PED-ID

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

D4.2 PED agreement model for cities and municipalities

Deliverable No.	D4.2
Deliverable Name	PED agreement model for cities and municipalities
Version	V4
Release date	15/04/2022
Dissemination level	Public
Status	Final
Authors	Camilla Rampinelli (e7) Gerhard Hofer (e7)

Document history:

Version	Date of issue	Content and changes	Edited by
V1	03/03/2022	First version for review	Camilla Rampinelli (e7)
V2	23/03/2022	Re-work	Camilla Rampinelli (e7)
V3	04/04/2022	Final Version	Camilla Rampinelli (e7)
V4	15/04/2022	Format	Camilla Rampinelli (e7)

Peer reviewed by:

Partner	Reviewer
e7	Gerhard Hofer
SEVEn	Jakub Kvasnica

This project has received funding from the JPI Urban Europe programme.

Table of contents

List of Figures

List of Tables

Acronyms table

CO_2	Carbon Dioxide
EE	Energy Efficiency
EU	European Union
GHG	Green House Gases
NECP	National Energy and Climate Plan
P2P	Peer to peer trading: enable prosumers to sell/buy or exchange energy between them.
PED	Positive Energy Districts
RES	Renewable Energy Sources
V2G	Vehicle to Grid: when E-vehicles can be used as batteries for grid flexibility or even for energy trading.

1 Executive summary

Positive Energy District projects (PED) are urban transformation processes requiring several parties, such as municipalities, urban developers, habitants, and others. These different stakeholders from the public and private sectors need to reach an agreement regarding the quality and technical aspects related to the project. Therefore, the Quality Agreements of a PED project is a covenant between the parties involved that contains and specifies the conditions, timeframe and standards with which each project interface should comply. Therefore, we present a model for the quality agreement of a PED in this document.

Many cities have developed their own specific agreements throughout the years, which reflect the general energy, social, environmental and economic requirements that urban projects should achieve.

- In **Austria**, initiatives from the ministries converge on this major objective, tackling various aspects related to climate neutrality. The current Austrian Austria's National Energy and Climate Plan (NECP) presents a medium- and long-term framework to develop the energy system in line with the Paris Agreement. Two examples from Salzburg and Zell am See municipalities show how specific quality agreements settled between developers, local authorities, and other parties can detail the building project's goals and responsibilities.
- In **Sweden**, local programmes to promote sustainable urban transformation develop new mechanisms to support stakeholders on this pathway. Climate contracts signed between municipalities, the national government bodies and others state a commitment of all parties actively contributing to accelerating the climate transition up to 2030. Additionally, CityLab Action Guide is an initiative from the Sweden Green Building Council (SGBC) to support urban development projects to address and achieve specific sustainability targets, providing a guideline and list of indicators to be considered in the planning of these projects.

Based on these experiences, we propose an overall quality agreement for PEDs. The purpose of this agreement model is to detail terms & responsibilities concerning the several aspects involved in a PED project – thus being **an instrument for quality assurance to all stakeholders** involved. It should clearly describe what will be executed, define who is responsible for which aspect, the probable time windows of the actions, present clear definitions, and, if necessary, describe how amendments shall be made. This exchange between different stakeholders **should be guided according to PED principles**, which are.

- **Yearly positive energy balance**: more energy is produced than consumed
- **RES**: maximum use of the site's renewable energy potential
- **Energy efficiency**: designs and structures should include energy-saving strategies
- **Energy flexibility**: adjust demand according to production + storage.
- **Decarbonisation**: net-zero CO2 emissions
- **Better quality of life**: and social welfare for users and habitants
- **Sustainability**
- **Integrative** design of private, semi-public and public spaces
- The commitment of **close cooperation between stakeholders** - public, private, utilities and others.

2 Introduction

2.1 PED-ID Project

PED-ID is an innovation project that aims to accelerate the decarbonisation of the urban environment by promoting the implementation of Positive-Energy-Districts (PED). PEDs are districts in urban areas that manage their resources to achieve net-zero energy balance (more energy is produced than consumed) and reduce greenhouse gas emissions. This project provides decision-makers with improved information about methods, tools and guidance for PEDs at an early stage of development, proposing a knowledge-based participation process. Stakeholders will be able to actively use these methods in the data-driven participation process to consolidate their options and make decisions based on data. This process will be tested using real Living Labs of potential PED projects. With the help of this method, the decision on sites will be accelerated to reach the goal of 100 PED sites in Europe.

2.2 What is a quality agreement?

The process of urban transformation and development ignited by initiatives such as PEDs should aim to execute a decarbonised-plus energy model and improve **the quality of life in the neighbourhood.** The driving force behind this change is a new form of cooperation between stakeholders involved: civil society, utilities, building developers and the local authorities. The ambitious targets for the energy aspects **required that all parties work together to translate the vision for the energy-plus neighbourhood into concrete requirements** that should be met by all involved.

