

PED StepWise

Participatory Process Map

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Executive summary

This report presents three distinct Participatory PED Process Maps developed through co-creation in the PED Stepwise Living Labs in Malmö (Sweden), Utrecht Science Park (the Netherlands), and Vienna–Gartenheim (Austria). These maps provide structured, context-specific roadmaps for navigating the social, technical and economic steps required to transform existing districts into Positive Energy Districts (PEDs).

The three maps reflect the unique characteristics of their local contexts: differences in ownership models, regulatory frameworks, energy infrastructures, and stakeholder constellations.

Together they demonstrate that PED implementation in existing districts across different countries cannot follow a single universal template. Instead, the PED process must be flexible and co-created with local actors to ensure feasibility and support and to ensure it reflects well the local characteristics and the needs to be addressed at each specific phase. A key insight is that the PED implementation is not a step-by-step plan where everything can be mapped out beforehand where everything goes exactly as expected. The process needs to be adaptable with the capacity to change. A wide variety of factors depend on each other, and many different parties need to work together and align their agendas and needs.

The process maps produced in Malmö, Utrecht, and Vienna serve as three working prototypes of the stepwise PED approach. They will guide the practical activities in WP4, where the maps will be tested and refined. The insights gathered will subsequently support WP5 in developing generalised learnings for PED processes in European contexts and energy-related urban district development.

1. Introduction

This report presents the development of three Participatory PED Process Maps created within the PED Stepwise project. The maps were produced in the three Urban Living Labs in Malmö (Sweden), Utrecht Science Park (the Netherlands), and Vienna–Gartenheim (Austria). Each map outlines a stepwise process for supporting the transition of an existing district towards a Positive Energy District (PED), with attention to the social, technical, and economic dimensions that shape this transition.

The starting point for the work in all three Living Labs was the recognition that existing districts differ significantly in terms of ownership structures, regulatory frameworks, local planning cultures, and stakeholder constellations. As a result, the process of developing a PED must be adapted to local conditions. The aim of this deliverable is therefore not to provide a single, universal roadmap, but to present three context-specific maps, each building on local insights, stakeholder dialogues, and co-creation activities.

The maps were created through a combination of participatory methods conducted in each Living Lab. Workshops, mission mapping, future-making exercises, and iterative mapping sessions were used to gather input from local stakeholders and to structure the sequence of steps required in the PED process. These methods allowed each Living Lab to identify its own priorities, opportunities and challenges, and to translate these into a coherent process outline.

The resulting maps differ in detail and emphasis, reflecting the distinct characteristics and ambitions of each Living Lab. At the same time, they share a common structure informed by the overarching PED Stepwise approach: the PED process is organised around three dimensions (social, technical, economic) and progresses through three broad phases (development, preparation, and implementation). Each map identifies milestones, decision points, and critical moments where coordination between actors is required.

Together, the three maps form the basis for the next steps in PED Stepwise. They will guide the activities in WP4, where the processes will be tested and refined in practice. The comparative insights from this work will contribute to WP5, where the project will synthesise generalised learnings for PED development in varying European contexts.

2. Methodology

2.1. Malmö

2.1.1. Interdisciplinary workshop with stakeholders

On the 22nd of June, City of Malmö organized a workshop with the majority of the stakeholders in the area to map out previous energy-related work and investments, as well as discuss and formulate plans regarding future actions and cooperation. The workshop gathered the main project organizations (The City of Malmö, Eon, KTH Royal Institute of Technology, Malmö FF) as well as Europaporten, CA Fastigheter, BRF Lagmannen, and consultants (White Arkitekter).

The main purpose of the workshop was to gather stakeholders in the stadium area to review the current energy baseline, confirm decided- and planned energy measures, and co-create priorities and decision points for area energy development with a focus on energy sharing and decarbonisation. The workshop focused on a brief project background, objectives and the PED scope, followed by presentations of the energy mapping, efficiency potential and status reports from each actor. Participants then presented their decided and planned measures (captured in 3.1.1) and jointly identified priority activities, dependencies (e.g. transformer capacity), regulatory and business-model challenges (virtual vs physical energy sharing) and knowledge gaps. The session closed by consolidating decisions into follow-up investigations (legal, technical, business model and funding) and agreeing to follow up for future steps towards implementation. Working formats were plenary presentations, table-based consolidation and moderated discussion to produce concrete actions and timelines.

2.2. Utrecht

2.2.1. Mission mapping workshop with USP stakeholders

On June 4th, 2025, researchers from the PED-StepWise project organized a mission mapping session at Utrecht Science Park (USP). This session brought together ten key stakeholders representing five organizations (Hogeschool Utrecht, Utrecht University, SSH, Danone, and Genmab). The three-hour workshop aimed to explore opportunities for stronger collaboration within the USP living lab, with the shared ambition of achieving CO₂-neutrality by 2050. While all organizations at USP are committed to this goal, they currently work largely independently. Through PED-StepWise, the researchers aim to facilitate joint actions where possible, amplifying impact and accelerating progress towards a CO₂-neutral campus.

The session employed the **mission mapping** method, a participatory design and systems-thinking approach that enables organizations to jointly visualize and align ongoing and future activities around a common mission. Using visual tools and interactive group work, this method fosters engagement and supports co-creation among stakeholders.

2.2.2. Future-making with USP stakeholders

Mission Mapping is not a one-time exercise. On September 11th, 2025, a second follow-up session was held to build on the insights and ambitions shared by stakeholders during the first session.

The second session aimed to stimulate the imagination of USP stakeholders by probing and envisioning possible futures of the campus in relation to sustainability and liveability. In this report, we distinguish between two complementary approaches to thinking about futures. **Future-making** and **probing futures** is “the work of imagining, interpreting, negotiating, and shaping desired futures while recognising that the future may unfold differently than expected” (Comi et al., 2025). The value of this exercise is that it shifts people away from linear, goal-driven thinking and opens space for creativity, pattern recognition, and new forms of collaboration. Probing futures is divergent: it opens up multiple possible futures and helps participants discover patterns, signals, and new behaviours in uncertain environments.

Envisioning, by contrast, is convergent: it brings participants together around shared images of a desired (or undesired) future that can guide collective action. Used together, these approaches complement one another—probing expands possibilities, while envisioning helps align direction.

This session was prepared and facilitated by two facilitators with a background in systemic co-design. The session brought together a diverse group of USP stakeholders, including researchers, building managers, sustainability and energy coordinators from Utrecht University, University of Applied Science Utrecht, University Hospital UMC Utrecht, student housing association SSH, and research organizations such as Genmab active on campus.

2.3. Vienna

The aim of the Participatory Process Map in the context of the Urban Living Lab Vienna was to create a common roadmap and orientation for the participating stakeholders. Based on several meetings and discussions with the various stakeholders, realitylab and e7 worked together in a series of mapping meetings to create an increasingly detailed roadmap for the Urban Living Lab in Vienna. The primary goal was to take into account the social, technical, and economic dimensions of the transformation process and to interlink them in a way that made sense. To this end, key milestones were defined for each dimension, which we could use as a guide when creating the roadmap. The two central challenges here were (1) the logical sequence of the various steps and (2) finding a manageable scale for the roadmap.

3. Results

3.1. Malmö

3.1.1. Stakeholder input

The creation and facilitation of a process map that will benefit the stakeholder collective in the area necessitates a high level of understanding regarding the current status, and future plans for implementation of energy measures.

3.1.1.1. Decided and Planned Energy Measures

From the stakeholder workshop the following information regarding decided and planned energy measures were gathered.

City of Malmö: Investment decision for the Multisport Hall and New Stadium building has been made (500 kW + 300 kW max solar panels respectively), the buildings will share the same high power connection service. Multihall and New Stadium will be connected to Low temperature 4th generation district heating. Additional new buildings in the area built by the City of Malmö are planned to be connected to this district heating network. In connection with the Multihall, a collection tank for pitch irrigation and rainwater will be built.

Table 1 Decided and planned energy measures for the City of Malmö

City of Malmö		
Year	Quarter	Description
2026	Q1	The city will have developed an initial systematic work method for energy-related district development.
	Q2	Start of dissemination of PED Stepwise project results.
2028	Q2	2028 Q2 - Final inspection of Multihall expected to be conducted.
	Q4	Final inspection of New Stadium expected to be conducted
2030	-	Possible installation for visualization of energy flows

Malmö FF:

MFF has already optimized time schedules on all ventilation units; installed water-free urinals (saves 750,000 liters/year); switched to LED pitch lighting (60% savings) from traditional solution; installed about 100 room sensors for supply temperature control of secondary system.

