
EuroGEO
URBAN
Analysing the pattern dynamics in Earth Observation Research & Innovation
#OneEuroGEO
COMBINE, COORDINATE, COOPERATE

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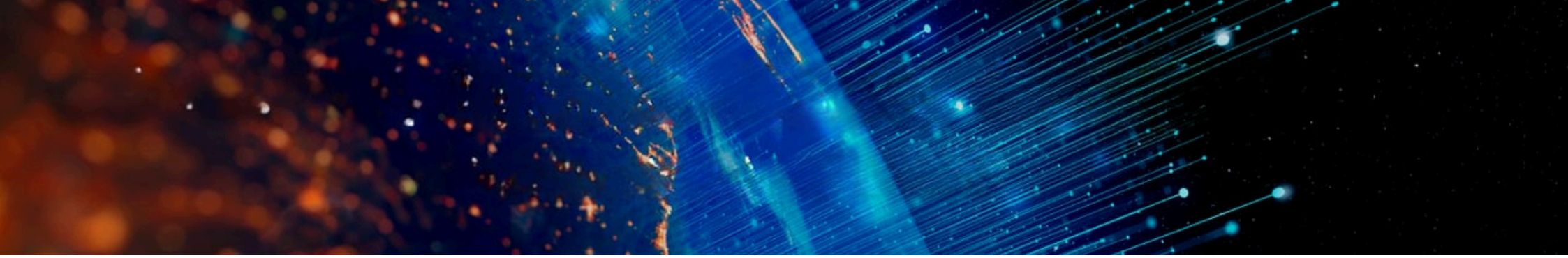


Introduction

In recent years, there has been an **increasing uptake of Earth Observation** (EO) as a tool in support of the implementation of various policies and the execution of a wide range of operational tasks. Users across the value chains of different sectors can utilise EO-based solutions in support of their work, **realising significant benefits** (economic, environmental, societal, etc.). Market demand for such solutions is driven by policies and sector-specific needs. Technological advances have the potential to enable solutions that match the specific needs.

EuroGEO, Europe's part of the Group on Earth Observation, stands at the intersection of research, policy, and markets. This **strategic position** allows it to identify and monitor relevant developments and trends, to engage stakeholders, and to assess the evolving EO landscape in Europe and beyond. Capturing insights relevant for the different stakeholders allows EuroGEO to document the current state of play of EO, its trajectory, and the required steps for broader adoption and increased benefits.

With the support of the 🔗**EuroGEOSec project**, and with the aim of **maximising the impact of Research and Innovation** (R&I), a dedicated effort has been made to establish the **R&I Observatory for Earth Observation** (RIO). This includes a team of analysts and an online tool to monitor and analyse past and ongoing R&I in EO in order to identify trends and support strategic decisions on future R&I activities. Relying on the RIO, the so-called **R&I State-of-Play Reports** are created presenting a concise overview of the policy context, technological perspectives, and market trends within the thematic areas covered by the 🔗**EuroGEO Action Groups** (AG). This present report focuses on analysing patterns in the **urban segment**. Research has been complemented by multiple other reports and studies, including studies performed by and for EuroGEO's Urban AG.

The aim of this report is to **support EuroGEO and its stakeholders in decision-making** regarding future work programmes and strategic innovation agendas (such as those of the Knowledge Centre on Earth Observation—KCEO), inform the review of the **EuroGEO Implementation Plan**, and contribute to the production of institutional outputs.

The following EuroGEO **Action Groups** develop application pilots/conduct other actions foreseen in the EuroGEO roadmap: Agriculture, Land Cover and Land Intelligence (LC&LI), Urban, Disaster Resilience and Health, Energy, Biodiversity, ecosystems and geodiversity (BEG), Marine, Climate, and Green Deal Data Spaces.

Methodology

The browser-based tool of the **R&I Observatory for Earth Observation** (RIO) allows retrieving relevant information from a variety of sources, including project information (e.g., descriptions, partners, budgets, results, timelines) for the majority of relevant European R&I programmes. Sources include information related to e.g., Horizon Europe (HE) and its predecessors, the LIFE programme, the Connecting Europe Facility, Eurostars, COSME, the European Defence Fund, and the European Defence Industrial Development Programme. Additional sources are being incorporated as part of the continuous development of the RIO.

The RIO structures the information into a standardised format for the uniform documentation of R&I activities. Functions of search, bookmarking, filtering, visualisation, and export allow the processing and analysis of the pre-curated information.

