PED-ID

Holistic assessment and innovative stakeholder involvement process
for identification of Positive-Energy-Districts

D3.2 Visual concept for presentation of results of PED assessment

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Acronyms table

Acronym	Definition
PED	Positive energy district
RES	Renewable energy source
GIS	Geographic information system
PED-ID	Project "Holistic assessment and innovative stakeholder involvement process for identification of Positive-Energy-Districts" *(this document is part of it)*

1 Executive summary

PED-ID creates a knowledge-based participation process where decision-makers are provided at an early stage with guidance on how to achieve Positive Energy District status, the options and the impacts. Data will be collected and processed using existing methodologies adapted for appropriate stakeholders, who may then actively initiate a data-driven participation process, consolidate their opinions and make qualified decisions.

This process will be tried and evaluated in three real EU Living Labs, all at their early stage of development, focusing on the participation process and the identification of necessary data. By applying the devised methodology, the objective is to accelerate the development of Positive Energy Districts and accomplish the goal of 100 PED sites in Europe by 2025.

This document outlines the communication strategy for PED inception to be used by a consultant or PED facilitator, to communicate effectively the aspects involved in this type of project to a general audience. It focuses on four stages of PED development with varying levels of detail:

- PED introduction;
- Detailed process;
- Consultation maps;
- Scenarios.

Since the stakeholder engagement takes time and progresses in stages, the stages are designed to cover unique needs of PED phases. Practically, most of the presentations' content originates in D3.1 (Holistic assessment method in early development phase of potential PED areas) and can be taken over from existing presentation of assessment methodology.

2 Introduction

Developing a PED is an ambitious undertaking. It is demanding to fulfil all the requirements:

- technical, given by available technologies and existing physical conditions;
- economic, given by available resources;
- societal, given by diverse interests of various involved stakeholders;
- environmental;
- regulatory;
- countless others.

Communicating the features of PED inception, or early stage, from the very idea to a mutual understanding and agreement among all the involved stakeholders**, is key to success**. Following table shows the presentation with description and a note on stakeholder engagement.

Table 1 PED communication stages

No.	Title	Content	Stakeholder engagement
1	PED Introduction	PED definition, basic info on benefits, PED development and next steps	Initial contact with stakeholder, spark interest in PED, nudge to PED inception
2	Detailed process	Detailed info on PED development, required data, calculation methods, making of scenarios	Stakeholder learns about his/her commitment and requirements on data provision and the way the data would be processed
3	Consultation maps	Comprehensible presentation of prospective area based on the gathered data and spatial analysis, ideally in an interactive map application	Stakeholder learns about the current state and opportunities of prospective area and gives feedback on additional requirements and conditions
4	Scenarios	Presentation of feasible scenarios based on the area' features (from #2) and additional requirements (from #3).	Stakeholder learns about scenarios to implement PED and issues the final decision

As can be seen, the width of information flow in both directions increases through the process, from just a basic concept in the first phase to the detailed consultation maps in the third stage. However, to make the process sustainable and reach a feasible decision option in the end, it is necessary to narrow down the amount of information in the end and based the decision making on just a few selected benchmark parameters. The concept is depicted below.

Table 2 Complexity of communicated information throughout the stages

Stage No.	Objective	Level of detail	Complexity Simple → Complex			
1	Tell the basic idea, get a go/no-go	Simple, plain				
2	Obtain the necessary	Detailed, not aggregated				
3	Formulate scenarios	Comprehensive, aggregated				
4	Benchmarking, making PED investment decision	Simple, few parameters				

3 Stakeholders

Stakeholders of many kinds may enter the PED inception process. With varying degrees of importance, with various interests, representatives, communication needs and customs. In general, the fewer stakeholders, the easier communication of a PED project is.

The **first attribute** of a stakeholder **is the ownership relation to the PED project**. At least, a PED creation relates to the owners of buildings and land in question. Here already, things may get complicated. It is conceivable to have a sole owner, e.g. a municipality, a real estate developer, or a company. On the other hand, there can be virtually hundreds of stakeholders in an urban environment—in apartment houses with each apartment owned separately or patches of land divided among multiple owners etc.

In the **second layer**, there are **concerned institution that give statements, deliver expertise or grant permissions**. Although these are often informed only formally when the need arises, it helps to have them involved before the formal document or testimonial is required.

Then there are **various more or less close and more or less organized public groups**. Non-governmental civic organisations representing various interests are common and often vocal in cities. From local football team maintaining the nearby football field to beekeepers to environmental protectionists. Other public groups may be defined only with difficulty but may be equally important in urban context: the voters. A PED may bring significant changes in life to the neighbourhood. It is more than certain that a mayor and local councillors would follow public opinion closely. Communicate the PED to the wide public may be most challenging yet necessary.