Table 2 Decided and planned energy measures for MFF

MFF		
Year	Quarter	Description
2024	Q2	Optimized schedules on all ventilation units
	Q3	Installed water-free urinals (saves 750,000 liters/year) Switched to LED pitch lightning (60% savings) from traditional solution
	Q4	Installed about 100 room sensors for supply temperature control of secondary system

E.ON: -

KTH: KTH has so far conducted research on virtual and physical electricity sharing.

Table 3 Decided and planned energy measures for KTH

KTH		
Year	Quarter	Description
2025	Q1	Research on virtual and physical electricity sharing. Investigating regulations/ legislations.
	Q3	Research on battery potential
2028	Q4	Roadmap for stakeholder engagement

Europaporten:

Table 4 Decided and planned energy measures for Europaporten

Europaporten		
Year	Quarter	Description
2023	-	Installation of optimized time schedules for ventilation.

	-	Installation of new pumps with smart control and staff training. (ongoing until 2026)
	-	Continuous window replacement (ongoing until 2027)
2025	Q1	Replace thermostats in building.
	Q2	Started work on developing control/regulation in building
	Q3	Controlled LED indoors and outdoors; energy efficiency analysis; switchgear replacement.
2026	Q1-Q3	Installation of more modern ventilation units.

CA Fastigheter:

Table 5 Decided and planned energy measures for CA-Fastigheter

CA-fastigheter		
Year	Quarter	Description
2017-2018	-	Connected control systems.
2019	-	Operational optimization new control systems and replacement of park lighting at parking.
2020	-	Replacement of EC fans at operating stop.
2021	-	Replacement of refrigeration units.

Parking Malmö:

Table 6 Decided and planned energy measures for Parkering Malmö

Parkering Malmö		
Year	Quarter	Description
2029	Q1-Q2	Estimated time of completion for mobility hub construction. Plans for installation of solar panels, batteries and EV chargers in mobility hub.

BRF Lagmannen:

Table 7 Decided and planned energy measures for BRF Lagmannen

Lagmannen		
Year	Quarter	Description
2015	-	Additional insulation installed in attics.
2016-2017	-	Replacement of heat exchangers, pressure-controlled fans, exhaust air heat pumps. Replacement of lighting in common areas.
2017	-	Replacement of radiators and thermostatic valves.
2020-2025	-	Window adjustments.
2025	Q1	Armature replacements in common spaces

3.1.1.2. Desired activities

City of Malmö: Battery feasibility study; study regarding electricity sharing; energy projects in existing buildings (Stadion Park preschool, Malmö Sports Gymnasium, Stadium houses, Handball Hall); highlight Stadionområdet as an example in advocacy for tax legislation on solar panels.

Malmö FF: Far-advanced plans for solar panel and battery installation.

E.ON: Collaborate with all actors for a joint solution; develop proposal for a business model for virtual electricity sharing.

KTH: Development of a digital twin for the area.

Europaporten: Meeting about joint development of the area; Ectogrid; district cooling; roof replacement 2029 Q1–Q2; renewable energy plant 1,500 kWt 2030 Q1–Q2; solar panels 2030 Q1–Q2; realise others’ wishes

CA Fastigheter: Discussion with tenants about replacing fluorescent lighting with LEDs; new detailed development plan (internal decision); decision on new detailed development plan in City Council 2029 (property Inredningsarkitekt 1, 2029 Q3–Q4); construction 2031–2036 Q3–Q4.

BRF Lagmannen: Knowledge gathering; information efforts at resident level; roof replacement; solar panels.

All the relevant energy measures carried out and planned in the period pre 2024 to 2030 are summarized in Figure 1. Figure 2 shows the desired activities per stakeholder between 2025 and 2030.

	Pre 2024	2024				2025				2026				2027	2028	2029	2030	2031	
	Q1	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4						
City of Malmö							Investment decision for the Multisport Hall and New Stadium building - (500 kW + 300 kW max solar panels respectively)				The city will have developed an initial systematic work method for energy-related district development.		Start of dissemination of project results for project.				Q2-Final inspection of New Stadium expected to be conducted. Q4-Final inspection of New Stadium expected to be conducted.		Possible installation for visualization of energy flows.
MFF			Optimized time schedules on all ventilation units	Installed water-free urinals (saves 750,000 liters/year) switched to LED pitch lighting (60% savings) from traditional solution	Installed about 100 room sensors for supply temperature control of secondary system.														
EON																			
KTH						Research on virtual and physical electricity sharing. Investigation of rules/legislation;		Research on BESS potential	Roadmap for stakeholder engagement.										
Europaporten	2023–2026 installation of new pumps with smart control and staff training.		Staff training			Replaced thermostats in building.	Started work on developing control/regulation in building	Controlled LED indoors and outdoors; energy efficiency analysis; switchgear replacement.		Installation of more modern ventilation units.				2023-2027 Continuous window replacement.					
P-Malmö																	Q1-Q2 Estimated time of completion for mobility hub construction. Plans for installation of solar panels, batteries and EV chargers in mobility hub.		
BRF Lagmannen	2015: Additional insulation installed in attics. 2016–2017: Replacement of heat exchangers, pressure-controlled fans, exhaust air heat pumps. Replacement of lighting in common areas. 2017 Replacement of radiators and thermostatic valves.					Armature replacements in common spaces			2020–2025: window adjustments										
CA-Fastigheter	2017–2018: connected control systems 2019: operational optimization new control systems and replacement of park lighting at parking. 2020: replacement of EC fans at operating stop. 2021: replacement of refrigeration units.																		

Figure 1 Stakeholder decided and planned energy measures.

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Desired activities	Pre 2024	2024				2025				2026				2027	2028	2029	2030	2031
	Q1	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4					
City of Malmö								Battery feasibility study; study regarding electricity sharing		Energy projects in existing buildings			Highlight Stadionområdet as an example in advocacy for tax legislation on solar panels.	End of PED Stepwise				
MFF							Far-advanced plans for solar panel and battery installation											
EON								Collaborate with all actors for a joint solution	Develop proposal for a business model for virtual electricity sharing									
KTH														Digital Twin for the area				
Europaporten										Meeting about joint development of the area			Collaboration regarding Ectogrid; district cooling			Roof replacement	Solar installation 1500 kWp	
P-Malmö																		
BRF Lagmannen								Knowledge gathering	Information efforts at resident level	Roof replacement	PV installation							
CA-Fastigheter										Discussion with tenants about replacing fluorescent lighting with LEDs	New detailed development plan (internal decision)					New detailed development plan decision in City Council 2029?	Construction	

Figure 2 Timeline of desired activities per local stakeholder.

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Figure 3 shows the common collaboration and decision points for the project that were identified during the stakeholder workshop.

2025				2026				2027	2028
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Solar electricity Multihall 1.2 MW possible, larger transformer – joint investigation; legal studies, Malmö’s new energy company as party.			Knowledge sharing; business model that provides incentives; clarity on whether physical sharing is legal (E.ON wants virtual sharing); basis for political decision.	Challenge the 500 kW limit on tax exemption for sole electricity self consumption. Clarify benefits of solar panels.	Investigation of electricity sharing. EU grants/regional funds? Regulatory sandbox?		Limitation – do not install larger solar installations than what E.ON can receive.	Location for batteries? Investigate cooling solutions in a changing climate.	Coordination for parking solutions

Figure 3 Common collaboration and decision points.

3.1.2. Analysis of stakeholder input

The main upcoming opportunity for new renewable generation in the area is driven in part by Malmö Stad and the two large new construction projects (multisport hall + new stadium) that enable large-scale PV rooftop installations. The size of these installations depends on local grid/transformer capacity and the financial case for large scale instalments. 1,2 MW is a technical possibility for the multisport hall, but tax regulation and the need for upgraded transformer station disincentivises investment. Local electricity sharing solutions may offer better economical case but future 1,2 MW installation seems unlikely in lieu of changing tax-code changes. As it stands the current plans (multi sport = 500 kW, stadium = 300 kW) should be assumed as the most likely future case for PV on these buildings.

The stakeholder collective, however, possesses a sizeable amount of rooftop space for renewable PV electricity generation and planning regarding future investments for several stakeholders is already underway. The coordination of common efforts regarding potential electricity sharing solutions might be a way forwards to unlock potential for further investments as well as laying the foundation for long-term collaboration within the scope of an energy community.

E.ON positions itself as a collaborator regarding the areas energy infrastructural development and prefers virtual sharing and warns that large PV without local battery capacity is currently uneconomic due to export/transformer constraints.

Both property owners, CA-fastigheter and Europaporten are focused on staged retrofits and future energy installations. To be noted here is that CA-fastigheter is looking at possible options to develop their property in the long term, which can have potentially sizeable implications for the energy consumption and supply in the future.

Lagmannen - the tenant association - is also retrofit-focused and interested in coordinated rooftop PV with neighbouring associations but needs to investigate to arrive at a clearer economic case for their investments.