The focus of the analysis is on **mapping R&I efforts across segments** by analysing project information. **Core applications** of the urban segment have been defined and mapped in line with EuroGEO's priorities as well as accepted taxonomies, here largely based on the applications addressed by the European Agency for the Space Programme (EUSPA):

- Air quality monitoring in urban environments
- Light pollution
- Thermal auditing
- Urban greening
- Urban heat islands
- Informal dwellings
- Real estate
- Surveying and mapping of urban areas
- Urban modelling, 3D modelling, Digital Twins
- Urban planning

To address the research questions—i.e., to identify trends in EO-related R&I for urban applications and the drivers behind them—the following **limitations or simplifications** were applied:

Data Processing

- Project information sourced from the RIO (including acronym, title, coordinators, topic, programme, pillar, objectives, work programme, status, start and end dates, budget, grant, and links) has been filtered using segment-specific keywords to ensure that only relevant projects are included and no projects are overlooked. This relies on full-text search in existing descriptions and meta data, along with the use of consistent terminology. Where data might be missing or unexpected terminology is used, certain projects may have been missed.
- The filtered list of projects considered relevant has been extracted (i.e., exported into a spreadsheet) for processing.
- Data has been manually checked for relevance and further cleaned accordingly, then augmented by segment-specific categorisation for more detailed analysis. This categorisation aligns with EUSPA's definition of segment-specific EO applications.

Methodology

Timeframe

In order to restrict the analysis to relevant activities while drawing from a significant enough sample size, a (roughly) **10-year timeframe** is used, covering the period **from 2014 to 2024** (i.e., only projects that have started before 2025 and have not ended before 2014 have been analysed). This timeframe is used to capture long-term trends, technological developments, and measurable outcomes of concluded projects. It also ensures that typical project lifecycles, such as those in Horizon Europe, are included. It coincides with the launch of the first Sentinel-1 satellite in 2014, the free and open data of Copernicus being considered as one driver of EO-related R&I, which has been attempted to confirm through the analysis.

Sample Size

The sample data is limited to the sources **currently included in the RIO**, expected to cover relevant European R&I projects to a large extent, but with further potentially relevant projects not included in the analysis where the data source has not been included yet. It is further limited to the keywords and queries applied (see data processing above) and timeframe selected (see timeframe above).

Budget allocations per application

Breaking down budgets of projects that address more than one segment-specific application and dividing them across these applications has been done following a simplified approach assuming an (unlikely) even distribution. Therefore, budget sizes per application can only **reflect trends** and may not be fully accurate.

To interpret and complement the findings from the RIO tool, **desk research** has been conducted across reports and studies, including:

- European Space Agency (ESA) application or industry articles
- European Commission (EC) documents, e.g., Climate factsheets, Reports on uptake barriers of EU space services
- EUSPA EO and Global Navigation Satellite System (GNSS) 2024 Market Report
- Stocktaking Reports from related Group on Earth Observations (GEO) initiatives
- Horizon Europe's Strategic Research and Innovation Agendas
- Segment-specific as well as EO-related strategic research and innovation agendas including outcomes of the Horizon 2020 (H2020) project FIRE
- EuroGEO Workshop Reports
- 🔗**EuroGEO Urban AG Expert Study**

These **sources** were carefully reviewed to extract relevant content that addressed the questions raised during the analysis. They were particularly useful in identifying gaps and barriers in each segment, as well as R&I trends and technologies that are (or can be) applied to address these issues.

The EuroGEO **Urban Action Group (UrbAG)** has been involved in the review process and has contributed to complementing the findings with their expertise in the segment.

Urban Overview

More than 56% of the **world population** and over 76% in the European Union (EU) live in urban areas, with increasing tendencies expecting the global figure to double by 2050. **Continuous urbanisation and growing climate change implications** highlight the necessity for cities' **resilience and sustainability** in tackling aspects like mobility, critical infrastructure, security, poverty, housing, climate change adaptation, etc.

By addressing critical issues, Earth Observation (EO) data and innovative operations can help promote **environmental sustainability**, **public health**, **and social equality** through comprehensive planning. EO can provide extensive support in addressing urban challenges that impact human wellbeing, such as **extreme heat**, **scarce green areas**, **air pollutants**, but also the **preservation of urban heritage**.