The settlement of a PED quality agreement requires that stakeholders' opinions and inputs are considered and incorporated into the PED guide principles by the public authority. These quality standards are a joint agreement that states goals and conditions for distinct aspects of the PED project such as housing, open spaces, mobility and others: In this process of holistic urban transformation, representatives of all parties and institutions should jointly develop and sign the quality agreement, which **defines the energy concept of the project and the roles and responsibilities of the main stakeholders**. This agreement is essential for the deployment and correct implementation of the actions in a PED project.

The goals must be agreed upon as early as possible between the city, the landowners and the future builders. Therefore, we present in this document a **model for the quality agreement of a PED, which could be broadly used by cities and municipalities as a master** to be used in their PED process.

2.3 Scope of this document

The topics in the report are divided as follows:

- **Background & Sources**: A summary of the experiences of Austria and Sweden in establishing common indicators or requirements for urban transition projects. Some practices in the EU on requirements for urban projects that envisages climate neutrality are used as guiding lines to

develop a dedicated PED agreement model. These initiatives are briefly introduced in this section.

- **Proposal of a customised PED quality agreement**: The purpose of this agreement model is to detail terms & responsibilities concerning the different aspects involved in a PED project. The goal is to offer a conceptual basis considering the specific objectives of a PED project so that others can develop their contracts tailored to local conditions.
- **Final thoughts**: Remarks and discussions concerning the quality agreement process and its relation to PED projects.

3 Background and sources

Urban development and transformation projects, such as PEDs, need to present joint agreements concerning quality and sustainability standards settled between civil society, developers, and local authorities at a very early stage. These agreements express a common understanding of the requirements and standards to be followed by the PED project and the priorities and commitments. It is essentially a translation into standards and specific requirements of the PED project vision.

Some experiences in the EU of integrating stakeholders' views and discussion into a common agreement that envisages climate neutrality can be used as foundations for a dedicated PED agreement model. Such initiatives are briefly introduced in this section. Their experience and results supported creating a model suitable for PEDs.

3.1 Austrian experience

In recent years, the sustainable development and transformation of the urban space have become a significant goal for Austrian authorities. Different initiatives from the ministries converge on this major objective, tackling various aspects related to climate neutrality. The current Austrian Austria's National Energy and Climate Plan (NECP) [1] presents a medium and long-term framework to develop the energy system in line with the Paris Agreement. Table 1 summarises the main objectives and measures directly related to urban development projects such as PEDs.

Table 1: Main objectives & action areas of the Austrian NECP related to PEDs [1]

Sector	Measures	Instruments
Transport	▪ Strengthen & develop public transport: electrification and mobility management. ▪ Increase walking and cycling. ▪ Shift from road to rail ▪ Promote E-mobility in private transport. ▪ Investigate the use of additional environmentally and socially acceptable incentives for low-emission and zero-emission mobility in the tax and funding system. ▪ Possibility to deduct input tax for business use of electric bicycles & motorcycles ▪ Increase the share of renewable energy in transport by using biofuels and increase the percentage of RES e-mobility.	Public procurement, Infrastructure development, Funding, Raising awareness, Funding for infrastructure and vehicle purchase, Regulatory precedence, R&D,
Buildings	▪ Phase out fossil fuels by replacing them with RES for heating, hot water and cooling needs. ▪ Conduct thermal energy renovation of building stock and improve the efficiency of heating systems. ▪ Increase the share of efficient renewable energy sources and district systems for heating, hot water and cooling, including component activation, active use of hot water storage and buildings as storage for load balancing and load flexibility.	Regulatory policy, Identification and gradual phasing out of counterproductive incentives and subsidies, Funding

Waste management	▪ Avoid methane & CO_2 emissions in waste management. ▪ Prevention of waste Aerobic and anaerobic treatment of biogenic waste. ▪ Reduction in single-use plastic items ▪ Increase the proportion of municipal waste recycling.	Regulatory policy, Raising awareness, Identification and gradual phasing out of counterproductive incentives and subsidies
Spatial planning	▪ Improve spatial planning and spatial energy planning.	Planning Regulatory
Energy	▪ Expand the generation of renewables under the Renewable Energy Expansion Act. ▪ Create a '100 000 rooftops solar panel and small-scale storage programme. ▪ Develop a hydrogen strategy. ▪ Tax advantage for biogas, hydrogen & sustainable biogas. ▪ Abolish the tax on self-produced electricity. ▪ Extend the tax exemption for self-produced and self-consumed electricity generated by a photovoltaic system. ▪ Mitigate temporary surpluses and shortfalls using appropriate flexibility technologies. ▪ Invest in electricity, gas and district heating grid infrastructure. ▪ Invest in storage, including heat accumulators. ▪ Accelerate demand response management programmes. ▪ Accelerate market integration and energy system flexibility ▪ Adapt the grid tariff structure.	Funding, Market-based invitations to tender, Regulatory law Market incentives, Identification and gradual phasing out of counterproductive incentives and subsidies energy market integration, Security of supply

