AmsTErdam BiLbao cItizen drivEn smaRt cities

Deliverable 10.7: Completed and published Massive Open Online Course (MOOC) for students in higher education and professionals

WP10, Task 10.4

Date of document

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 864374.

Document History

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Project Coordinator	Frans Verspeek ATELIER.EU@amsterdam.nl City of Amsterdam		
Project Duration	01/11/2019 – 31/10/2024 (60 Months)		
Deliverable No.	D10.7 Completed and published Massive Open Online Course (MOOC) for students in higher education and professionals		
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Deliverable Lead	SEZ		
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	x	Final version	
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Work Package Lead	SEZ		
Contributing beneficiary(ies)	AUAS		
DoA	The MOOC comprises multi-media presentations, written course materials, case studies, exercises, lectures, examination materials and guidance for lecturers. The source for the materials are the two project demonstrations as well as other smart city projects. The language is English. The MOOC will be published on an open education platform.		
Date	**Version**	**Author**	**Comment**
16/10/2023	1	AUAS	First draft of deliverable
20/10/2023	2	SEZ	Second draft of deliverable
31/10/2023	3	SEZ	Final version of deliverable

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Abbreviations and Acronyms

Acronym	Description
MOOC	Massive Open Online Course
WP	Work Package
PED	Positive Energy District
AUAS	Amsterdam University of Applied Sciences
SEZ	Steinbeis Europa Zentrum
SCC1	Smart Cities and Communities Lighthouse
H2020	Horizon 2020
HEU	Horizon Europe

Table 1: Abbreviations and Acronyms

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0. Executive Summary

The project ATELIER's Massive Open Online Course (MOOC) was developed by ATELIER partners to share knowledge and learnings from the implementation and planning of Positive Energy Districts (PEDs) with students in higher education and professionals everywhere around the world. Everyone who speaks English and who has an internet connection can enrol in the MOOC and get a well-structured, audio-visual introduction to PEDs. Furthermore, the MOOC is embedded to a learning platform that enables the exchange with peers. It addresses a broad range of target groups from individuals interested in the energy transition to professionals involved in other PED projects and students of higher education with a focus on PEDs. The first module of the MOOC explains the basic concept of PEDs, the energy system applied in PEDs, the social aspects to consider in PEDs, the concept of Innovation Ateliers that enables the implementation of innovative concepts such as PEDs in actual surroundings and at last the role of PEDs in the bigger context of the energy transition. The MOOC is tailored to the user's needs through the possibility to take quizzes between the videos, to adjust the speed of the videos and to stop, replay or skip the different sections if desired. It uses real-life examples from the ATELIER project in Amsterdam to illustrate the functioning of the PED. The MOOC is regularly promoted through ATELIER's communication channels and has been a useful source of information for 92 learners since its launch in June 2022 and October 2023. There is a lot of potential to further develop the platform, especially in cooperation with other projects working on Positive Energy Districts. The MOOC was mainly developed by ATELIER partner Amsterdam University of Applied Sciences and includes inputs from other ATELIER partners such as TNO, Waag or the City of Amsterdam.

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1. Introduction

This report describes the development and functioning of a Massive Open Online Course (MOOC) on Positive Energy Districts (PEDs) in the framework of the EU-funded Smart City project ATELIER. The MOOC is an inclusive possibility for anyone around the world with an internet connection to learn about PEDs free of charge and in an engaging way.

1.1. Purpose and Target Group

This report provides a behind-the-scenes insight into the development of the MOOC's content, its current structure and the impact it has reached so far. It can therefore be a helpful source of information for others working in research and innovation who plan to disseminate their knowledge in a similar way.

1.2. Contributions of partners

The following Table 2 depicts the main contributions from project partners in the development of this deliverable.

Partner short name	Contributions
AUAS	Detailed descriptions on MOOC development and content
SEZ	Introduction, dissemination of the MOOC on the ATELIER website and in other channels, editing of the deliverable

Table 2. Contributions of partners

2. Objectives and goals

EU Horizon 2020 projects should prioritize the dissemination of their gained knowledge as it embodies the essence of collaborative research and innovation. By sharing findings, insights, and breakthroughs, these projects not only foster transparency but also ensure that the broader scientific and societal community can benefit from their work. Knowledge dissemination promotes the rapid advancement of science and technology, allowing for the efficient transfer of valuable expertise to industries, policymakers, and the public. Moreover, it encourages cross-border cooperation and strengthens Europe's position as a global leader in research and innovation. Ultimately, the dissemination of knowledge from Horizon 2020 projects contributes to the collective effort to address complex global challenges and drive sustainable development, making it a crucial aspect of the EU's research and innovation strategy.

There are many ways that knowledge dissemination can be done. Massive Open Online Courses (MOOCs) can be highly effective tools for disseminating knowledge in several ways:

1. **Accessibility**: MOOCs are easily accessible to a global audience. Anyone with an internet connection can enrol, removing geographical and financial barriers to education.

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2. **Scalability**: MOOCs can reach a vast number of learners simultaneously, making them an efficient means of disseminating knowledge to a large and diverse audience.
3. **Flexibility**: MOOCs offer flexible learning schedules, allowing participants to study at their own pace. This accommodates individuals with different time constraints and learning preferences.
4. **Multimedia Content**: MOOCs often incorporate various forms of multimedia, including video lectures, quizzes, interactive simulations, and discussion forums, making learning engaging and effective.
5. **Expertise Sharing**: MOOCs can bring together experts and thought leaders from around the world to share their knowledge and insights on a specific topic, enhancing the quality and depth of the content.
6. **Self-assessment and Feedback**: MOOCs typically include assessment mechanisms, such as quizzes and assignments, along with immediate feedback. Learners can gauge their progress and understanding, promoting deeper learning.
7. **Community Building**: Discussion forums and peer-to-peer interactions within MOOCs create opportunities for networking, collaboration, and the exchange of ideas among learners.
8. **Lifelong Learning**: MOOCs encourage continuous learning, enabling individuals to acquire new skills and knowledge throughout their careers, fostering a culture of lifelong learning.
9. **Global Reach**: MOOCs are offered online and can potentially be translated into multiple languages, further expanding their reach to learners from different linguistic backgrounds.