KTH is set to deliver research tools (digital twin) and battery/ sharing studies which are critical enablers.

Several common needs are also repeatedly identified: joint feasibility studies (PV sizing, batteries, transformer), a tested business model (virtual vs physical), legal/tax clarity, and early visualisation tools to build political support and decision packages.

3.1.3. Proposed process map

As a foundation for the development of a process with which to guide the common work in the project, the core stakeholders have employed the PEPP-process (Positive energy planning

process) developed by White Arkitekter (Positive energy districts - PED, 2025). The main outline of this process is visualized in **Fehler! Verweisquelle konnte nicht gefunden werden..**

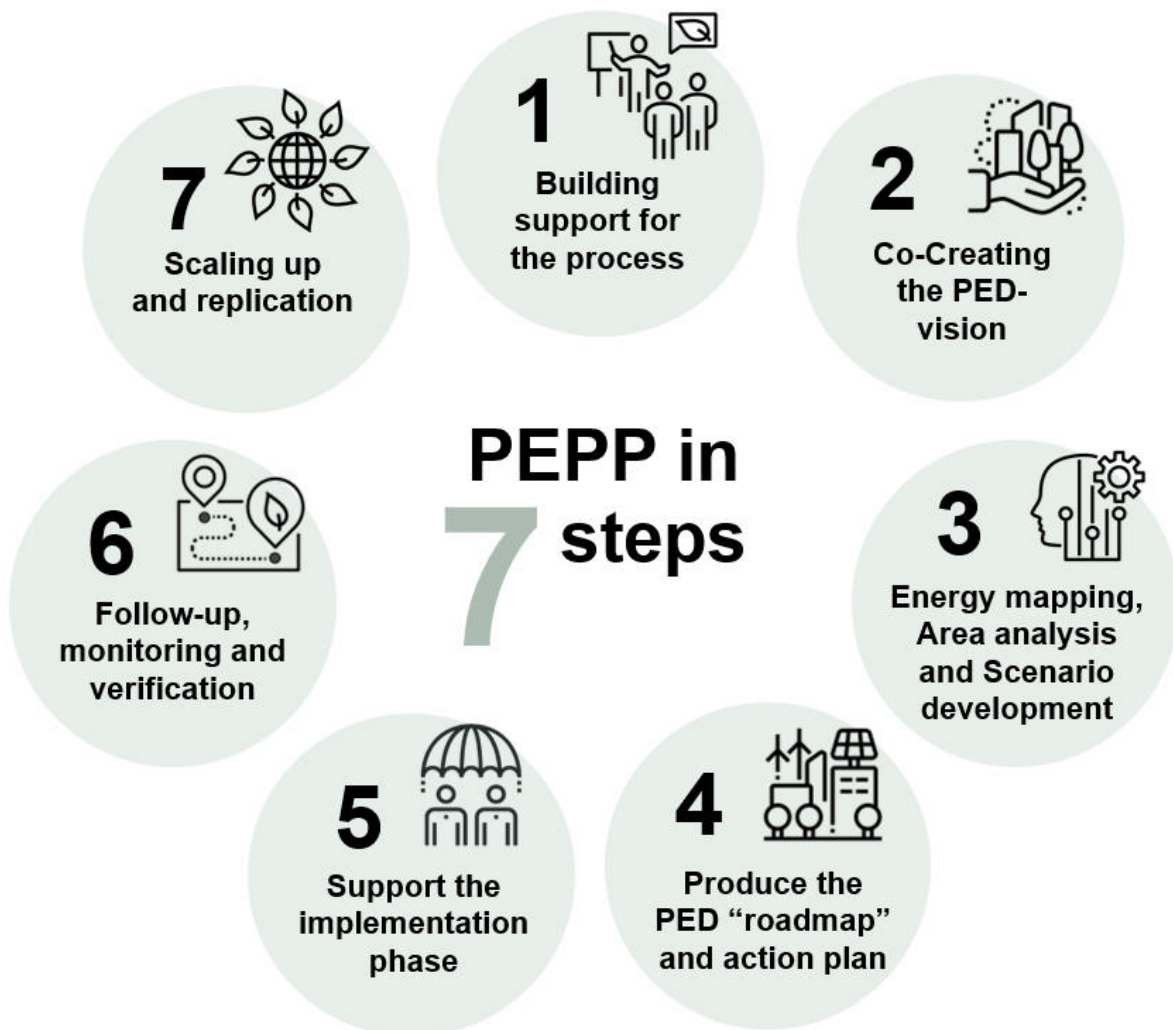


Figure 4 Visualization of the Positive Energy Planning Process (PEPP) developed by White Arkitekter.

The main steps of this process act as an outline with which to guide the development of the PED, which in the project is being done in close cooperation with White Arkitekter. Due to the nature of the characteristics of the PED area in question – Stadionområdet - the way these steps are applied is being tailored to the needs of the stakeholder collective and the unique energy profile and use-cases for the area.

In order to ensure implementation and continued cooperation regarding energy and sustainability in the area, common processes and arenas needs to be implemented as the PED Stepwise project draws to a close.

Work is ongoing to develop a more systematic approach towards district energy development for the City of Malmö, which will deliver first completed results in the beginning of 2026. This process map will influence the energy initiatives and collaborations within other districts in the city, influenced by the learnings from PED Stepwise and as such the roadmap being developed will

have bearing upon district development within Stadionområdet, as it is being utilized by the city authority. The process map for the energy-related development for Stadionområdet needs therefore to have a focus on being actionable for the area itself, with clear moments where decisions regarding common goals, as well as investments, are expedited to the relevant decision makers. In addition, it also needs to have a great focus on the circular nature of learning from the experiences and successful initiatives performed in the district. In this way the energy related development in other districts can benefit, and vice versa, and the positive effects of the work can spread beyond the borders of this particular district.

In **Fehler! Verweisquelle konnte nicht gefunden werden.** the process map for this approach is visualized, with the partnership formation as a starting point and critical moments where decisions are needed with the involvement of the internal decision-making processes from each of the partners in the project group.