3.1.1 Zell am See initiative

Another example from Austria is Zell am See, located in the Salzburg region. A specific quality agreement [2] settled between developers, local authorities, and other parties details the goals and responsibilities for the building project "*Sonnengarten Limberg*" - Zell am See based on the policy goals of the municipality. The size of the planning area is approx. 22,000 m², including subsidised rental flats, subsidised condominiums and freely financed condominiums. Through workgroup meetings, a list of quality criteria was formulated. The guidelines for the statement were:

High life quality | Renewable energy supply | Sustainable mobility | Conjointly designed | intelligently networked

Main features of the agreement:

- **INTEGRATION:** Sustainable planning and building means the integrative design of private, semi-public and public spaces & implies a better quality of life and future orientation.
- **COMMUNICATION:** Sustainable, integrated planning requires dialogue and cooperation between all stakeholders of the project: architects, developers, open space planners, energy planners, the inclusion of social science components and, above all, the concerns of future users and neighbours.
- **HOLISTIC URBAN DISTRICT PROJECT**: The project has an interdisciplinary and complex character, and all participants also embrace this interdisciplinary culture in their area of responsibility.

3.1.2 Salzburg

According to a recent publication by JRC [3], one of the pioneers in this field was the municipality of Salzburg, e.g., the *Stadtwerk* programme, which has created a process for establishing a "high-quality agreement" with the engagement of multiple stakeholders. The aim was to ensure each one's duties and to ensure their full participation in the governance of the project:

> *"The term sustainable has been the central objective of the district, and by concentrating on important issues, such as quality of life, the whole community has benefitted."* [1]

The project's development has been conducted and planned holistically, including high energy-efficient buildings and increasing RES use (solar PV and district heating). The municipality of Salzburg was behind the stakeholder process that served as a basis for the plan "Smart City Salzburg" 2050. A total of 25 goals were established jointly and incorporated into the city's master plan, including developing carbon-neutral districts - a foundation for PEDs to flourish. Salzburg's finalised plan is a fitting example of bringing stakeholders from different sectors on board and creating a productive dialogue to settle an agreement for standards and requirements concerning energy and emissions of a neighbourhood. The model for setting the sustainable development requirements includes **quality of life, social equity, economic efficiency, environmental impact and citizen engagement**.

Main features of the agreement:

- **RENOVATION OF EXISTING BUILDINGS**: Change of insulation, district heating and controlled ventilation to reach good comfort levels and a low energy renovation standard.
- **NEW BUILDINGS**: Should have a very low energy demand - improved envelopes - and be integrated into a district-heating network. Additional solutions such as solar collectors and cool air supply should be addressed whenever possible.
- **INTEGRATION OF RENEWABLE ENERGY SUPPLY**: renewable energy supply plan integrates solar energy into the existing district heating network, including Solar collector fields on buildings of 2000 m2 of constructed surface, PV providing estimated 40 MWh/year of savings in electricity from the grid, individual solar thermal systems and micro-network grid to distribute the solar energy generated internally.

3.2 Swedish experience

Sweden is advancing its local programmes to promote sustainable urban transformation and developing new mechanisms to support stakeholders on this pathway. Recently, major cities such as Uppsala, Gothenburg, Malmö and others **have signed the first climate contracts in the EU**. These contracts signed between municipalities, the national government bodies and Viable Cities (an innovation programme) state a commitment of all parties actively contributing to accelerating the climate transition up to 2030 [4]. The contract defines the parties responsible/committed, the goals in a progressive timeframe, and planned actions for each city.

3.2.1 Climate City Contract

The Uppsala Climate Contract [5] specifies each party's commitment toward different climate goals, e.g., 90% decrease in GHG emissions by 2040 and a 100% decrease by 2050. To achieve these goals, the contract states what actions are the municipality, Viable Cities programme and national agencies responsible for in the following years, the strategic development projects in 2022 and the monitoring and evaluation of these assurances. This is an excellent example of setting specific requirements between different stakeholders assigning responsibilities and duties within a working timeframe. Figure 1 shows a general overview of each partner's thematic and attributions in the 2021 review of the contract.

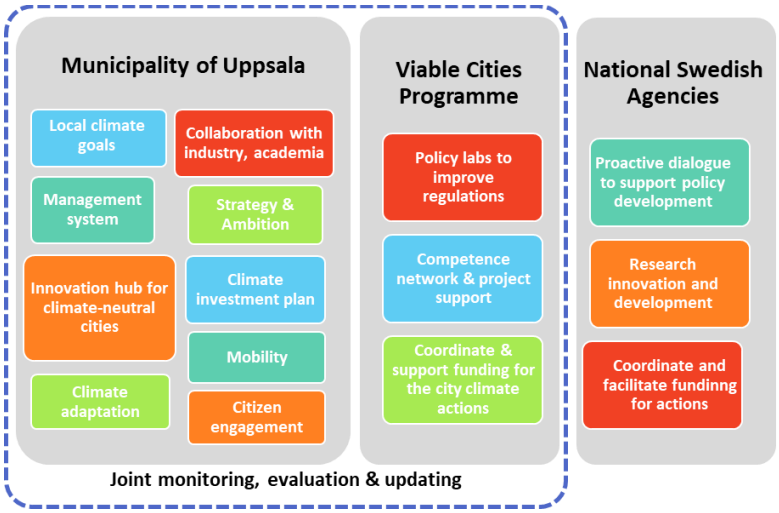

Figure 1 Overview of the commitments from each party in the Uppsala Climate City Contract []