As a response to the required holistic approach for liveable societies, Europe's part of the Group on Earth Observations (EuroGEO) Urban Action Group (UrbAG) brings a collaborative multi-disciplinary approach to these challenges. It aims to better understand the spatial and temporal dimensions of various wellbeing aspects in support of the relevant policy frameworks. UrbAG is playing a crucial role in establishing **Copernicus**—the EU's EO component—as a key tool for **policy implementation**, while also contributing to **high-level strategic studies** such as the IPCC (Intergovernmental Panel on Climate Change) Special Report on Climate Change and Cities, which has a strategic global impact. These efforts, alongside many others, support the broader goal of fostering **sustainable**, **resilient cities** across Europe.

In line with UrbAG's actions, this report examines the main topics to be addressed by key and emerging technologies, while highlighting the current (and, where relevant, historical) landscape of Research & Innovation (R&I) projects and initiatives in support of the identified topics. As introduced above, these include climate change, resilience, natural disasters, energy, health, cultural heritage, heat, and environmental stressors. The report also identifies the relevant policies and market trends that support urban sustainability and may be linked to EO. It concludes with an overview of the outlook for the segment and how EuroGEO can be part of it.

Policy Context

EO solutions can help urban actors in **monitoring**, **planning**, and **enforcing urban policies** related to the above-mentioned challenges, providing a **wide range of precise data** which can be leveraged to generate **key insights** for complex environments. In view of both challenges and recognised EO capabilities, urban policies have been increasingly encouraging the use of EO data and information products and services for urban applications. The increased awareness of EO's potential to address emerging urban challenges is reflected in the funding of relevant R&I activities and their evolution over time. This is clearly illustrated in the graph below, generated using data from the RIO.

Fig. 1: Evolution of EO R&I Urban Budget (€M) and Key Policy Shifts

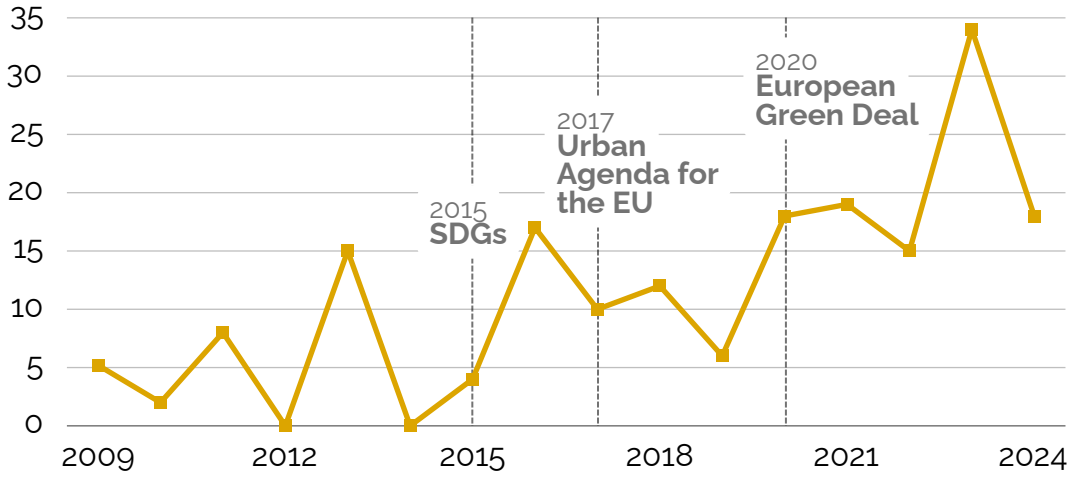


Figure 1 depicts the fluctuations in European budgets for EO-related R&I efforts in the urban segment, generated with the sampled data of 56 European-funded projects extracted from the R&I Observatory (RIO). This data has been mapped against segment-specific EO applications and relevant policy implementations or changes to analyse the potential correlation between the two. Thus, one can clearly see (i) **the significant increase of investment over time**, and (ii) the **correlation of the investment with key policy drivers** discussed below.

Frameworks such as the **European Green Deal** (EGD) and the United Nations (UN) **Sustainable Development Goals** (SDGs) are **guiding urban actors towards sustainability and resilience**. The EGD is the EU's strategic plan to achieve climate neutrality by 2050. It emphasises sustainable urban development through initiatives aimed at reducing **greenhouse gas (GHG) emissions**, promoting **energy efficiency**, and enhancing public transportation systems. To encourage urban GHG mitigation measures, EO data on building attributes, aerosol load, and atmospheric factors can be used to evaluate energy efficiency and solar integration potential in buildings. The EGD also supports the renovation of buildings to improve energy performance and advocates for the development of **green spaces** within urban areas. Since the approval of the EGD in 2020, at least **6 new EO-related R&I projects addressing urban greening** have started with combined budgets of close to €27M (see Figures 2 and 3).