Overall, MOOCs serve as versatile and powerful tools for disseminating knowledge, catering to the evolving educational needs of a diverse and global audience while leveraging technology to enhance the learning experience.

3. Creation process

The choice to create a MOOC as part of the dissemination aspect of the ATELIER project was made when writing the proposal. The content of this MOOC, however, was not decided on in that stage of the project. A project team was formed in 2020 to determine what subjects should be covered, who the intended audience would be, and in what form knowledge should be presented. The team faced three main challenges when it came to deciding on the content. The first one was deciding who the intended audience would be, the second was what subjects should be covered and the third was Covid-19 restrictions, that made production at times challenging.

3.1 Audience

The first step in making the MOOC was deciding on the intended audience as this largely determines the content of the MOOC. After much deliberation the MOOC team decided to create an introductory course that gives an overview of different aspects that PED projects have to face. Making an introductory course can serve a diverse audience:

- ATELIER project fellow cities, aimed at capacity building;

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- Employees and associates of consortium partners of the 18 SCC1 Lighthouse projects across Europe;
- Organisations and individuals interested in Positive Energy Districts (and in energy transition & smart cities in general);
- People involved in the EU's Smart and Climate Neutral Cities Mission ambitions and targets;
- Inhabitants of Positive Energy Districts;
- Students at ATELIER's participating knowledge institutions.

3.2 Subjects

Given the complex nature of PEDs and disputes on the definition of a PED, selecting the subjects of the MOOC was no easy feat. However, the project team found the exercise of coming to a widely supported consensus to be very useful. After much deliberation in the MOOC team in concordance with ATELIER experts, five subjects were chosen to focus on in the introductory module. These subjects are:

1. *What is a Positive Energy District and how to develop it in your city?*

This module serves as a brief introduction to PEDs. It explains what a PED is, how it works in broad terms, what the innovative aspects of PEDs are, and what the benefits of PEDs are. Furthermore, it explains what is to be learned from PEDs. This chapter also serves as an introduction to the next chapters of the MOOC.

2. *The PED energy system*

This chapter covers: what an energy system is, PEDs as an energy system, the boundaries to PED energy systems, the four components of PED energy systems, and targets and calculating the energy performance of a PED. This chapter serves as a deep dive into what is needed to create a net positive energy performance on a district level. Which energy systems and innovation play a role in this, and how can we plan or model and evaluate the actual energy generation and use.

3. *PED as social innovation*

This chapter is about the users of a PED. Are users open to using energy in a different way? Are they able to organize themselves? Do they use energy platforms for decision making and making financial agreements? This chapter serves as an insight into the roles of different actors in the energy transition. Who are the different stakeholders and what is the role of legislation? It looks forward towards what the capabilities of communities are in the energy transition.

4. *Innovation Ateliers*

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This chapter puts everything into context. The concept of Innovation Ateliers was developed to embed innovative ideas into the actual environment. It can show how situations are shaped and organized together with relevant public and private stakeholders, connected to a city's goals and ambitions in the energy transition. This chapter serves as an introduction into the mechanism of innovation ateliers and why they can play an important role in realizing the different aspects of PEDs. It also serves as a guide for city planners on how to start a PED in their own city by experimenting, adjusting governance, take into account different stakeholders, go over the methods and conditions for PEDs as living lab, while reflecting continuously and looking for upscaling opportunities.

5. *PED as part of the energy transition*

PEDs are very innovative and a new concept that has to be further developed together with companies, government bodies, research institutes, and citizens. Issues that are faced often ask for different and even out-of-the box solutions to create new legal, social, and financial arrangements that make PEDs possible and mainstream. This often requires systemic shifts. This chapter serves as an insight into the energy transition as an abstract problem in which technology is not the real bottleneck, but rather the complex interworking between societal, legal, and commercial aspects. It is argued how PEDs are a good testing bed for giving insight into these complexities and therefore being part of the solution to the energy transition.

4. Work done until October 2023 (M48)

On 29 September 2021 the website pedlearning.eu was launched. This website hosts an open education platform that is built with Learnworlds education software. Everyone with an internet connection can visit this website and sign up without any costs. The platform can function as a learning centre with several courses. As of now there is one course available named the "PED start guide". The whole course is offered in English, but subtitle translations may be added in the future.