In the following sections, general phases of PED inception and related communication are described. From the very number of conceivable stakeholders it is evident that any of them may be the target audience in any phase. When a PED is designed on a private property with just a few owners, it is possible to keep just a one communication channel and talk to just the owners, or at least mainly to them. But **when public buildings are included, communicating a PED may take form of huge public deliberation process with public consultations needed in every step**.

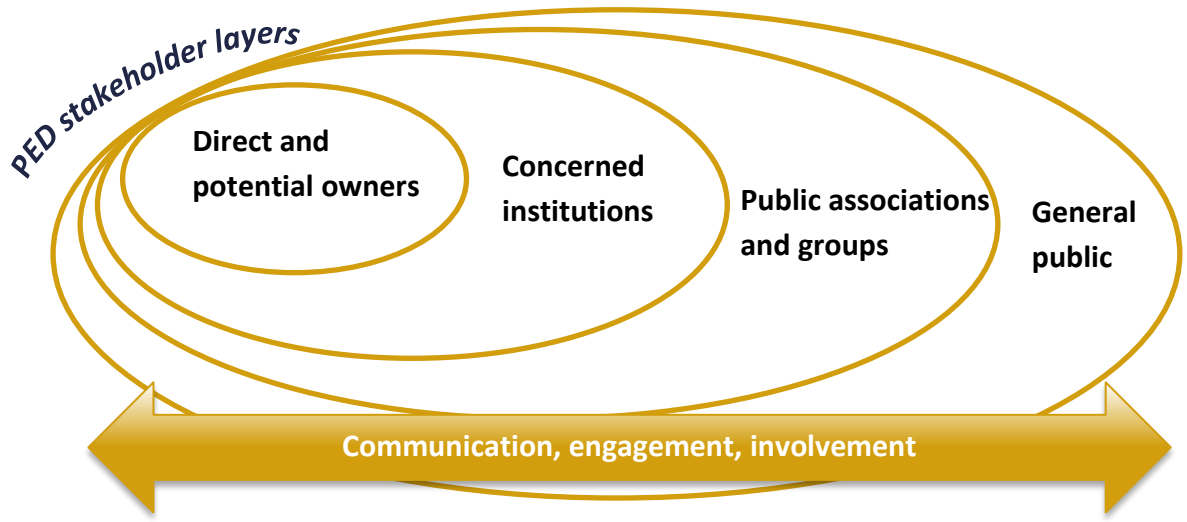

Figure 1: Stakeholder relationship layers concerning PED

4 PED communication stages

As stated in the introduction, communicating the features of PED inception consists **of 4 important communication stages—PED introduction, detailed process, consultation maps and scenarios**. These stages are discussed in detail in the following chapters.

4.1 Level 1: PED Introduction

No.	Title	Content	Stakeholder engagement
1	PED Introduction	PED definition, basic info on benefits, PED development and next steps	Initial contact with stakeholders, spark interest in PED, nudge to PED inception

Initial contact with a stakeholder is a key one. First impressions may affect the outcomes of any project in both ways, boost or hinder. With a PED, many additional ingredients mix in. A PED is a comprehensive, multi-layered and long-term undertaking. Even a professional—proficient in energy efficiency, energy production, public administration, public affairs or one of the many professions needed for a successful PED completion—need time to grasp the concept fully.

The information complexity needs to be reduced for a layperson who contacts a PED once or twice. When conceiving the **first level presentation**, an author should **keep in mind two objectives**:

- to spark an interest in PED and;
- to nudge a stakeholder to commit to PED implementation.

Therefore, explaining the PED in the least possible detail is necessary. Focus on the vision, **general ideas and connections. Introduce the time dimension and its length**. And, foremost, **explain the ultimate goals of the PED**, or the **benefits for a stakeholder and the community**. Dwelling into any technical details should be avoided. Follows an exemplar content of the initial presentation:

1) PED introduction – basic concept of achieving energy surplus in the chosen area;
2) costs and benefits;
3) implementation process outline – to give an idea of the time and effort needed;
4) follow-up – feasibility study on PED.

When all the content is delivered, it is up to stakeholders to decide on the proceeding to the next step. The first phase may consist of numerous meetings, even public gatherings, webinars or other convenient interactions. It may also take time until all the relevant stakeholders become familiar with the concept and feel confident to decide on it. A **PED facilitator/developer should nonetheless push the process forward** and aim for ending the first step in a reasonable time of, say, a few months.

