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# PED-ID

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

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This is an ARQ-report from White Arkitekter. The work presented has been conducted with support from ARQ and White Research Lab, our organisation for practical research, environmental monitoring and knowledge transfer.

# Abstract

*“Positive Energy Districts are energy-efficient and energy-flexible urban areas or groups of connected buildings which produce net zero greenhouse gas emissions and actively manage an annual local or regional surplus production of renewable energy. They require integration of different systems and infrastructures and interaction between buildings, the users and the regional energy, mobility and ICT systems, while securing the energy supply and a good life for all in line with social, economic and environmental sustainability.”*

*JPI Urban Europe<sup>1</sup>*

The project “PED-ID: Holistic assessment and innovative stakeholder involvement process for identification of Positive-Energy-Districts” was supported by JPI Urban Europe, and in Sweden by Energimyndigheten and Viable Cities. The aim of the project was to develop innovative assessment and stakeholder engagement methods for the development of Positive Energy Districts (PEDs).

The project PED-ID was a research and innovation project aiming to accelerate the urban environment’s decarbonisation by promoting the implementation of Positive-Energy-Districts (PED). PEDs are districts in urban areas that manage their resources to achieve a positive energy balance (more energy is produced than consumed on an annual basis) and reduce greenhouse gas emissions.

This project provides decision-makers and practitioners with improved information about methods, tools and guidance for PEDs at an early stage of development, proposing a knowledge-based participation process. Stakeholders can actively use these methods in a data-driven participation process to consolidate their options and make decisions based on data. This process was tested using real Living Labs of potential PED projects. With the help of this method, it is hoped that the decision on more PED sites will be accelerated to reach the goal of 100 PED sites in Europe.

The project involved partners from across Europe with the living labs located in Uppsala (Sweden), Vienna (Austria) and Rožnov (Czech Republic).

Lise-Lott Larsson Kolessar  
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# PED-ID

*“Society is facing new challenges regarding energy generation from Renewable Energy Sources (RES), and only focusing on energy objectives does not ensure that the sustainability challenges as a whole will be met. Design plays a key role as an enabler for the transition from fossil fuels to RES. To exploit design potentialities new approaches are needed, since in the current practice energy and space design are treated in separate domains, if at all...”*

## IEA SHC Task 51

### STAKEHOLDER ENGAGEMENT AND PROCESS MANAGEMENT

White arkitekter took on the role of the “PED Enabler” at the Uppsala Business Park (UBP) living lab, which enabled us to develop and test out a stakeholder engagement process for PEDs. This also provided the opportunity to develop knowledge about the extent that digital tools (such as White’s WHEAT) and the use of Digital Twins can contribute to the PED development and stakeholder processes.

Working together with the Digital Twin City Centre (DTCC) at Chalmers we explored the potential for Digital Twins to be used both in stakeholder engagement and early-stage assessments. This resulted in a report identifying the roles that Digital Twins might have in supporting the development of PEDs.<sup>2</sup> Following on from the PED-ID project White has continued to work with this topic in the context of the ongoing Digital Twins 4 PEDs project, with the Jättesten district in Gothenburg as the case study.

### SYSTEM BOUNDARIES FOR UBP LIVING LAB

Uppsala Business Park was the case selected for the Swedish “Living lab”. Early in the process agreement was reached about the system boundaries that would be set. These included geographic boundaries as well as technical ones. It was decided that for the purposes of the UBP PED project that mobility aspects would not be included as part of the energy balance calculations. This was due to the limited scope and short time frame of the PED-ID project. However, energy and emissions related to transport are often included in PED scenarios.

### ENERGY, ARCHITECTURE AND SPATIAL PLANNING

As society strives to increase the use of renewable energy sources to tackle climate change and reduce Europe’s dependency on fossil fuels, there is a growing conflict with land allocation for other uses such as housing, agriculture, food production, forestry etc. It is becoming increasingly important to explore how buildings and other urban infrastructure can be designed/adapted to minimise energy use and contribute





Uppsala Business Park aerial view (left page top). One of the Pharmacia buildings at Uppsala Business Park (left page bottom). The Kasper Sahlin prize (above).

to the local generation of energy from renewable sources, without impinging negatively on the qualities of the built environment.

One of the learnings from the PED-ID project is that an architect and urban planning practitioner (such as White) brings a holistic and stakeholder focussed approach to the early-stage development of PEDs. Which is identified by research as one of the key success factors.