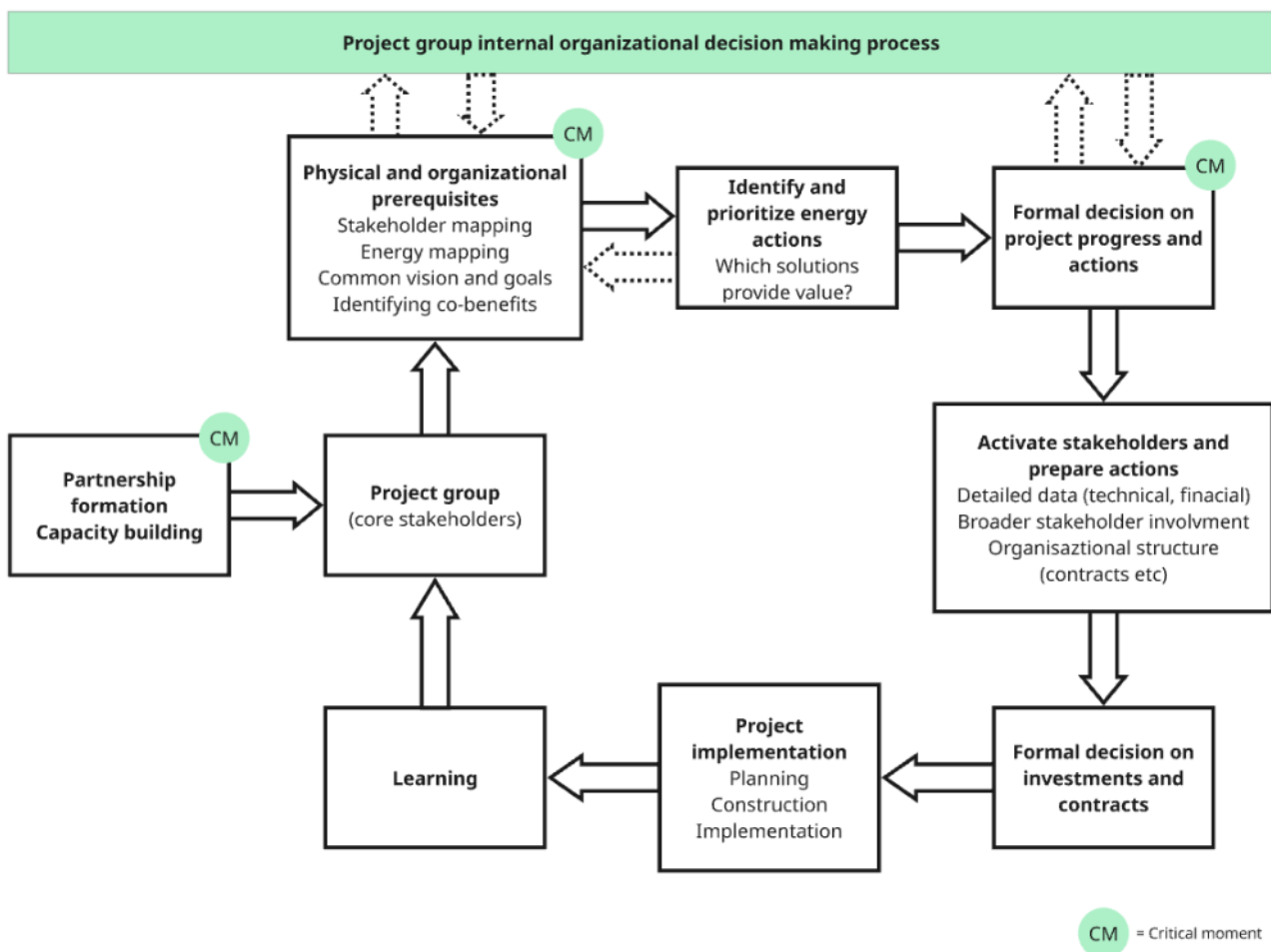


Figure 5 Visualization of the Positive Energy Planning Process (PEPP) developed by White Arkitekter applied to the Malmö Living Lab, including the identification of critical moments

For this project, the partnership formation was the capacity building that took place after the identified need for energy actions in the area at the initial onset of the new development within the district, as well as the PED Stepwise application process.

2. Mapping the system and creating islands: In the next step, participants mapped the system surrounding the mission by identifying key projects and activities related to CO₂ reduction at USP. They first completed an individual exercise, making an inventory of both current and envisioned activities contributing to CO₂ neutrality. Current projects were marked with orange stickers, while desired or envisioned projects were indicated with light pink stickers (Figure 7 and Figure 8).

Participants then used this inventory to collaboratively create "*ambition islands*" — clusters of aligned efforts and potential synergies (shown as dark pink notes in Figure 9). These islands served as building blocks for a shared sustainability landscape.

3. Building the landscape and visualizing interdependencies: Participants built a collective map on the floor, drawing connections between projects and activities (Figure 10). They positioned themselves within this landscape, identifying intervention points and mapping routes between the islands to illustrate interdependencies.

In total, nine ambition islands were identified, which were grouped into three main themes (Figure 11). These themes cover social, cultural, organizational, educational, technical, and economic aspects of the transition.

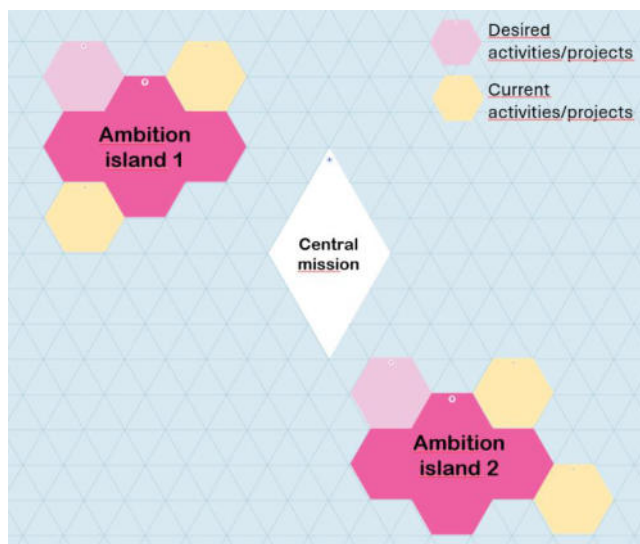


Figure 7 Method of creating ambition islands or buildings blocks in mission mapping



Figure 8 Participants drawing the building blocks of the system at the USP during the first mission mapping session



Figure 9 Creation of ambition islands (in pink color) by participants during the first mission mapping session



Figure 10 Participants drawing the shared sustainability landscape during the first mission mapping session

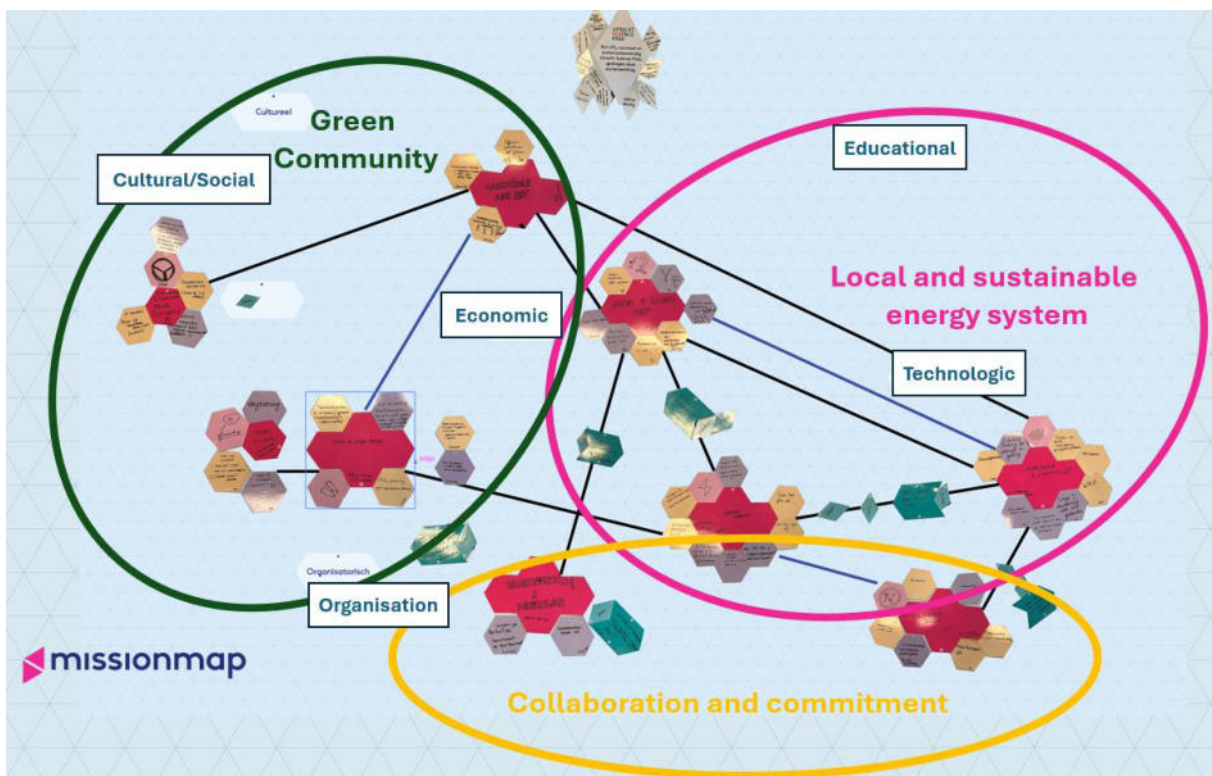


Figure 11 Digital landscape built by participants at the USP living lab after the first mission mapping session. The landscape is formed by the nine ambition islands and the three main themes identified.

In the following, we will describe the nine ambition islands that were identified during the session.

Theme 1: Green community: *Create in the USP an area where green choices become the norm, supported by policies that make these choices easy and attractive for all end-users. Important focus areas within this theme are:*

- User in control: Participants discussed empowering end-users to make informed energy choices and actively participate in achieving CO₂ reduction goals. This included promoting behavioral change within buildings and encouraging USP users to contribute to broader climate objectives. Main focus areas included more efficient space usage, promoting sustainable travel and reducing flights and business trips, and fostering a mindset focused on conscious energy use.
- Steering toward sustainable choices: This concept symbolizes how organizations can guide behavior without forcing it. Strategies discussed included nudging (making sustainable choices automatic), promoting cycling, public transport, and low-CO₂ catering options, and establishing organizational structures dedicated to climate goals.
- Long-term perspective: Participants underlined the need for a clear long-term vision, including inspiring examples, defined transition paths, and the use of CO₂ pricing to make impacts tangible.
- Dream Island: This concept represents space for experimental and future-oriented projects that inspire and push the boundaries of what is currently possible. For example, in addition to energy-related goals, participants envisioned future possibilities that go beyond traditional energy themes. They discussed initiatives around urban greening, mobility, the reuse of residual flows, and digital innovations.

