USE-CASES – Space for Sustainable, Connected and Liveable Cities

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This document lists the use cases to be used as part of the "Space for Sustainable, Connected and Liveable Cities" thematic call for proposals. It aims at developing sustainable services leveraging space assets and technology in consort to address key challenges and opportunities to develop operational solutions. The use cases presented result from the cooperation between the European Space Agency (ESA) and city representatives, including members of the "Smart Cities Task Force". The use cases have been split according to the city who provided them. When writing the initial proposal (APQ/APQ+ proposal), the applicant will make clear which use case(s) their solution will address, if chosen from those listed here.

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City of Essen (DE)

The City intends to act as **pilot users** for the proposals which are addressing their use cases.

Building Energy Consumption

The City of Essen is interested in having more detailed information (in terms of spatial and temporal resolution) of the energy consumption and heat emission. This is needed during both the planning and the implementation phase as well for existing buildings and for better designing new buildings or retrofitting existing ones.

Production of Local Energy

In the past years, the city has relied on external consultants for urban energy planning facing several challenges in terms of monitoring of solar panel installations and identification of potential site location. The City is therefore looking for innovative solutions that can support the implementation of new solar energy projects and/ or to optimize the operations of existing solar system installations in the urban context.

Air Quality Monitoring

The needs expressed by the city are targeting the following areas of application:

- better health for the population
- minimizing emissions from conventional vehicles
- monitoring of current emissions
- climate-change adaptation / mitigation

The city has already been using data and innovative technologies with the goal of improving the air quality as reported here below:

•Within the COMO project two road trajectories within the city of Essen are being equipped with sensors (optical and environmental) in order to better measure and manage traffic and emissions;

•Data from Copernicus (Sentinel 5P) is being utilized in order to account for overarching (ambient) emissions brought to the territory of Essen from its surroundings by wind also injecting these data into the emission models utilized for traffic management;

•AI-based strategies are being developed in order to better manage traffic and evaluate /optimize these strategies concerning emission reductions.

The proposed service shall build on the results of the previous experience and improve the current performances.

Green Index Measurements

The needs expressed by the city are targeting the following metrics:

- o   better tree health assessment

- o   ecosystem service monitoring and preservation

- o   more effective watering and cost efficiency

- o   climate-change adaptation / mitigation services

The city has already been using data and innovative technologies with the goal of improving the air quality as reported here below:

- •   Within the [research project TreeCop](#) a protopye monitoring has been implemented trying to combine satellite data with in-situ sensor data in order to cater for an improved watering management for urban trees.

- •   Essen is involved as user in the ESA BASS Demonstration project called [Urban Green View](#) led by OHB with the objective of developing sustainable services for the integration of green spaces in a sustainable urban context and, in this way, to improve the response to present and future hazards related to climate change.

- •   Essen is involved as user in the ESA BASS Demonstration project called [AERIUS](#) led by SBI with the objective of developing a solution to support city authorities in the maintenance and sustainable planning of their Urban Green Space and water bodies.

- •   Within SECAP (Sustainable energy and climate action plan convent of mayors) data from Google Earth Engine is tested for being utilized for urban green index monitoring

The proposed service shall build on the results of the previous experience and improve the current performances.

City of Sindelfingen(DE)

The City intends to act as **pilot users** for the proposals which are addressing their use cases.

Climate Adaption Conceptioning (Klimabetroffenheit)

The City of Sindelfingen is seeking for an operational solution which will protect the citizens and the infrastructure from effect of the climate change (e.g. impact of extreme weather events). The City has already collected some data which have been collected because of the current legal obligation (*Klimaanpassungsgesetz*)

*Local Heating Plan (*Kommunaler Wärmeplan*)*

The City of Sindelfingen is aiming to achieve that all buildings in its territory are CO_2 neutral by 2040. The achievement of this objective requires the development of operational services aimed at the identification of thermal loss in the buildings, identification of potential site for solar installation and services for efficient operation management of such buildings. This is needed during both the planning and the implementation phase as well for existing buildings and for better designing new buildings or retrofitting existing ones.

Production of Local Energy

In the past years, the city has relied on external consultants for urban energy planning facing several challenges in terms of monitoring of solar panel installations and identification of potential site location. The City is therefore looking for innovative solutions that can support the implementation of new solar energy projects and/ or to optimize the operations of existing solar system installations in the urban context.

City of Paris (FR)

Paris aims to be one of Europe's greenest cities by 2030 which is one of the goals outlined in the French capital's 2024-2030 Climate Plan[1]. Measures are being adopted in pursuit of that goal that includes reducing vehicular traffic, introducing new bicycle paths and creating new spaces and parks.

The City's 15th district (15e arrondissement de Paris) intends to act as **pilot users** for the proposals which are addressing their use cases.

Climate adaptation

Plan Climat 2024-2030[2] is Paris' plan to reduce greenhouse gas (GHG) emissions, improve air quality, and adapt the city and its economy to the rising impacts of climate change. Climate

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[1] https://cdn.paris.fr/paris/2024/05/13/planclimat_synthese_en_web-qG4w.pdf

[2] https://cdn.locomotive.works/sites/5ab410c8a2f42204838f797e/content_entry5ae2f905a2f4220ae645f026/5af7316614ad660b652531de/files/Paris_-_Paris_Climate_Action_Plan.pdf?1526890697

adaptation of the city is key for the environmental transition. The city is therefore looking for innovative solutions on the topics of

- understanding urban heat islands
- assessment of green spaces
- monitoring heat loss from old buildings and public infrastructures
- optimising solar roof potential
- monitoring of air quality in the city

Smart Lighting

As part of its Climate and Energy Action Plan launched in 2007, the City of Paris has committed to reduce energy consumption due to public lighting by 30% by 2026. Initiatives around Smart Lighting are of specific interest to the city since it is developing such solutions as a testing ground for the entire city in some of our streets.

Water quality monitoring and flood risk management

As part of the Paris 2024 Games, athletes took part in swimming events in the Seine River. It now plans to open up several bathing areas to the general public[3]. However, the river is continually impacted by pollutants and stormwater. The following topics of interest has been identified

- identify and monitor pollution discharged into the river
- flood risk management of the river
- vegetation monitoring to reduce flooding, soil erosion and water pollution

Combating light pollution and preserving biodiversity

The City of Paris is taking action to preserve and enhance biodiversity and introduced a Biodiversity Plan aimed at strengthening the City's actions in favour of the protection of flora and fauna as well as the development of the place of nature in the city. As part of its commitment to biodiversity, the Greater Paris Metropolis has conducted an ambitious experiment aimed at combating light pollution, which poses a threat to the survival of certain species. Light pollution mapping and preservation of biodiversity topic is of interest to the city.

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[3] https://www.paris.fr/en/pages/bathing-in-the-seine-will-be-possible-in-2025-27102