

# D3.2 BIPED TRAINING PROGRAMME

*Educating PED Stakeholders*





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# Executive summary

This document presents Deliverable D3.2 BIPED Training Programme of Work Package (WP) 3 of the Building Intelligent Positive Energy Districts (BIPED).

The main product for the deliverable is a simplified visualization of the BIPED training programme, and the plan for 2025 and 2026, including how the training programme evolves and is progressively made available on the [BIPED website](#) (3) in response to emerging needs from both local stakeholders in Brabrand/Aarhus and the project (see part 3).

D3.2 establishes the foundation for ensuring a smooth implementation of the BIPED extended digital twin for Aarhus, through a series of training activities and resources carried out in 2025 and 2026. This training will prepare the stakeholders involved in the implementation phase, the operation and maintenance of the model, to have all necessary technological knowledge about the model and how to use it to conduct a meaningful analysis. Training will also focus on educating stakeholders in preparing and participating in campaigns on gathering soft data at district level.

This deliverable is divided into three parts, building upon each other:

**PART 1:** This section outlines the **purpose, objectives, and goals** of the D3.2 BIPED Training Programme (section 1). It details the programme's scope, key milestones, and the iterative process for tracking progress. The target audience is identified, emphasizing the importance of educating PED stakeholders.

**PART 2:** This section explores the **community-centered training approach**, integrating theory and practice for a comprehensive educational experience (section 2 and 3). It includes Community Insights and Lessons Learned, covering data collection methods, stakeholder identification, and needs assessment. Key findings are presented (section 4). The Training Programme Design is detailed, with modules, learning objectives, key concepts, activities, exercises, and assessment methods (section 5). Evaluation, adaptation processes, continuous improvement, feedback loops (section 6), and an implementation plan with timelines and required resources are also covered (section 7) .

**PART 3:** This section focuses on the **Accessibility of Resources**, highlighting online resources, downloadable materials, and additional tools to support participants (section 8). The conclusion summarizes key insights, offers recommendations for future training initiatives, and provides final thoughts on the programme's objectives and outcomes (section 9).

# 1. Introduction

One of the key advantages of training programme's is their capacity to connect theoretical knowledge with practical application. This ensures that local stakeholders can effectively implement what they've learned in real-world scenarios, enhancing the overall success and sustainability of the BIPED-project. This deliverable presents detailed information on the process, creating a collection of training resources to help cities educate their stakeholders via a community-centered training programme that addresses different needs of different stakeholders within the D3.2 BIPED Training Programme. The training programme is structured to not only enhance the immediate capabilities of our stakeholders but also to facilitate the later phases of replicability and scalability with stakeholders beyond Aarhus. By integrating these principles into the design phase, we ensure that the methodologies and practices developed can be effectively transferred and adapted to various contexts.

## 1.1. The Scope

In order to ensure a smooth implementation of the BIPED extended digital twin for Aarhus, the purpose of D3.2 BIPED Training Programme is to create a comprehensive collection of training resources, such as online documents, articles, explainer videos, case studies, and co-creation tools, all accessible on the project website. These resources aim to educate PED stakeholders through a community-centered training programme tailored to the diverse needs of different stakeholders. The training programme integrates theoretical knowledge, technical skills, practical insights, and hands-on sessions, providing opportunities to apply knowledge in real-world scenarios. Additionally, the programme incorporates feedback and adaptations to suit various cultures, situations, and levels of knowledge and maturity.

During 2025 and 2026, a series of training activities will be carried out. This training will prepare the stakeholders involved in the implementation phase, the operation and maintenance of the model to have in-depth technological knowledge about the model and how to use it to conduct a meaningful analysis. Training will also focus on educating stakeholders in preparing and participating in campaigns on gathering soft data on district level.

## 1.2. Objectives

To ensure the successful implementation of the BIPED extended digital twin in Aarhus, the following specific and measurable steps will be undertaken as part of the D3.2 BIPED Training Programme:

Objective	Goal	Step
<b>1. Community-Centered Training Approach</b>	Enhance community involvement.	Consistent and ongoing use of the BIPED stakeholder engagement framework, while adhering to the iterative approach outlined in The Stakeholder Engagement Life Cycle

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		according to and as referenced in D3.1 BIPED Community.
<b>2. Stakeholder Needs Analysis</b>	Identify stakeholder needs.	Develop and distribute a questionnaire, then analyze responses by M12 2024 and again during 2025 and 2026
<b>3. Training Programme Design</b>	Create a relevant training programme.	Define learning objectives and design curriculum and materials by M12 2024 and again during 2025 and 2026
<b>4. Training Modules</b>	Develop specific modules.	Create content based on needs, then pilot test and adjust for modules to be released in 2025 and again in 2026.
<b>5. Evaluation and Adaptation</b>	Improve the training programme continuously.	Conduct evaluations and adapt based on feedback after each released module (activities).
<b>6. Implementation Plan</b>	Implement the training programme.	Develop timeline and assign roles, then launch the programme and ensure accessibility within M12.
<b>7. Training Activities aligned with BIPED WP2 and the BIPED project as a whole</b>	Execute activities and align with deliverables.	Finalize tasks and produce training materials, then implement and launch activities to fit Work Package 2 deliverables and the BIPED project as a whole.

*Table 1. Objectives: BIPED Training Programme*

### 1.3. Goals

The core purpose of the D3.2 BIPED Training Programme is to offer a comprehensive set of training resources that are easily accessible and with a high degree of user-friendliness and user involvement.

The goal is to educate stakeholders about PED (Positive Energy District) project goals through a community-centered approach. The Community-Centered Approach enhances community involvement by addressing local needs and conditions - section 2 provides a



detailed explanation of the community-centered approach. The training programme is designed to meet the diverse needs of different stakeholders by integrating:

- Theoretical Knowledge
- Technical Skills
- Practical Insights
- Hands-on Sessions

This approach allows participants to apply their knowledge in real-world scenarios. The programme also emphasizes the importance of incorporating feedback and making adaptations to fit various cultures, situations, and levels of knowledge and maturity.

### 1.4. Target Audience

In the context of the BIPED training programme, the target audience encompasses four major stakeholder groups, each playing a vital role in the project's success:

- Public sector decision makers
- Private enterprises
- Citizens, communities & local interest groups
- Innovation communities

These stakeholders are already well described in both the GA and [D3.1 BIPED Community](#) (2, chapter 3), and their roles are reiterated in the training programme. From the Aarhus side, there is now a much deeper and more insightful understanding of stakeholders, enabling the start of building a PED and Digital Twin community.

Stakeholders beyond Aarhus/Brabrand are also taken into account at this stage, ensuring that the current version with Aarhus stakeholders lays the groundwork for an efficient training programme. This foundation will support the involvement of other European stakeholders, encouraging the replication of the BIPED solution.

### 1.5. Importance of PED Stakeholder Education

Educating stakeholders about Positive Energy Districts (PEDs) and digital twins is important for several reasons:

1. **Informed Decision-Making:** Stakeholders, especially public sector decision makers and private enterprises, need a thorough understanding of PED concepts to make informed decisions that support sustainable development.
2. **Community Engagement:** Educating citizens, communities, and local interest groups fosters greater involvement and support for PED projects. When people understand the benefits and goals, they are more likely to participate actively and contribute valuable insights.
3. **Innovation and Collaboration:** For innovation communities, education ensures that researchers and developers are up-to-date with the latest PED technologies and practices. This knowledge promotes collaboration and the development of innovative solutions.

4. **Effective Implementation:** A well-informed stakeholder base ensures that PED projects are implemented effectively and efficiently. Stakeholders who understand the technical and practical aspects of PEDs can better manage and execute these projects.
5. **Sustainability and Adaptation:** Continuous education allows stakeholders to adapt to new challenges and opportunities, ensuring the long-term sustainability of PED initiatives. It also helps in integrating feedback and making necessary adjustments to meet evolving needs.

Additionally, as we explore the intersection between Positive Energy Districts (PEDs) and Local Digital Twins (LDT), it is crucial to educate stakeholders about the potential of LDT solutions for PEDs. This training programme will highlight the benefits and applications of LDT, ensuring that all stakeholders are well-informed and prepared to leverage these technologies effectively.

Overall, stakeholder education and training is essential for the success and sustainability of PED projects, as it empowers all involved parties and beyond to contribute meaningfully and work towards common goals.

## 2. Community-Centered Training Approach

*This section describes the The Community-Centered Training Approach used in D3.2 BIPED Training Programme:*

The Community-Centered Training Approach in D3.2 BIPED Training Programme is designed to enhance community involvement and address the needs, desires, and conditions of the target group in BIPED ensuring the approach is locally based and relatable.

The D3.2 BIPED Training Programme builds upon the foundation set by the [D3.1 BIPED Community](#) (2, chapter 2), which emphasized that:

*“The BIPED-Project will make its digital twin solution human-centric by design, a principle reflected in all pilot phases, as evidenced by the use of a quadruple helix model, design thinking, gamification, and community-driven urban planning that leverages 3D modelling to allow citizens to design neighbourhoods that they want and need while taking into account available resources and planning requirements.*

*Delivering on this ambition will not be possible without a considered and dedicated stakeholder engagement strategy. BIPED will rely on well-known concepts and methods to make sure the right stakeholders are engaged at the right time throughout the project. Through this, both the BIPED-project and the city of Aarhus recognize the importance of The BIPED Community.”*

Overall, the Community-Centered Training Approach both acknowledges and ensures that the training programme is not only informative but also inclusive and responsive to the community's needs. This leads to more successful and sustainable PED projects. This approach is embedded in the later discussions of sections 4, 5, and 6, where the principles of inclusivity, scalability, and adaptability are further elaborated, ensuring a comprehensive and cohesive strategy.

## 3. Community Insights and Lessons Learned

This section describes the experiences that form the foundation of the D3.2 BIPED training programme, including collected data and lessons learned from similar projects. A brief summary of key findings is also provided:

### 3.1. Community Insights: Questionnaire to the local stakeholders in Brabrand

The development of this questionnaire began with a clear definition of research goals, ensuring that each question served a specific purpose. With these goals in mind, a collaborative effort resulted in a comprehensive list of questions, addressing a variety of needs and concerns relevant to the stakeholders.