We took the view that the architectural and spatial planning requirements should be considered at the same time as the energy aspects. This took expression in the work that we carried out during the stakeholder engagement workshops for Uppsala Business Park. White carried out a solar potential analysis and drew particular attention to the potential challenges of carrying out energy transformations on buildings with high architectural merit or heritage value.

#### HERITAGE CONSIDERATIONS IN THE PED PROCESS AT UBP

Many of the existing buildings in the Uppsala Business Park are from the mid-or late 20th Century. As such we initially assumed that there would not be any heritage constraints. However, the heart of today's Uppsala Business Park are the former buildings of the pharmaceutical company Pharmacia. It was here in the 1960s that the company laid the foundations for high quality research in a variety of fields - research that has given the area an impressive international reputation throughout the life science world. In 1971, Pharmacia's development was awarded the Kasper Salin Prize<sup>3</sup> with the motivation:

*"The facility is an example of a development where the requirements of technical rationality and a good working environment have been combined in a strong artistic design."*

In 2021 Uppsala Municipality produced a detailed plan for the area (Detaljplan för del av Fyrislund 6:11). Therein it states that buildings in the area should be of high architectural quality, taking into account the exposed location of the site and the architectural and cultural-historical values in the area.

In 2021, the Municipality produced a more detailed classification of the area based on a building inventory carried out by the Uppland Museum. Based on this material, Uppsala Municipality concluded that buildings 31 and 35, which constitute the area's entrance building and head office, are particularly valuable from a cultural-historical point of view in accordance with Chapter 8, Section 13 of PBL and thus may not be defaced.<sup>4</sup> Buildings 32, 33, 34, 36 and 38 are deemed to have a high cultural value according to PBL chapter 8, section 17, and cautionary provisions should therefore be applied for these.<sup>5</sup>

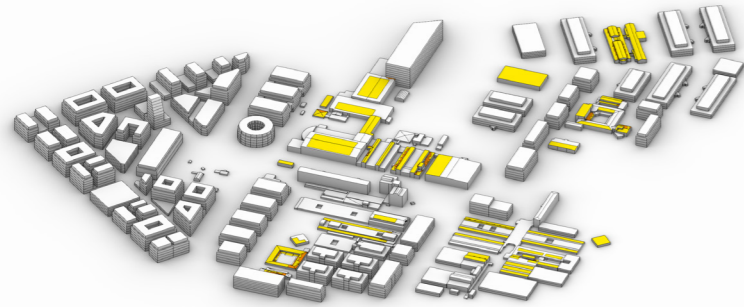
#### CASE STUDY CULTURAL HERITAGE AND ARCHITECTURAL VALUES

A case study was conducted to help the key actors gain a better understanding of the impacts on any heritage and architectural values at an early stage before the PED roadmap for the case study Uppsala Business Park was finalised.

Two workshops were held, which included the responsible planning architect at the municipality of Uppsala, White's heritage specialist Annika Andersson, and the masterplanning architects for Uppsala business Park Mandaworks.

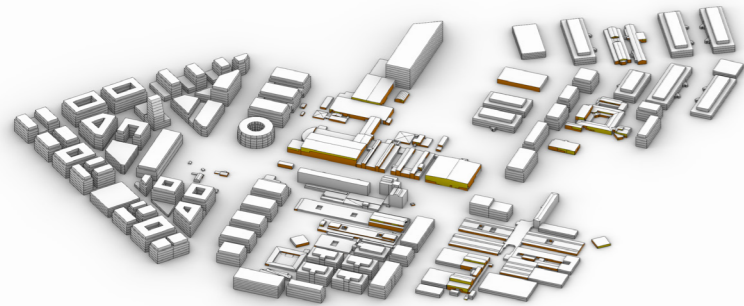
Before the first workshop the standpoint from the municipality was that there should be no installation of solar panels on any of the protected existing buildings.