A number of overarching EU policies and strategies are directly linked to the EGD. This also includes the **EU Missions in Horizon Europe** (HE), where in particular the **Adaptation to Climate Change** and the **Climate Neutral and Smart Cities** Missions are of high relevance for the urban sector. Here, urban actors (i.e., cities) sign contracts and receive funding to take action on e.g., reducing pollution or mitigating the impact of climate change on urban climate (e.g., urban heat islands), thus driving the development of new solutions for robust monitoring. This is reflected by an observed increase in related R&I activities since the launch of these Missions in 2021, i.e., at least **10 EO-related projects with an urban focus addressing climate change mitigation and adaptation** started with a combined budget of close to €28M, at least **5 projects addressing urban heat islands** with a combined budget of more than €17M, at least **7 projects addressing air quality monitoring** in urban environments with a combined budget of nearly €20M, and at least **4 projects addressing EO-enabled digital twins** with a combined budget of more than €10M.

As an integral part of the EGD, the **New European Bauhaus** initiative encourages sustainable, inclusive, and aesthetic urban development. The **New Leipzig Charter** complements the EGD by providing a framework for sustainable urban development, which helps achieve the goals outlined in the EGD. It promotes the creation of compact, socially inclusive, and environmentally sustainable cities. The **European Cohesion policy** is a key financial instrument to implement the EGD's objectives, allocating funding to reduce regional disparities and promote urban and rural development via funding mechanisms such the European Regional Development Fund (ERDF). Notably, **8% of this specific fund is dedicated to urban sustainability initiatives** with the 2021-2027 programming period further expanding its focus on urban areas. The Cohesion policy also includes the **European Urban Initiative**, which facilitates networking and capacity-building among urban authorities.

Policy Context

Further complementing the EGD, the **Territorial Agenda 2030** promotes territorial cohesion to ensure balanced development across all regions. It addresses challenges such as demographic change, climate adaptation, and digitalisation, emphasising the need for **place-based policies** that consider the unique characteristics and potentials of different territories.