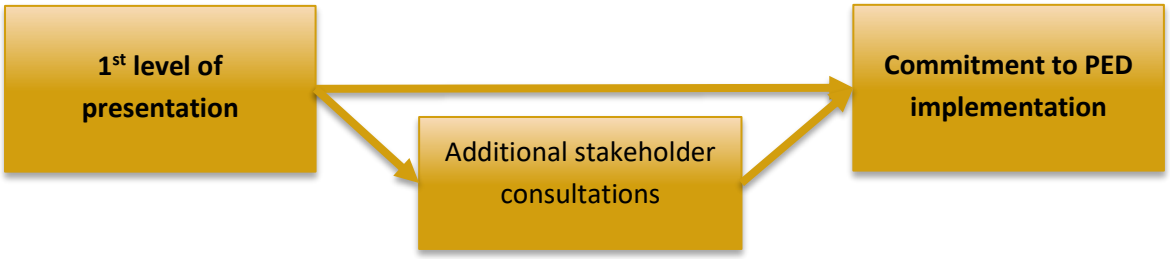

Figure 2: Level 1: PED introduction process

Table 3 shows exemplar simple informative slides to support the presentation of the PED basics. An overview of the PED preparation is depicted in the top left corner (fig. a). Using a **straightforward process diagram**, the initial phases can be explained. Other slides show **specific PED attributes** (*figs. b to d*). It is also necessary to clearly state the requirements of the next steps. **Designing a PED requires a lot of data** that need to be provided by the owner, administrator or user of all the objects. The width of the task must be communicated to a stakeholder. In *fig. e*, an example of required data about the existing heating system is described. Finally, the **holistic and multidisciplinary nature of the PED** should be stressed to distinguish a PED project from a regular one – dimensional, say, renovation or RES installation project (*fig. f*).

Table 3 Example of simple informative slides for initial presentation

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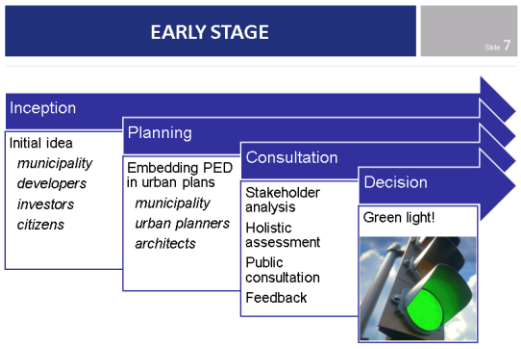
<tr><td> 
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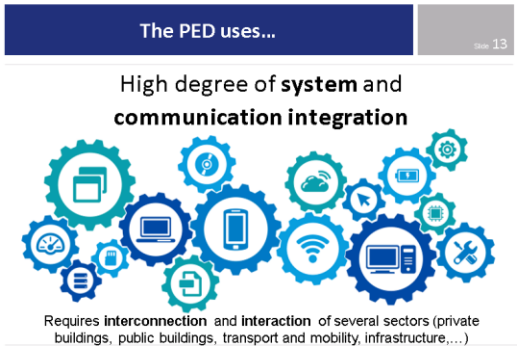
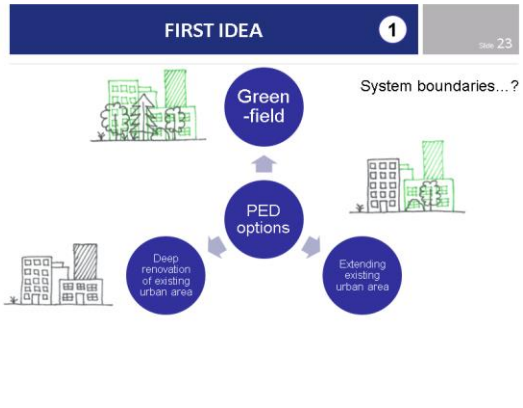
<tr><td> 
</td><td> 
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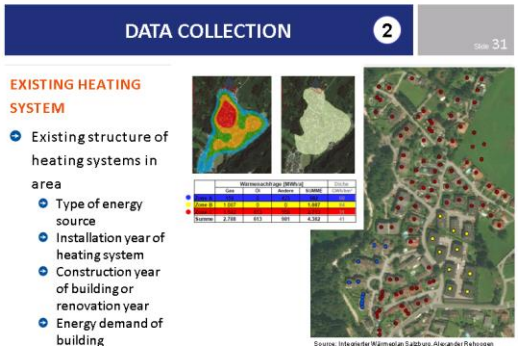	

4.2 Level 2: Detailing the process

No.	Title	Content	Stakeholder engagement
2	Detailed process	Detailed info on PED development, required data, calculation methods, making of scenarios	Stakeholder learns about his/her commitment and requirements on data provision and the way the data would be processed

The aim of the second phase is twofold. Firstly, to **gather and process the data about the prospective PED area**, and secondly, to **explain the structure and mechanics of the analysis to be performed in greater detail**. In other words, a consultant must specify the type and detail of the required data and see that these are gathered. In return, a consultant explains to the stakeholder what the data is needed for and what kind of outputs can be expected.