SOLELSPOTENTIAL STRUKTURPLAN TAK BEFINTLIGA BYGGNADER



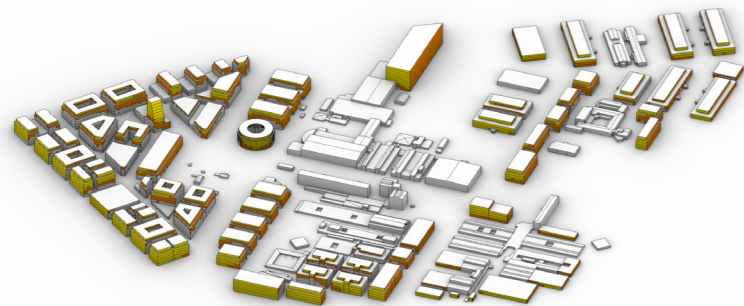
	Yta	Bra (<800 kWh/m <sup>2</sup> )	Acceptabel (600-800 kWh/m <sup>2</sup> )
Bef byggnader	Tak	32 000 m <sup>2</sup>	2 300 m <sup>2</sup>

SOLELSPOTENTIAL STRUKTURPLAN FASADER BEFINTLIGA BYGGNADER



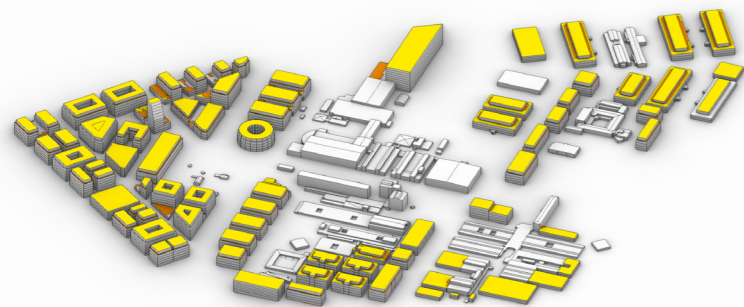
	Yta	Bra (<800 kWh/m <sup>2</sup> )	Acceptabel (600-800 kWh/m <sup>2</sup> )
Bef byggnader	Fasader	5991 m <sup>2</sup>	18409 m <sup>2</sup>

SOLELSPOTENTIAL STRUKTURPLAN FASADER NYA BYGGNADER

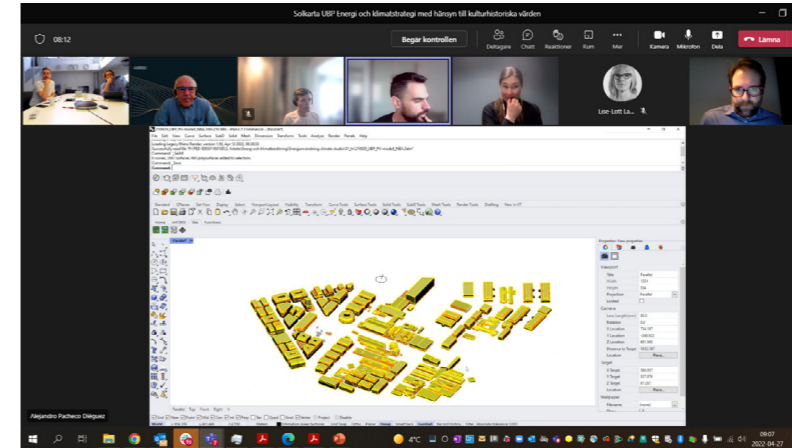


	Yta	Bra (<800 kWh/m <sup>2</sup> )	Acceptabel (600-800 kWh/m <sup>2</sup> )
Nya byggnader	Fasader	47636 m <sup>2</sup>	65238 m <sup>2</sup>

SOLELSPOTENTIAL STRUKTURPLAN TAK NYA BYGGNADER



	Yta	Bra (<800 kWh/m <sup>2</sup> )	Acceptabel (600-800 kWh/m <sup>2</sup> )
Nya byggnader	Tak	127182 m <sup>2</sup>	15772 m <sup>2</sup>



Workshop 1.

At the first workshop the group discovered that PV's could be categorised as technical installations (Teknisk installation) instead of a building integrated architectural element, which could simplify the building permit process. A discussion was also held with regards the potential conflict between areas required for green roofs, and areas suitable for solar panels. And this was identified as an area needing further examination. Another important outcome was that the municipal planning architects agreed to make a site visit together with the municipality's heritage officer to assess the situation.

Site Visit to Case Study Area

In between the workshops the municipal planning architects responsible for the case study area had a dialogue with the municipality's heritage officer (Kommunantikvarie). The municipality's planning architect had a meeting with the municipality's city heritage advisor on site.

The new conclusion as a result of the site visit was that on buildings with high cultural value, PVs could be placed on protected buildings, provided that they are not visible in the townscape.

Following the site visit another workshop was held with more or less the same group that had met for workshop 1.

Digital studies were used to assess the solar energy potential of the existing buildings and the masterplan proposals (left). Due to Covid constraints the workshops were held online (above).