Theme 2: Local and sustainable energy system: *This second theme focuses on building a local and sustainable energy system at USP.*

- Local 4 local: Participants discussed the importance of smart, local collaborations in energy systems, emphasizing the connection of different energy assets and avoiding grid congestion. Ideas included linking Aquifer Thermal and Cooling Energy Storage Systems among partners such as Danone, Genmab, and the University Medical Center to optimize resources. Utrecht University was identified as a potential leader in this area, given its own heating network and generation capacity. Additional ideas included expanding solar generation, and possibly introducing wind power, supported by shared data and research.
- Production, use, and monitoring: To better balance supply and demand, participants stressed the importance of improved monitoring and smart system control. Actions included enhancing the technical and organizational performance of Aquifer Thermal Energy Storage systems, installing and using more solar panels, and preparing buildings

for low-temperature heating. Energy exchange between partners and adopting systems thinking to understand interdependencies were also highlighted.

- Energy transition: Participants discussed the importance of technological innovation alongside organizational cooperation. Key actions included phasing out natural gas, integrating renewable sources more effectively, and reducing demand through insulation and efficiency measures, following the Trias Energetica principle. It was emphasized that both supply and demand sides must be addressed to achieve meaningful progress.

Theme 3: Collaboration and decisive action: *The third theme emphasizes that USP partners must commit to long-term sustainability at the strategic/board level, while collaborating effectively at the tactical and operational levels. Green choices that comply with regulations or offer a short payback period are always implemented.*

- Collaboration and support: Participants stressed the importance of structural, long-term collaboration. While most decisions are currently made independently, they emphasized the need for a permanent USP-wide coordination group. At present, there is no permanent, USP-wide group coordinating sustainability initiatives; these exist only within individual organizations. They proposed establishing a recurring meeting (three to four times per year) to facilitate joint actions, knowledge sharing, and implementation. Board-level commitment is essential — even in the case of leadership or management changes — and should be complemented by active bottom-up engagement. The participants were also realistic about the scarcity of time and the potential obstacle that might be for initiating this.
- No-regret island: This refers to practical, straightforward measures with immediate impact and return on investment, such as mandatory energy actions under environmental permits, solar shading foil to mitigate overheating, improve Aquifer Thermal energy Storage system balance, and optimize laboratory ventilation. Participants also suggested collective procurement to lower costs and emphasized learning from each other to accelerate progress.

Discussed follow-up actions

At the end of the first mission mapping session, participants formulated desired actions. Representatives from Utrecht University expressed the intention to expand energy collaboration and improve system connectivity among partners. Hogeschool Utrecht proposed developing a shared sustainability language that aligns with national frameworks, for example, through implementation of the Corporate Sustainability Reporting Directive. Participants from both Hogeschool Utrecht and Utrecht University expressed interest in establishing a USP-wide coordination platform to define its purpose and structure. Finally, participants from Danone and Genmab emphasized the importance of sharing knowledge and solutions to enable cost savings, which will in turn support long-term strategies.

These commitments mark the start of a more integrated and collaborative approach to achieving CO₂ neutrality at USP. The nine ambition islands can serve as a guide for strengthening partnerships and coordinating actions in the coming years.

3.2.2. Second future-making session

The second session consisted of three parts:

- 1. Probing futures and reflecting on behavior and emotions:** In the first part, participants were placed in a future-like situation to experience what behaviour in an uncertain environment might feel like. This exercise, called future probing, invites participants to “try out” possible futures by embodying them together. The exercise had two stages: an embodied activity followed by a group reflection.

During the embodied activity, participants acted according to guiding principles identified in the first session—thinking locally, acting cooperatively, connecting top-down and bottom-up, and applying systems thinking. They received no further instructions and could not speak. They were asked to act together towards a sustainable USP in 2040, while complying with the guiding principles.

The exercise developed through simple actions: participants imitated one another, hesitated, experimented with rhythm and proximity, and gradually coordinated without words. Some joined immediately; others held back until later. Eventually, the group formed a circle, creating a collective structure shaped by silent coordination.

In the reflection that followed, participants shared their experiences and emotional responses: Did they act quickly or wait? Did they feel energised, confused, or uncomfortable? These reflections revealed group-level patterns that had previously been invisible—such as differences in pace, assumptions about leadership, or a desire for direction. In other words, the exercise showed how group dynamics shape collective action in uncertain contexts, mirroring the complexity of the ongoing and future sustainability transition at USP.

We need to recognize that the energy transition does not follow a linear plan with predictable outcomes, but unfolds through uncertainty, interdependence, and the need for ongoing alignment among many actors. It therefore requires continuous attentiveness and adaptability—listening to one another, to the system, and to emerging developments—so that actions can be adjusted as circumstances change (Maessen 2025).

- 2. Envisioning futures:** In the second part, participants imagined both desirable and undesirable futures for the campus in 2040. By visualising these futures on paper and using Lego models, participants in small groups created both positive/idealistic scenarios and catastrophic “do nothing” scenarios for the USP in 2040. These visions are not fixed roadmaps but attractors—shared images of the future that inspire and align collective action.

The two desirable futures discussed among participants are described below:

- **Our campus, our city** (Figure 12): A self-sufficient USP district with local renewable energy, smart façades in buildings, collective data sharing, car-free mobility in most places, and electric vehicles serving as batteries (vehicle-to-grid concept). The district is green, biodiverse, and has sufficient water areas. It also has a strong community identity. There are meeting places, and plenty of space to study, work, and live nearby. Everything revolves around collective effort, sustainability, and connectedness, meaning that residents hardly need to travel outside the campus.

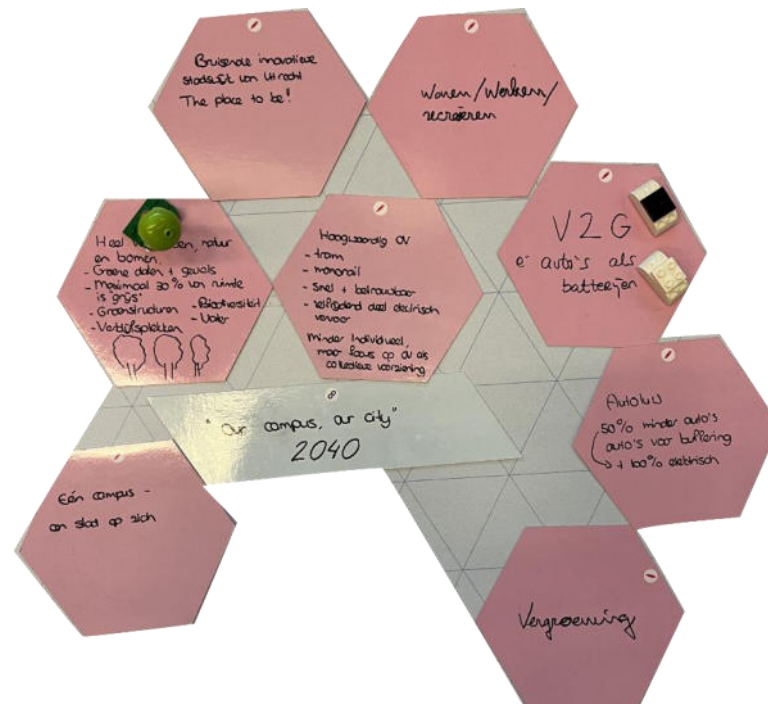


Figure 12 Illustration of the ideas collected by one sub-group for the optimistic scenario (called "Our campus, our city") at the USP in 2040

- **Garden of Knowledge** (Figure 13): In 2040, the USP is internationally known as the *Garden of Knowledge*, the successor to USP. The area runs entirely on renewable energy, partly shared with the surrounding region, and everything is smartly connected and efficiently organized. Opportunities for energy production underground are collectively exploited. The green and biodiverse campus promotes mental well-being, prevents loneliness, and reduces the need for healthcare, thereby creating space for housing, for staff and students, and pleasant meeting places. High-quality (fossil fuel-free) public transport is the norm, electric cars function as buffers, and the entire area is prepared for climate change. With advanced underground heat and cold storage, and a strong reputation as a model region, the campus attracts talent and offers a healthy, attractive living environment.