3.2.2 CityLab Action Guide

This is an initiative from the Sweden Green Building Council (SGBC) to support urban development projects to address and achieve specific sustainability targets, providing a guideline and list of indicators to be considered in the planning of these projects. CityLab Action Guide [6] has specified ten overall sustainability goals that all urban development projects must strive to achieve:

[1] **Good health and well-being**
[2] **Equality, gender equality and social cohesion.**
[3] **Participation and influence**: Apply to everyone regarding gender, transgender identity or expression, ethnicity, religion or other belief, function and age.
[4] **Safe and secure living environment**
[5] **Good supply of services and opportunities**
[6] **Accessible and inclusive city life**
[7] **Resource management**: This means that the use of energy, materials and water is minimised, that resources are used and re-used efficiently in cycles and that renewable energy types and materials are chosen in the first place. Shared use of resources can significantly reduce the need for resources.
[8] **No negative climate impact:** Net-zero emissions of additional Carbon dioxide and other GHG from various activities cause the global climate to change and become warmer.
[9] **No negative environmental impact**: To preserve and promote biodiversity and the natural and cultural environment, and people's activities leave as small an ecological footprint as possible.

[10] **Resilience and flexibility**: The built and natural environment must withstand climate change and be able to adapt to future changing needs. Flexibility means, for example, the opportunity to change the buildings to meet the current housing needs.

Indicators suggested

The guide developed by the CityLab initiative lists seventeen of what it calls "Focus Areas" related to sustainable urban development projects. These indicators were designed to support Sweden's work to achieve the global goals for sustainable development (SDG). The focus areas are complex, and they partly overlap. Therefore, the focus areas must be read and applied parallel as part of a game plan to support the project's sustainability work. Table 2 **presents a resume of the sectors and indicators suggested by the guide that are most relevant to PED projects.**

Table 2: City Lab Action Guide indicators

area	Indicators	Guiding points
Functions	**Mixed range**: Create access to social, commercial and cultural services and recreation in the planned area.	▪ Workplaces, activities and livelihood opportunities should be located in the area or the surroundings. ▪ A mix of housing and workplaces should be sought in the planned area with a 70/30% guide value.
	Socially mixed housing: Access to housing with different tenancy forms, sizes and price levels is affordable to the majority.	▪ Consideration is given to the possibility of living in the area based on different stages of life, such as different sizes and prices. ▪ Enable other management forms, such as architectural communities (communal areas and functions) and building communities. ▪ Flexible housing that can be adapted to changing needs should be considered.
Building Structure	**Integrated building structure:** The buildings shall create a coherent urban structure between new and existing buildings with clear lanes and meeting places.	▪ New buildings should be developed in interaction with the city's existing technical and ecological plans. ▪ The land area for the project should primarily consist of re-used or utilised land. Conserved natural land should not be exploited. ▪ Barriers or constraints, which prevent spatial and social integration in the built environment, should be minimised. It can avoid gentrification. ▪ The built environment should be accessible by sustainable transport (walking, cycling and public transport). The needs of people with disabilities should be aggregated into the project. ▪ A well-balanced building density should be ensured regarding the degree of utilisation, spaciousness figures and average house height concerning city qualities such as daylight and good sound quality.
Places	**Accessibility to public places**: The built and natural environment should provide safe and accessible public spaces, attractively designed to contribute to well-being and social encounters.	▪ Public and semi-public spaces should be accessible to all, regardless of age and physical disabilities. ▪ There should be places with access to greenery as a prerequisite for experiences with all the senses. ▪ There should be access to meeting places for cultural and associative activities. ▪ Good local thermal climate conditions should be considered.
Learning	**Adequate learning environment**: Schools must be near the area and with suitable environments.	▪ School activities, including farms for outdoor activities, should be located about noise, air pollution, odours and daylight. ▪ Schools should be located on safe and secure roads to facilitate sustainable transport - public transport stops should not exceed 400 meters.