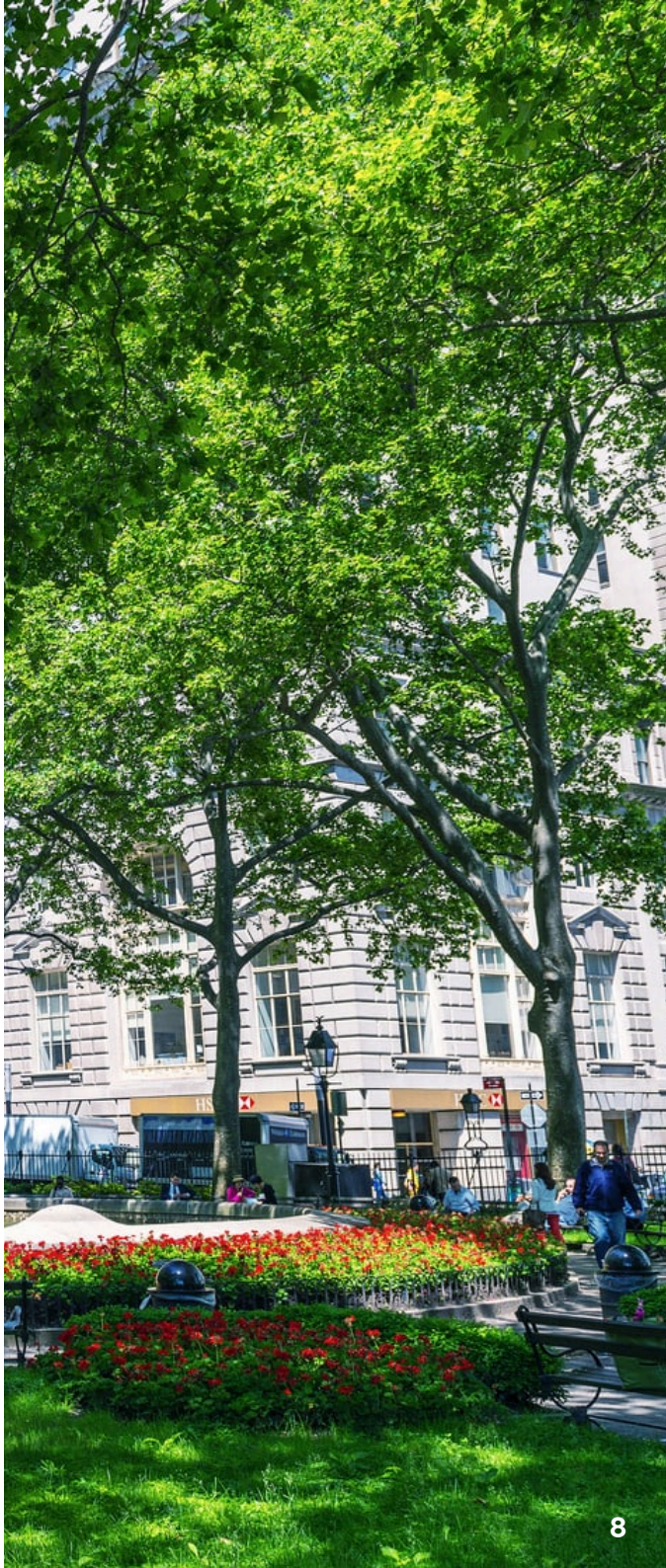
Other European policies, such as the **Urban Agenda for the EU** (integrated with the European Urban Initiative), explicitly encourage the use of EO, and Global Navigation Satellite System (GNSS), to address urban challenges. In particular, EO data—incl. remote sensing, in situ, EO-powered numerical models—of urban environmental parameters is critical to assess the gaps between current and future targets of key priority issues—e.g., air quality, climate adaptation, cultural heritage, digital and energy transitions, etc. The Urban Agenda for the EU fosters the development of action plans by enabling partnerships among the European Commission (EC), EU organisations, national governments, local authorities, and non-governmental organisations (NGOs). These action plans address legislation, funding programmes, and the sharing of best practices.

On an international level, the **SDGs** provide important benchmarks for urban development. SDG 3 focuses on good health and well-being, recognising that living conditions in urban areas—such as **air quality** and access to **green spaces**—significantly impact public health and quality of life. SDG 11 emphasises the need for sustainable cities and communities by prioritising access to public transport, open spaces, and **clean air** to improve urban living and environmental sustainability EO not only monitors SDG indicators (e.g., air pollutant levels in cities) but also uses high-resolution geospatial data to drive targeted city-level actions that reduce these indicators and improve urban outcomes.

The Organisation for Economic Cooperation and Development (OECD) **Principles on Urban Policy** promote the development of coherent and integrated strategies to create smart, sustainable, and inclusive cities. Their implementation is supported by initiatives such as the Athens Pledge.

Endorsed by the UN in 2016, the **New Urban Agenda** sets **global standards** for sustainable urban development. It advocates for cities that are inclusive, safe, resilient, and sustainable, and emphasises the role of national and local governments in urban planning and management, promoting policies that ensure equal access to services, housing, and economic opportunities.

In summary, **European and international policies related to urban environments promote sustainability**, **climate action**, and **urban resilience**, all of which create significant opportunities for EO-enabled products and services. These **policies mandate data-driven decision-making and monitoring**, for which EO is suited across all urban challenges, creating demand that has been supported by GEO-related projects that target the urban sector. With policies driving R&I activities and providing **significant funding** for these, there is a strong expectation that R&I supporting the implementation of urban-related policies will retain significant focus over the coming years.



Technological Perspectives

Local authorities play a crucial role in addressing climate change through sustainable urban development. EO in the urban segment is considered to have a significant potential for public authority uptake due to its high level of technical maturity, which in turn highlights the prominence and presence of R&I in the segment.

The AI4SmartCities project illustrates the growing need for Artificial Intelligence **(AI)-focused initiatives** to deal with and understand large amounts of data. This particular project generates solutions for very high resolution socio-economic and geospatial indicators for smart city planning and management by extending AI algorithms and big EO data management features to very high-resolution data.