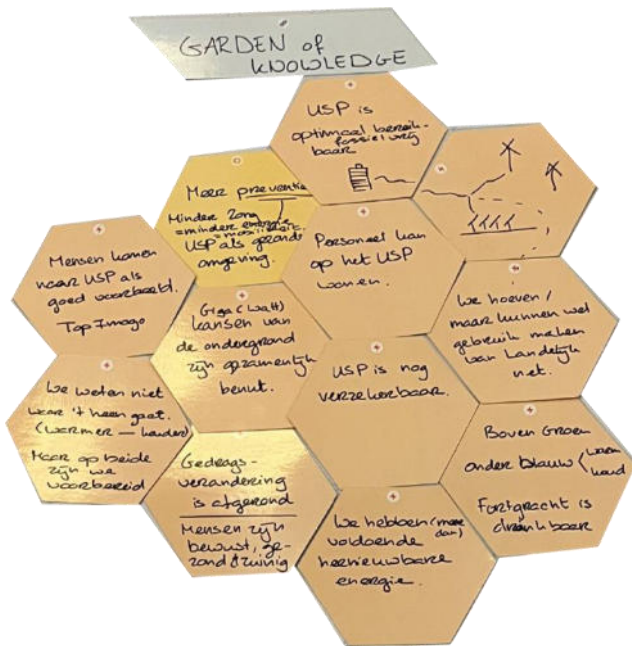


Figure 13: Illustration of the ideas collected by one sub-group for the optimistic scenario (called "The garden of knowledge") at the USP in 2040

Participants also discussed a catastrophic, "Do Nothing" scenario:

- Utrecht Industrial Park** (Figure 14): In 2040, Utrecht Industrial Park has turned into a place with little cooperation or collective efforts: Utrecht University has sold all the land to the highest bidder, the USP foundation no longer exists, and industry dominates. There are more roads, production sites, and office buildings, but fewer facilities and less green space; the botanical garden has disappeared. No efforts have been taken to phase out the natural gas powerplant or to improve the current Aquifer Thermal Energy system. As the energy demand grew higher than the supply, extra energy production comes from nuclear- and lignite power plants, and possibly even an offshore drilling platform. Liveability has declined sharply: the area is unsafe at night, students and residents have left, and it has become an anonymous, deserted environment.

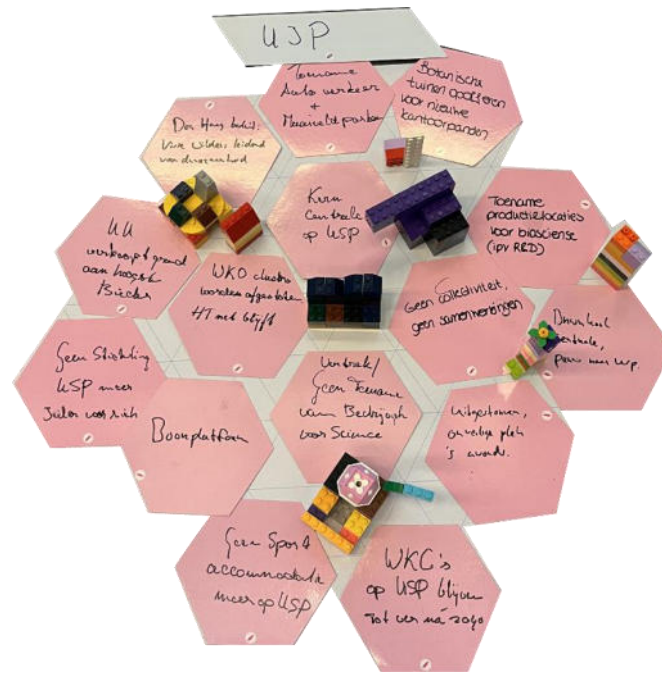


Figure 14 Illustration of the ideas collected by one sub-group for the pessimistic scenario (called "Utrecht Industrial Park") at the USP in 2040

- 3. Backcasting exercise to identify required actions:** As a follow-up exercise, participants reflected on the actions needed to move from the current situation towards the envisioned futures. The backcasting exercise has highlighted several key elements that form the backbone of a successful roadmap for the USP.
- a. At the heart of this roadmap lies the principle of *joint alignment and a shared vision*. Efficiency and impact will only be achieved if all stakeholders move toward a common horizon and coordinate their actions accordingly. This requires the involvement of all USP partners, together with the municipality and the province, and hinges on political decision-making, clear mandates, and secured financing.
 - b. The distinction between success and failure was also discussed among participants. *Success is defined by concrete plans, continuity, and commitment*, whereas failure results from a lack of mandate, indecision, or symbolic actions without follow-up. Crucially, the process begins with decision-makers—leaders who must make binding agreements—after which their constituencies can operationalize the vision and put collaboration into practice.
 - c. The *Sustainability Network USP* is identified as the driving force for building a successful USP-wide collaboration. By providing a platform for sharing knowledge, time, and meeting spaces, the network can inspire joint initiatives, create economies of scale, and accelerate progress towards sustainability goals. Yet, this collective effort can only thrive if there is a long-term focus and active engagement from all USP partners at different levels. Withdrawal or passivity would undermine the process and slow down progress.

From the insights gained in the future probing session, we have identified several **concrete actions**:

- a. First, *strategic alignment must be achieved through the development of a shared long-term vision, culminating in a joint decision-making session with key leaders from the USP, municipality, and province*. In terms of governance and mandate, it is necessary to establish clear structures with formalized responsibilities and to *secure long-term financing agreements* for collaborative projects.
- b. Operationally, the *launch of SNUSP as a formal collaboration platform* will be central. Defined roles for coordination, facilitation, monitoring, and reporting should be agreed upon. To ensure momentum, 2–3 flagship projects in areas such as energy, mobility, or biodiversity can serve as early wins, demonstrating tangible progress and providing visibility. These efforts should be complemented by transparent mechanisms for tracking and communicating results across partners.
- c. Finally, *commitment and continuity* must be embedded by signing a collective charter among USP partners and *integrating responsibilities into existing structures*, such as building managers and sustainability offices. Building a collaborative culture is equally important: regular exchanges in the form of knowledge sessions and workshops can help to build trust, inspire new ideas, and foster broad engagement. Students, staff, and researchers should be actively encouraged to participate in SNUSP activities, ensuring that the sustainability transition is rooted across the entire USP community.

At the end of the session, participants agreed to develop the SNUSP as a concrete action in the coming months. This initiative will be embedded within the PED-StepWise activities and serve as the first step towards establishing a USP-wide sustainability network.

3.2.3. Proposed process map

Our USP proposed process map (Figure 15) is centered on the establishment of a Sustainability Network USP in the coming year. This network aims to build a collective, USP-wide collaboration with active engagement of partners at different levels. By creating such a platform, partners will be able to share knowledge, time, meeting spaces, and resources, and jointly work on achieving a CO₂-neutral USP.

The preliminary process map presented here provides a first visualisation of how this collaboration could be structured. It outlines different layers of engagement—from management to operational and thematic levels—and highlights milestones such as co-creation sessions, shared visions, and continuity of collaboration. The process also emphasizes the importance of creating formal structures, clear responsibilities, and long-term financing agreements to ensure sustained impact.

This map should be seen as a starting point for discussion. In the coming months, it will be refined and elaborated further through input from USP stakeholders, ensuring it reflects both shared ambitions and the practical steps needed to reach them.