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4.1 Sign up and navigation

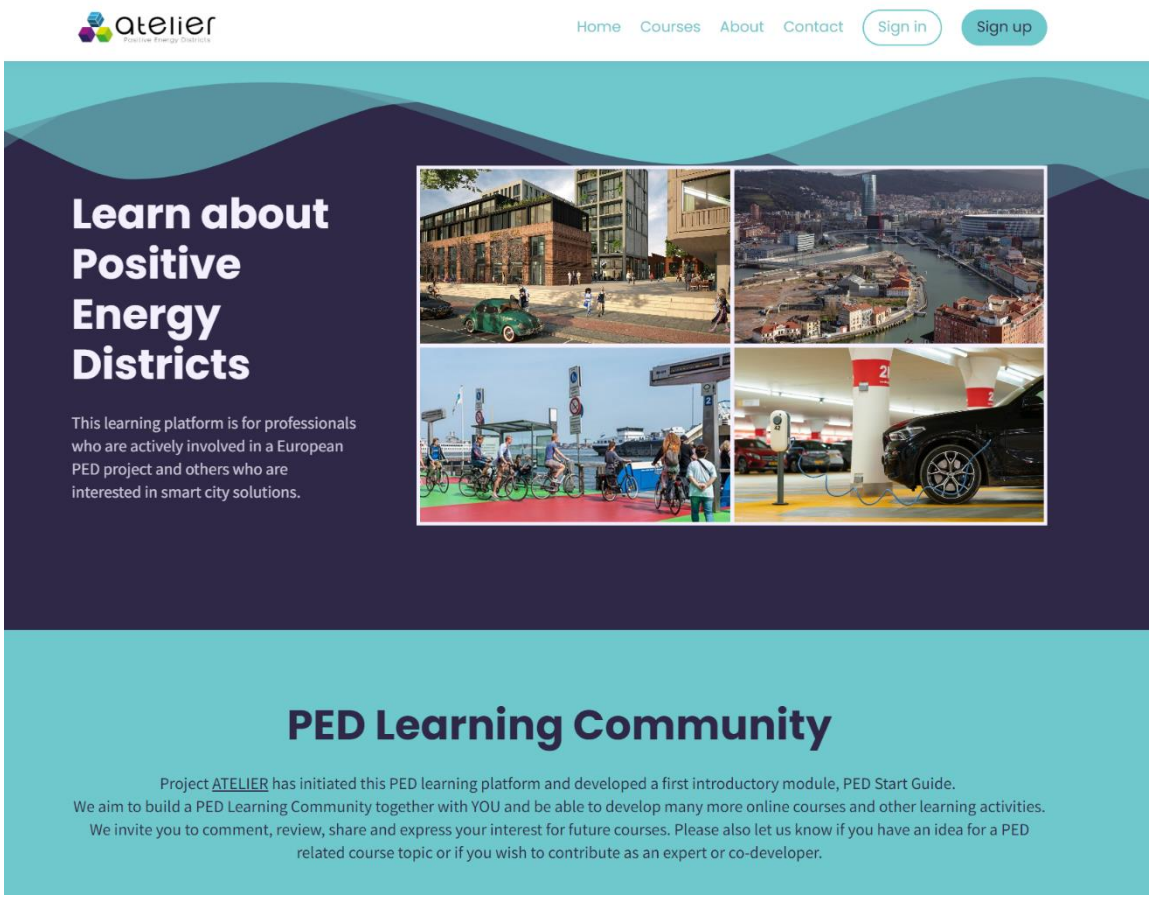

Figure 1 Landing page pedlearning.eu

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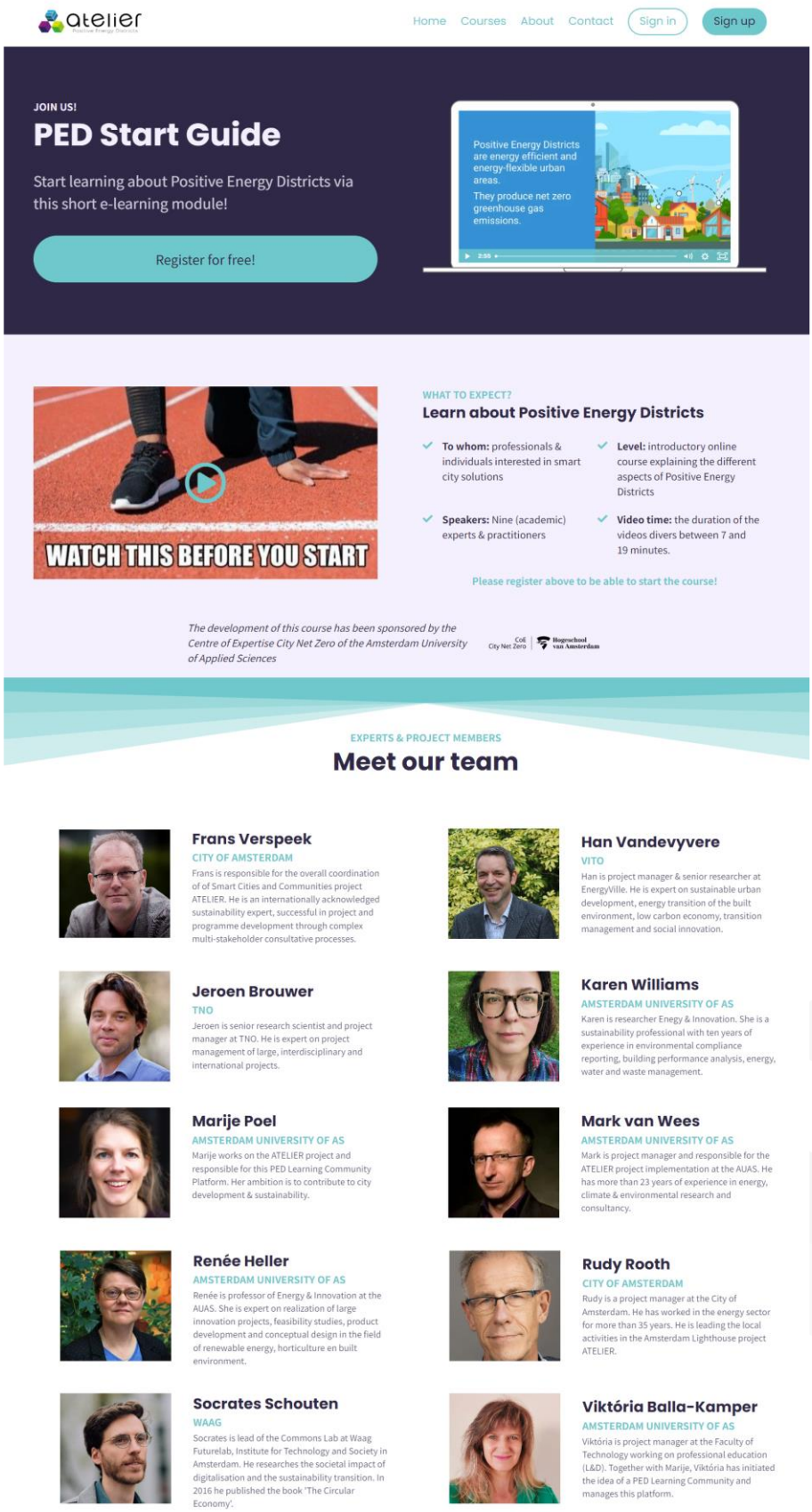

Figure 2 The PED Start Guide course page

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Once signed up, learners can navigate the course by selecting one of the subjects in the navigation bar. The order of the subjects was carefully chosen by the makers, but learners do not have to complete one section to go to another. The whole course is self-paced and there are no deadlines.