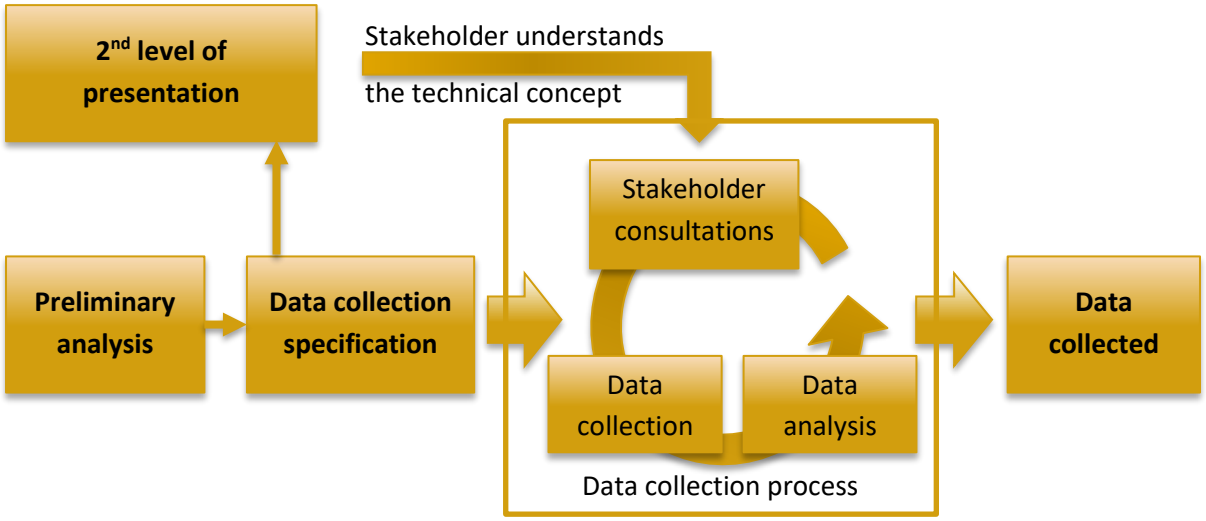

Figure 3: Level 2: Detailing the PED process and data collection

In contrast with the first phase, where simple graphical means of communication were used**, it is possible to take on a more technical mode in the second phase**. We can assume that a stakeholder has decided to conduct the PED. The focus of the communication changes as well. **It is necessary to exchange a significant amount of data**. Some of them may be at hand, others, however, might need some digging to be collected. A stakeholder possibly also designates a different contact person.

When a new person meets the project, it is always possible to use materials from the first phase. However, spreadsheets are the main tool for phase two.

Also, a **checklist comes in handy so that each of the multiple layers of a PED is accounted for**. An example of such a checklist follows. It shows a decomposition of existing renewable energy sources (RES) and an indicator needed for their description. While the basic level is sufficient just to form a comprehensive overview of the area and for some basic estimations, the advanced level can already be used for most of the calculations and evaluations. The expert level will enable an accurate assessment of all parameters and variables, but it is also the most difficult to obtain and process all the required information.

Table 4 Checklist for RES potential in the area

Basic level		**Advanced level**		**Expert level**	
Main section indicator/metrics	**Solution / data source**	**Subsection indicator / metrics**	**Solution / data source**	**Indicator / metrics**	**Solution / data source**
RES Potential – Current production from RES					
Areas of energy sources/production	Survey on the current RES in the area.				
		Current production from RES			
		Total Electricity production (kWh/year)	Survey on the current RES in the area. Summary from the expert level.		
		Total Heat production (GJ/year)	Survey on the current RES in the area. Summary from the expert level.		
				Water energy	
				Areas, Electricity production (kWh/year), Heat production (GJ/year)	Identification of water bodies in the Area - map survey
				Geothermal energy	
				Same as for water energy	Individual survey
				Wind energy	
				Same as for water energy	Individual survey

Basic level		Advanced level		Expert level	
Main section indicator/metrics	Solution / data source	Subsection indicator / metrics	Solution / data source	Indicator / metrics	Solution / data source
				Bio energy	
				Same as for water energy	Individual survey
				Solar energy	
				Same as for water energy	Individual survey

Each kind of RES can be described in more detail if available. An example of such a detailed part of the checklist, including necessary calculation parameters for bio-power follows.