area	Indicators	Guiding points
Cultural	**Preserve local heritage:** Cultural values of the existing environment should be a starting point for the development.	▪ Analyse how the design of new buildings relates to the cultural heritage. ▪ Examine the need for preventive or protective measures for buildings preservation. ▪ Building materials, local materials and craftsmanship should be re-used in new and existing buildings. ▪ Any works of art in a cultural environment should be defined as real or movable property and its owner should be clearly identified.
Local supply	**Social clauses & Circular economy**	▪ Social clauses may involve building contractors, companies, the municipality, and others, so during the project, a part of the workforce is recruited locally. ▪ The urban development project can contribute to developing a locally adapted economy with recycling centres and recycling stations. ▪ Conditions should be created to promote local actors, such as small entrepreneurs, to create a sustainable local economy with local jobs, resource conservation, and social cohesion.
Transport	**Sustainable modes of transport**: Promoting sustainable modes of transport and sustainable logistics solutions.	▪ An analysis should be made concerning the need & possible measures of the local transport system, prioritising the use of sustainable modes (walking, cycling and public transport). ▪ The area's planning should consider the distances to public transport stops. ▪ Stops and hubs should facilitate combined trips, including a safe cycle path and lockable and weather-protected bicycle parking directly adjacent to the stop. ▪ Cycle parking should be made more accessible to the interchange than car parking. ▪ The project should plan how to address mobility issues at the property level to prioritise sustainable transport modes and deploy charging infrastructure for electric vehicles. ▪ Conditions should be created for efficient freight and logistics solutions that promote a good sound environment and low environmental impact.
Information & Communication	**Digital urban design**: Digital tools should be integrated and used to develop the city sustainably.	▪ Municipalities can develop a "rolling" master plan system, whereby the plan is developed gradually and linked to long-term sustainability goals and strategies for the built environment. ▪ Meters and sensors can be used to collect information. Data collected can be used to analyse and optimise the city's flows. ▪ Digital tools can be used to create participation, social contact and cohesion. ▪ ICT can be used to make available and display local services and offerings that facilitate sustainable lifestyles
Air	**Good air quality**: It should be ensured, and issues should be included early to avoid future problems.	▪ Follow the environmental quality objective of Fresh air and its specifications. ▪ Analysis should be made of the project's impact on future air quality. The analysis shall also cover the construction phase. ▪ Air quality improvement measures should be described, including the expected effects of the measures
Lighting	**Good lighting conditions**: It must be ensured to safeguard health aspects and urban qualities.	▪ Considering diurnal and seasonal variations, it should be adapted and designed with good access to daylight and direct sunlight outdoors. ▪ Light analyses should be made according to planning features (street network, nodes), building orientation, building design (geometry, materials, windows, roof shape), street lines, trees, and greenery.
Sound	**Good environmental acoustics**: Counteracting disturbing	▪ For new residential construction, the following noise guidelines for road and rail traffic should not be exceeded: 55 dBA daytime equivalent noise level -

area	Indicators	Guiding points
	sounds and contributing to a positive and sustainable environment.	outdoors at the façade and in public places / 70 dBA maximum noise level - at the façade and in public places. ▪ Sound should, as far as possible, be handled as a design element with the support of acoustic design.
Green & Blue Structures	**Multifunctional green and blue structures**	▪ Natural areas of high nature value — important for the ecological functions - shall be given long-term protection. ▪ The conservation and creation of new green & blue spaces should be based on identified key needs and benefits. ▪ Biodiversity should be planned to have the long-term potential to be maintained. Those who will be responsible for the maintenance of green spaces should be involved in the pre-project and design stages.
Climate Adaptations	**Climate resilience:** Increase the resilience of society to environmental change and reduce vulnerability to future extreme weather	▪ Existing climate adaptation documents & local risk assessments need to be incorporated into the project. ▪ The impact of future climate change on soil and rock materials should be considered, such as landslides and erosion risks. ▪ Risks of rising temperatures and the possibility of influencing heat islands in green and blue structures should be considered. ▪ A plan should be developed for how the area will cope with future climate change in terms of natural disaster risks. ▪ The green structure should be used as much as possible to regulate the local climate.
Material Flows	Low resource use shall be pursued by creating and exploiting circular flows of renewable and resources, prioritising renewable resources over fossil resources.	▪ The planning of material flows should be based on mapping the area's existing building and resource needs. Optimisation of material quantities should take place in design and production. ▪ The area should be planned and managed for a circular use of resources with low demand for finite and renewable resources. ▪ Water, energy and waste/material flows should be linked for increased resource efficiency. ▪ The use of plastics should be reduced. The district should provide systems for sorting plastic waste. ▪ Construction site waste management should be planned according to the EU waste hierarchy. ▪ Targets should be set for the maximum amount of waste going to landfill from the construction site, e.g., kg/sqm. ▪ Waste management should allow its organic waste to be transformed into energy and re-used.
Products	The choice of products and materials shall be made in such a way as to prevent the release of substances harmful to the environment and health into the air, water and soil.	▪ Requirements for emissions from construction products and chemical products installed in the area should be based on the EU LCI emission values. ▪ The products and materials estimated to have the greatest climate impact for the project from a life cycle perspective should be identified, and measures should be taken to reduce the climate impact. ▪ A list of products and materials used, including quantity and location, should be established for documentation, monitoring requirements, and information to those responsible at the management stage.

