

Draft

HORIZON-MISS-2023-CIT-01-02: Positive clean energy district (PED) digital twins – from modelling to creating climate neutral Cities

Specific conditions	
<i>Expected EU contribution per project</i>	The Commission estimates that an EU contribution of between EUR 6.00 and 7.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
<i>Indicative budget</i>	The total indicative budget for the topic is EUR 20.00 million.
<i>Type of Action</i>	Innovation Actions
<i>Eligibility conditions</i>	<p>The conditions are described in General Annex B. The following exceptions apply:</p> <p>If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).</p>
<i>Technology Readiness Level</i>	Activities are expected to achieve TRL 6-8 by the end of the project – see General Annex B.
<i>Legal and financial set-up of the Grant Agreements</i>	<p>The rules are described in General Annex G. The following exceptions apply:</p> <p>Grants awarded under this topic will be linked to the following action(s): HORIZON-MISS-2021-CIT-02-03</p> <p>Collaboration with the Cities Mission Platform¹ is essential and projects must ensure that appropriate provisions for activities and resources aimed at enforcing this collaboration are included in the work plan of the proposal. The collaboration with the Mission Platform must be formalized through a Memorandum of Understanding to be concluded as soon as possible after the projects' starting date.</p>

¹ Conceived through the Horizon 2020 project NetZeroCities - Accelerating cities' transition to net zero emissions by 2030, Grant Agreement n. 101036519, to be scaled up through the topic *HORIZON-MISS-2021-CIT-02-03: Framework Partnership Agreement (FPA) for the Climate-Neutral and Smart Cities Mission Platform*

Expected Outcome: Project results are expected to contribute to all the following expected outcomes:

- Increased number of (tangible) city planning actions for positive clean energy districts using the (proto-)PED design, development and management digital twin tools (based on pre-market research learnings) using open-standards based components which can be reused elsewhere.
- Enhanced data gathering approaches with identification relevant (standardised) multi-dimensional data set (e.g. meteorological, load profile, social, geo-spatial, etc.) high-resolution real-time data streams (e.g. renewable energy production, energy consumption), and relevant forecasting data, drawing also on the work of common European data spaces, including the smart communities data space.
- Consolidated city sensor network specifications (based on optimal density necessary), complemented by appropriate data gathering approaches for soft data.
- Increased integration of existing smaller scale management systems (e.g. Building management systems) with open-standards based operational city platforms using sectorial data (e.g. Building data, mobility, Urban Planning, etc.).
- Increased number of city planning departments / approaches using common data and (replicable) elements and processes.
- Improved performance of AI based self-learning systems for optimization of positive clean energy districts and bottom-up complex models.

Scope: Effective support for the Cities Mission should follow a systematic approach appropriate to the highly complex task of delivering climate neutral and smart cities. In order to be manageable, this task should be approached starting from the smallest representative scale, i.e. the District level.

Measuring, analysing and modelling the characteristics and behaviour of a potential Positive clean Energy District (PED) is necessary to get the best possible picture of the status quo and the extent of the challenge. Creating a digital twin can support identification of the most effective set of integrated solutions and the management of the system in real time in order to adapt/optimize it over time and space.

Proposed projects are expected to go beyond the creation of a digital twin and the integration of (technical) PED solutions. The proposed projects will serve as the scientific base for a reflection on the necessary, replicable elements and processes that are needed to make first a district, and later on the whole city, climate neutral.

Proposals are expected to develop a digital twin that goes beyond the virtual representation of the built environment, by integrating a comprehensive modelling layer of the local energy systems² as well as mobility and transport solutions in the project defined district boundaries. The digital twin should support scenario analysis with different boundary conditions to help define the optimal solution matrix. It should draw on existing components and use open standards, technical specifications and open source software where possible.

Projects are expected to address all of the following:

- Develop and test a digital twin of a (project defined) potential Positive clean Energy District (PED) in a European city.
- Prepare an economic impact study for this digital PED twin, a risk analysis and a data security strategy.
- Use the digital twin to improve evidence-based decision-making and to create district development pathways with a clear timeline for associated transformation actions.
- Involve/train necessary public and private actors at district/city level in building and using digital twins for co-creation, communication, public consultation/dialogues and good practice sharing.
- Make use of gamification and/or co-creation approaches³ to change citizens' awareness of and behaviour towards energy efficient/energy conservation and to make results of the digital twin analysis easily understandable to non-technical audiences.
- Recommend a set of actions that foster a cost effective and secure digitalization of the local energy system.
- Publish practical guidelines, reusable models, algorithms, data models, components and training material that will help other cities to successfully replicate digital twins in their district/cities.

Projects should establish links to the data space for smart communities and sectoral data spaces⁴ as relevant (energy, mobility) as well as working with the Data Space Support Centre⁵. Projects should collaborate with Living-in.EU to support efforts on developing the Minimal Interoperability Mechanisms (MIMs) approach to improving interoperability of data, systems and services, and to contribute to standardisation efforts in the area of local digital twins at European and international

² Including Energy Communities if possible.

³ e.g. in support of New European Bauhaus objectives.

⁴ https://ec.europa.eu/newsroom/repository/document/2021-46/C_2021_7914_1_EN_annexe_acte_autonome_cp_part1_v3_x3qnsqH6g4B4JabSGBy9UatCRc8_81099.pdf i.e. section 2.2

⁵ https://ec.europa.eu/newsroom/repository/document/2021-46/C_2021_7914_1_EN_annexe_acte_autonome_cp_part1_v3_x3qnsqH6g4B4JabSGBy9UatCRc8_81099.pdf i.e. section 2.2

levels. Participation of partners and potential Positive Energy Districts is encouraged, in particular from Mission Innovation (MI) member countries⁶ and linking to the objectives of the MI Urban Transitions Mission⁷.

Collaboration with the Cities Mission Platform is essential and projects should ensure that appropriate provisions for activities and resources aimed at enforcing this collaboration are included in the work plan of the proposal. The collaboration with the Cities Mission Platform should be formalised through a Memorandum of Understanding to be concluded as soon as possible after the projects starting date.

⁶ <http://mission-innovation.net/our-members/>

⁷ <http://mission-innovation.net/missions/urban-transitions-mission/>. The global Urban Transitions Mission is co-led by the European Commission, the Global Covenant of Mayors and the Joint Partnership Initiative (JPI) Urban Europe.