Table 5 Detailed Checklist, Biomass RES sources

Expert level		Solution		Energy calculation	
Detailed information	How to solve it	Basic solution	Detailed solution	For calculation / estimation / assessment	How to solve it
Free areas for agriculture for biofuels	Map survey Individual survey			**For forests:** – annual production of wood waste – types of wood ➔ production (t) * calorific value **For farming:** – potential area X yield of potential plant ➔ tonnes / year – potential area X calorific value of potential plant X yield of potential plant ➔ potential gross energy per year (consider that combustion does not have 100% effectivity)	Technical information for several types of biofuels Calorific values for types of wood Farming/forestry information Technology systems information (e.g. efficiency, fuel consumption,)
Current areas with biofuels farming + their use	Map survey Individual survey				
Commercial forests + their use	Map survey Individual survey				
Wood processing – sawmills	Map survey Individual survey				

The gathered information should be further analysed and implemented into a Geographic information system (GIS) in the form of an information maps of the solved area. GIS maps can in easy visual way answer where the energy consumption is and what is its value; identify potential areas for energy performance improvement or GHG emissions reduction and characterise the energy and environmental interconnection and interaction of various sectors in the PED area.

4.3 Level 3: Consultation maps

No.	Title	Content	Stakeholder engagement
3	Consultation maps	Comprehensible presentation of prospective area based on the gathered data and spatial analysis, ideally in an interactive map application	Stakeholder learns about the current state and opportunities of the prospective area and gives feedback on additional requirements and conditions

Phase three offers the stakeholder a comprehensive view of the prospective PED area. It is based on a vast amount of data and sophisticated analysis and should show the neighbourhood's present and future. Therefore, a consultant needs to present comprehensive and multi-layered and multi-temporal information.

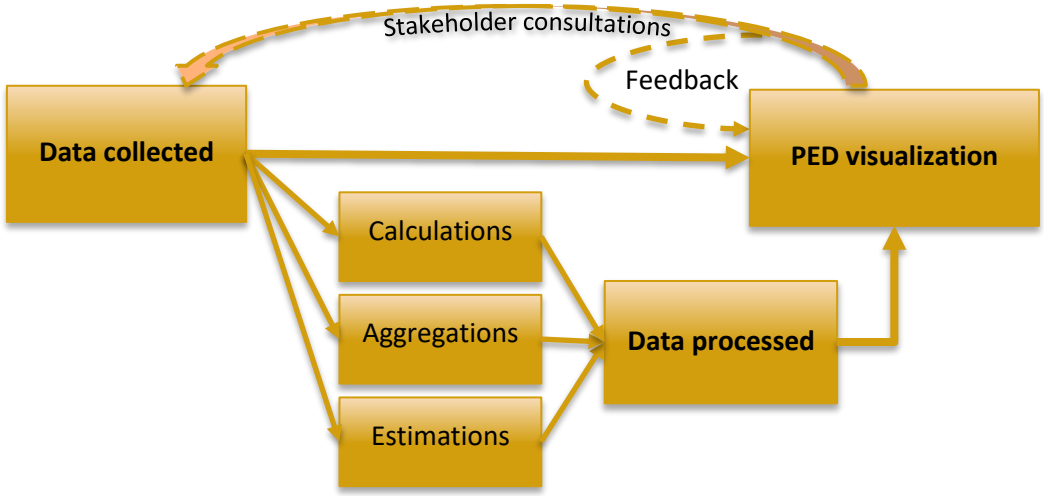

Figure 4: Level 3: Basic process map for creating a consultation map

The **objective** of the communication at this stage **is to show the options and let a stakeholder steer the upcoming process**, now with additional information at hand. Given the amount of information, it is necessary to follow the topics or layers one by one, e.g. distinct kinds of energy production, energy performance measures, behavioural changes etc. **Map visualisations are the most convenient tool to deliver**.

Presentations should rely on visual information and refrain from using text where possible. The graphic design should follow the same pattern and show different values and indicators on the same background allowing a reader to compare different scenarios easily.

- Impact on the local economy should be included;
- process outline – what is our contribution to the urban planning process;
- stress the change/contrast – actual state and envisioned one;
- create the vision – visualise the vision.

There are maps of many kinds that can be used. Here are some main examples in a non-exhaustive list with no specific order:

- map sketch of the selected area with the use of each building/space (residential, administrative, roads, infrastructure, and greenery), mobility needs…;
- map sketch with changes under consideration such as RES installations, building renovations, new buildings and other proposed measures;
- map sketch with energy production and consumption;
- graph with energy production and consumption per sector (buildings, transport…) and energy sources;
- table or suitable graphic concluding necessary investment and economic analysis.