area	Indicators	Guiding points
Water	Environmentally and health-wise reliable and resource-efficient water supply and water management.	▪ Capacity conditions of the public stormwater and sewerage system should be investigated and the possibilities of re-using the energy, nutrient and water content of the wastewater nutrients. ▪ Future treatment challenges in terms of microplastic separators, disposal of environmental toxins and pharmaceutical residues should be reviewed and assessed. ▪ Operation and maintenance should be described in the planning of measures, such as stormwater facilities. ▪ Stormwater should be treated as a resource in planning and urban development. ▪ EU agreed environmental quality standards for water include clear limits on pollution levels in our lakes, rivers and seas. Developments must not pose a risk of exceeding an environmental quality standard.
Energy	**Energy system with low-climate impact:** Greenhouse gas emissions from the area's buildings, facilities and infrastructure shall be minimised through high energy efficiency and the use of renewable energy sources.	▪ The urban development project should formulate objectives and a strategy to contribute to a climate-neutral building and sector by 2045, with a 50% reduction in the carbon footprint by 2030. By 2025 emissions from the sector show a clear downward trend. step until 2022 is for stakeholders to map emissions and set climate targets. ▪ The energy strategy should consider the 'low carbon energy system' indicator. ▪ Environmental impacts and climate impacts should be considered from a life cycle perspective. ▪ Consideration of the orientation of buildings to reduce energy use and to maximise active and passive solar energy harvesting. ▪ Planning should consider how all types of renewable energy production in the area can interact with neighbouring buildings and common energy systems. ▪ Facilitate the use of charging stations for electric cars, manage energy storage and use consumption flexibility. ▪ The planning, design and construction of buildings should follow the principles of the Kyoto Pyramid. This means that a building should have low energy losses, energy-efficient installations, energy-aware occupants and that the energy supplied is renewable. ▪ Climate impact is calculated based on actual emissions that can be linked to the district. Environmental analyses are carried out to compare with alternative solutions. Environmental assessment of energy will follow calculation and accounting standards such as the Green House Gas Protocol (GHGP) Scope 1, 2 and 3 to avoid double counting of reduced environmental impacts.

4 Quality statement for PEDs — proposal

The purpose of this agreement model is to detail terms & responsibilities concerning the distinct aspects involved in a PED project – thus being **an instrument for quality assurance to all stakeholders** involved. Generally, it is said that a solid Quality Agreement should clearly describe what will be executed, define who is responsible for which aspect, the probable timeframe of the actions, present clear definitions, and, if necessary, describe how amendments shall be made [7].

In PEDs, the process consists of formulating a requirement list, such as presented in Table 3, with the participation of the main stakeholders, either through workshops or other consultation strategies. Once the inputs and feedback are collected, the different parties (civil society, utilities, developers and local authorities) should discuss and settle a final list of standards and requirements agreed to the PED project.

This exchange between different stakeholders **should be guided according to PED principles**, which are:

- **Yearly positive energy balance**: more energy is produced than consumed
- **RES**: maximum use of the site's renewable energy potential
- **Energy efficiency**: designs and structures should include energy-saving strategies
- **Energy flexibility**: adjust demand according to production + storage.
- **Decarbonisation**: net-zero CO2 emissions
- **Better quality of life**: social welfare for users and habitants
- **Sustainability:** use of sustainable and environmental-friendly solutions
- **Integrative:** collaborative design of private, semi-public and public spaces
- The commitment to **close cooperation between stakeholders** - public, private, utilities and others.

The challenges of urban development programmes cannot be solved using generalised measures and standards. The problems to be faced are highly dependent on both local conditions and other physical, social, and economic factors. Each location will have its unique set of elements and aspects that will shape every part of a PED project. Therefore, it is highly complex to develop a model applicable in all regions of the EU, for example. So, our aim here is to **offer a conceptual basis considering the specific objectives of a PED project** so that others can develop their contracts tailored to local conditions.

In the following pages, Table 3 presents a proposal of quality agreement developed specifically for PEDs, which should be adjusted for the local context of each project.

Table 3: Quality Agreement Model for PEDs

Sector	Issue addressed	Actions committed	Responsible party & contributors	Control according to timeframe:	
				Planning	Execution
Energy use & production	Energy Supply	▪ The energy supply of the district should be done as much as possible by the local RES infrastructure. ▪ If not possible, it may be procured from an outside provider, prioritising RES sources with lower climate impacts.			
	Local Renewable Energy Production	▪ The local renewable energy infrastructure should be conceived to cover the yearly local energy needs as much as possible. ▪ Renewable energy sources should have a net-zero carbon emission related to the energy production process: PV, wind, geothermal, solar thermal, biogas, heat recovery and others. ▪ Year balance should be positive – more RES energy produced than consumed.			
	Thermal Energy	▪ Energy-efficient and climate-friendly systems such as heat pumps and solar thermal panels should provide the heat/cooling necessary to achieve thermal comfort. ▪ Heat recovery systems should be used as much as possible to re-use wasted heat.			
	Lighting	▪ General lighting indoors and outdoors will use energy-saving LED technology or similar energy-efficient technology.			
	Energy Flexibility	▪ Enable peer to peer (P2P) energy trading & balance if possible. ▪ Storage: Wherever possible, units and systems to store local RES surplus should be installed for heat and electricity. ▪ Demand-side management: The energy demand should be managed to match as much as possible the local energy production – through demand response systems, dynamic billing, or other incentives.			
Building Structure	New buildings	▪ Considering the building materials used, it will be built to the best energy efficiency standard. The aim is to achieve the highest possible score in the sustainability evaluation according to local regulations. ▪ Phase out the use of fossil fuels by replacing them with RES for electricity, heating, hot water and cooling needs. ▪ Climate adaptation methods guarantee a minimum energy efficiency standard under extreme conditions.			
	Refurbishment	▪ The existing building should be refurbished to the best standard possible: thermal energy renovation of building stock and improved efficiency of heating systems.			