Following the initial draft, the questionnaire underwent a pilot test in Aarhus. Several users participated in this trial run, providing essential feedback that helped refine the questions and format for clarity and relevance.

Once refined, participants were invited to take part in the survey. Detailed instructions and an invitation were sent out (Annex 1 and 4), encouraging stakeholders to engage with the questionnaire. Responses were then gathered, with careful monitoring to ensure a robust and representative dataset.

Afterwards, the results were reviewed, and a comprehensive analysis was conducted, including insights and lessons learned (Annex 2).

Through these meticulous steps, the aim was to capture meaningful insights from the BIPED community, ensuring that the questionnaire was both effective and inclusive.

#### 3.1.1. Quantitative presentation of the questionnaire responses

Following the review of the questionnaire, several key findings emerged and here is the quantitative presentation of the questionnaire responses:

##### 3.1.1.1. General Information

**Needs and Preferences:** Respondents were specifically asked, "What do you need?" These questions aimed to understand their needs and preferences better. The responses provided valuable insights into the areas where respondents seek more information and support. Firstly, respondents were asked about their primary goals for engaging in BIPED's initiatives and activities. The responses were as follows:

- 18% of respondents expressed a desire to learn more about BIPED's digital twin from a technical perspective and understand positive energy districts.
- 3% indicated an interest in learning how to use and maintain BIPED's digital twin.
- 15% aim to conduct meaningful analysis using BIPED's digital twin.
- 35% want to understand and use data within BIPED's digital twin and in general.

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- 6% answered 'Other', expressing interest in activities such as establishing connections to potential test environments within the BIPED area and educating residents, particularly young people, about energy resources.

**Future Use of BIPED's Digital Twin:** When asked, "What will you use BIPED's digital twin for in the future?" the responses were as follows:

- 50% would like to use it for modeling and simulating scenarios (making predictions).
- 28% are interested in further development, such as adding data models.
- 11% did not know
- 11% answered 'Other', they would like to use it as part of communication about open data and dissemination of data, and to create interaction and dialogue based on data.

**Relevant Topics:** Then they were asked, "Which topics are most relevant to you?" The responses were as follows:

- 26% answered Basic knowledge of digital twin technology.
- 18% answered Basic knowledge of positive energy districts.
- 5% answered Detailed use and operation of digital twin technology and Maintenance and operation of digital twin technology.
- 21% answered Data analysis methods and visualizations.
- 26% answered Knowledge about energy, mobility, data sovereignty, and data-driven decision making.

**Preferred Initiatives and Activities:** Then respondents were asked, "What type of initiatives and activities would you prefer?" They were instructed to prioritize and choose 2-3 options. The responses were as follows:

- 6% answered that they would like to have Physical workshops and courses and On-demand workshops, such as customized workshops based on specific needs.
- 23% would like On-demand workshops, such as customized workshops based on specific needs.
- 6% preferred E-learning modules (self-paced learning).
- 1% would like Blended learning (a combination of physical and online) and Mentorship programs, such as one-on-one guidance with an expert.
- 31% would like Networking meetings, which was the clear favorite.

**Learning Styles:** To create a training program that accommodates different learning styles, respondents were asked, "How would you assess that you learn best (rank in order of priority - move up and down)?" The results showed that 28% chose the following three options as their first choice:

- Learn best by doing (kinesthetic)
- Learn best by seeing (visual)
- Learn best through a combination of the four mentioned learning styles (combination)

### 3.1.1.2. What do you need?

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- 1% would like Blended learning (a combination of physical and online) and Mentorship programs, such as one-on-one guidance with an expert.
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- Learn best by doing (kinesthetic)
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- Learn best through a combination of the four mentioned learning styles (combination)

### 3.1.1.3. Current challenges

**Knowledge and Usage Ratings:** In another section, it was interesting to ask more directly about Digital Twins and Positive Energy Districts. Respondents were asked to answer on a Likert scale.

- On a scale from 1 to 10 (1 = very good, 10 = not at all), the average rating for knowledge of digital twins was 5.79.
- The average rating for knowledge of positive energy districts was 4.79.
- Regarding how often respondents use data-driven tools to make and/or be inspired to make decisions, the average rating was 4.29.

### 3.1.1.4. Digital Twins and Positive Energy Districts

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- Regarding how often respondents use data-driven tools to make and/or be inspired to make decisions, the average rating was 4.29.

### 3.1.1.5. Feedback and suggestions

**Specific Questions and Challenges:** It was also asked, "What specific questions, challenges, or topics would you like a digital twin to help you with?" Five respondents answered:

- As a student, I would like to be able to use a digital twin as a data basis and reference tool for future projects.
- As a student, I would like to be able to use the digital twin as a tool to gain insight into some complex situations in an in-depth and dynamic way.
- In my everyday life, a digital twin is used to convey knowledge based on data as a pivot point. So what does it mean when we use a new data source and model this in that digital twin? What consequences does it have for the rest of the model?

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- Information about the electricity grid regarding areas limited by transformer stations.
- Overview and details regarding electricity consumption/production in 8220, preferably at the transformer level.

**Additional Comments:** Finally, we asked respondents to share any additional comments, needs, or insights they have regarding the development of BIPED's competence and collaboration plan (optional). Here are the responses from three participants:

- "Keep up the good work, but don't forget that those around you are not sitting around with their fingers in the dirt like you are. It is only when everyone else around you understands BIPED that you have really succeeded :-)"
- "It could be exciting to talk about testing options as part of the work in BIPED." (Danish)
- "We are very curious about the work with data collection and the experiences behind it. When we work with municipalities to make data freely available, it is precisely in a project like digital twins that we see opportunities to initiate conversations about openly exhibiting new data types."

### 3.1.2. Lessons Learned from the Questionnaire

#### Stakeholder Engagement:

- **Diverse Participation:** The questionnaire included responses from various stakeholders, including public employees, private companies, NGOs, and educational institutions. This diversity highlights the broad interest and involvement in the BIPED project, underscoring the need for a comprehensive training programme that addresses the varied needs of these groups.
- **Collaboration Needs:** Many respondents emphasized the importance of collaboration and coordination with other stakeholders to effectively use BIPED's digital twin technology. This feedback will be integral in designing training modules that foster collaborative skills and knowledge sharing.
- **Needs and Preferences:** Key areas of interest include understanding and using data within BIPED's digital twin (35%), learning more about the digital twin from a technical perspective (18%), and conducting meaningful analysis (15%).
- **Future Use of BIPED's Digital Twin:** 50% of respondents want to use it for modeling and simulating scenarios and 28% are interested in further development, such as adding data models.

#### Knowledge and Training Needs:

- **Relevant Topics:** Basic knowledge of digital twin technology (26%) and knowledge about energy, mobility, data sovereignty, and data-driven decision making (26%) are the most relevant topics for respondents. There is a significant need for training on the technical aspects of BIPED's digital twin and positive energy districts. Respondents expressed a desire for detailed knowledge on data usage, modeling, simulation, and maintenance of digital twin technology. This highlights the necessity for a robust training programme that covers these technical areas comprehensively.
- **Preferred Initiatives and Activities:** Networking meetings are the most preferred (31%). On-demand workshops customized to specific needs are also popular (23%).



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- **Learning Styles:** Respondents prefer learning by doing (kinesthetic), seeing (visual), and a combination of learning styles (each 28%). Stakeholders prefer a combination of learning methods, including workshops (both physical and online), e-learning modules, and network meetings. This indicates a need for flexible and varied training approaches to accommodate different learning preferences and schedules.

### Challenges:

- **Biggest challenge:** The biggest challenge is a lack of knowledge/resources (33%). Coordination with other stakeholders and time management are also significant challenges (25%).
- **Resource Constraints:** Common challenges include a lack of knowledge and resources, time constraints, and difficulties in data handling and coordination with other stakeholders. Addressing these challenges through targeted training can enhance the overall effectiveness and efficiency of the BIPED project.
- **Technical Difficulties:** Some respondents mentioned technical challenges in using and maintaining the digital twin technology. The training programme will need to include practical solutions and support mechanisms to help stakeholders overcome these technical barriers.
- **Handling Challenges:** Respondents rely on collaboration with BIPED employees, reading materials, and using project management tools to handle challenges.

### Usage and Application:

- **Future Applications:** Respondents see potential in using the digital twin for data analysis, scenario modeling, and decision-making. There is also interest in using the technology for educational purposes and community engagement. The training programme should therefore include modules on these applications to maximize the utility of the digital twin technology.
- **Specific Needs:** Stakeholders highlighted specific needs such as understanding energy resources, mobility, data sovereignty, and data-driven decision-making. These topics should be integrated into the training curriculum to ensure stakeholders are well-equipped to leverage the BIPED solution effectively.
- **Specific Questions and Challenges:** Respondents are interested in using digital twins for educational purposes, gaining insights into complex situations, and understanding the impact of new data sources.
- **Additional Comments:** Emphasis on broader understanding and communication of BIPED. Interest in testing options and data collection experiences

## 3.2. Similar Projects and lessons learned

In developing the BIPED Training Programme, valuable lessons from similar projects are carefully reviewed and integrated. These lessons provide critical insights into best practices and potential pitfalls, helping to shape a more effective and efficient approach.

Key takeaways include the importance of early and continuous stakeholder engagement, which is implemented to ensure that all relevant parties are involved from the outset. Additionally, the use of iterative feedback loops is emphasized, allowing for ongoing adjustments and improvements based on real-time input.



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Great inspiration is drawn from projects such as [SPARCS](#), [TIPS4PED](#), and [EXPEDITE](#) (Annex 3). SPARCS is a completed project, and the focus is specifically on their training activities and experiences. They have some tools and materials that are particularly useful, for instance, the way SPARCS communicates about PED and digital twins using comics (4) and how they use a Buddy Class concept (5). They have also developed an app that allows citizens to monitor their consumption and find inspiration on how to save energy. Additionally, they have created video material to explain positive energy districts (6).

TIPS4PED and EXPEDITE, sister projects to BIPED, are also in progress. They are followed particularly in relation to PED stakeholder engagement and community building.