The European Space Agency (ESA)'s EO archives, including data from the European Remote Sensing (ERS) programme, Environmental Satellite (Envisat), and some Copernicus Sentinel missions, together with ongoing tools like the Sentinel Application Platform (SNAP) and Copernicus Services (e.g., Land Monitoring—CLMS and Emergency Management—CEMS), provide **comprehensive capabilities for monitoring aspects related to fundamental challenges**. They cover **urban sprawl**, **air quality** management, **informal dwellings** monitoring, infrastructure health, **greening** progress, and **disaster monitoring**. EO is used with other data to accurately survey and map urban areas for the creation of detailed 3D models of the built environment. High-resolution imagery for urban planning is also provided by CLMS, helping with detailed monitoring of land use, infrastructure, and environmental factors. There is an emerging focus on **urban heat islands** and promoting urban **greenery**, which is also supported by Sentinel-3 Land Surface Temperature (LST) data, which can be further improved by Sentinel-2 surface reflectance data. In order for these technologies to be properly leveraged, it should be recognised that end users often lack the expertise to analyse EO data, so interfaces should be created with information extracted from EO data that is already prepared for analysis.

Further, advanced data models integrate satellite data with **Building Information Modelling** (BIM) and **Digital Twin** tools for an improved output for modern urban development. BIM is becoming increasingly crucial in **smart city planning**, creating complete digital representations of physical spaces, and the integration of this tool with EO and geospatial data enhances modelling capabilities through data accuracy and detail for improved decision making. EO-enabled digital twins are virtual replicas of physical aspects that integrate satellite data and in situ observations, creating **simulations** that enable **predictive analysis**. When combined with EO data, the potential for improvement in the monitoring and preservation of urban assets including cultural heritage is significant. Application barriers for these technologies include scalability concerns and limited computational resources as well as currently limited capabilities for data integration.

At an earlier stage of awareness and adoption, other innovative technologies are considered relevant for the sector. By leveraging ESA's historical data, **machine learning** (ML) models such as neural networks can be trained to analyse long-term changes in cities, identifying trends and environmental impacts. This method was used for the examination of the Liège railway line in 2023, where historic time series of satellite data was fed into a Deep Neural Network to detect urban changes and construction hotspots. Other current technology efforts include scenario-based projections enabled by using Copernicus data, complemented by other remote sensing and in situ data, leading to the creation of exploration tools based on an innovative data cube to facilitate data access. In addition, virtual laboratory platforms are being created to match users with existing EO products, processes and services to increase uptake and awareness.

Urban planners and innovators also face **data integration** and **standardisation challenges**, as multiple data sources (e.g., satellite, in situ) are required for comprehensive and precise smart city planning. Interoperability across different platforms and sensors is not always given. In addition, the vast amounts of data generated and required for robust planning systems pose a challenge to storing and processing to extract actionable insights.