Step by step to our next destination: A CO2-neutral Utrecht Science Park

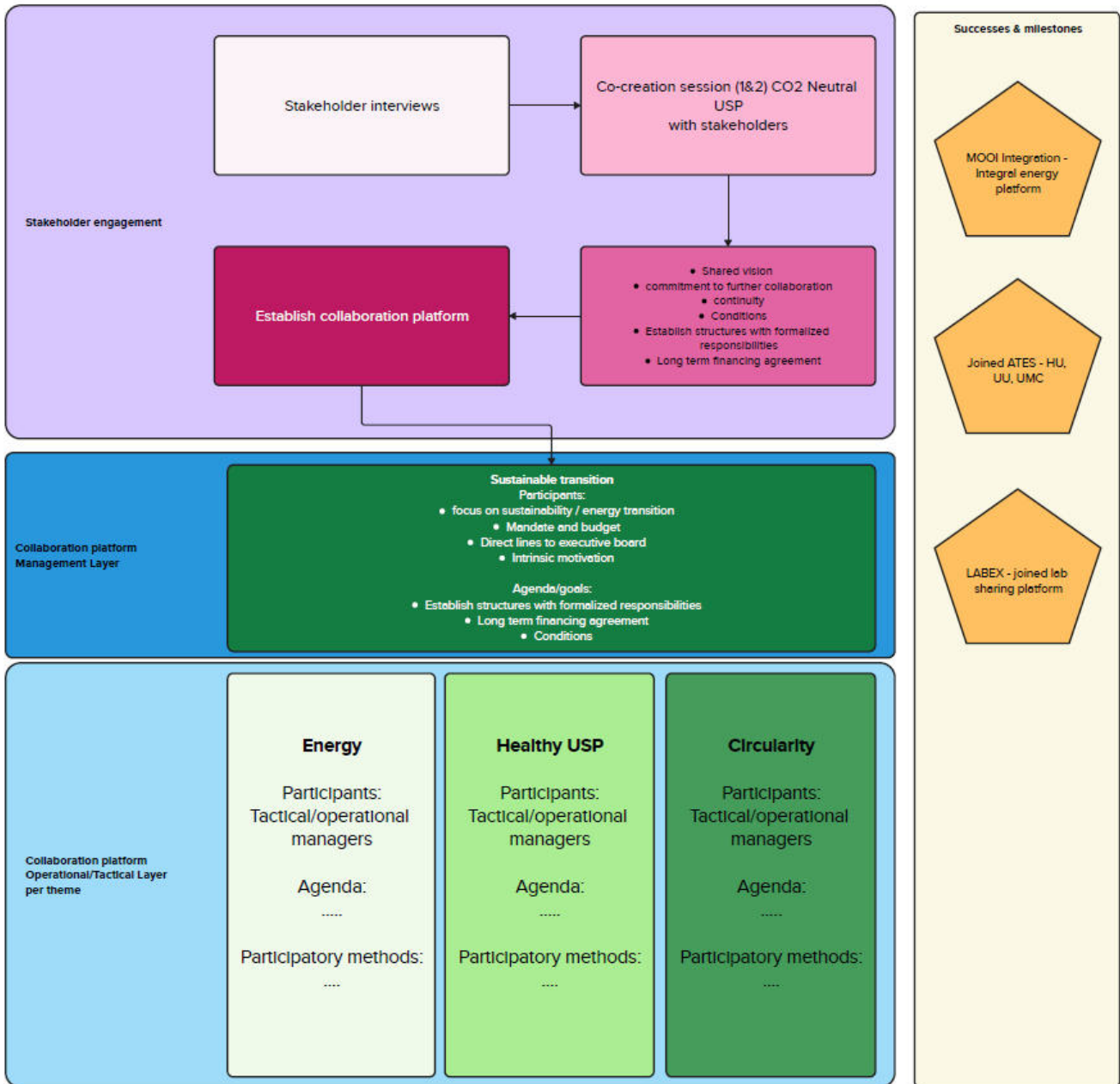


Figure 15 Proposed step-by-step process map for USP living lab

3.3. Vienna

3.3.1. Three versions of the participatory process map

The participatory process map was developed at the Urban Living Lab Vienna in a multi-stage process together. The aim was to create clear guidance for the implementation steps of renovation and decarbonization while equally integrating the social, technical, and economic dimensions. The three versions of the map show the step-by-step approach to a balanced and practicable structure.

Version 1: The first map (Figure 16) depicted the process in a highly detailed form. It contained numerous individual activities and methods such as focus groups, walks, digital interaction, and questionnaires, which primarily emphasized the social dimension. While this made the diversity of participatory activities visible, the map as a whole was difficult to understand: there was no clear sequence of steps, and stakeholders could hardly identify key milestones. This version impressively demonstrated the social density of the process, but also made it clear that reduction and structuring were necessary.

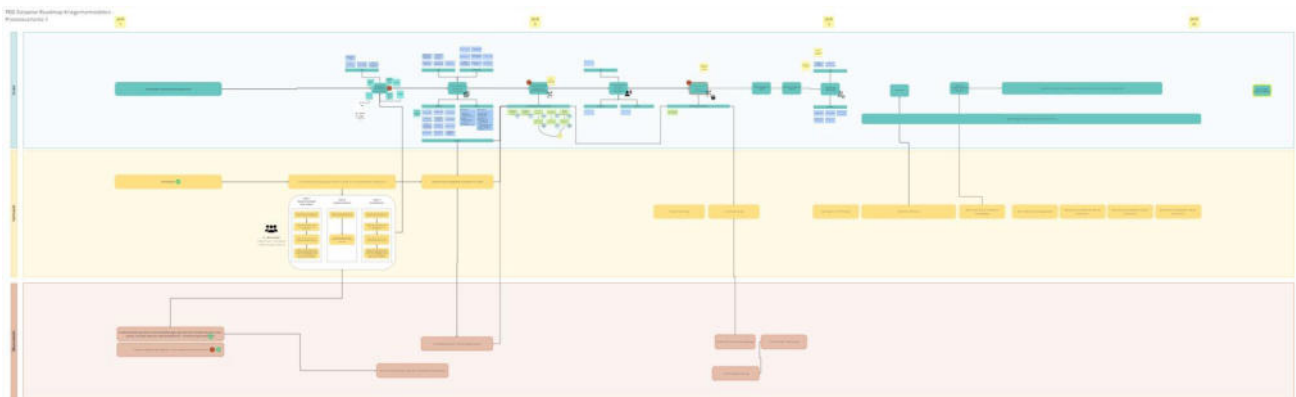


Figure 16 First version of the participatory process map

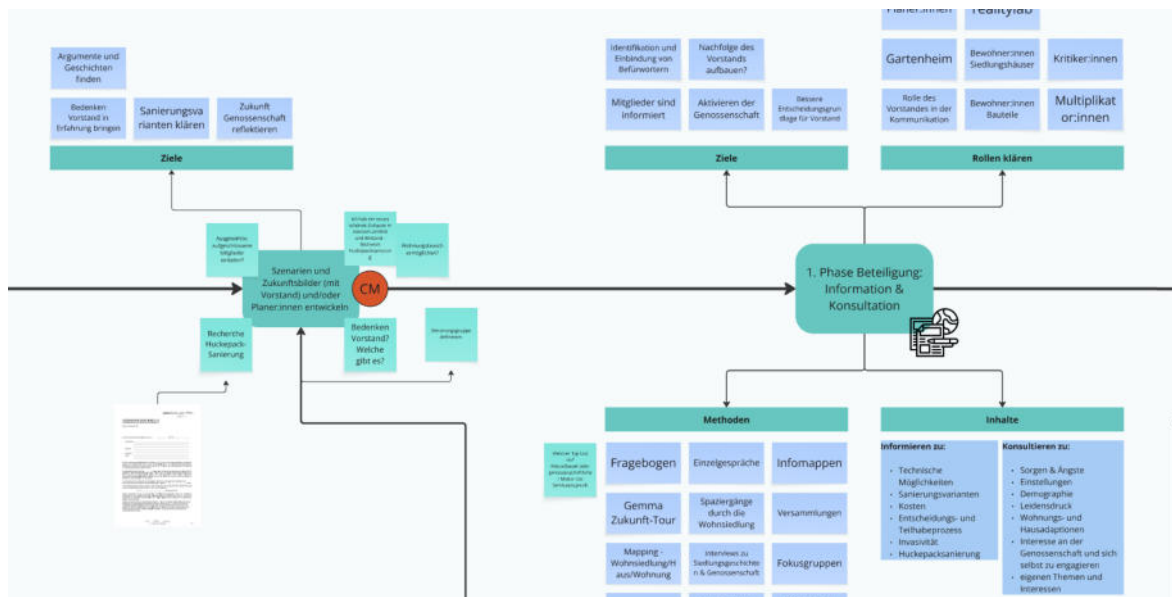


Figure 17 Section of the first process map

Version 2: In the second map (Figure 18), the complexity was reduced. The three dimensions – social, technical, and economic – appeared side by side with equal weighting. In addition, three overarching phases were introduced: development phase, preparation phase, and implementation

phase. This gave the presentation a clearer thread. However, the social dimension was now heavily condensed and lost some of its differentiation: while the technical and economic levels appeared clearer and more structured, important social activities and milestones were only briefly depicted.

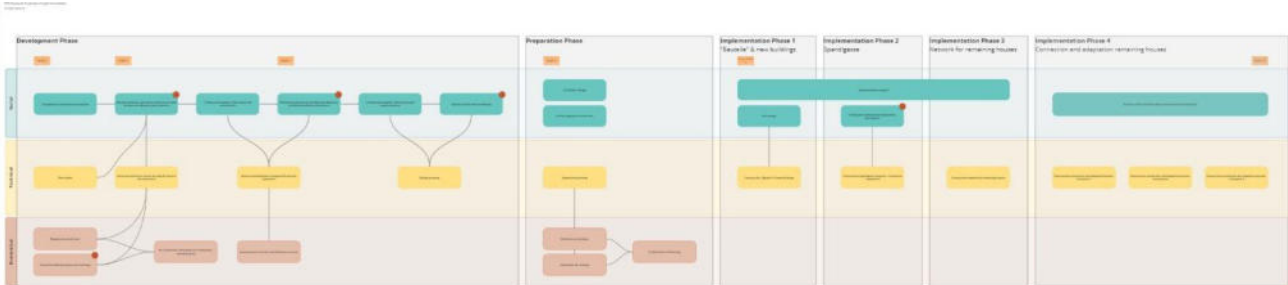


Figure 18 Second version of the participatory process map

Version 3: The third version (Figure 19) finally balanced the various requirements. While technical and economic aspects remain clearly structured, the social dimension has been formulated in greater detail. It now includes specific activities, goals, and decision-making processes that place greater emphasis on the role of residents and cooperative bodies (e.g., board of directors, general assembly). Version 3 thus represents the mature and final roadmap, combining clarity with depth of content.