By leveraging these lessons learned, the BIPED Training Programme builds on past successes and avoids common challenges, ultimately leading to a more resilient and responsive framework.

### 3.3 Key Takeaways

In developing the training programme, a questionnaire was conducted and other projects were reviewed to gather valuable insights. These findings have directly influenced the need for and design of the training programme, ensuring it is comprehensive, effectively communicated, well-supported, and collaborative. By integrating these lessons into the training programme, a more effective and responsive learning environment can be created. These insights ensure that the training programme meets the needs of all stakeholders and supports the successful implementation of digital twin technology. Feedback from the questionnaire helps make the training programme truly community-centered, allowing stakeholders from Brabrand/Aarhus to express their actual needs. This approach enhances BIPED's engagement with project stakeholders and gathers valuable knowledge from users.

#### Key Takeaways

- **Diverse Participation:** Stakeholders from public employees, private companies, NGOs, and educational institutions show broad interest in the BIPED project.
- **Collaboration Needs:** Effective use of BIPED's digital twin technology requires strong collaboration and coordination with other stakeholders.
- **Knowledge and Training:** Key topics include digital twin technology, energy, mobility, data sovereignty, and decision making. Preferred activities are networking meetings and customized workshops.
- **Challenges and Applications:** Main challenges are lack of knowledge/resources and coordination issues. Future applications include data analysis, scenario modeling, decision-making, education, and community engagement.

Additionally, inspiration can be drawn from tools used in other projects, benefiting from their proven concepts and achievements.

## 4. Training Programme Design

This section describes the Training Programme Design focusing on meeting learning objectives.

### 4.1. Programme Design and Framework

A Training Programme Design refers to the process of creating a structured and effective training curriculum to meet specific learning objectives. On the other hand, a didactic framework provides a structured model for implementing the didactic design - which will be further detailed in sections 6 and 7, where the processes of evaluation and implementation are elaborated.

#### 4.1.1. Didactic Relationship Model

One of the key advantages of training programme's is their capacity to connect theoretical knowledge with practical application. In the BIPED project training programme, Hiim and Hippe's Didactical Relationship Model (1) is utilized to ensure a comprehensive and reflective educational approach. This model focuses on six key elements:

**1. Learning Preconditions:**

- Assessing the prior knowledge, skills, and attitudes of participants to tailor the training effectively.

**2. Framework Factors:**

- Considering external conditions such as time, resources, and the learning environment to optimize the training process.

**3. Goals:**

- Setting clear objectives and outcomes that the training aims to achieve, ensuring alignment with the project's overall goals.

**4. Content:**

- Selecting relevant subject matter and materials that meet the needs of the participants and the project's objectives.

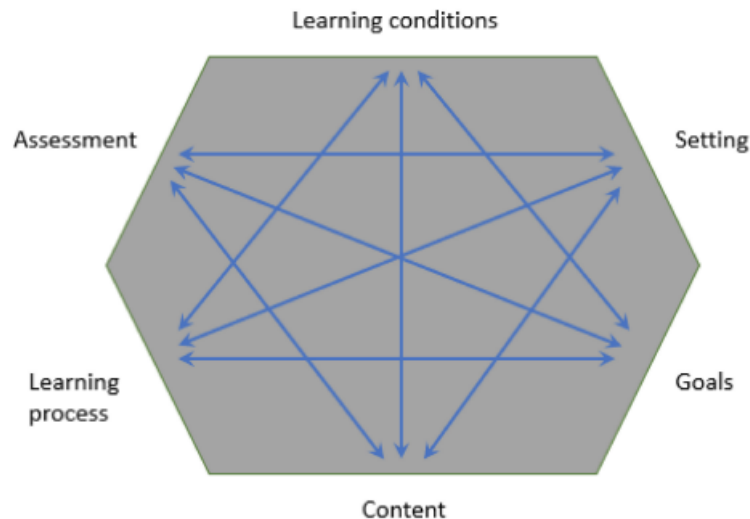
**5. Learning Process:**

- Implementing diverse methods and activities to facilitate effective learning, catering to different learning styles.

**6. Assessment:**

- Evaluating whether the learning goals have been achieved through various assessment methods, allowing for continuous improvement.

## D3.2 BIPED Training Programme



*Figure 1: The didactical relationship model by Hiim and Hippe (1)*

By integrating this model, BIPED ensures that all aspects of the training programme are considered and aligned, creating a holistic and effective learning experience for all participants.

### 4.2. Benefits of Using the Didactic Relationship Model in BIPED

The model is used especially when planning various activities in the BIPED Training Programme. Using the Didactic Relationship Model in the BIPED project, which focuses on Positive Energy Districts (PEDs) and digital twins, offers several advantages:

**Comprehensive Framework:** The model provides a structured approach to planning and analyzing educational activities, ensuring that all critical aspects of the learning process are considered. This is crucial for the complex and interdisciplinary nature of PEDs and digital twins

**Stakeholder Engagement:** By emphasizing the interconnectedness of different elements in the teaching process, the model helps in creating a balanced and effective learning experience. This is particularly important for engaging various stakeholders involved in PEDs, such as urban planners, engineers, and community members

**Adaptability:** The flexibility of the Didactic Relationship Model allows it to be tailored to different educational contexts, including the innovative and evolving field of digital twins. This adaptability ensures that the training programme remains relevant and effective as new technologies and methodologies emerge

**Community-Centered Approach:** The model supports a community-centered approach by incorporating feedback from stakeholders, which helps in aligning the training programme with the actual needs and expectations of the community. This is essential for the successful implementation and acceptance of PEDs

**Continuous Improvement:** Using the model as an analytical tool enables continuous evaluation and improvement of teaching practices. This ensures that the training programme can adapt to new insights and developments in the field of digital twins and PEDs

Overall, the Didactic Relationship Model aids in creating a structured, flexible, and responsive educational environment that can effectively support the goals of the BIPED

project both in relation to different resources collected and modules created but especially activities conducted in 2025 and 2025.

## 5. Training Modules

As initial findings from our ongoing stakeholder engagement activities suggest, there is a need for a general introduction to PEDs and digital twins for both cities, communities, the broader public and professionals involved, as the technology behind it and the opportunities it offers is still to a degree unknown to most involved. Such introduction should provide a high-level overview about what a PED and a digital twin is, how it is technically set up and how it represents physical properties of a city or neighbourhood, such as Brabrand and its community, what data-driven models can assess and where limitations are, and what benefits a digital twin can provide related to the stakeholder groups. Such stakeholder groups can be grouped on high-level in the following:

- A. digital twin users, such as decision makers, planners, researchers or the local community, interested in results and outcome derived from data-driven models within the digital twin to take informed action, and
- B. digital twin developers, such as software developers and technical professionals aiming to extend the digital twin by adding additional models and data sets, or support users from a technical angle (i.e. upload data, run and deploy models).

Based on these needs, BIPED will offer three modules over the next two years, provided, but not limited, to suggested target audiences, allowing a tailored training with the purpose to serve specific and stakeholder-related needs:

Level	Modules	Content	Target Audience
2025: Introduction & Information	<b>Module 1: Introduction to PED and Digital Twin</b>	<ul style="list-style-type: none"> <li>• General</li> <li>• Introduction to PED</li> <li>• Introduction to DT</li> <li>• Technical setup</li> <li>• Benefits</li> <li>• Limitations</li> <li>• Data sets</li> <li>• Use cases</li> <li>• Potential further implementations</li> </ul>	<ul style="list-style-type: none"> <li>• City Management</li> <li>• Planners</li> <li>• Citizens</li> <li>• Researchers</li> <li>• Developers</li> <li>• Local Industry</li> </ul>
2026: Hands-on sessions	<b>Module 2: BIPED Users</b>	<ul style="list-style-type: none"> <li>• In-depth session on BIPED work environment</li> <li>• Model description</li> <li>• Data set description</li> <li>• Results &amp; interpretation</li> <li>• Potential informed follow up actions</li> </ul>	<ul style="list-style-type: none"> <li>• Decision Maker</li> <li>• Municipality</li> <li>• Project Manager</li> <li>• Researcher</li> <li>• Citizens</li> <li>• City Planner</li> <li>• Energy Planner</li> <li>• Mobility Planner</li> </ul>
2026: Hands-on sessions	<b>Module 3: BIPED Developers</b>	<ul style="list-style-type: none"> <li>• In-depth session on BIPED backend and architecture</li> <li>• Implementation via API</li> <li>• Data sets</li> </ul>	<ul style="list-style-type: none"> <li>• Software Developers</li> <li>• Technical Professionals</li> </ul>

		<ul style="list-style-type: none"> <li>Models</li> </ul>	
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*Table 2. Training Modules*

**Our approach** will create a curated collection of materials that covers a wide range of formats, languages, perspectives, topics, and levels of specialization. This will allow different target groups to select resources in collaboration with the facilitator, based on their specific needs. Over the next two years, we plan to add various materials to the website, including valuable links and resources from other projects and contributors, as well as specific content developed by BIPED. In specific, the modules contain the following:

### 5.1. Module 1: [Introduction to the BIPED Digital Twin]

Module 1 will provide a general overview about what PEDs and digital twins are and how they can contribute to a city or local community, as in Brabrand. The module will be held as the first one in 2025, offering a common knowledge base for upcoming and more hands-on modules (Module 2 and 3) in 2026. In doing so, suggested audience groups include (but are not limited to):

- City Management
- City Planner
- Citizen
- Researchers
- Software Developers
- Local Industry

The module will be delivered as an online handbook (teaching material) available on our webpage (3) and additional 1-3 online workshops, depending on stakeholder feedback.