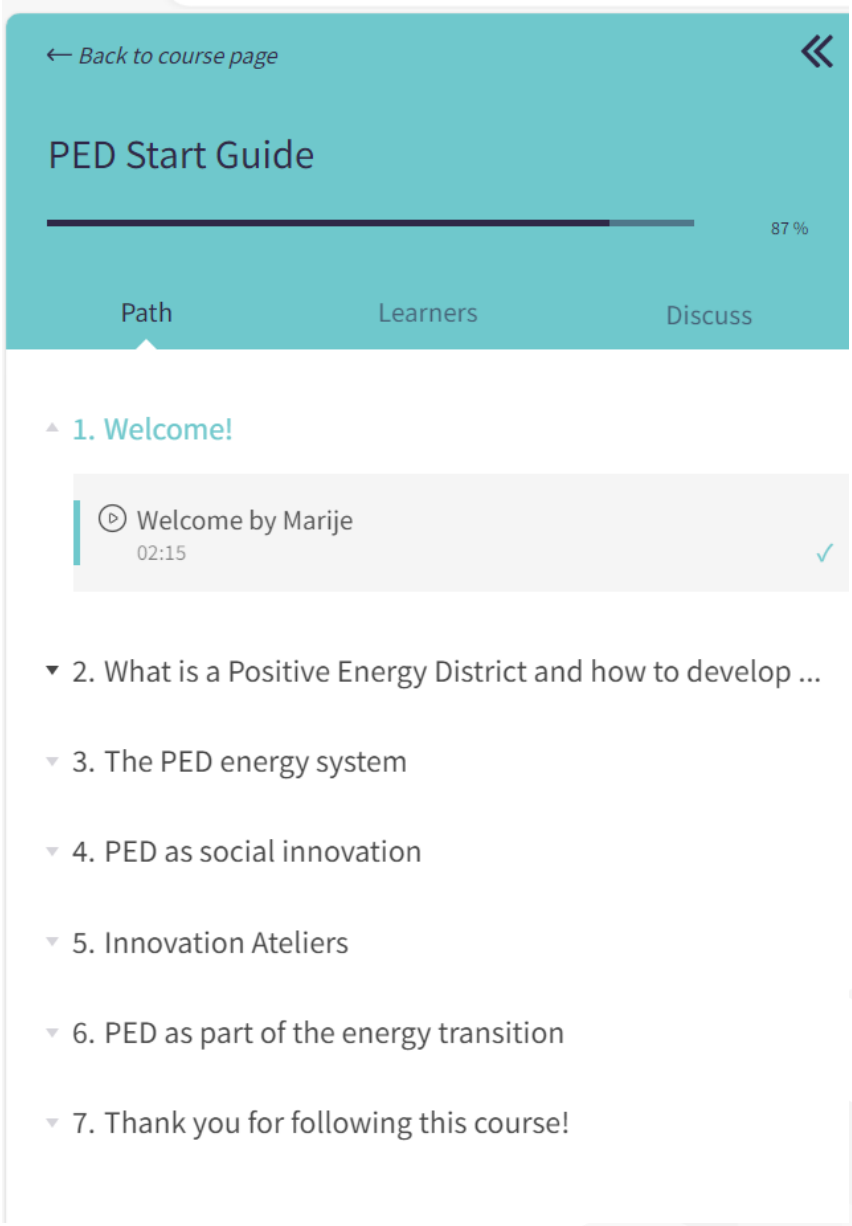

Figure 3 Course navigation bar

4.2 Course materials

Each section addresses a different subject on PEDs and contains videos, literature, explanatory images, or quizzes.

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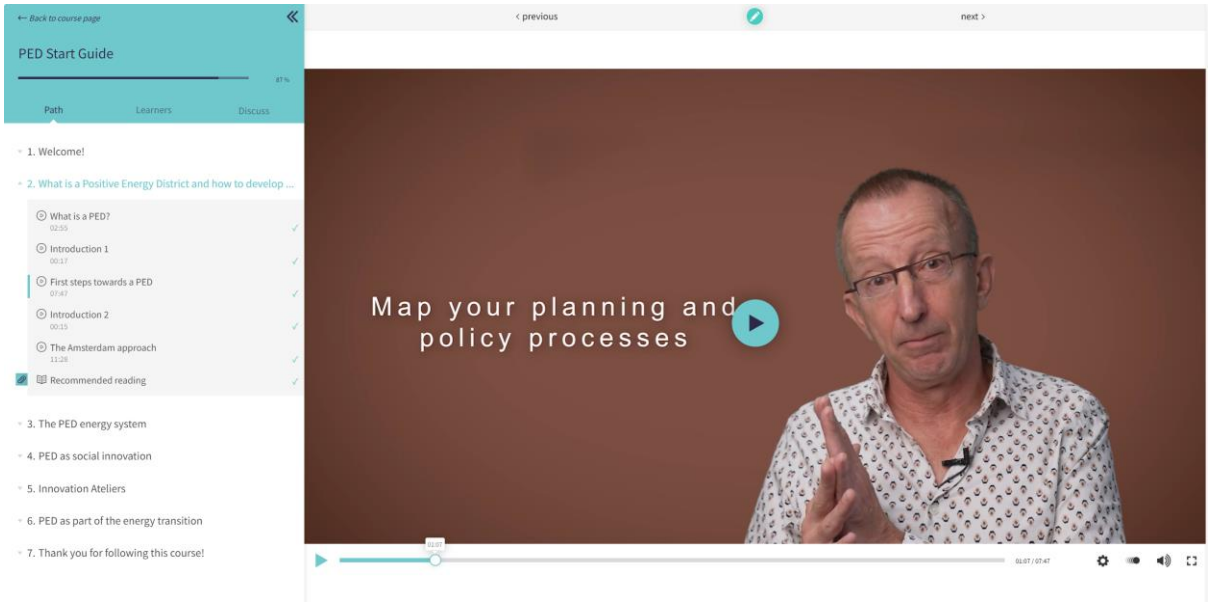