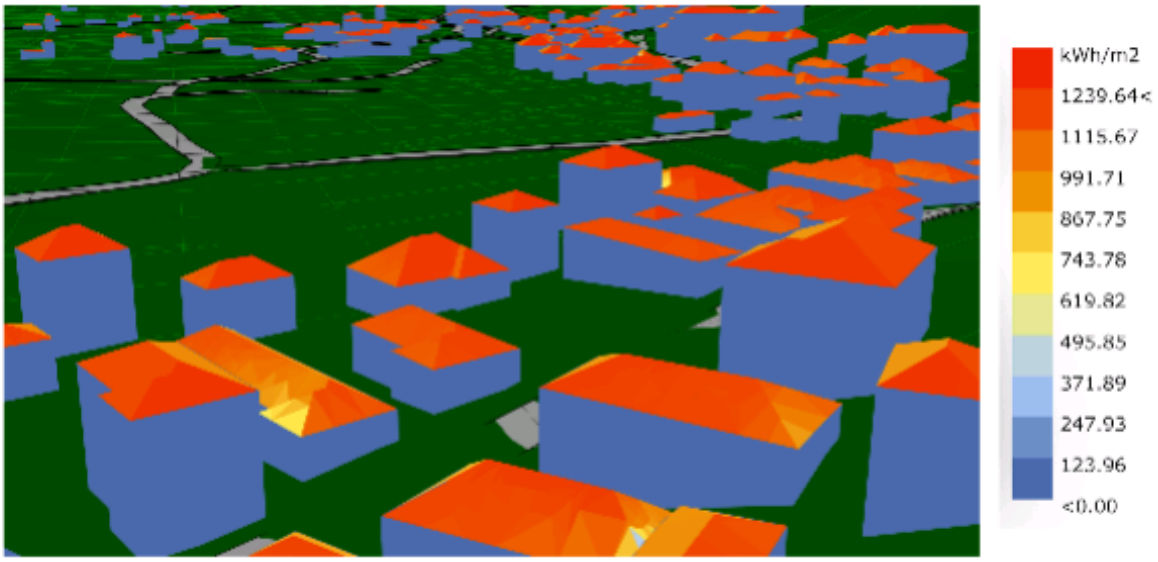

Figure 5: Simulation model of the solar potential of roof structures of part of a village

Source: Staněk, Dan & Wolf, Petr & Kichou, Sofiane. (2020). A study on the strategy for the placement of photovoltaic electricity sources on permissible areas and buildings in the Olomouc Region. UCEEB, ČVUT. Available from: https://www.olkraj.cz/download.html?id=78720 (accessed 28.3.2022).

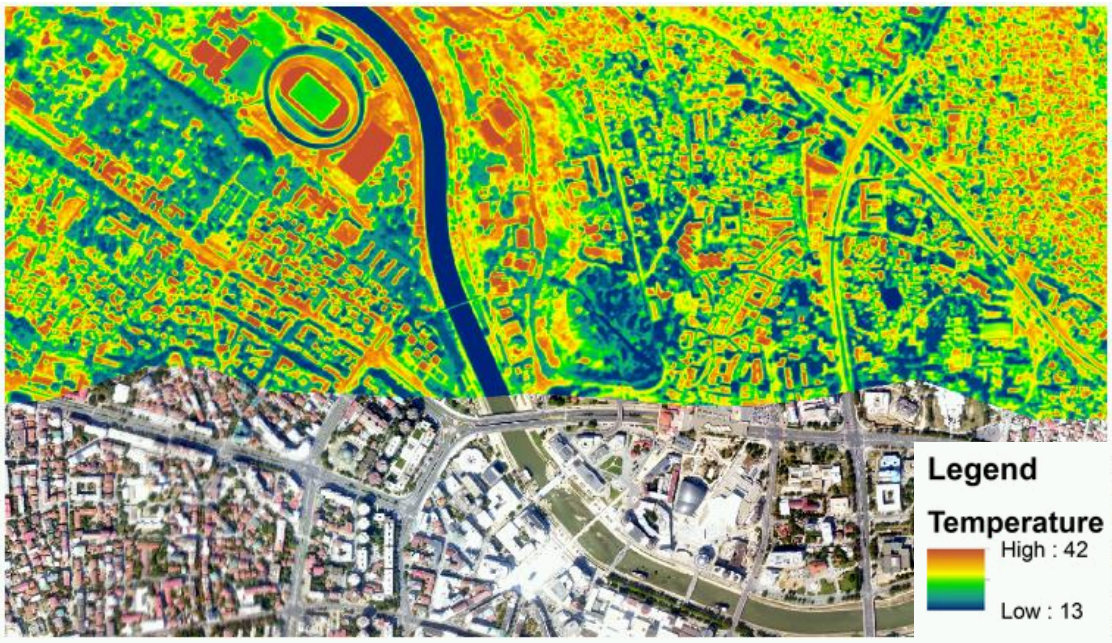

Figure 6: Skopje´s thermal map

Source: Kaplan, Gordana et al. (2020). SKOPJE'S FIRST THERMAL MAP! Are Urban Heat Islands Real? SkopjeLab — City of Skopje Innovation Centre. [results of "ICT for Urban Resilience" Project]. Available from: https://www.innovationlab.mk/skopjes-first-thermal-map-are-urban-heat-islands-real/(accessed 28.3.2022).