Sector	Issue addressed	Actions committed	Responsible party & contributors	Control according to timeframe:	
				Planning	Execution
		▪ "Energy efficiency first" principle should be used (i.e. first improvement of thermal-technical properties of the building envelope, then resolve technologies and efficient energy sources). ▪ Attention should be paid to preserve cultural heritage.			
	Energy needs	▪ Overall, building energy needs should be lowered to match local RES production.			
	Architecture	▪ Integration of PV panels and green walls into the design: ▪ Exploit in the building design the possibilities of natural lighting, the use of passive techniques and bioclimatic approaches to lower the building energy needs. ▪ Housing should consider users at various stages of life, such as different sizes (rooms, area) and prices (availability to lower-income families). ▪ Enable other management forms, such as architectural communities (communal areas and functions) and building communities. ▪ Flexible housing that can be adapted to changing needs should be considered. ▪ Concepts must undergo specialist review for accessibility.			
Circularity	Material flow	▪ Building materials should be based on a low environmental impact standard - optimising material quantities and waste. ▪ The area should be planned and managed for a circular use of resources with low demand for finite and renewable resources. ▪ Construction site waste management should be planned to avoid excessive waste amounts.			
	Water & Waste	▪ Water, energy and waste/material flows should be linked for increased resource efficiency for the area. ▪ Rainwater recovery systems. ▪ Internal water re-use for flushing and others. ▪ Recycle waste collection. ▪ Heat recovery from waste.			
Mobility	Decarbonise	▪ Prioritise decarbonised modals of transportation over cars: walking, cycling, e-vehicles. ▪ Prioritise decarbonised modals of transportation over cars: walking, cycling, e-vehicles. ▪ Vehicle sharing including the necessary infrastructure (passenger and freight transport).			

Sector	Issue addressed	Actions committed	Responsible party & contributors	Control according to timeframe:	
				Planning	Execution
		▪ Smart mobility solutions (smart traffic management systems, mobility stations, smart taxi stands, eco-driving technologies and training programmes…) ▪ Smart mobility logistics (optimisation of logistic and delivery flows).			
	Pedestrians	▪ Walkable pathways connecting different points of the area that are accessible, secure and thermally comfortable.			
	Bicycles	▪ Promote cycling as the number one choice with secure bicycle lanes connecting to public transport. ▪ Proper & numerous dedicated parking & charging spots (for e-bikes, e-scooters) ▪ Rental systems for bicycles and trolleys should be considered.			
	E-vehicles	▪ Dedicated parking spaces with charging sockets connected to RES. ▪ Integration to the grid – vehicle to Grid (V2G) should be considered a flexibility strategy.			
	Public Transport	▪ Improve the city's connectivity through sustainable and accessible transport networks to provide access to jobs, education, services, retail, leisure, and recreation. ▪ An electric fleet or renewable sources should entirely constitute public transport. ▪ Real-time info at stops made available. ▪ Easy, safe and pleasant: vehicles should oversee the flux at peak times.			
Open Spaces	Public Spaces	▪ Attractive, thermally comfortable and accessible Public and semi-public open spaces. ▪ Leisure spaces (playground, exercise, resting areas) ▪ Summer and Winter accessibility ▪ Power outlets should be made available for EV charging – indicating a surplus of local RES generation.			
	Green areas	▪ Use of native and climate-adapted plants ▪ Thermal comfort: Green space should be used to provide district thermal comfort (shading of sidewalks, buildings and areas) ▪ Conserve natural green spaces if they exist			
Social aspects	Housing	▪ High-quality housing (size, type, tenure, accessibility & price) affordable to a broader spectrum. ▪ Consider aspects of the area's living life based on different life stages (childhood, adulthood, older phases). ▪ Enable other forms of housing management such as building communities, housing cooperatives or associations.			