Figure 4 Example of a video

The videos can be played back in different qualities to accompany learners with limited bandwidth internet connections. Furthermore, the videos can also be played back at several speeds, making it easier for students to learn at their desired pace.

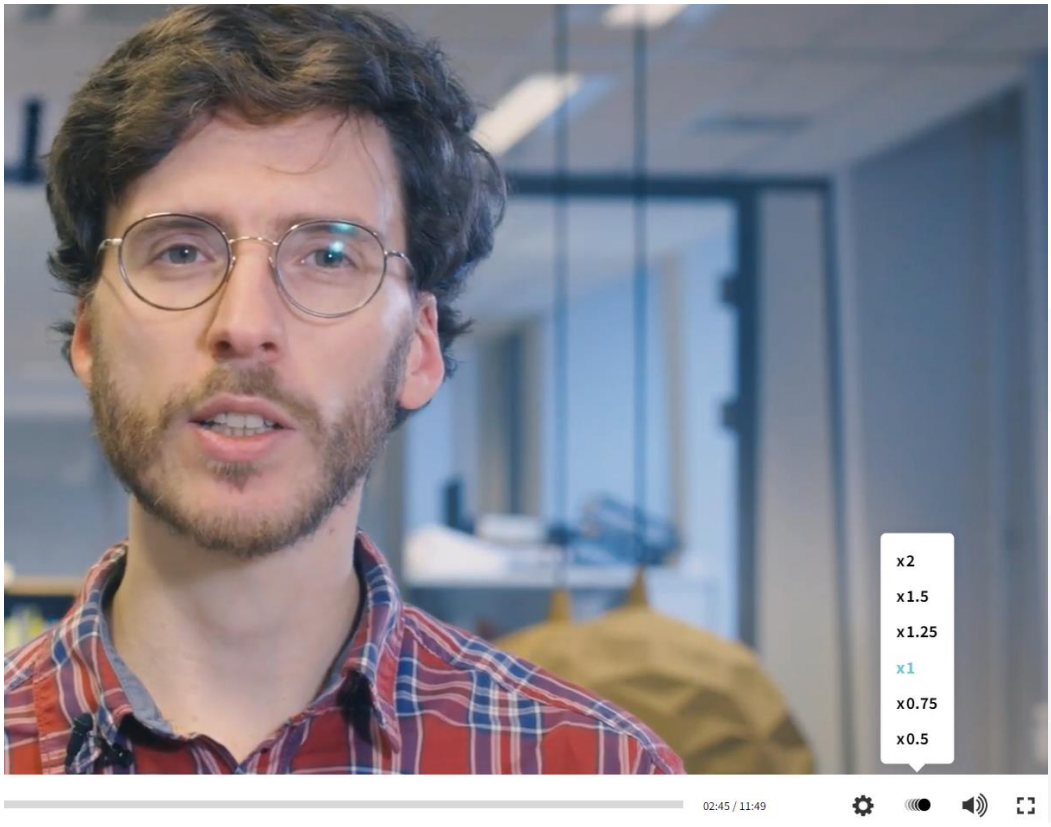

Figure 5 Video controls with quality and playback speed options

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Self-administered quiz questions are included to allow learners to assess whether they understand the knowledge that was provided in the videos.