4.4 Level 4: Scenarios

No.	Title	Content	Stakeholder engagement
4	Scenarios	Presentation of feasible scenarios based on the area's features (from #2) and additional requirements (from #3).	Stakeholder learns about scenarios to implement PED and issues the final decision on the implementation

The third communication stage described in the previous section should obtain stakeholders' preferences. Up until the third stage, technically feasible options and opportunities are gathered. Then, barriers and limitations given by stakeholders are incorporated. A consultant compiles scenarios subject to all the conditions based on these inputs.

Therefore, in the fourth stage, the scope of delivered information narrows again after being only extended so far. **The goal is to condense all the gathered knowledge into a few distinct scenarios and let the stakeholders decide**. Scenarios should be as simple as possible. All the details remain in the stage three outcomes and can be consulted anytime. However, the decision making over the scenarios should follow a few simple metrics—such as costs, installed energy capacity or the type of installed RES—and get a benchmark to facilitate the final selection. Of course, the overall positive energy balance requirement should be the constant for any PED scenario. For evaluating qualitative criteria, it is appropriate to use **multi-criteria analysis in combination with stakeholder dialogue**.

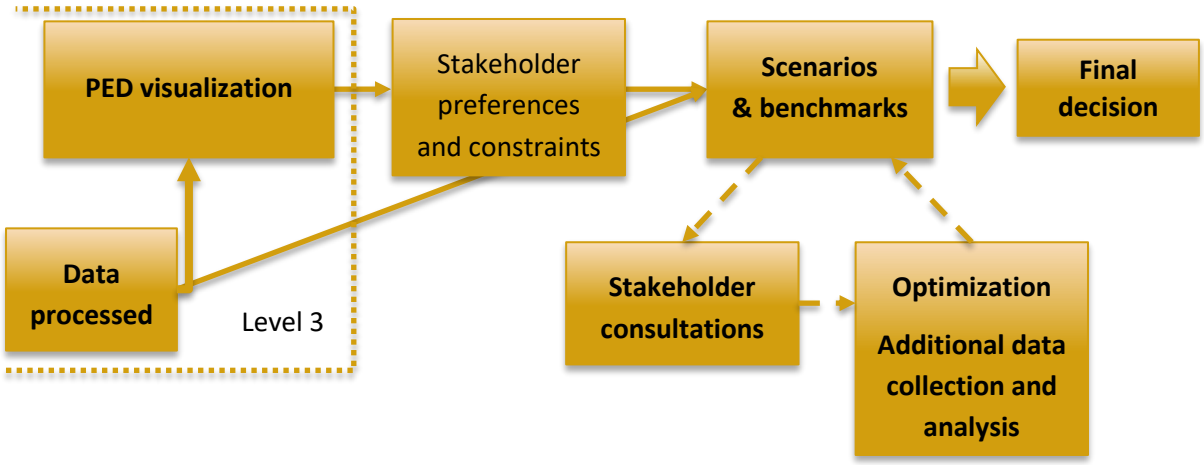

Figure 7: Level 4: process map for creating a scenarios

Scenarios are then presented using the comparison tables, maps or other suitable graphic tools (for examples see chapter 6 in Deliverable 3.1.) to stakeholders or decision-makers. Even at this stage, the process can be iterated multiple times if the latest information, requirements or demands appear. Depending on the relationship between individual stakeholders, decision making process and the role

of a consultant or a process facilitator, the **fourth stage may conclude with an open ending, and the decision on the PED development may not be reached**. Nevertheless, data collected, PED area assessment and scenarios created can still be particularly useful for future urban development in the area even without full PED implementation.

Table 6 Example of benchmarks and scenario comparison

Quantitative criteria	Scenario 1	Scenario 2	Scenario 3
Positive energy balance reached (✓ / X)			
Total primary energy consumption (TJ)			
RES energy generation (TJ)			
Total investment costs (EUR)			
Total operational costs (EUR)			
Qualitative criteria	**Scenario 1**	**Scenario 2**	**Scenario 3**
Life comfort and quality improvement			
Social acceptability			
Score achieved per scenario			