### 5.2. Module 2: [BIPED User]

Based on the theory and general overview on digital twins in Module 1, Module 2 will be a hands-on training that focuses on BIPED users, interested in the results and outcome of the digital twin for Brabrand. The module will be offered in 2026 and target following stakeholder groups:

- Decision Maker
- Municipality
- Project Manager
- Researcher
- Citizen
- City Planner
- Energy Planner
- Mobility Planner

These stakeholder groups are expected to be interested in practical insights of the BIPED digital twin and how to transform those into actions maximizing the impact in the real world or using the BIPED digital twin to shed light on urban and societal phenomena, relating different properties found in the urban landscape to each other, rather than technical details. Besides exploring various kinds of data sets as used in the BIPED digital twin and discussions on potential additional data sets beyond, the module will dive into soft data properties and how such properties can be collected in a quantitative way (i.e. by suggesting crowdsourcing platforms such as mobile apps, etc.) By addressing this user group, Module 2 will focus on the outputs and result interpretation of the digital twin models and how these can be translated into real-world interventions.

The module will be delivered as an online handbook (teaching material) available on our webpage (3) and additional 1-3 online workshops, depending on stakeholder feedback.

### 5.3. Module 3: [Software Developer, Technical Professionals]

In parallel to Module 2, Module 3 will target the technical details of BIPED digital twin, rather than modelling results and interpretations, and how the digital twin technical platform and APIs are set up. The module will be held in 2026 and target following stakeholder groups:

- Software Developers
- Technical Professionals

Software developers and technical professionals are expected to be interested, less in the output of the BIPED digital twin and conclusions that can be drawn from it, but more in the technical extension of it, such as to include additional models, different data sets including soft data sets, and libraries of software packages via API interfaces. Additionally, interest in the functionalities of the BIPED DT should be considered, as these can be viewed as valuable outputs of the training programme. This focus will help users understand and leverage the full potential of the platform. This makes a module describing the details of the components of the technical backbone, the BIPED platform, necessary as it will outline technical procedures of how to access the platform from a software perspective. By supporting the steady extension of BIPED, this module opens doors to discuss topics related to energy that have not been discussed before in relation to PED, while not limiting them.

The module will be delivered as an online handbook (teaching material) available on our webpage (3) and additional 1-3 online workshops, depending on stakeholder feedback.

## 6. Evaluation and Adaptation

Evaluation and adaptation are important for ensuring effectiveness and sustainability. In the D3.2 BIPED Training Programme, evaluation assesses whether goals are being met, identifies strengths and weaknesses, informs decision-making, ensures accountability, and measures impact. Additionally, adaptation allows for responding to feedback, maintaining flexibility, fostering continuous improvement, ensuring sustainability, and encouraging innovation. Together, these processes enable a project to remain relevant, effective, and resilient over time.

### 6.1. Evaluation

In D3.2, activities and initiatives will be continuously evaluated to ensure the project's development and quality. For selected activities, the following steps will be taken to ensure a valuable evaluation of the training programme:

## D3.2 BIPED Training Programme

1. **Clear Objectives:** Define what success looks like
2. **Collect Data:** Ideally, gather both quantitative and qualitative data
3. **Analyze Data:** Assess the data to identify trends, strengths, and areas for improvement.
4. **Report Findings:** Share the results with stakeholders and the BIPED project to ensure transparency and accountability.

The evaluation will be designed for the specific activities in 2025 and 2026.

### 6.1.1. KPIs and the M&E framework in BIPED

Connecting the evaluation to relevant KPIs and the M&E framework in BIPED can enhance the training programme's effectiveness. Here are some possible connections:

- **User Engagement:** Track active users on the BIPED DT platform to measure reach and stakeholder engagement.
- **Training Effectiveness:** Assess knowledge and skill improvements related to Positive Energy Districts and digital twins through pre- and post-training evaluations.
- **Feedback and Satisfaction:** Collect and analyze user feedback and satisfaction scores to gauge the programme's success in meeting user needs.
- **Implementation Success:** Monitor the adoption rate of digital twin technology in Positive Energy Districts to reflect the training programme's practical impact.
- **Community Involvement:** Measure community participation and feedback to ensure the programme aligns with community needs.

Integrating these KPIs into the M&E framework (as outlined in D4.1) provides a structured approach to monitor and evaluate the training programme's progress and impact, ensuring continuous improvement and alignment with project goals.

## 6.2. Adaption

To adapt the evaluation for both subsequent activities and scaling purposes, the following steps should be followed:

1. **Review Feedback:** Consider feedback from stakeholders and evaluation results.
2. **Identify Changes:** Determine what adjustments are needed to improve the project.
3. **Implement Changes:** Make the necessary modifications to the project plan or execution.
4. **Monitor Impact:** Continuously observe the effects of the changes and make further adjustments as needed.

By following these steps BIPED can remain effective, relevant, and resilient over time.



## 7. Implementation Plan and Strategy

### 7.1. Best Practices for Effective Implementation

Best practices for effective implementation of the/a BIPED training programme will apply/contain the following methods and elements:

1. **Clearly define objectives, goals, and potential outcomes** of the training programme, as well as of the project.
2. **Understand the target audience** (should be assessed before the training sessions take place, but based on Community Insights from the questionnaire made in this deliverable D2.3 (section 3.1)):
  - a. Their roles
  - b. Their daily work activities
  - c. Use cases relevant to the audience
  - d. In relation to the offered training programme:
    - i. Their tech skills
    - ii. Their domain knowledge
3. **Develop interesting, engaging, varying, and clear content**
  - a. Different learning formats available (online, offline, workshops, exercises, quizzes, one-on-one sessions, etc.)
  - b. Multilingual availability of material (e.g., in Danish and English)
  - c. Content to be potentially easily editable (to update it based on user feedback)
4. **KPIs and progress monitoring**
  - a. Collect and use the existing KPIs (e.g., from the project) or define suitable KPIs, and establish their baseline values.
  - b. Define when and how to evaluate the selected KPIs (e.g., at the beginning of a training session, after a training session)
5. **Interactive improvement cycle**
  - a. Continuous feedback and its assessment, as well as integration in the next Training Programme version (i.e., update of the Training Modules and practices)
6. **Available support to end-users**
  - a. Project partners to offer on-demand sessions for support on training material, and/or tools that are presented
  - b. Shared and openly available collected knowledge (FAQs, user manuals, best practices, recordings of streamed training sessions, etc.)
7. **Provide/exploit user-friendly tools** for any type of interaction with the users (where technology is needed), e.g., Google Forms, Mentimeter, etc. However, accessibility features that cater to all age groups and abilities are included here. Specifically, the experiences detailed in section 3.1 of this document, which examine insights from the target group, are also incorporated.

### 7.2. Timeline and Milestones

The following time-relevant, high-level events are foreseen with the goal of developing, rolling out, collecting end-user feedback, evaluating and improving the Training Modules



[illegible]

## D3.2 BIPED Training Programme

Figure 3 illustrates these elements and milestones over a two-year timeline, aligning with the planned implementation period.

*Figure 3: Milestones for the BIPED Training Programme over a two-year timeline*

### 7.3. Risk Management

When delivering training modules to diverse end-users such as policymakers, decision-makers, city planners, and citizens (as listed in Section 5), we need to anticipate and mitigate potential risks that could arise. This is important as our goal is to educate and create an environment for end-users to uptake the solutions and services presented, which in the end is necessary to achieve the vision for Brabrand:

*“By the end of the [BIPED] project, Brabrand has been placed on the global stage as a shining example of sustainable, inclusive and prosperous urban living, where innovation harmonizes with community spirit to create a vibrant, thriving district.” (from the BIPED Deliverable D1.1 “Project Vision”, February 2024).*

Table 3 provides a list of potentially relevant risks with each their own possible mitigation measures to minimize their occurrences. Furthermore, for clarification and focus purposes, we categorize the risks in several categories: technical risks, user-related, content and delivery, organizational/administrative, ethical/social, as well as a post-training risk category.

The Training Module owner(s) will monitor the risks during the standard progress monitoring of the development of the Training Modules and their implementation. Any detected risks from the table (or additional ones that may be identified in the meantime) will be addressed through the proposed mitigation measures.

Risk	Impacts	Mitigation Actions	Risk Categories
Low number of (relevant) end-users attending the workshops	Insufficient participant diversity or expertise may limit the breadth of perspectives and real-world applicability.  Targeted end-users may miss critical knowledge, leading to poor decision-making or improper tool usage  BIPED tools/services adoption/uptake by end-users not achieved	Stakeholder/end-user mapping (D3.2)  Reach out to end-users in a targeted way that highlight the relevance of the workshop to their specific roles  Offer flexible formats (hybrid, do-it-yourself material), and flexible times (respect users' working schedules, 24/7 available training material)	User-related Organizational Ethical/social

### D3.2 BIPED Training Programme

Low number of (relevant) end-users accessing, reading, trying out the (online) training material	<p>Insufficient participant diversity or expertise may limit the breadth of perspectives and real-world applicability.</p> <p>Targeted end-users may miss critical knowledge, leading to poor decision-making or improper tool usage.</p> <p>BIPED tools/services adoption/uptake by end-users not achieved</p>	<p>Stakeholder/end-user mapping (D3.2)</p> <p>Offer flexible formats of training material (videos, infographics, do-it-yourself material, interactive, simulations).</p> <p>Offer possibility to end-users to arrange 1-on-1 online session with an expert</p> <p>Promote Training Material via different channels (social media, website, e-mails, newsletters)</p> <p>User friendly design of all materials!</p>	<p>User-related</p> <p>Organizational</p> <p>Ethical/social</p>
Low quality of the training material	<p>Users misinterpreting or misusing the tools, leading to incorrect decisions</p> <p>Users perceive the training material as unprofessional and insignificant</p> <p>BIPED tools/services (including the training material) adoption/uptake by end-users not achieved</p>	<p>Include experienced people and experts on the subject (domain, knowledge transfer, training) to review the produced material.</p> <p>Quality checks, proofreading, technical tests</p> <p>Use end-user relevant use cases and examples</p> <p>Use user-friendly formats (e.g., infographics, interactive quizzes, videos)</p> <p>Update material based on end-user feedback</p>	<p>Technical</p> <p>Content and delivery</p>
Language barrier limiting non-English speaking users to interact with the Training Material	<p>Misunderstandings, misinterpretations</p> <p>Incorrect tool/service implementation and usage</p> <p>BIPED tools/services (including the training material) adoption/uptake by end-users not achieved</p>	<p>Translate all training materials (manuals, presentations, videos) into the language of the target audience.</p> <p>Exploit automatic AI-based translators</p> <p>Local project partners offer Training Modules workshops</p>	<p>Users</p> <p>Technical</p> <p>Content and delivery</p> <p>Ethical/social</p>
Limited feedback from end-users, thus not really assisting the	<p>No improvements interesting/relevant to end-users</p> <p>Disconnect between training</p>	<p>Simple feedback approaches (forms, simple rating systems, chatbots) and inclusive elements (anonymous option)</p> <ul style="list-style-type: none"> <li>• Clear and user-relevant</li> </ul>	<p>Users</p>