Workshop 2.

At the second workshop White highlighted the issue of the culturally valuable buildings in connection with exploiting the solar energy potential. Studies were carried out for the potential of existing roofs and facades, as well as the proposed new buildings' roofs and facades. Based on these simulations, calculations were then made to see if an energy positive balance can be achieved. The planning architect marked the buildings on a map where it is considered not appropriate with solar installations. The results showed that the exceptions made for cultural heritage buildings in Uppsala Business Park did not affect the energy calculation significantly (less than 1 %). But the work confirmed the importance of considering heritage issues at the early stages, and this was noted in the Process Map that was one of the PED-ID project deliverables.<sup>6</sup>

We can conclude that where a building or development is considered a unique example of its time, or of high architectural merit, it can mean that there are more constraints on how it might be refurbished or retrofitted with energy-efficient improvements. It may be more difficult to gain planning permits to install solar panels on the building or upgrade the windows and facades with more energy-efficient solutions. Therefore, before any strategy is proposed for upgrading existing building assets it is essential to identify any heritage constraints and propose solutions that are not considered detrimental to the heritage values. In a subsequent PED proposal that White is engaged in the Austrian case study includes buildings by the well-known architect Adolf Loos. This is another example of a project where the architectural significance of the buildings will need to be assessed and carefully considered when developing the energy strategy. In yet another case we came across one of the buildings within the PED district has World Heritage status. These examples

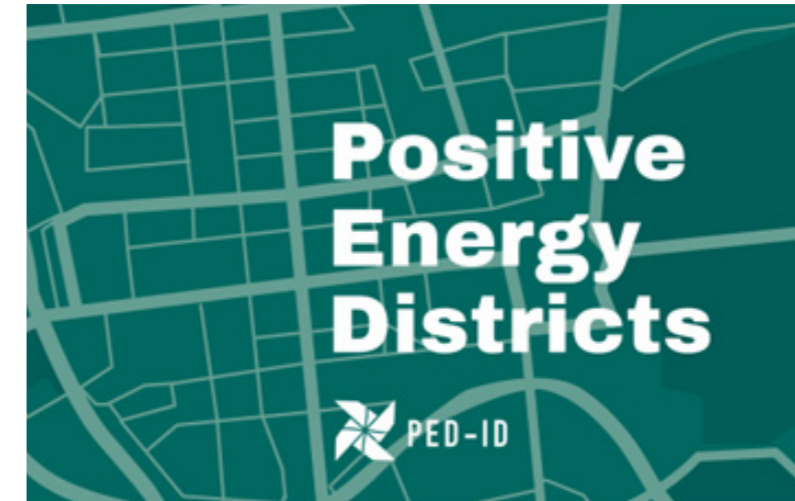
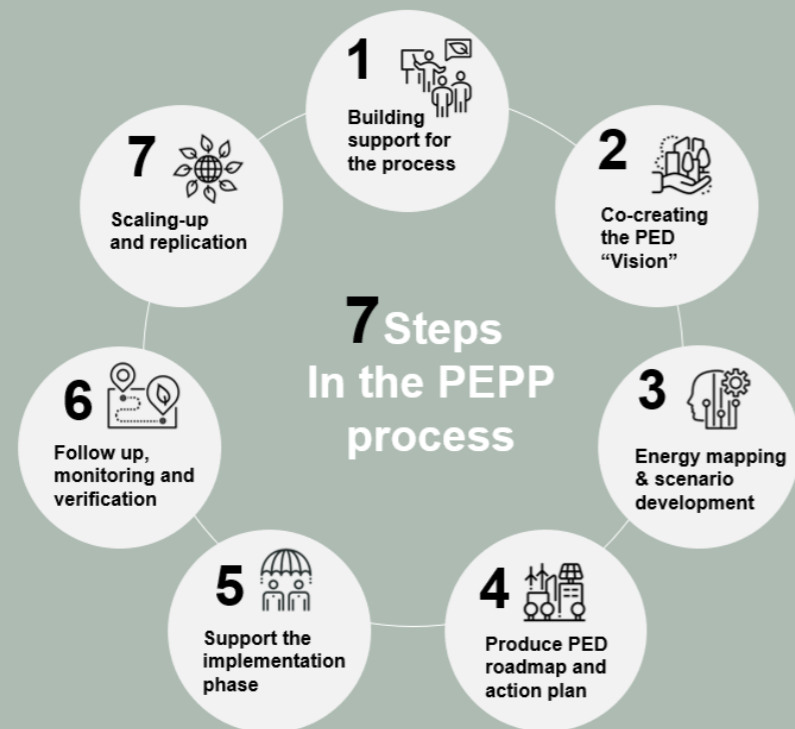
# PEPP Positive Energy Planning Process for Positive Energy Districts (PEDs)



WHITE ARKITEKTER

## PEPP

Positive-Energy Planning Process for **net-zero**, Positive-Energy Districts (PEDs)



all serve to reinforce the view that heritage and architectural values should be highlighted and carefully considered in the early stages of PED developments.