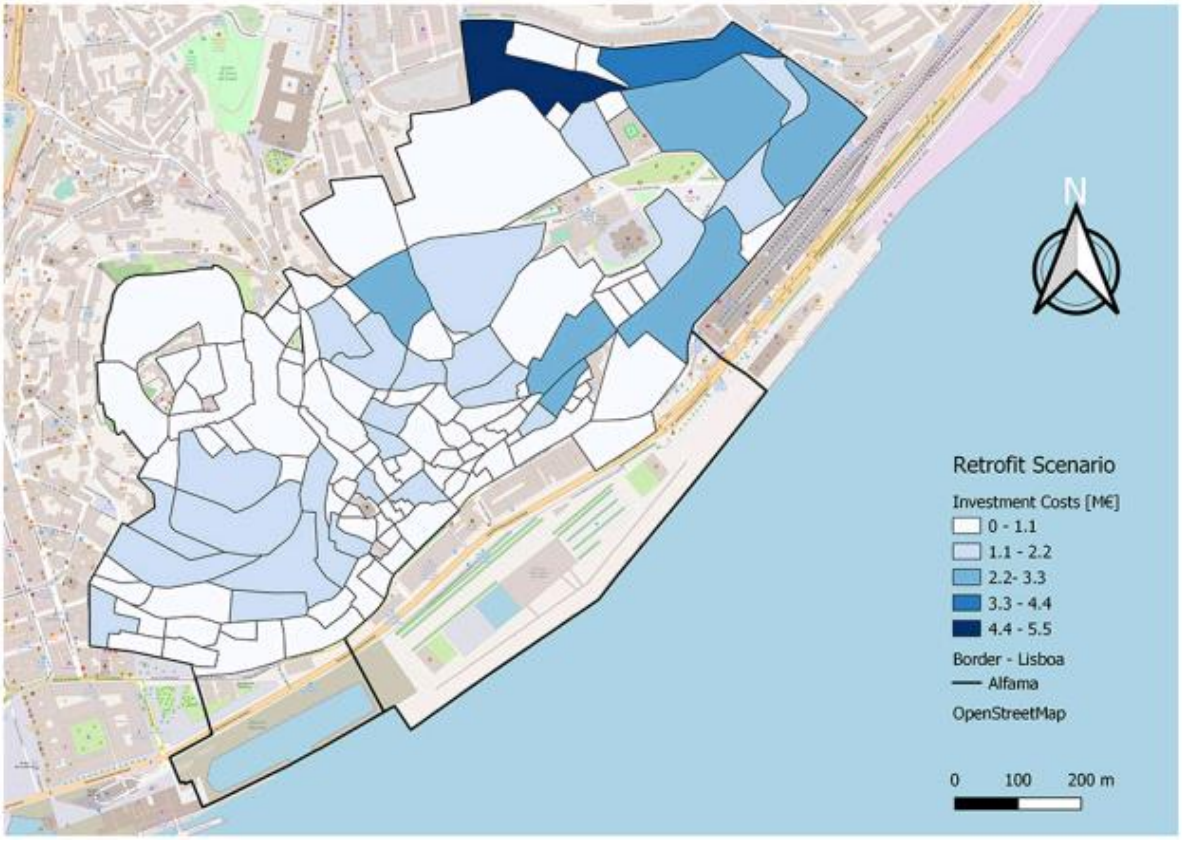

Figure 8: Exemplar map visualising a selected layer of the scenario

Source: Gouveia, João & Seixas, Julia & Palma, Pedro & Duarte, Henrique & Luz, Henrique & Cavadini, Giovan Battista. (2021). Positive Energy District: A Model for Historic Districts to Address Energy Poverty. Frontiers in Sustainable Cities. 3. 648473. 10.3389/frsc.2021.648473.

5 Closing remarks

The **four communication stages** should **guide** stakeholders and a consultant **through the PED initiation process**. In the beginning, only a vague understanding of PED opportunities is expected on the side of most of the stakeholders. There are scant data, and it is not clear that a PED is feasible at the locality.

Following the **path of slowly widening the presentations' scope and data requirements**, a consultant may get stakeholders on board, gather sufficient hard data and subjective limits, and define technically, economically, environmentally, and socially acceptable scenarios of PED development. Then, following the **converse process of narrowing down the selected options and facilitating relevant stakeholders' final decision making**.

This document points out the appropriate visual concept approach. It defines the essential elements that need to be communicated with stakeholders so that the PED concept can be delivered and ready for the final yes/no decision on its implementation. On the other hand, there are also the principles for communication and stakeholder engagement—selecting core stakeholders, dealing with stakeholders, sparking their interest and establishing collaboration to reach on PED implementation decision. **This is addressed in deliverable 2.2** (Holistic Stakeholder Engagement Model for early PEDs), **which describes the cooperation process with stakeholders** and deals with practical experience from Living labs on PED and sustainable urban development.

The visual concept presented in this document can also be linked to PED Roadmap from Task 4.3, which outlined the **three phases for creating PEDs**—strategic, planning and implementation phases. The visual concept is related to the strategic phase and partially to the planning phase, including urban implementation and building plans. Nevertheless, the visual concept covers the preparatory stages only, i.e. steps 1 to 10 of the roadmap. Other plans are to be developed after choosing a particular scenario.

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PED-ID

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