### D3.2 BIPED Training Programme

improvement of the Training Modules	and real-world application  BIPED tools/services (including the training material) adoption/uptake by end-users not achieved	questions aimed at improving the training modules and offered services.  Collect feedback before and after training sessions to evaluate expectation vs satisfaction.	
Technical issues with the tools or services being demonstrated/ shown.	Training Material not available, not possible to present  Disruption of training sessions  End-users may lose confidence and trust in the presented tools/services and project impact, and no uptake of BIPED services in future/post-project/their daily workflows.  Lack of meaningful end-user feedback to improve services	Perform dry runs to identify and solve potential issues  Available support during workshops/training, and availability of support for online material (via, e.g., e-mail, telephone, chat, etc.)  For live demonstrations, create videos as back-up solutions.  Collect feedback on any issues to improve future training sessions.  Create clear user-friendly user-manuals	Technical
Unclear roles and responsibilities	Confusion around who should:  implement or use the services and tools post-training and post-project.  provide feedback for improvement of the Training Material  resulting in no improvements, no satisfaction with offerings, and no uptake of BIPED services in future/post-project.	Clearly identify and stage/communicate who the relevant users are for Module 1, Module 2 and Module 3.  Clearly communicate the needed roles for the use of services.	Post-training User

## D3.2 BIPED Training Programme

Misalignment between user expectations and (possible) project outputs	<p>Disconnect between training and user-expected application (user dissatisfaction)</p> <p>BIPED tools/services (including the training material) adoption/uptake by end-users not achieved</p> <p>Perception of the project and potential future projects as not useful or desired</p>	<p>Clearly communicate the project goals, limits, and scope</p> <p>Include end-users in the improvement via their feedbacks</p> <p>Align expectations in an early stage</p> <p>Collect requirements and users needs, user stories</p>	User Content and Delivery
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*Table 3. Risk Management*

## 8. Accessibility of resources in the BIPED training programme

This section outlines the accessibility of resources in the BIPED training programme. It includes details on online access and specifies which resources will be available. As a starting point, accessibility is achieved by publishing material online on the BIPED website. However, insights from section 3 of this document reveal that digital inclusion and the needs of everyone must be considered from the outset. This is why significant attention is given to stakeholders and users' needs and preferences regarding materials and accessibility in relation to the didactic considerations in the implementation phase, where personal contact and activities such as networking events play a crucial role in the implementation process.

### 8.1. Online Accessibility and Resources

The plan is to allocate space on the website for materials related to the BIPED training programme (D3.2). Initially, the plan is to feature a simple visualization of the training programme, which will be rolled out over 2025 and 2026 (see section 7). Over the next two years, various materials will be added to the website, including **1)** a collection of valuable links and resources from other projects and contributors, as well as **2)** specific content developed by BIPED including a handbook with different materials (refers to modules 1, 2 and 3 described in section 5). The website should be regarded as the primary tool for effective communication and dissemination in the BIPED Training Programme, and as a means to achieve the goal.

The BIPED training program refers to the plan established and offered by the BIPED project to local stakeholders in Brabrand (section 1-7 in this document), as well as to other stakeholders beyond Aarhus interested in drawing inspiration from our activities and materials. Below (figure 3) is a simplified visualization / onepager of the BIPED training programme, which condenses the key points from D3.2. This summary highlights the essence of the program and will be available on the BIPED website:

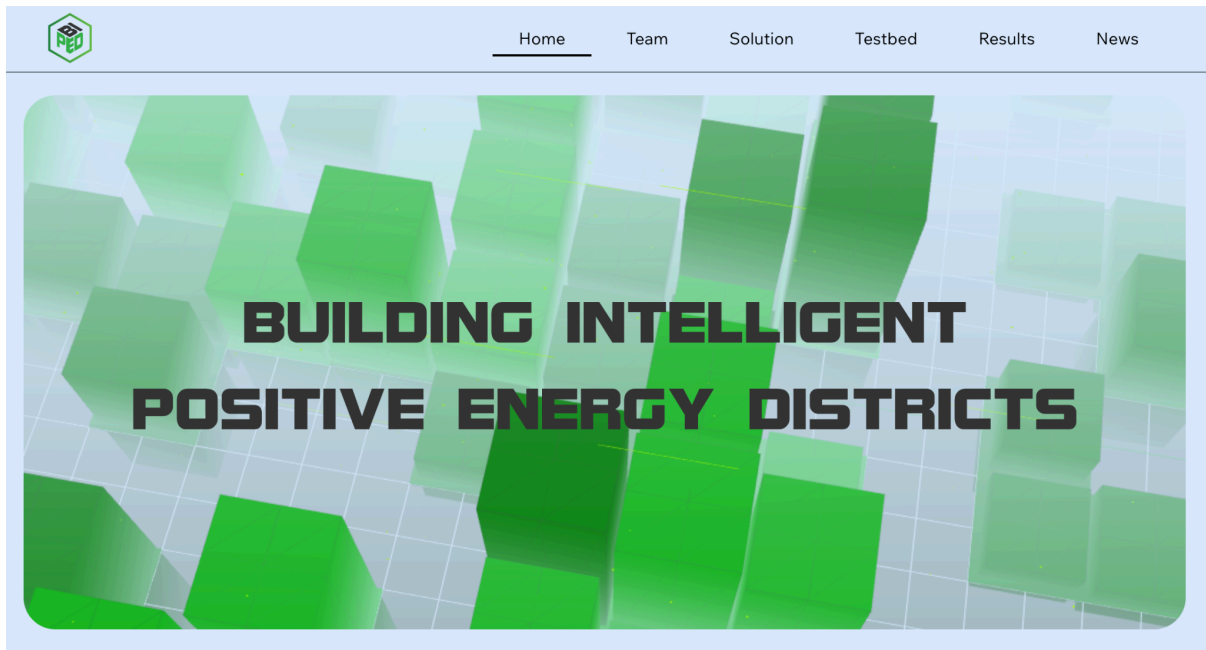


Figure 3: Simplified visualization of the BIPED training programme

### 8.1.1 Preview of the BIPED Training Materials Page

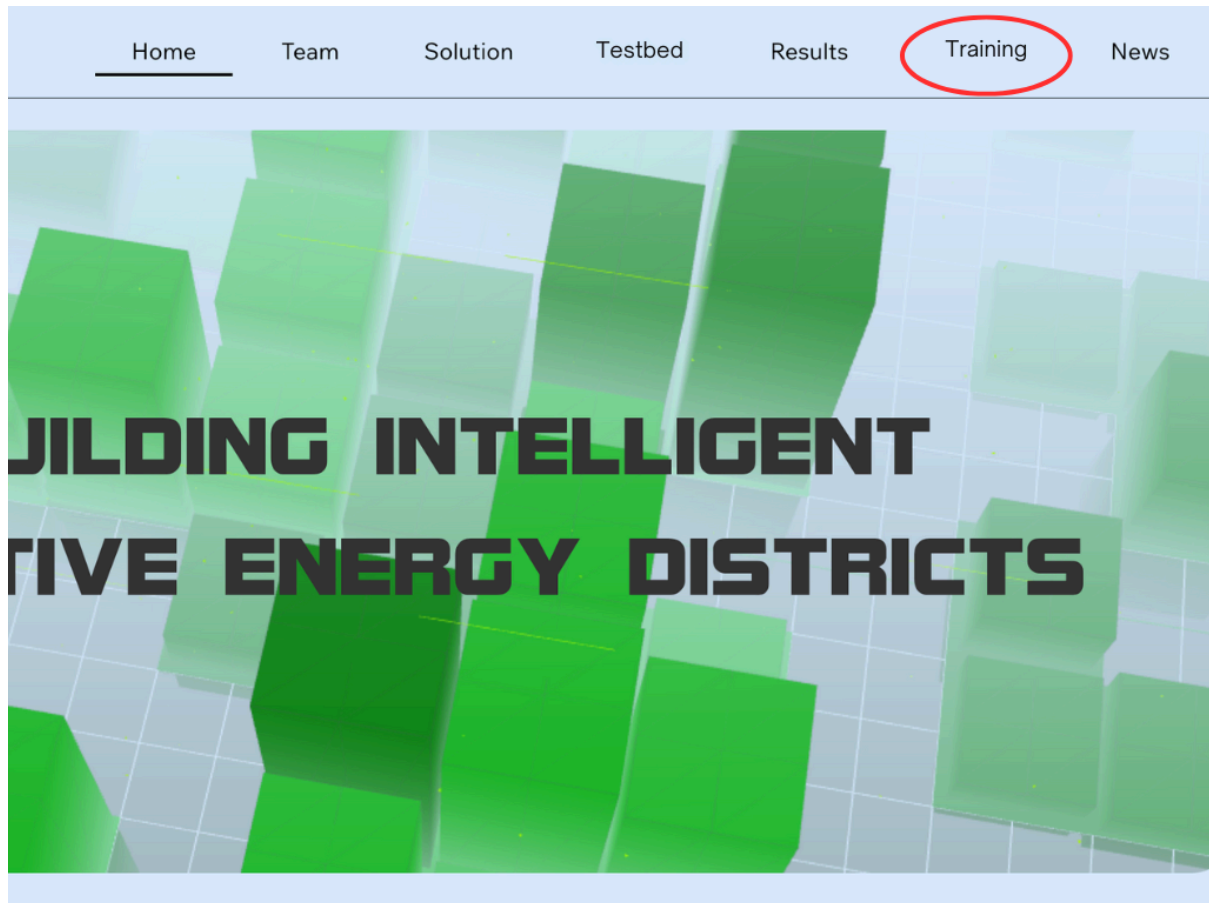
Here is the draft prototype for the dedicated Materials (training and resources page) on the BIPED website (3). The page will be structured as follows:

1. **Original BIPED page:** Shows The main entry point of the website without the 'Training' in the menu: <https://www.bi-ped.eu/>



*Figure 4: BIPED Homepage (original)*

2. **BIPED Homepage:** The main entry point of the website with 'Training' in the menu.