The culture heritage focus on the process PED assessment phases has permitted us to develop the White's own process for PED developments (PEPP) further in relation to the planning process. Another important conclusion of workshop 2 was that in these relatively new buildings it would even be of interest to discuss with the original architects of the area about the development of the area.

### *Final result from the workshops*

This case study went from originally a complete NO-GO to PVs on culture heritage buildings, to that PVs could be considered on protected buildings provided that they are not visible in the townscape.

### **THE ROLE OF THE "TRUSTED INTER-MEDIARY" AS "PED ENABLER"**

Part of the challenge with the creation of PED's is that the responsibility for their creation is not clearly identified. In some cases, it is a municipality that drives the question forwards, in other cases it can be a private developer, and sometimes it is the combination of the two. The

expertise needed for developing PEDs is usually only partly found in these organisations.

Where a city, a community or a developer has decided that it wants to create a PED there is nearly always going to be a need for a "PED enabler", a "Trusted Intermediary" who has a sufficient grasp of the various technical, social, environmental, and spatial aspects, and also has the requisite skills for leading the whole process forwards. We took the view that those practitioners used to managing complex urban planning processes, as we find in urban design and planning practices, such as White, would be well-placed for such a task.

The PED-ID project provided the opportunity to test this theory and develop knowledge concerning assessment and stakeholder engagement methods for PEDs. It also provided the chance to evaluate the roles that an architecture and urban planning consultant can bring to both the early stages of the PED development process, and for successful PED project implementation.

### **WHITE'S POSITIVE ENERGY PLANNING PROCESS (PEPP)**

White has used the experiences and learnings gained during the PED-ID project to develop a new service: "Positive Energy Planning Process" or PEPP.<sup>7</sup> We are now using PEPP to assist the development, co-creation, and implementation of strategic, holistic, positive-energy roadmaps, which have a high degree of acceptance amongst key stakeholders, in other municipalities. Thus, the lessons learnt during the PED-ID project are, as intended, helping to promote the development of more PEDs in Europe.

White's Positive Energy Planning Process (PEPP) was one of the valuable outcomes of White's involvement in the PED-ID project (left).

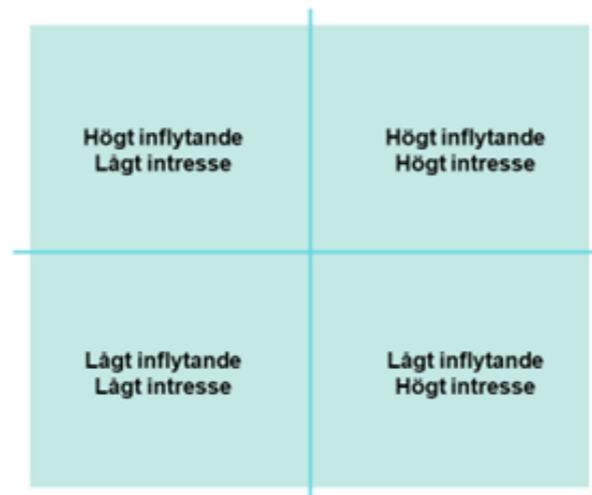
# Summary of Key Lessons Learnt



white

FÖRDJUPNING / STEG 4

## Intressentanalys



### 1. STAKEHOLDER ENGAGEMENT IS CRUCIAL FOR SUCCESS

Effective stakeholder engagement from the early stages is critical to success because many differing interests and priorities need to be balanced. Stakeholder engagement also helps the identification of resources and the alignment of actions by key stakeholders. Multidisciplinary urban planning practitioners, such as White, can bring a holistic and stakeholder focused approach that is very valuable for the early-stage development of PEDs.

### 2. THE ROLE OF THE TRUSTED INTERMEDIARY

Energy issues are not generally the responsibility of municipal planning departments. Even though they can play an important role in helping to achieve Municipal climate goals, the responsibility for the creation of PEDs is often not clearly identified. In many cases there is a need for an experienced "trusted intermediary"; a project facilitator with the requisite skills for leading the whole process forwards.

