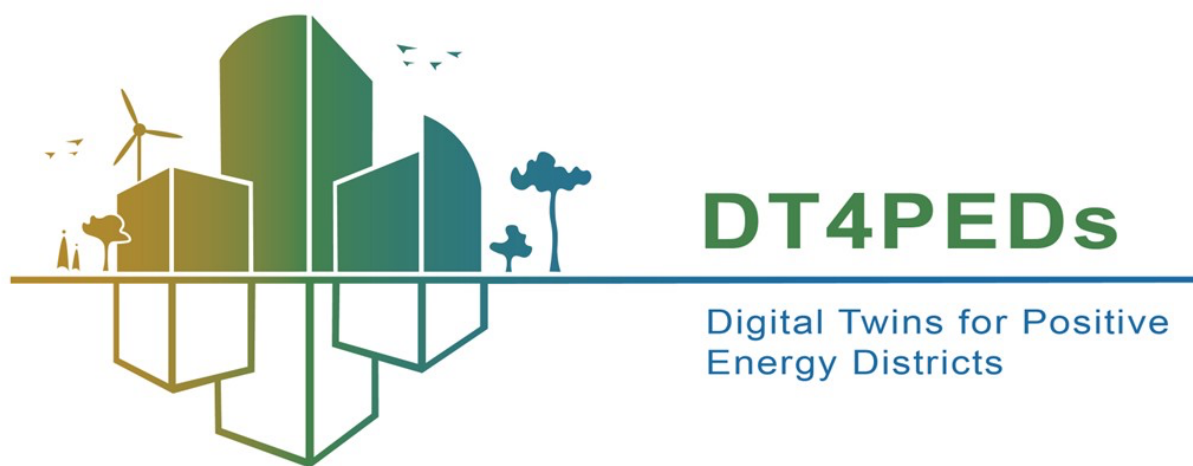


# Digital Twin for Positive Energy Districts



The DigitalTwins4PEDs project wants to develop a quality assurance process with a digital twin energy model to ensure energy performance in the entire neighbourhood, test it in three pilot areas and thus ensure a positive energy balance in the entire process.

**Positive Energy Districts (PED)** are a piece of the puzzle for the goal of climate neutrality in the coming decades. It is a great challenge to reconcile the different requirements of developers, planners, the city administration, and other stakeholders. In addition, there are technical and social challenges due to increased energy production in the neighbourhood.

The implementation of Positive Energy Districts (PED) requires the **participation of building owners, planners, and other stakeholders** in a longer process of neighbourhood development. The integrated energy the digital energy model should support QA to realise planned energy performance in the operation phase of urban districts.

concepts become more complex: In the future, various renewable energy systems situated in the neighbourhood will cover the energy demand for buildings, mobility, and supply/disposal to bring forward a positive energy balance.

We see from existing PED project that there is a need for a **trusted intermediary** for urban area development to balance the interests of different stakeholders. A **central, digital energy model** of the buildings and the energy system provides the necessary support for trusted intermediaries to be able to cover the requirements of the different process steps. The project develops **Quality Assurance method for PEDs by applying Digital Twin** models from early design phases onwards. In several stages of PED processes

This **Digital Twin Quality Assurance** concept will be tested and analysed in **3 different living labs** in every participating country. By designing a business model for Digital Twins for PEDs and disseminating the experiences and concepts, this approach is also to be used for other neighbourhood projects. The three living lab demonstration sites will be built in Sweden, Austria, and Turkey.

## PROJECT OVERVIEW

**Acronym:** DT4PEDs

**Full Title:** Dialogue and Quality Assurance Support for PEDs by Digital Twin District Energy Models

**Start date:** October 2022

**End date:** September 2025

**Funding:** JPI Urban Europe, Viable Cities - the Swedish Energy Agency <https://jpi-urbaneurope.eu/ped/> <https://en.viablecities.se/for-dig-i-projekt>

**Keywords:** Digital Twins, Quality Assurance, Positive Energy Districts, Trusted Intermediaries, Stakeholder Engagement.

**Project coordinator:** Camilla Rampinelli from [e-sieben](#) (Austria)

**Swedish team coordinator:** [LianeThuvander](#) from [Chalmers](#)

**Turkish team coordinator:** [Ilker Dursun](#) from [Sakarya University](#)

## Am Kempelenpark, Vienna, Austria

A new, diverse urban quarter is being created at "Kempelenpark" in Vienna. Around 1,100 rental flats will be created in what has been a purely commercial location up to now. Two thirds of these will be built on a non-profit basis and one third will be privately financed. This will enable high-quality and at the same time affordable living. In combination with a wide range of commercial areas, local supply and the construction of an all-day primary school and a kindergarten, a balanced mix of living space will be created.

A large public park forms the heart of the urban development planning. Together with the adjoining green spaces, the area will contribute to a climatically pleasant living environment in the future. Sustainable mobility and the networking of inner-city routes (Sonnwendviertel and Böhmischer Prater) make the new urban quarter a promising project for the entire district.