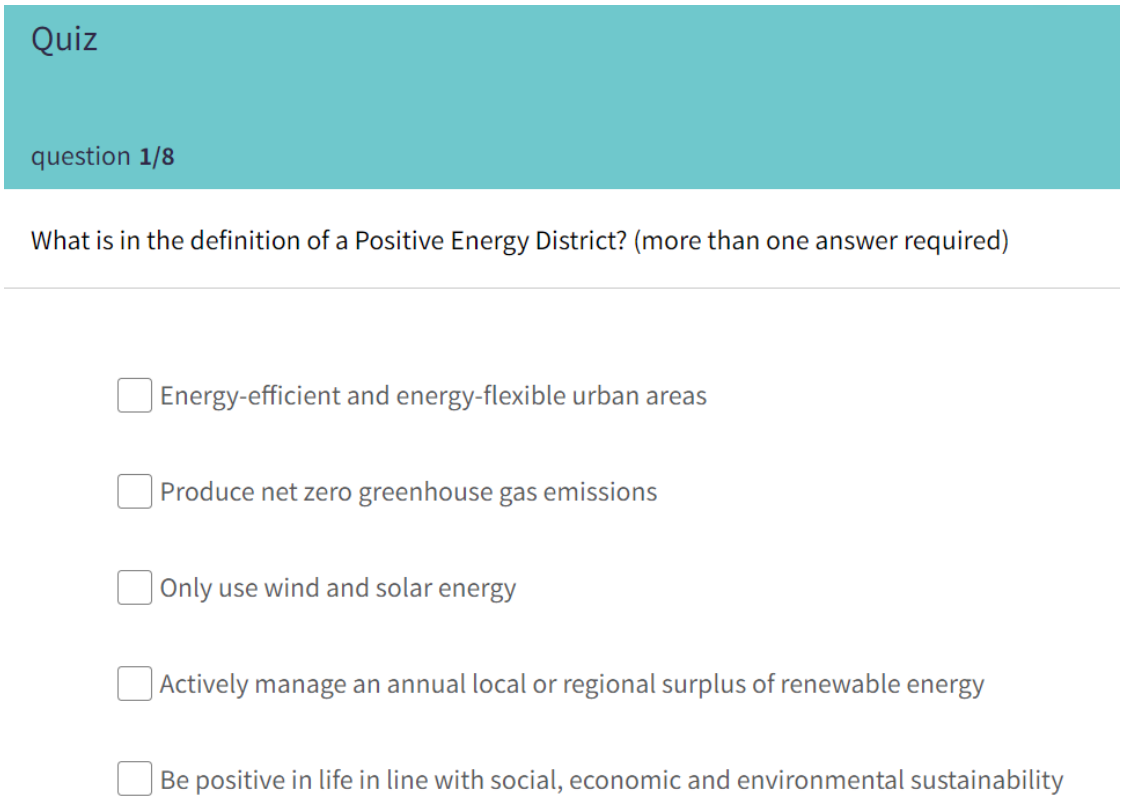

Figure 6 Example of a quiz question

4.3 Interactivity

Another important feature of the learning platform is that learners have the ability to have interactions with each other. Learners can ask questions or post statements that can include images and polls. Fellow learners have the ability to comment on this.

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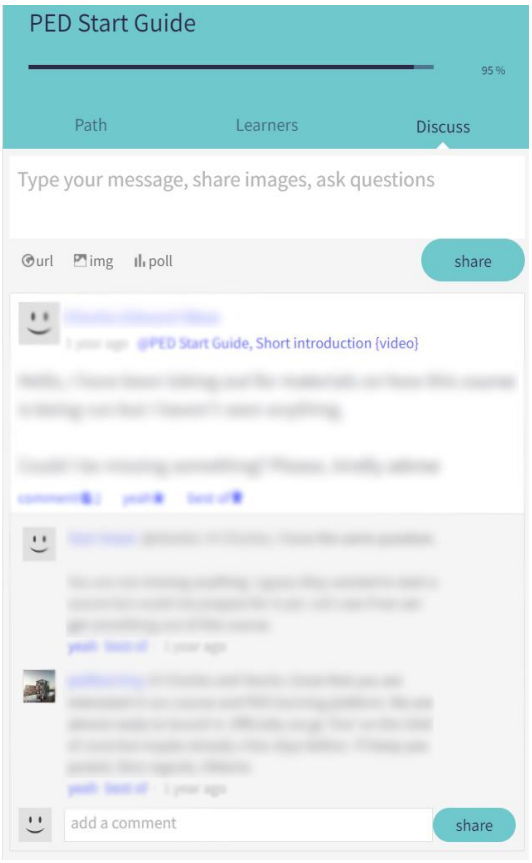

Figure 7 Interactive options in the MOOC

4.4 Embedding ATELIER experiences

Even though the content of the course is focused on PEDs as a concept, learners are obviously introduced to experiences that were made during the ATELIER project. For example, the Amsterdam case study is being discussed in one video and a publicly available ATELIER deliverable is offered as a recommended reading for one of the course subjects.

Figure 8 Snapshot of the video 'The Amsterdam approach'

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5. Promotion of the MOOC

The official launch of the PED Learning platform and the MOOC was promoted through the ATELIER communication channels. This included posts on Social Media, an article in ATELIER's newsletter and a blog post on the website in which representatives of Amsterdam University of Applied Sciences reflect on sharing learnings on PEDs through the PED Learning Platform.

Beyond our Cities

Check out our PED Learning Platform!

We have recently launched our new learning platform dedicated to Positive Energy Districts! Discover our PED Start Guide - the introduction module of our online course on PEDs which will soon be followed by additional modules and further learning activities.

The platform is for all professionals involved in PED projects as well as newbies with little knowledge but a lot of interest in innovative smart city solutions.

Click here to access: www.pedlearning.eu

Figure 9 Article from the ATELIER newsletter in Nov. 2022

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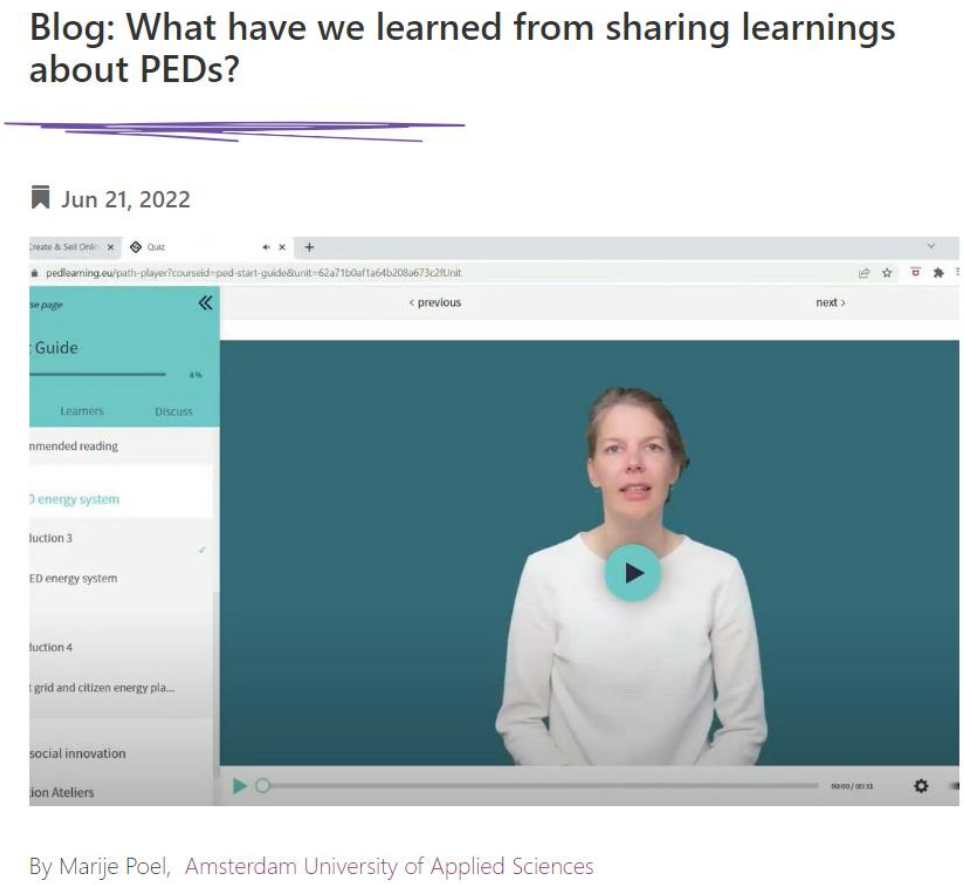