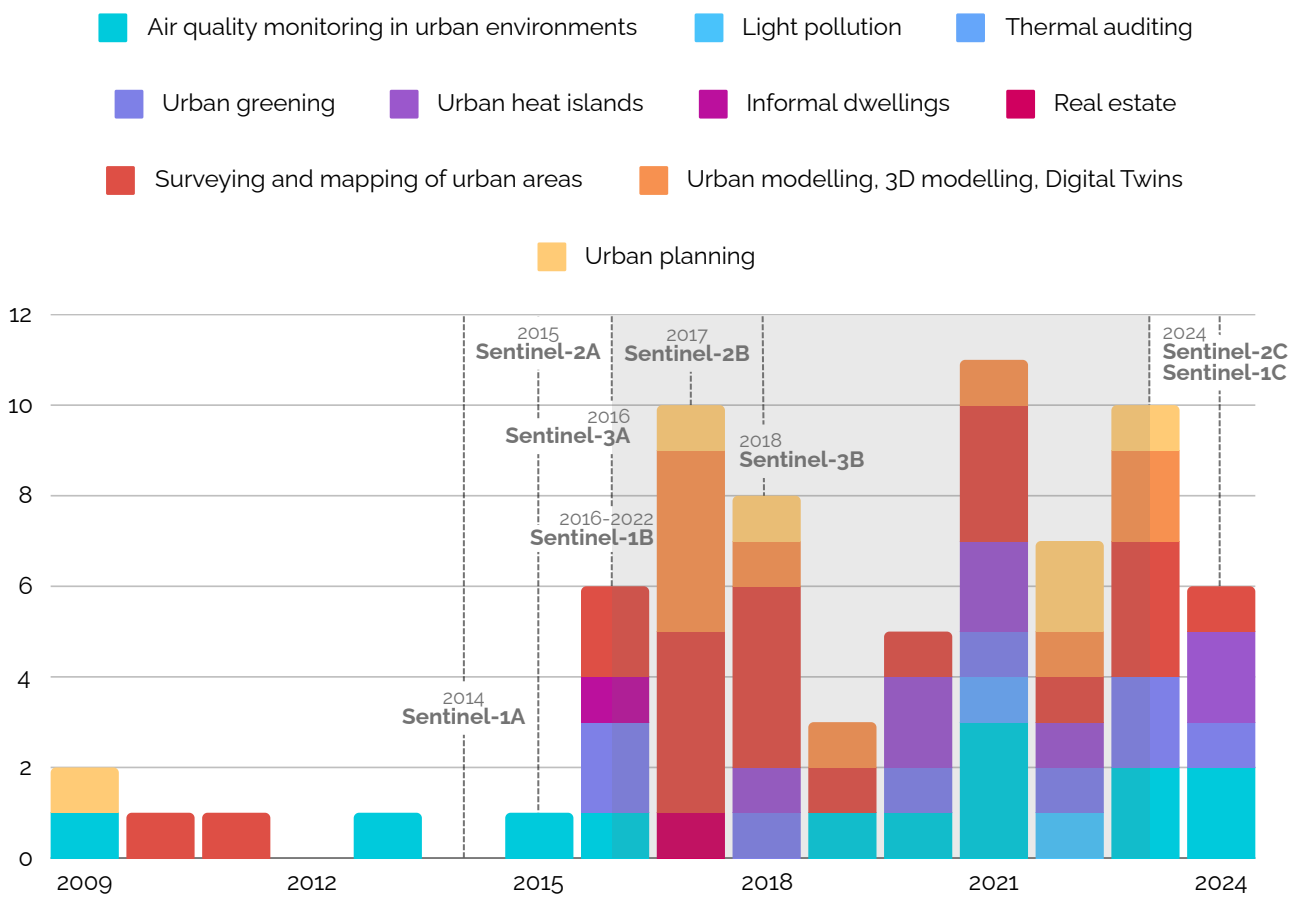
Research is attempting to fill this gap with means of **data fusion**, which integrates data from various sources to create a holistic perspective. For instance, the project LandSense (2016-2020), which targeted citizens' ability to monitor and report on their environment, combined EO data, mobile devices, community-based environmental monitoring, data gathering, interpretation, and information distribution systems. Another example is the So2Sat project (2017-2023), which mapped urban infrastructure and its changes over time in 3D by aggregating remote sensing data from EO satellites with vast amounts of data from GIS and social media.

Technological Perspectives

Also under H2020, in the CURE project (2020-2022), research has been carried out creating **cross-cutting applications** to address urban resilience through the use of third-party data, in situ observations and modelling via one single portal. As another example, Harmonia (2021-2025) is developing a platform that leverages satellite and auxiliary data to provide localised information, enhancing resilience and promoting sustainable urban areas in response to climate change and extreme events.

In Figure 2, we have plotted the number of EO-related urban R&I projects over time, signalling the relevant Copernicus Sentinel missions for city management, i.e., Sentinel-1, -2, and -3. Figure 2 demonstrates that the EO-related projects in this segment started emerging around 2015, initially prioritising **air quality** and **urban greening monitoring**. These areas continue to receive the highest relative investment in innovative developments, reflecting their importance for climate change adaptation. The rising number of R&I projects is consistent with the increasing trend in budget allocation over time. Notable peaks in activity occur in 2017 and 2023, reflecting the gradual adoption of data from the launched Sentinel missions. Sentinel-2 and Sentinel-3 play significant roles in urban monitoring. Sentinel-2 is particularly valuable for tracking land cover changes, environmental monitoring, and identifying buried archaeological sites. It also supports the mapping of urban green spaces and urban sprawl. Sentinel-3, on the other hand, focuses on monitoring land-use changes and supporting weather forecasting. This is complemented by Sentinel-1, which contributes to land monitoring and emergency response. Its Synthetic Aperture Radar (SAR) instrument supports monitoring of ground movement and displacement.