Various meetings and workshops were held to engage with stakeholders, to understand their driving forces, and to articulate a shared vision for the PED at Uppsala Business Park.

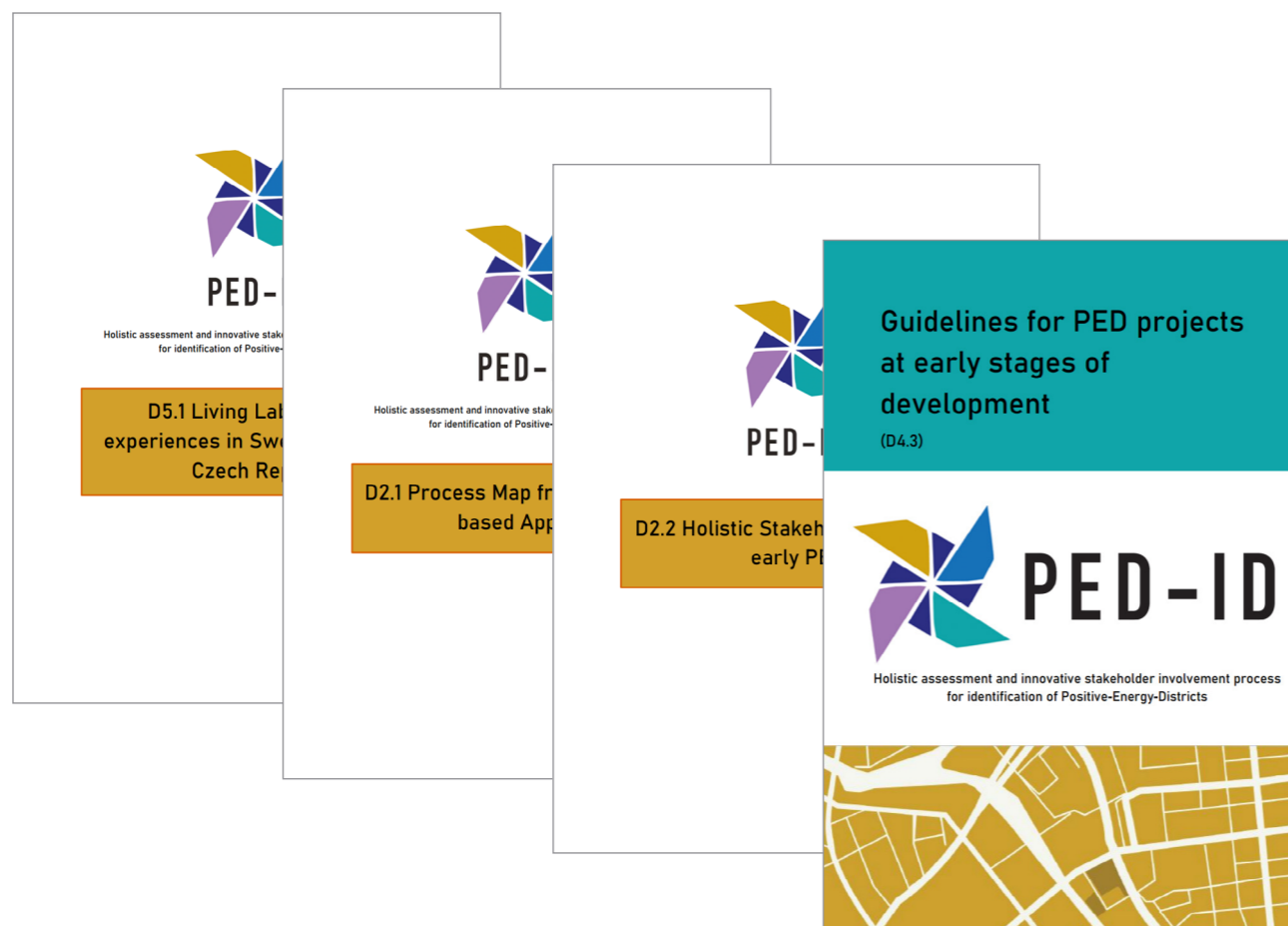
### 3. RESPECTING ARCHITECTURAL VALUE AND CULTURAL HERITAGE

The work at Uppsala Business Park confirmed the importance of considering architectural value and cultural heritage issues at the early stages. Some building energy solutions can have a detrimental effect on architectural qualities, and it is therefore important to take steps to identify any buildings of high architectural quality, or with significant cultural heritage value, early on during the energy planning process.