Figure 10 Blog post with reflections on the PED Learning Platform

The MOOC was also presented to other Smart City projects amongst others in one of the monthly Task Group meetings of the Smart City umbrella project Scalable Cities in which communication and dissemination representatives from Smart City projects meet every month.

In June 2022, shortly after its launch, the MOOC was presented at the Positive Energy Districts Conference which was organized by ATELIER partners AUAS in Amsterdam – thus providing the visitors with appealing complimentary material to support the event.

Moreover, in October 2023 the MOOC was listed as a resource on the NetZeroCities platform – the newly created main resource library for the 112 cities that aim to become climate-neutral by 2030 within the framework of the EU's Climate-Neutral and Smart Cities Mission.

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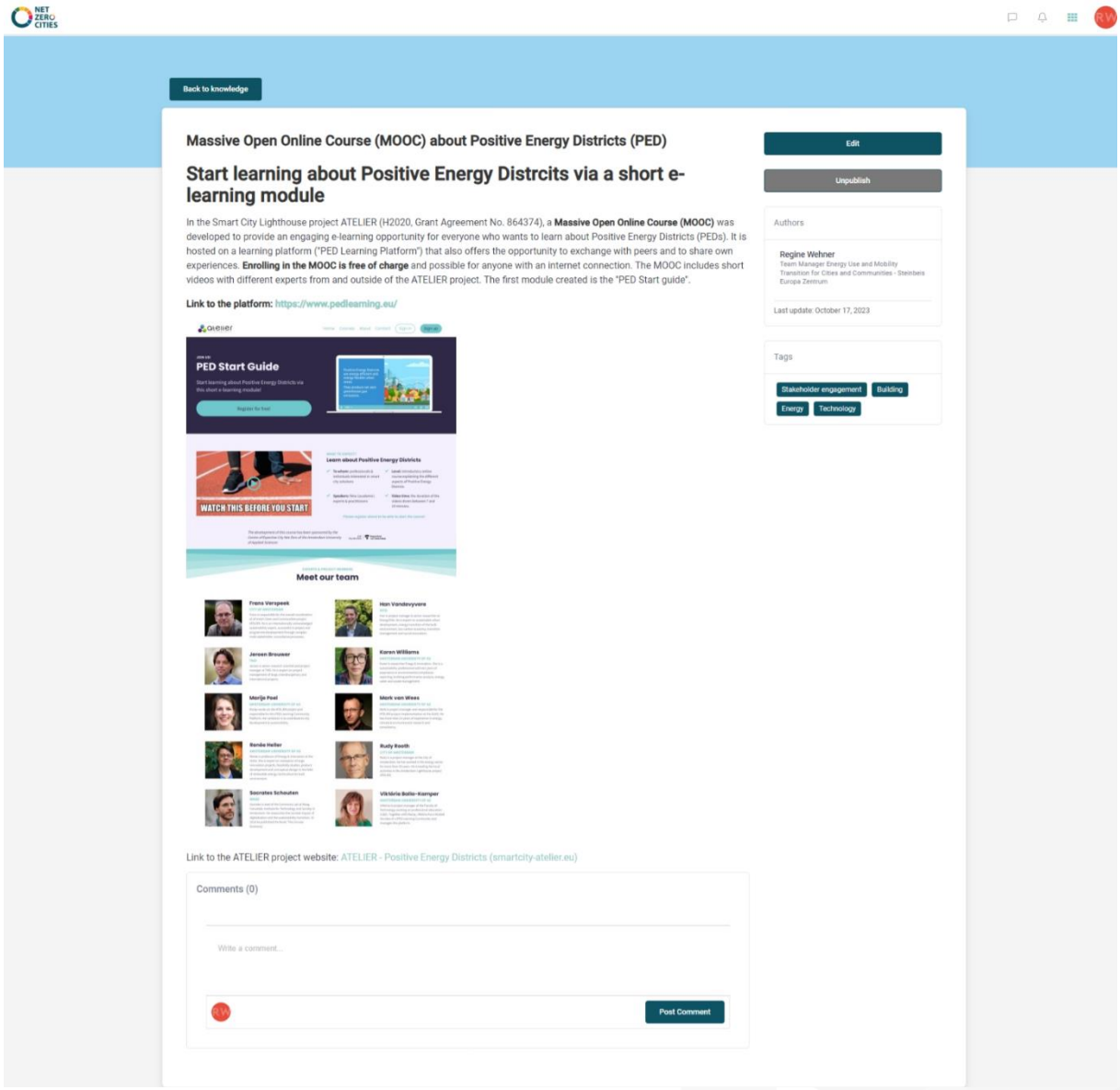

Figure 11 MOOC listed as resource on NetZeroCities portal

6. The PED Learning Platform on the ATELIER website

As a useful resource for ATELIER's audience, the PED Learning Platform is embedded on the ATELIER website. It is included in the section "Outcomes".