*Figure 5: Prototype: BIPED Homepage*



## D3.2 BIPED Training Programme

### 3. **BIPED Footer:** The bottom section of the website with additional Training Materials

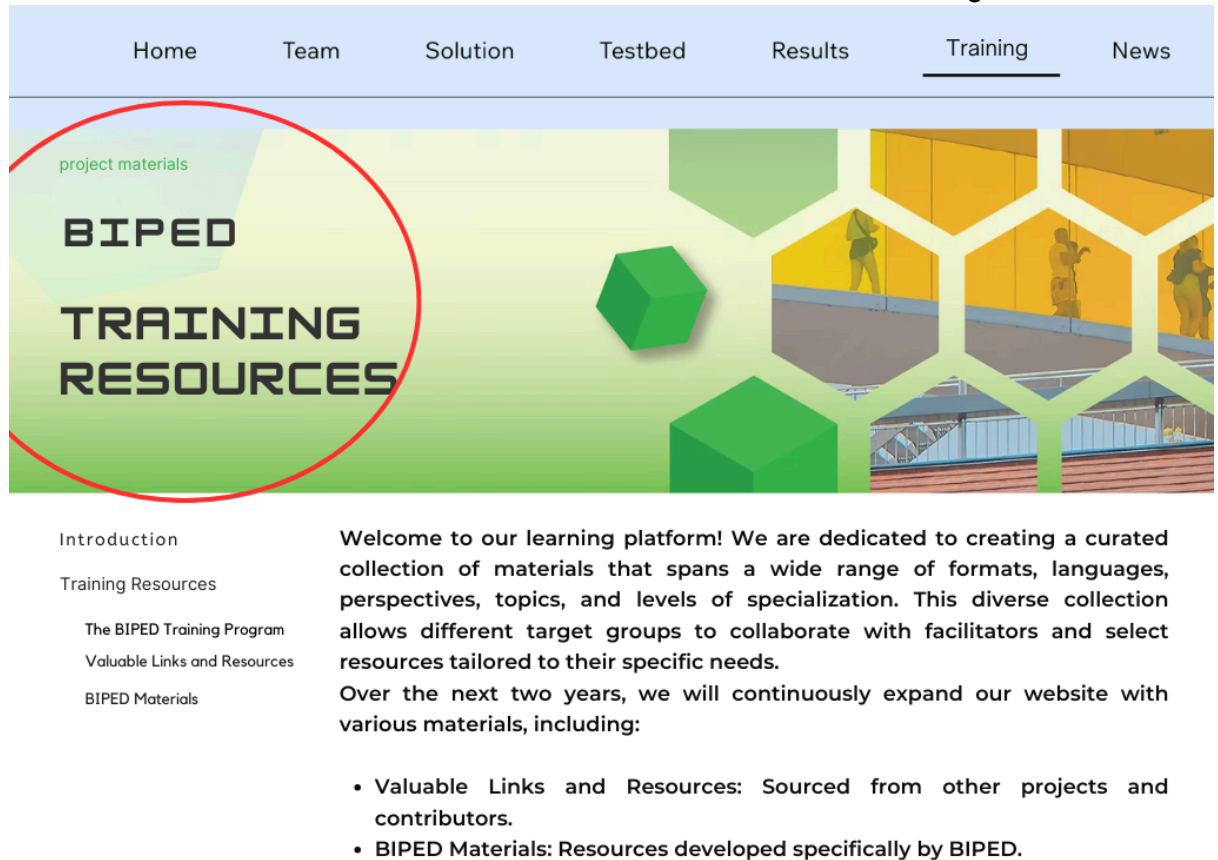


Figure 6: Prototype: BIPED Footer

## D3.2 BIPED Training Programme

4. **Training Programme Integration:** An example of how the training programme (handbook) is seamlessly integrated into the website:

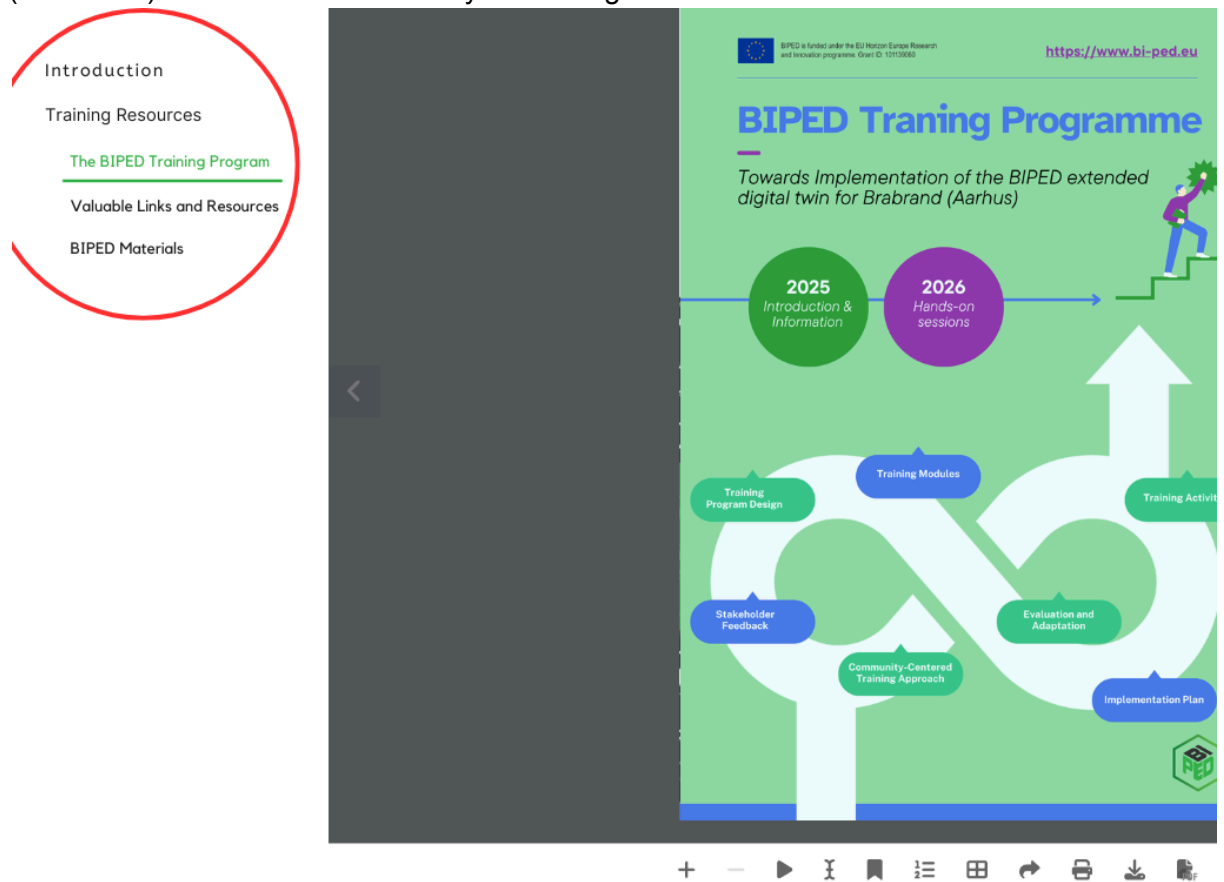


Figure 7: Prototype: Training Programme Integration

As stated at the beginning of this section, all online materials are accompanied by a thorough assessment of stakeholders' needs concerning didactic considerations during the implementation phase. This ensures that the materials are not isolated but are integrated into a human-centered approach.

## 9. Conclusion and next steps

**The D3.2 BIPED Training Programme**, characterized by its community-centered approach and modular structure, is set to greatly enhance stakeholder engagement and skill development. By utilizing community resources and promoting collaborative learning, the programme aims to create a supportive network that fosters continuous improvement. The modular design offers flexibility and targeted learning, allowing participants to progress at their own pace while achieving the programme's goals.

This document establishes the framework for implementing the BIPED extended digital twin for Aarhus and details the work planned for BIPED T3.3 over the next two years.

### 9.1. Deliverable Components:

The deliverable comprises two main parts:

- 1) **Training design and framework:** This detailed document provides insights into the BIPED Training Programme process where the training design and framework should be emphasized as the central components (section 1-7).
- 2) **Communication and dissemination tool:** Visualization of the Training Programme and its integration on the BIPED Website (section 8).

#### 9.1.1. Training design and framework – Key Highlights from Sections 1-7

**Section 1:** The BIPED Training Programme aims to bridge theoretical knowledge with practical application, ensuring stakeholders can effectively implement their learning in real-world scenarios. This deliverable details the creation of training resources to educate stakeholders through a community-centered approach, addressing diverse needs. The programme is designed to enhance immediate capabilities and facilitate future scalability and replicability beyond Aarhus. By integrating these principles into the design phase, the methodologies and practices developed can be effectively transferred and adapted to various contexts.

**Section 2:** The Community-Centered Training Approach in the D3.2 BIPED Training Programme focuses on enhancing community involvement by addressing local needs and conditions. It builds on the human-centric principles of the D3.1 BIPED Community, using a quadruple helix model and community-driven urban planning. The approach ensures stakeholder engagement and inclusivity, aiming for successful and sustainable PED projects. The principles of inclusivity, scalability, and adaptability are further elaborated in subsequent sections.

**Section 3:** In developing the training programme, a questionnaire was conducted and other projects were reviewed to gather valuable insights. These findings have directly influenced the need for and design of the training programme, ensuring it is comprehensive, effectively communicated, well-supported, and collaborative. By integrating these lessons into the training programme, a more effective and responsive learning environment can be created. These insights ensure that the training programme meets the needs of all stakeholders and supports the successful implementation of digital twin technology. Feedback from the questionnaire helps make the training programme truly community-centered, allowing stakeholders from Brabrand/Aarhus to express their actual needs. This approach enhances BIPED's engagement with project stakeholders and gathers valuable knowledge from users. Additionally, inspiration can be drawn from tools used in other projects, benefiting from their proven concepts and achievements.