## Positive Energy Districts (PED)

Europe aims to be a global role model in energy transition and reducing its carbon footprint. Cities and the building sector play a decisive role in that process. Contributing to the ambitious targets of the European Strategic Energy Technology (SET) Plan, SET Plan Action 3.2 - the Programme "Positive Energy Districts and Neighbourhoods for Sustainable Urban Development" aims to support the planning, deployment and replication of 100 Positive Energy Neighbourhoods by 2025 and is joined by 20 EU member states. The Programme will be conducted by JPI Urban Europe, and involves stakeholders from R&I funding networks, cities, industry, research organisations and citizen organisations.

Countries involved in the PED Programme



# Reports from the PED-ID project

All the reports that White contributed to can be accessed via the project web site: [https://www.e-sieben.at/en/projects/20049\\_PED\\_ID.php](https://www.e-sieben.at/en/projects/20049_PED_ID.php)

Some of the key reports are:

**Living Labs: PED-ID experiences in Sweden, Austria & Czech Republic**

[https://www.e-sieben.at/publikationen/20049\\_PED-ID/PED-ID\\_LivingLab\\_Report\\_V1\\_220627.pdf?m=1658487976&](https://www.e-sieben.at/publikationen/20049_PED-ID/PED-ID_LivingLab_Report_V1_220627.pdf?m=1658487976&)

**Process Map from Knowledge-based Approach**

[https://sustainableinnovation.se/app/uploads/2022/06/PED-ID\\_D2.1\\_Process-Map\\_v4\\_220415.pdf](https://sustainableinnovation.se/app/uploads/2022/06/PED-ID_D2.1_Process-Map_v4_220415.pdf)

**Holistic Stakeholder Model for early PEDs**

[https://sustainableinnovation.se/app/uploads/2022/05/PED-ID\\_D2.2\\_StakeholderEngagementProcess\\_v3\\_220415.pdf](https://sustainableinnovation.se/app/uploads/2022/05/PED-ID_D2.2_StakeholderEngagementProcess_v3_220415.pdf)

**Guidelines for PED projects at early stages of development**

[https://www.e-sieben.at/publikationen/20049\\_PED-ID/PED-ID\\_D4.3\\_Guidelines\\_V2\\_220630.pdf?m=1658487958&](https://www.e-sieben.at/publikationen/20049_PED-ID/PED-ID_D4.3_Guidelines_V2_220630.pdf?m=1658487958&)



## Solcellsanläggning hus 1 UBP

### 3 Taket



Takstorlek:	4500 m <sup>2</sup>
Taktyp:	Plåttak
Byggbar yta:	70%
Azimutvinkel:	199°
Lutning:	2 till 3°

#### Kommentar

Byggnadens taktyper lutar 2 till 3 grader med en azimutvinkel på 199 grader. På detta tak lämpar sig ett takparallellt system bäst för att nyttja takets lutning och riktning mot solen.

### 7.1 Placering & installation



#### Kommentar

Förelägen anläggning kommer att täcka cirka 540 kvadratmeter takyta vilket visualiseras ovan.