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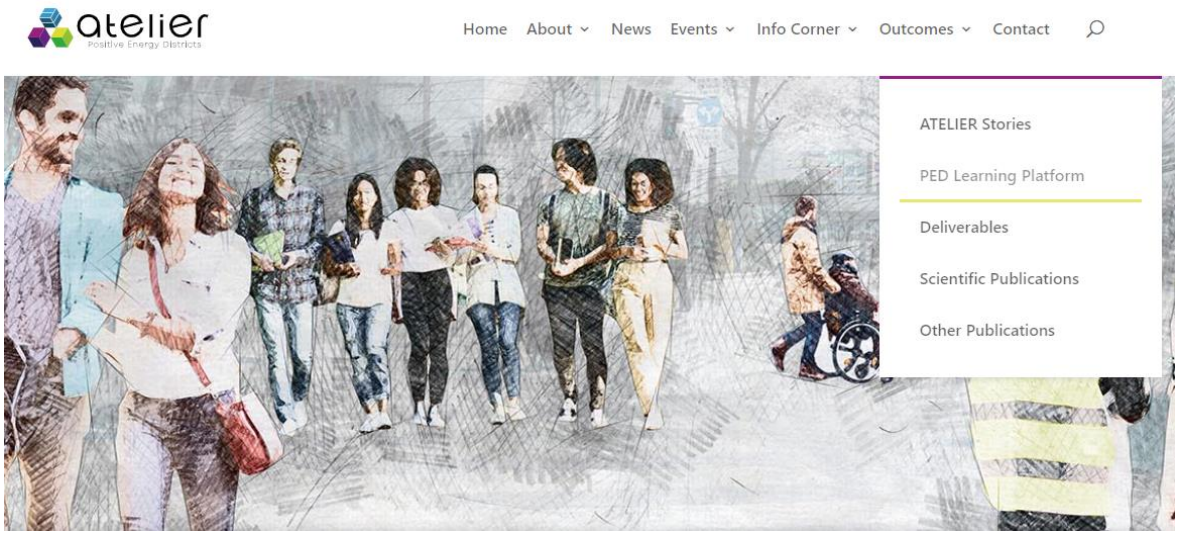

Figure 12 ATELIER website menu

When clicking on “PED Learning Platform”, the user gets redirected to a subpage that gives a rough summary of the goals and offers of the platform. The platform itself is accessible by clicking on the button at the centre of the subpage as shown in the figure below.

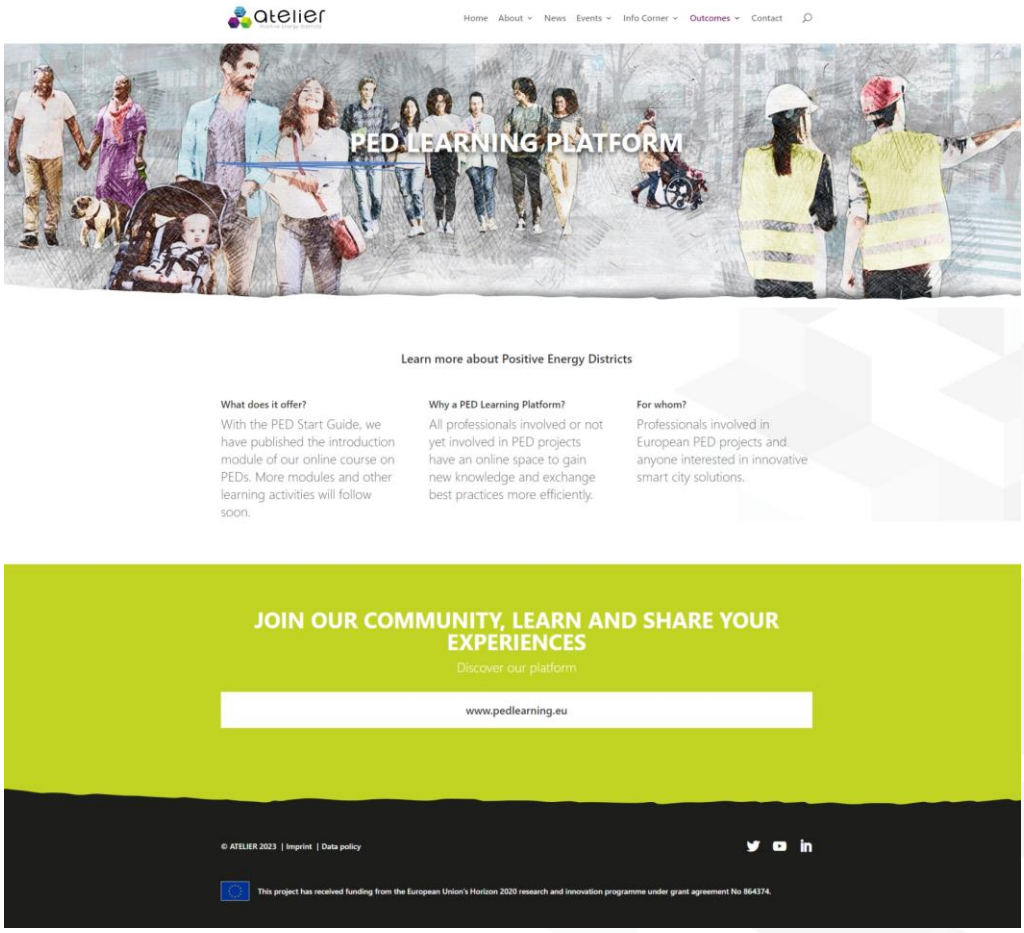

Figure 13 PED Learning Platform subpage on ATELIER website

7. Outlook > next modules

The subsequent steps involve creating additional MOOC modules in partnership with other Horizon 2020 and Horizon Europe PED projects and educational institutions. The objective is to delve deeply into a range of PED-specific topics. This is intended to benefit cities contemplating the development of a PED, as well as those further advanced in the process.

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