



Positive Clean Energy District Digital Twins in the European Context

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@Munich Urban Colab

Digital Twin – so many questions...

What are the 3 key characteristics?

- A **physical system**, a **virtual representation** of it, and the **bi-directional data connections** that feed data from the physical to the virtual representation and vice versa

Since when?

- Allegedly first used as term in 2003, but the approach was there for a long time...

Digital Twin – so many Ds...

- **Definition**
- **Decision** support systems
- **Data** → “CICA”
- **Dimensions** → not only 3D
- **Deterministic** → Probabilistic
- **Discussion**

Digital Twin – so many Ts...

- **Twinning** systems
- **Time**
- **Transformation** → Scenarios
- **Trends** → Forecasts
- **Technologies**
- **Trial**
- **Transferability**

Digital Twin – so many actors...

- Focussing on **DG ENER** perspective, e.g. **DG CONNECT** look at many other facets of digital twins.
- Also many other perspectives, e.g. from Horizon Europe calls:
 - HORIZON-CL5-2023-D2-01-03: Advanced digital twins for **battery cell production** lines
 - HORIZON-CL5-2023-D3-02-14: Digital twin for forecasting of power production to **wind energy demand**
 - HORIZON-CL5-2024-D4-02-03: BIM-based processes and digital twins for facilitating and **optimising circular energy renovation**
 - HORIZON-CL5-2023-D3-01-10: Supporting the development of a digital twin to improve management, operations and resilience of the **EU Electricity System** in support to REPowerEU

Positive Clean Energy Districts

Smart Cities and Communities **Horizon 2020** (2014-2020)

- **120 cities**
- **18 Smart Cities and Communities projects**
- funded by **Horizon 2020: EUR 345 million**
- **>550 demonstrations** of technological and social innovations in the areas of **mobility and logistics, buildings, urban data and ICT infrastructure, citizen engagement** as well as **urban governance**

Positive Clean Energy Districts

- **HORIZON-MISS-2021-CIT-02-04:** Positive Clean Energy Districts
 - ASCEND Accelerate poSitive Clean ENergy Districts
 - NEUTRALPATH Pathway towards Climate-Neutrality through low risky and fully replicable Positive Clean Energy Districts
- **HORIZON-MISS-2023-CIT-01-02:** Positive clean energy district (PED) digital twins



OBJECTIVES OF THE MISSION

Deliver at least 100 climate-neutral and smart European cities by 2030;

Ensure that these cities act as experimentation and innovation hubs to put all European cities in a position to become climate-neutral by 2050.



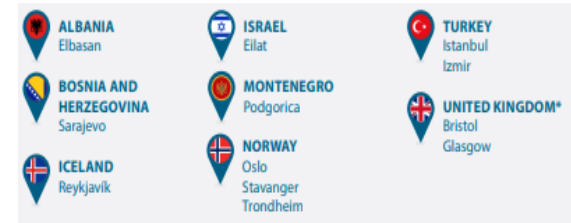
SELECTED CITIES (MISSION CITIES)

- 100 EU cities selected from all Member States and of different types (size, current emissions, level of preparedness), representing 12% of the EU population.
- +12 cities from associated countries.

EU27



Associated countries





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

Expected outcome

- Increased number of city planning actions for positive clean energy districts using the (proto-)PED design, development and management digital twin tools
- Enhanced data gathering approaches with identification relevant (standardised) multidimensional data set, high-resolution real-time data streams, and relevant forecasting data
- Consolidated city sensor network specifications
- Increased integration of existing smaller scale management systems



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

Scope:

- 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
- Involve/train necessary public and private actors at district/city level in building and using digital twins for co-creation, communication, public consultation



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

- **Type of action:** Innovation Actions
- **Indicative budget:** EUR 20.00 million
- **Expected EU contribution per project:** between EUR 6.00 and 7.00 million (3 projects expected)
- **Deadline was:** 27.04.2023
- **Specific conditions:** collaboration with the Cities Mission Platform through an MoU.

Digital Twin – still so many questions...

- What R&I do you think is most needed in this sector?
- Which solutions can be repurposed ?
- How do you see replicability?
- Are there already clusters (forming?)



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