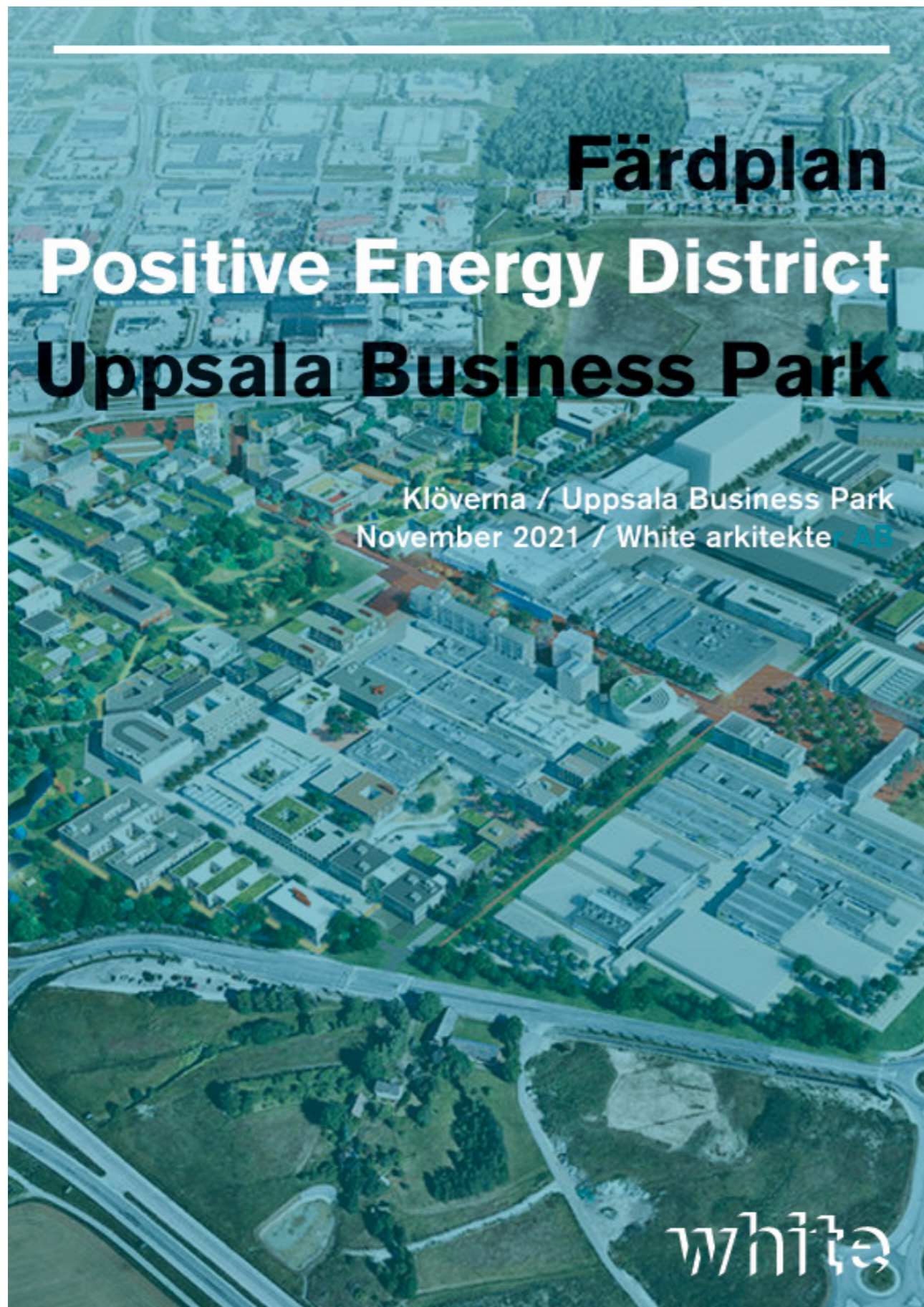
## Hänsyn till kulturhistoriska värden



# Endnotes

The Endnotes add further details and are referenced in the general text

- <https://jpi-urbaneurope.eu/ped/#:~:text=%E2%80%9CPositive%20Energy%20Districts%20are%20energy,surplus%20production%20of%20renewable%20energy>
- [https://sustainableinnovation.se/app/uploads/2022/06/PED-ID\\_D2.1\\_Annex\\_DigitalTwins\\_v2\\_220624.pdf](https://sustainableinnovation.se/app/uploads/2022/06/PED-ID_D2.1_Annex_DigitalTwins_v2_220624.pdf)
- The Kasper Salin Prize : (Kasper Salin-priset) is a prize awarded annually by Architects Sweden (Sveriges Arkitekter) to a Swedish building or building project "of high architectural quality". It is considered the most prestigious architectural prize in Sweden.
- PBL, Chapter 8, Section 13: A building that is particularly valuable from a historical, cultural-historical, environmental or artistic point of view may not be defaced.
- PBL, Chapter 8, Section 17: Modification of a building and relocation of a building shall be carried out carefully so as to take account of the building's character and to safeguard its technical, cultural-historical, environmental and artistic value.
- [https://sustainableinnovation.se/app/uploads/2022/06/PED-ID\\_D2.1\\_Process-Map\\_v4\\_220415.pdf](https://sustainableinnovation.se/app/uploads/2022/06/PED-ID_D2.1_Process-Map_v4_220415.pdf)
- <https://whitearkitekter.com/pepp/>



# Project Data

## FUNDING BODIES

ARQ  
JPI Urban Europe  
Swedish Energy Agency  
Viable Cities

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Cover from the PED Roadmap for Uppsala Business Park (left page).



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