemination Approaches

Effective dissemination of the CWA should rely on complementary strategies to reach both expert and non-expert audiences:

• Academic publications and conference sessions, to ensure visibility within the research and standardization community (Arsida, Laura, Gregoire, Xavier);

• Seminars and executive roundtables, especially oriented toward municipalities and public agencies (Laura, Bonifazi);

• Professional networks, such as Eurocities, ICLEI, and energy planning associations (Svitlana);
• Civic-oriented media, including illustrated content and local storytelling formats (Basile), especially where awareness and behavioral change are critical;
• Social media campaigns, with varying relevance depending on audience (some, like Gregoire, expressed skepticism about their strategic value);
• Targeted dissemination through sector-specific channels (e.g., engineering associations, municipal networks), ensuring resonance with technical actors (Blondeau).

Questions for Workshop Discussion
• How can we ensure that consensus-building during the CWA process reflects a balance of scientific, technical, and local knowledge?
• What criteria should guide the choice between proposing guidelines vs. pre-normative requirements in the CWA?
• How can dissemination efforts be aligned with the practices and channels of different stakeholders?

Part B – Elements for the Project Plan and CEN CWA Proposal

Task 7.6 – CEN Workshop Agreement

Objective:
To formulate a CEN Workshop Agreement that translates the Citizens4PED results into a structured, consensus-based guideline for Positive Energy Districts. The CWA will act as a pre-normative reference framework, supporting replication, comparability, and future standardization across Europe.

Key Design Principles Emerging from WP7 Feedback
• **Scientific and Practical Integration**: Include both theoretical models and real-world outcomes (e.g., from Bari, Brussels, Vienna), ensuring actionable and tested content (Bonifazi).
• **Cross-Sectoral Composition**: Integrate techno-energetic, socio-economic, and institutional dimensions without privileging one domain over the others.
• **Open, Participatory Development**: Embed continuous stakeholder feedback and open validation mechanisms (Basile), fostering legitimacy and relevance.
• **Value-Based Anchoring**: Frame the CWA around democratic participation, social equity, and ecological responsibility as guiding commitments (Basile, Gregoire).
• **Scalable Usability**: Ensure that proposed methods and workflows are usable by cities and actors with differing technical expertise, including those with limited resources (Blondeau).

Recommended Structure of the CWA

1. Shared Definitions and Terminology (Gregoire, Bonifazi)

2. Overview of PED Implementation Challenges
3. Guiding Principles per Dimension (Techno-energetic, Socio-economic, Institutional)
4. Integrated Planning and Decision Nodes (based on WP7 Section 4)
5. Case-Based Illustrations
6. Steps for Stakeholder Involvement
7. Assessment Tools and Replicability Criteria

Stakeholder Involvement Strategy

• National and European-level workshops for shared authorship and consensus-building;
• Interviews and surveys to gather contributions from diverse stakeholders;
• Partnerships with local governments and civil society to tailor and validate the CWA in different contexts;
• Deliberative assemblies or digital forums to include grassroots voices (Bonifazi);
• Technical validation sessions involving engineers, data managers, and planning staff to refine procedural feasibility (Blondeau).

Dissemination Strategy

• Multilingual executive summaries for accessibility across Europe;
• Policy briefs and practice-based reports, oriented to mayors, planners, and agencies;
• Modular learning resources, such as toolkits and explainer videos, especially for civic audiences (Basile);
• Standardization and innovation networks, for dissemination through formalized EU channels;
• Integration into training programs for practitioners and early-career professionals (Blondeau).

Type of Output to Be Proposed in the CWA

Overall Orientation

A **Type 2 CWA – Guideline with Recommendations**, structured for:
• **Transferability**, with field-tested methods and procedural logic;
• **Flexibility**, allowing for contextual adaptation;
• **Integration**, providing templates for cross-sector collaboration and decision-making;
• **Usability across roles**, enabling both advanced and basic technical actors to apply the recommendations (Blondeau).

Output Types

• Informative summaries (tools, stakeholder practices, scenario development)
• Guiding recommendations (minimum procedural requirements)
• Contextual flags (e.g., on subsidy distortions, regulatory gaps)

• Optional annexes (e.g., mapping of decision nodes, proxy use protocols)
• Tiered protocols or modular tracks, addressing different technical capacities (Blondeau)

Target Audiences and Tailored Dissemination

Audience	Needs	Formats
Urban practitioners	Practical tools for design, data handling, engagement	Toolkits, workflows, stakeholder checklists
Municipalities & policymakers	Implementation pathways and legal coordination	Executive summaries, case-based roadmaps
Civic actors & associations	Inclusive language, accessible content, empowerment	Visual materials, co-creation stories, field guides (Basile)
WP leaders & project managers	Governance tools, coordination models	Internal handbooks, taxonomies, lessons learned briefs
Standardization bodies & agencies	Pre-normative content and terminology maps	CWA annexes, vocabularies, structured evaluation matrices
Technical stakeholders with limited capacity	Simplified planning tools and flexible templates	Adaptive guideline formats, annotated flowcharts (Blondeau)

Recommendation:
Adopt a **modular dissemination model** that aligns formats and content with stakeholder expectations. Key actions include:
• Leveraging EU platforms and local networks;
• Offering diversified access points;
• Embedding feedback loops for iterative refinement and legitimacy.

What emerges is a call to treat the CWA as a **living boundary object**: one that translates between systems, communities, and roles. By combining templates, guiding principles, and replicability criteria, the CWA can become a cornerstone for operationalizing PEDs—anchored in real cases, yet scalable for Europe's future needs.

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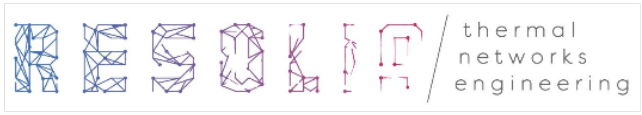	Resolia Engineering bureau Sustainable & efficient thermal networks (Resolia)
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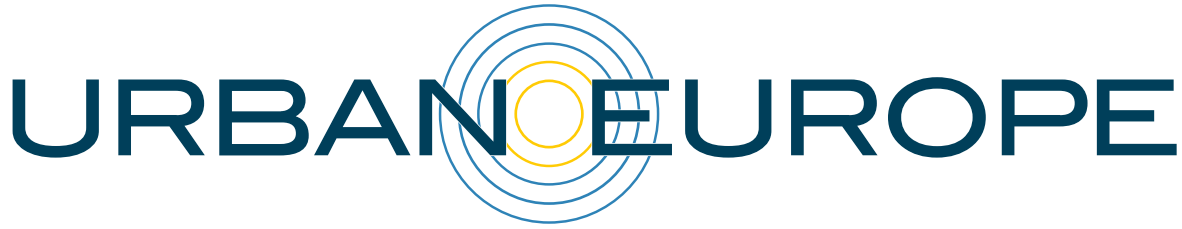

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