Sector	Issue addressed	Actions committed	Responsible party & contributors	Control according to timeframe:	
				Planning	Execution
		▪ Consider a fair social distribution, aligned with regional directive ▪ Subsided units according to the local plan. ▪ Involvement of residents in the decision making when possible. ▪ Tenancy transfer model according to local programme/specific ownership stipulated by PED facilitators.			
	Fulfilment of essential needs	▪ A mix of housing and services should be pursued in the area with the guide value 70%/30% ratio, respectively. ▪ Create a sustainable lifetime neighbourhood with high-quality environments, good local facilities, and employment opportunities. ▪ Support improvement of the city's performance, spread the benefits of reducing economic, environmental, and social disparities, and help create inclusive, sustainable communities.			
Management & PR	Management	▪ Define management responsibilities of the project at distinct stages. ▪ Ownership transfer procedures. ▪ Quality standards & verifications procedures.			
	Communication	▪ Project visual identity. ▪ Continuous stakeholder engagement & participation in decision-making steps. ▪ Communication: online (website, social media) and eventual mailing.			

5 General remarks

To achieve a sustainable and decarbonised urban transformation, initiatives such as the Positive energy districts need to establish in a concise way between all the actors involved in the project what the technical standards and requirements are for the different facets of the project. The process should not only aim at aspects of renewable energy generation but also at improving the structure and efficiency of the systems and, consequently the quality of life in the neighbourhood.

Establishing a PED quality agreement requires commitment from all parties associated with the project to achieve the proposed objectives by monitoring the progress and actions planned at different stages of development. Some essential points to be considered when developing a standard quality statement are:

- **THE VISION OF THE PROJECT:** The requirements established should contribute to the project's vision. These are ways to verify whether the overall project objectives and targets will be achieved and when.
- **ENGAGEMENT**: In this decision process, all parties must communicate actively and be heard. It is essential that each requirement set resulted from a common decision or agreement of all stakeholders involved
- **RESPONSIBILITIES**: for each requirement established, it is important to define the stakeholders who will be directly involved or in charge of the action. They would report the status and plans to achieve the objective set at different project phases.

Furthermore, the proposed agreement model in section 4 should be taken as a guide for PED projects and not as a formal contract or determination. There are many challenges associated with projects such as PEDs that cannot be predicted or solved using a standard primer of countermeasures or solutions. The issues to be addressed are highly dependent on the site and the related physical, political, social and economic circumstances.

Each project will need to develop a unique set of requirements to be agreed upon by all parties. The model presented in this report should be seen as a mine map to assist future agreements for developing countries.

6 References

[1] *Integrated National Energy and Climate Plan for Austria (2021-2030) - pursuant to Regulation (EU) 2018/1999 of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action, published by the Federal Ministry of Sustainability and Tourism of Austria; Vienna, 18 December 2019: Accessed on Feb 2022: https://ec.europa.eu/energy/sites/ener/files/documents/at_final_necp_main_en.pdf*

[2] *Sonnengarten Limberg: Sonnengarten Limberg Zell am See – Der Prozess einer Kleinstadt zur Smart City,by SIR – Salzburger Institut für Raumordnung und Wohnen, Smart Cities Demo – 8. Ausschreibung, 2020, Accessed on Feb 2022: https://smartcities.at/wp-content/uploads/sites/3/BGR5_2020_Sonnengarten-Limberg-1-6.pdf*

[3] *Joint Research Centre and European Commission. "From Nearly-Zero Energy Buildings to Net-Zero Energy Districts: Lessons Learned from Existing EU Projects". LU: Publications Office, 2019. https://data.europa.eu/doi/10.2760/693662.*

[4] *Climate City Contract 2030 by Viable Cities. Accessed on Feb 2022: https://en.viablecities.se/klimatkontrakt-2030*

[5] *Uppsala Climate City Contract 2030. Accessed on Feb 2022: https://en.viablecities.se/s/Climate_City_Contract_2030_ENG_Uppsala.pdf*

[6] *HÅLLBAR STADSUTVECKLING I PLANERING OCH GENOMFÖRANDE V3.0 - Handledning och certifiering, by Sweden Green Building Council. 2019. Accessed on Feb 2022: Ahttps://www.sgbc.se/certifiering/citylab/det-har-ar-citylab/citylab-guide/citylab-guide-hallbar-stadsutveckling-i-planering-och-genomforande/*

[7] *5 Key Questions About Quality Agreement, June 30, 2021, By Arvilla Trag. Accessed on Feb 2022: https://www.mastercontrol.com/gxp-lifeline/5-key-questions-about-quality-agreements/*

PED-ID TEAM

Coordinator:

ENERGY INNOVATION ENGINEERING	e7 Energy Markt Analyse GmbH (e7)

Partners:

FACULTY OF CIVIL ENGINEERING CTU IN PRAGUE	Czech Technical University in Prague, Faculty of Civil Engineering (CVUT)
SEVEn	SEVEn, Energy Efficiency Center, z.ú. (SEVEn)
Sustainable Innovation	Sustainable Innovation AB (SUST)
white	White Arkitekter AB (WHITE)

CONTACT

Project Coordinator:

e7 Energy Markt Analyse GmbH

Camilla Borges Rampinelli | camilla.rampinelli@e-sieben.at

This project has received funding from the European Union's Joint Programme Initiative Urban Europe programme.