## D3.2 BIPED Training Programme

**Section 4:** The Training Programme Design in the BIPED project focuses on creating a structured curriculum to meet learning objectives, using Hiim and Hippe's Didactic Relationship Model. This model connects theoretical knowledge with practical application through six key elements: learning preconditions, framework factors, goals, content, learning process, and assessment. The approach ensures a comprehensive, adaptable, and community-centered training programme, engaging various stakeholders and allowing for continuous improvement.

**Section 5:** The BIPED Training Programme will offer three modules over the next two years to address the needs of various stakeholders. Module 1 (2025) will introduce digital twins, targeting city management, planners, citizens, researchers, developers, and local industry. Module 2 (2026) will provide hands-on training for BIPED users, focusing on practical insights and real-world applications for decision makers, project managers, and planners. Module 3 (2026) will cater to developers, covering technical aspects and API implementation. The programme will include a curated collection of materials and be delivered through online handbooks and workshops.

**Section 6:** Evaluation and adaptation are crucial for the D3.2 BIPED Training Programme to ensure its effectiveness and sustainability. Evaluation involves defining objectives, collecting and analyzing data, and reporting findings to stakeholders. Key performance indicators (KPIs) and the Monitoring and Evaluation (M&E) framework help track user engagement, training effectiveness, feedback, implementation success, and community involvement. Adaptation involves reviewing feedback, identifying and implementing changes, and monitoring the impact to maintain relevance and resilience over time.

**Section 7:** The Implementation Plan and Strategy for the BIPED Training Programme includes best practices such as defining clear objectives, understanding the target audience, developing engaging content, and using KPIs for progress monitoring. The timeline involves developing, rolling out, and updating training modules through an iterative improvement cycle, with four key milestones over two years. Risk management involves anticipating and mitigating potential risks for diverse end-users, ensuring the programme's success and alignment with the project's vision for Brabrand.

### 9.1.2. Communication and dissemination tool - Key Highlights from Section 8

**Section 8:** The BIPED training programme aims to educate local stakeholders in Brabrand and others through a structured plan for 2025 and 2026. The programme will be visualized and summarized on the BIPED website, which will serve as the primary tool for communication and dissemination. Various materials, including a handbook and resources from other projects, will be added to the website over two years. The website will feature a dedicated section for training materials, ensuring easy access and effective integration of the training programme.

### 9.2. Next steps

Overall, the next steps within the BIPED Training Programme will be:

- **Finalize the Training Modules:** Ensure all training modules are complete and ready for deployment. This includes refining content based on feedback and ensuring alignment with the programme's objectives.
- **Collect diverse materials:** Collect resources on PEDs and Digital Twins in a variety of formats, languages, perspectives, topics, and levels of specialization.
- **Integrate Training Programme on the Website:** Visualize and integrate the training programme on the BIPED website, highlighting the training design and framework as central components.
- **Stakeholder Engagement:** Engage with community stakeholders to promote the training programme. This includes organizing informational sessions, distributing materials, and encouraging participation.
- **Launch and Monitor:** Officially launch the training programme and start monitoring its progress. Collect feedback from participants and stakeholders to make continuous improvements.
- **Regular Reviews and Adjustments:** Conduct regular reviews of the training programme and the digital twin implementation. Make necessary adjustments based on feedback and performance metrics to ensure the programme's success.

## 10. Reference list

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### 10.2. Websites:

- 2) BIPED (2024, July). BIPED Community ([Booklet](https://js.certifiedcode.io/pdf-viewer/index.html?options=%7B%22pdfUrl%22%3A%22https%3A%2F%2Fef679677-8ea5-425e-a09d-d0cd557484d0.usrfiles.com%2Fugd%2Fef6796_39bdf2b1b6ee4e1288cd17188b7c06d2.pdf%22%2C%22viewMode%22%3A%22webgl%22%7D#page1)).  
[https://js.certifiedcode.io/pdf-viewer/index.html?options=%7B%22pdfUrl%22%3A%22https%3A%2F%2Fef679677-8ea5-425e-a09d-d0cd557484d0.usrfiles.com%2Fugd%2Fef6796\\_39bdf2b1b6ee4e1288cd17188b7c06d2.pdf%22%2C%22viewMode%22%3A%22webgl%22%7D#page1](https://js.certifiedcode.io/pdf-viewer/index.html?options=%7B%22pdfUrl%22%3A%22https%3A%2F%2Fef679677-8ea5-425e-a09d-d0cd557484d0.usrfiles.com%2Fugd%2Fef6796_39bdf2b1b6ee4e1288cd17188b7c06d2.pdf%22%2C%22viewMode%22%3A%22webgl%22%7D#page1)
- 3) BIPED (2024). The BIPED website. <https://www.bi-ped.eu/>
- 4) SPARCS (2024, September 25). New ways to communicate about [SPARCS project](https://sparcs.info/en/news/new-ways-to-communicate-about-sparcs-project-to-the-residents-a-ped-comic/) to the residents – a PED-comic.  
<https://sparcs.info/en/news/new-ways-to-communicate-about-sparcs-project-to-the-residents-a-ped-comic/>
- 5) SPARCS (2024, September 5). SPARCS [Empowers Youth with New Engagement Models: a guide to Buddy Class concept](https://sparcs.info/en/news/sparcs-empowers-youth-with-new-engagement-models-a-guide-to-buddy-class-concept/).  
<https://sparcs.info/en/news/sparcs-empowers-youth-with-new-engagement-models-a-guide-to-buddy-class-concept/>
- 6) SPARCS (2024, September 5). [AV-material](https://sparcs.info/en/av-material/?Z1Sf7LD_filter_0=AV+Materials&Z1Sf7LD_filter_1).  
[https://sparcs.info/en/av-material/?Z1Sf7LD\\_filter\\_0=AV+Materials&Z1Sf7LD\\_filter\\_1](https://sparcs.info/en/av-material/?Z1Sf7LD_filter_0=AV+Materials&Z1Sf7LD_filter_1)

## 11. Annexes

### 11.1. Annex 1: Community Insights: The Questionnaire (in danish)

#### Interessent- og brugeranalyse

##### BIPED's kompetence- og samarbejdsplan

###### Introtekst

Kære Stakeholder i Brabrand,

Vi inviterer dig til at deltage i vores survey for at forstå dine behov og præferencer i forbindelse udviklingen og brugen af BIPED's digitale tvilling af Brabrand. Målet med den digitale tvilling er at:

- Skabe en model af strømme i Brabrands energinet
- Give indsigt i forbrugsmønstre
- Understøtte grønne valg og energirelaterede forretningsmodeller
- Muliggøre energifleksibilitet
- Støtte energifællesskaber

Din viden og indsigter vil særligt være værdifulde i udformningen af BIPEDs kompetence- og samarbejdsplan, der vil beskrive, hvilke tiltag og aktiviteter BIPED sætter i gang i 2025 og 2026.

Din besvarelse vil hjælpe os med at identificere, hvordan færdigheder inden for digitale tvillinger og positive energidistrikter kan målrettes, opnås og skabe værdi.

Vi sætter pris på din feedback og takker for din tid.

#### Sektion 1: Generel information

Navn (Valgfrit):

Hvilken gruppe beskriver dig bedst?

- Privat virksomhed
- Offentlig ansat med beslutningskomptence
- Offentlig ansat uden beslutningskomptence
- Borger
- Forening /NGO
- Uddannelse og Innovation
- Andet?

Rolle/Position:

- Teknisk ansvarlig
- Data Manager
- Byplanlægger/energiplanlægger
- Analytiker/Forsker

## D3.2 BIPED Training Programme

- Projektleder/koordinator
- Andet?

Organisation:

Jeg bor og/eller arbejder i:

- Brabrand
- Aarhus kommune
- Andet

Kontaktinformation / e-mail (Valgfrit):

På en skala fra 1 til 10 (1 = meget, 10 = slet ikke), hvor godt er dit kendskab til digitale tvillinger?

På en skala fra 1 til 10, hvor tit bruger du digitale værktøjer til at træffe beslutninger?

Hvilke specifikke spørgsmål, udfordringer eller emner vil du gerne have, at en digital tvilling hjælper dig med?

### Sektion 2: Hvad har du brug for?

I 2025 og 2026 vil vi i BIPED-projektet lave forskellige tiltag og aktiviteter. Hvad vil være dit primære mål med at deltage i BIPEDs tiltag og aktiviteter?

- Forståelse af BIPED's digitale tvilling fra et teknisk perspektiv
- Lære at bruge og vedligeholde BIPEDs digitale tvilling
- Udføre meningsfuld analyse ved hjælp af BIPEDs digitale tvilling
- Forberede og deltage i dataindsamling ved hjælp af BIPED digitale tvilling
- Andet (specificer venligst):
- Ved ikke

Hvad vil du bruge BIPED's digitale tvilling til i fremtiden?

- Modellering og simulering af scenarier (lave forudsigelser)
- Videreudvikling (fx tilføjelse af datamodeller osv.)
- Andet (specificer venligst):
- Ved ikke

Hvilke emner er mest relevante for dine behov? (Vælg alle der passer)

- Grundlæggende viden om digital tvilling teknologi
- Grundlæggende viden om positive energidistrikter
- Detaljeret brug og betjening
- Vedligeholdelsesprocedurer
- Dataanalysemetoder
- Viden om energi, mobilitet, data suverænitet, datadrevet beslutningstagning (alt det, som tvillinge teknologien muliggør).

### D3.2 BIPED Training Programme

- Andet (specificer venligst):
- Ved ikke

Hvilken type aktiviteter vil du foretrække (Prioriter 2-3 muligheder)?