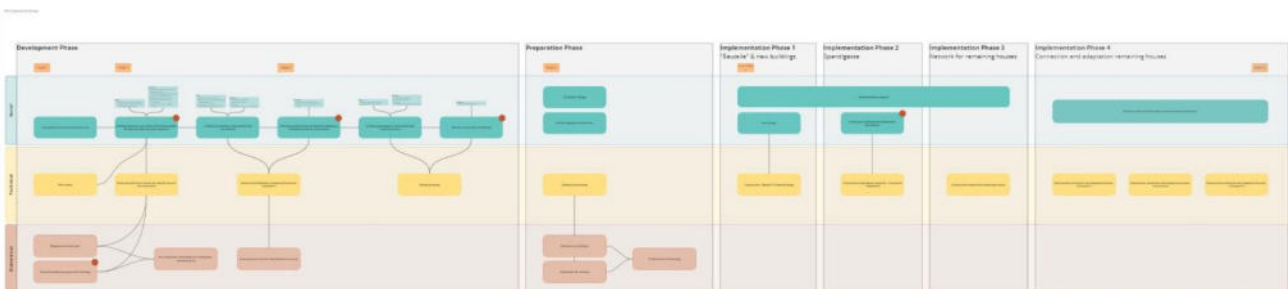


Figure 19 Third and final version of the participatory process map

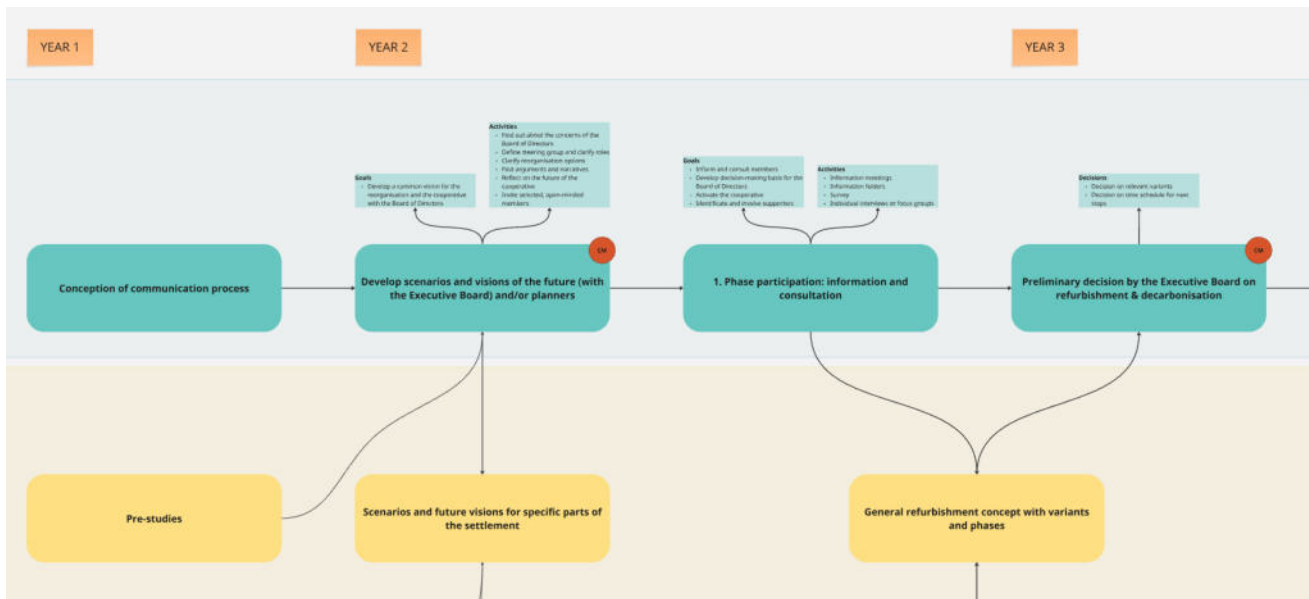


Figure 20 Section of the final process map

3.3.2. Explaining the map

3.3.2.1. The three dimensions of transformation

The final map organizes the process along three dimensions:

- **Social:** Participation, communication, and decision-making by the board and general assembly, involvement of residents, and activation of the cooperative.
- **Technical:** Creation of renovation and energy concepts, planning and implementation processes for building components, new buildings, and grid connections.
- **Economic:** Financing issues, subsidies, and cost estimates at various levels of detail.

These three levels are not independent of each other, but are intertwined in numerous ways.

3.3.2.2. Connections between the dimensions

The map explicitly shows the cross-connections: decisions made at the general meeting (social) are directly linked to financing commitments (economic) and the selection of renovation options (technical). Conversely, technical implementation steps—such as grid connections—require both economic viability and social acceptance. These connections make it clear that progress is only possible when all three dimensions work together.

3.3.2.3. Three main steps

The map structures the process into three main phases:

1. **Development phase (years 1–3):** Initial preliminary studies, renovation scenario development, financial viability analysis and design of the communication process. Key

social milestones here are the information and consultation phases, which support the board in making preliminary decisions on the scope of the renovation.

2. **Preparation phase (year 4):** Submission planning, development of detailed cost estimates and preliminary submission of funding applications. Socially relevant aspects include clarifying flat swaps and flat adaptations.
3. **Implementation phase (from year 5):** Divided into four sections based on different parts of the settlement: (1) building components and new buildings, (2) Spandlgasse, (3) remaining settlement houses, (4) their connection and adaptation. This step-by-step implementation allows for different entry points for residents and flexible solutions.

3.3.2.4. Time estimates, milestones, and critical moments

The map provides a timeline from year 1 to year 25. Milestones (e.g., decisions by the board, funding commitments, financing confirmations) and critical moments (CM) at which decisive course corrections must be made—such as the preliminary decision by the board, the general meeting, or the residents' decision on connection and adaptations—are highlighted. These moments show where special attention and coordination are required to continue the process successfully.

The final version (Figure 19) is a clear and detailed map. Not only does it show the technical and economic steps involved in the renovation and decarbonisation process, it also highlights the importance of the social dimension in relation to the other dimensions. The participatory process map in the Urban Living Lab Vienna thus serves as a practical tool that provides guidance, reveals connections, and creates a common basis for decision-making.

4. Conclusion

This deliverable presents the first iteration of three distinct Participatory PED Process Maps, each tailored to the specific organisational structures, technical conditions, and social dynamics of the respective Living Labs in **Malmö (Sweden)**, **Utrecht Science Park (the Netherlands)** and **Vienna–Gartenheim (Austria)**. While each map reflects its local context and stakeholder landscape, they collectively demonstrate a shared methodological foundation and a coherent PED Stepwise approach.

Across the Living Labs, the process confirmed that no single, universal PED roadmap is sufficient for existing districts. Ownership structures, grid conditions, regulatory frameworks, cultural expectations and decision pathways differ significantly between countries and neighbourhoods. This diversity can be considered a key insight of D3.1: the process must remain adaptable, allowing local conditions to shape the exact sequence of steps and decision moments. The three maps therefore function as location-specific prototypes, each showing how the same principles can be applied in different governance systems.

Despite their differences, the three maps converge on several essential findings. First, the social/organizational dimension is the backbone of PED implementation. In all Living Labs, early and repeated involvement of residents, property owners, institutions, and intermediaries will be necessary to secure support and unlock technical and financial decisions. The timing of

communication, consultation, and co-decision moments influences the viability of technical options and the pace of implementation.

Second, technical planning must be synchronised with social readiness. Whether assessing transformer constraints in Malmö, campus-wide low temperature heat network in Utrecht, or cooperative ownership boundaries in Vienna, technical decisions can only progress when they are aligned with stakeholder understanding, share ambitions and commitment. This establishes the need for joint feasibility studies, transparent visualization tools and iterative scenario development as part of the PED-Stepwise process.

Third, all three Living Labs highlighted the importance of economic and regulatory enablers, for example, business models for energy sharing, financial incentives, investment clarity, and legal/tax feasibility assessments. These factors often determine whether socially and technically attractive options can realistically be implemented. The process maps therefore emphasise the need for early identification of financing pathways, governance models and institutional responsibilities.

Taken together, the Swedish, Dutch and Austrian maps illustrate how the PED Stepwise methodology can be contextualised, co-created and put into practice in different European settings. D3.1 thus provides both three practical, localised roadmaps for use in WP4, and a foundation for synthesising a more generalised, widely replicable PED process in WP5.

The next steps in WP4 will test these maps in practice: implementing the engagement formats, performing the required technical analyses, and developing the financial assessments identified as enablers in each context. These activities will allow the consortium to refine the three maps further and identify the universal elements that can form the basis of the final replication guidance.

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6. PED Stepwise Consortium

Austria	Sweden	Netherlands
  	     	 

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