- City: Vienna, Austria
- Name of area: Am Kempelenpark
- Size of area: 50.000 m<sup>2</sup> total area
- Number of apartments: 1.100
- Building area for business use: 25.000 m<sup>2</sup>
- Type of buildings: 80% for residential use, 20% for business use

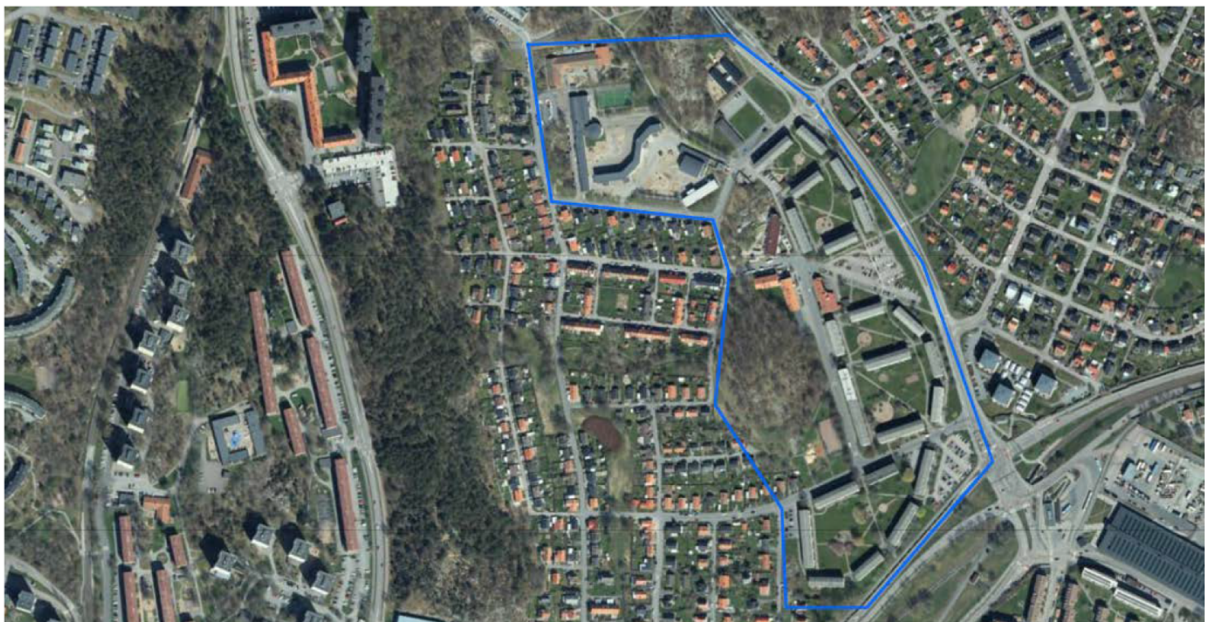


## Jättesten, Gothenburg, Sweden

The district consists of mainly residential buildings constructed in the 1950s and a school for 500 school kids (pre-school and 1st - 9th grade, 6 – 16 years) constructed in 1957. The residential buildings have three floors and are lamellar buildings group around larger green areas. Most of the apartments have 1 bedroom (2 rooms and a kitchen, 385 apartments), the remaining apartments are either 1 room (58 apartments) or 3 rooms (83 apartments) with a kitchen, and only one apartment has 4 rooms and a kitchen. The residential buildings are owned and managed by the municipal housing company Poseidon. Poseidon also owns 295 parking lots in the area and manages an existing boiler plant. The school is owned and managed by the municipal company Lokalförvaltningen which is responsible for all schools in Gothenburg.

The PED-Living Lab includes both retrofitting of the existing buildings and densification by adding 3 buildings (A-C) on properties owned by Poseidon (Building A and B) and the City of Gothenburg (building C). For construction of building C an existing garage building with 10 parking lots and a recycling room will be demolished.

- City: Gothenburg
- Name of area: Jättesten
- Number of apartments: 527 (existing, from 1950s) + 124 (new construction)
- Type of buildings: residential use (3-6 floors) and school





## Camili, Sakarya, Turkey

The Camili District is a new settlement established after the 1999 earthquake. Huge green parks, hospitals, new residential buildings, schools, shopping malls, mosques, university buildings, bike valley and huge bike paths, highways and governor's office are located here. In the scope of this project, it's planned to figure out a positive energy district by implementing Digital Twin tools.

Total area of the district is about 4.380.000 m<sup>2</sup>, there are 853 buildings which are mostly residential uses. In Fig. 7, digital twin approach is presented. Electricity, gas and water consumptions data will be gathered from utilities (co-operation partners) and the data will be processed according the digital twin approach. Representative buildings were identified as below. These buildings will be monitored and monitored data will be utilized for the district-level scenario developments.

Digital Twin platform delivers energy and environmental assessments, integrated with building and district-level digital twins. In addition, it monitors indoor air conditions of buildings for occupant wellbeing. In the scope of this project, Digital Twin Platform will be integrated into selected representative buildings of Camili District.

- City: Sakarya
- Name of area: Camili
- Size of area: Total area of the district is about 4.380.000 m<sup>2</sup>
- Number of apartments: 853
- Floor area of the buildings: 292.000 m<sup>2</sup>
- Type of buildings: 90% for residential use, 10% for business, governmental and other uses.