- Fysiske workshops og kurser
- Online workshops og kurser (webinarer)
- Workshops på efterspørgsel: Fx tilpassede workshops baseret på specifikke behov.
- E-læringsmoduler (selvlære)
- Fysiske materialer - fx en bog (selvlære)
- Blended learning (kombination af fysisk og online)
- Mentorordninger: Fx en-til-en vejledning med en ekspert.
- Andet (specificer venligst):
- Ved ikke

Der er fire grundlæggende måder at lære på: Hvordan vil du vurdere, at du lærer bedst (prioriterer fra 1-4)?

- lærer ved at lytte (den auditive)
- lærer ved at se (den visuelle)
- lærer ved at røre (den taktile)
- lærer ved at gøre (den kinæstetiske)
- Jeg lærer bedst ved en kombination af de 4 måder at lære på.
- Andet (uddyb gerne)
- Ved ikke

### Sektion 3 : Nuværende udfordringer

Hvad er de største udfordringer, som du står overfor i din nuværende rolle i forbindelse med brugen af BIPED's digitale tvilling? (Vælg alle der passer)

- Manglende viden/ressourcer
- Tekniske vanskeligheder
- Datahåndteringsproblemer
- Koordinering med andre interessenter
- Tid
- Ikke relevant eller ved ikke
- Andet (specificer venligst):
- Ved ikke

Hvordan håndterer du i øjeblikket disse udfordringer (specificer venligst)?

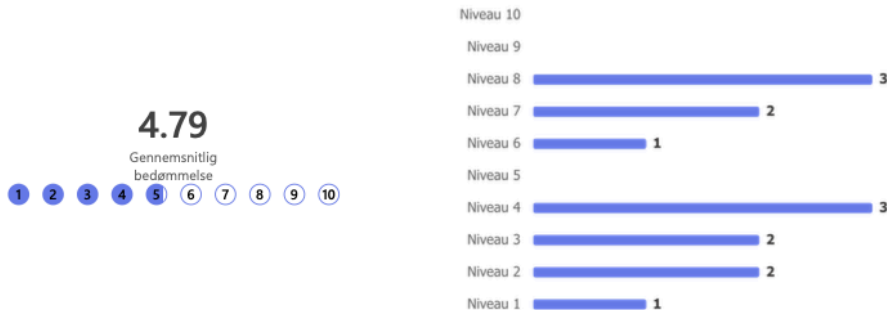
### Sektion 4: Feedback og forslag

Del gerne yderligere kommentarer, behov eller indsigter, du har vedrørende udarbejdelsen af kompetence- og samarbejdsplan?

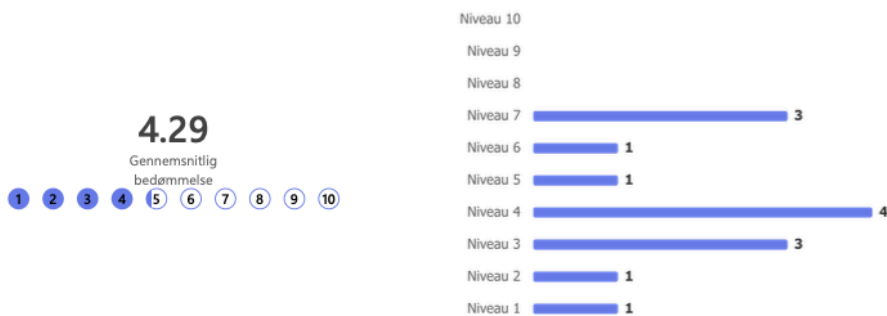


## 11.2. Annes 2: The stakeholders' responses (in danish)

18. På en skala fra 1 til 10 (1 = meget godt, 10 = slet ikke), hvor godt er dit kendskab til positive energidistrikter?



19. På en skala fra 1 til 10 (1 = meget ofte, 10 = slet ikke), hvor tit bruger du datadrevne værktøjer til at træffe og/eller blive inspireret til at træffe beslutninger?



20. Hvilke specifikke spørgsmål, udfordringer eller emner vil du gerne have, at en digital tvilling hjælper dig med?

**5**  
Svar

Seneste svar  
"overblik og detaljer vedr. elforbrug / produktion i 8220. Gerne på transformaterni... "  
"Information om elnettet mht områder begrænset af transformatorstationer"  
...

21. Del meget gerne yderligere kommentarer, behov eller indsigter du har vedrørende udarbejdelsen af BIPEDs kompetence- og samarbejdsplan (valgfri)?

**3**  
Svar

Seneste svar  
"Vi er meget nysgerrige på arbejdet med indsamlingen af data og de oplevelser so..."  
...

### 11.3. Annex 3: Inspiration from other projects

**SPARCS:** <https://sparcs.info/en/>

SPARCS is working to create a network of Sustainable energy Positive & zero cARbon Communities in two lighthouse and five fellow cities.

The project supports these cities as they deal with the multifaceted challenges they face on their path to sustainability. By setting up inclusive management and planning models and processes, SPARCS aims to demonstrate and validate innovative solutions for smart and integrated energy systems that will transform these cities into sustainable, zero carbon ecosystems with improved quality of life for their citizens.

It will do this by engaging with all the relevant stakeholders from industry and innovative SMEs and research organisations, to urban planning and technical departments. A key criterion for success is citizen involvement, and SPARCS has a clear focus on engaging with citizens and putting urban dwellers at the heart of its efforts.

**TIPS4PED:** <https://tips4ped.eu/>

To accelerate progress toward decarbonisation, the Horizon Europe project TIPS4PED will support municipalities in the implementation of Positive Energy Districts (PEDs). By developing an Integrated Assessment Platform (IAP) to facilitate decision-making, as well as designing and testing the real-world effectiveness and viability of a digital twin-based platform, TIPS4PED will help pave the way for emissions reductions across Europe.

**EXPEDITE:** <https://expedite-project.eu/>

ExPEDite aims at creating and deploying a novel digital twin, allowing for real-time monitoring, visualization and management of district-level energy flows.

## 11.4. Annex 4: Community Insights: Questionnaire to the local stakeholders in Brabrand (the questions in English)

2. I am participating in this questionnaire as a: \*

- ☐ Private company
- ☐ Public employee with decision-making authority and/or responsibility
- ☐ Public employee
- ☐ Citizen
- ☐ Association / NGO
- ☐ Education and Innovation

3. My physical workplace is located in: \*

- ☐ Brabrand
- ☐ The City of Aarhus

4. I live in: \*

- ☐ Brabrand
- ☐ The City of Aarhus

5. My Association / NGO is located in: \*

- ☐ Brabrand
- ☐ The City of Aarhus

## D3.2 BIPED Training Programme

6. My education and innovation are located in: \*

- ☐ Brabrand
- ☐ The City of Aarhus

7. **Role/Position at my workplace:** \*

- ☐ Technical Manager
- ☐ Data Manager
- ☐ Urban Planner/Energy Planner
- ☐ Analyst/Researcher
- ☐ Project Manager/Coordinator

8. **Organization (optional):**

9. **Contact information / email (optional):**

## What do you need?

We would like to understand your needs and preferences.

10. In 2025 and 2026, we in the BIPED project in Brabrand will undertake various initiatives and activities focused on BIPED's digital twin and positive energy districts, targeted at you and your needs. What will be your primary goal in participating in BIPED's initiatives and activities? \*

- ☐ Understanding BIPED's digital twin from a technical perspective.
- ☐ Understanding positive energy districts.
- ☐ Learning to use and maintain BIPED's digital twin.
- ☐ Conduct meaningful analysis using BIPED's digital twin.
- ☐ Understanding and using data in BIPED's digital twin and in general.
- ☐ Don't know.

11. What will you use BIPED's digital twin for in the future? \*

- ☐ Modeling and simulating scenarios (making predictions).
- ☐ Further development (e.g., adding data models, etc.)
- ☐ Don't know

## D3.2 BIPED Training Programme

12. Which topics are most relevant to you? (Select all that apply). \*

- ☐ Basic knowledge of digital twin technology
- ☐ Basic knowledge of positive energy districts
- ☐ Detailed use and operation of digital twin technology
- ☐ Maintenance and operation of digital twin technology
- ☐ Data analysis methods and visualizations
- ☐ Knowledge about energy, mobility, data sovereignty, data-driven decision making
- ☐ Don't know

13. What type of initiatives and activities would you prefer (Prioritize and choose 2-3 options)? \*

Vælg højst 3 indstillinger.

- ☐ Physical workshops and courses
- ☐ Online workshops and courses (webinars)
- ☐ On-demand workshops: For example, customized workshops based on specific needs.
- ☐ E-learning modules (self-paced learning)
- ☐ Physical materials - for example, a book (self-paced learning)
- ☐ Blended learning (combination of physical and online)
- ☐ Mentorship programs: For example, one-on-one guidance with an expert
- ☐ Networking meetings
- ☐ Don't know

## D3.2 BIPED Training Programme

14. There are four fundamental ways to learn: How would you assess that you learn best (rank in order of priority - move up and down)?

\*

Learn best by listening (auditory)

Learn best by seeing (visual)

Learn best by touching (tactile).

Learn best by doing (kinesthetic)

Learn best through a combination of the 4 mentioned learning styles (combination)

## Current challenges

15. What are the biggest challenges you face in your current role regarding the use of BIPED's digital twin? (Select all that apply) \*

- ☐ Lack of knowledge/resources
- ☐ Technical difficulties.
- ☐ Data management issues
- ☐ Coordination with other stakeholders
- ☐ Time
- ☐ Don't know

16. How are you currently handling these challenges (please specify)?



## Digital Twins and Positive Energy Districts.

17. On a scale from 1 to 10 (1 = very good, 10 = not at all), how good is your knowledge of digital twins?

1	2	3	4	5	6	7	8	9	10
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18. On a scale from 1 to 10 (1 = very good, 10 = not at all), how good is your knowledge of positive energy districts?

1	2	3	4	5	6	7	8	9	10
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19. On a scale from 1 to 10 (1 = very often, 10 = not at all), how often do you use data-driven tools to make and/or be inspired to make decisions?

1	2	3	4	5	6	7	8	9	10
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20. What specific questions, challenges, or topics would you like a digital twin to help you with?

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### Feedback and suggestions (optional)

21. Please feel free to share any additional comments, needs, or insights you have regarding the development of BIPED's competence and collaboration plan (optional).