Fig. 2: Urban Project Count Timelines by Application & Sentinel Missions

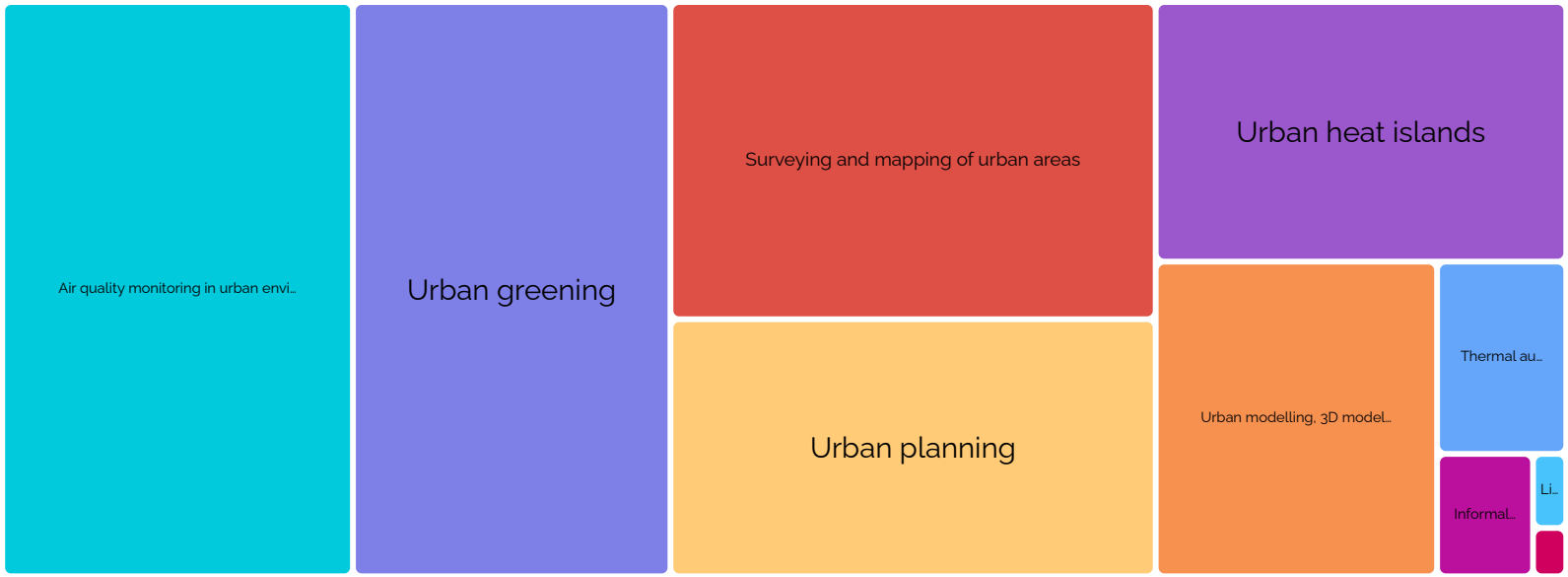


The primary focus areas of the identified projects include **air quality monitoring**, **surveying and mapping**, and **urban greening**. Specifically, this involves advancements in analysing the origins of air pollutants and their expected health risks, managing infrastructure and cultural heritage, and monitoring green spaces.

Starting in 2016, there has been an increasing interest in urban greening and air quality initiatives, which could be attributed to the 2015 implementation of the SDGs, aimed at promoting good health and well-being (with a focus on air pollutant and green space monitoring), and the 2017 Urban Agenda for the EU, which highlights the need to monitor air quality and build climate resilience. Furthermore, this shift coincides with the launch of Sentinel-2A and -3A. A small peak in interest is observed in 2021, following the implementation of the EGD, and again in 2023, when all Sentinels, except Sentinel-1B, had become consolidated and users were more aware.

Market Trends

Fig. 3: Budget Distribution for EO-Related R&I in Urban



In the context of rapid urbanisation and escalating climate challenges, EO is becoming increasingly indispensable in managing and transforming urban landscapes. EO, paired with other data and technologies, offers actionable insights for addressing **urban resilience**, **smart city development**, **green initiatives**, and **controlled growth**.

Global revenues from EO data and services in an urban context exceeded €400M in 2022🔗. This market is dominated by applications related to **surveying**, **mapping**, and **air quality monitoring**. Future growth is anticipated for further such applications, including **urban heat** analysis or urban resilience planning. This is confirmed by the analysed EO-related R&I activities, where projects active during the past 10 years amounted to at least **13 of which addressing air quality monitoring** in urban environments with a combined budget of more than €40M, **22 projects addressing surveying and mapping** of urban areas with a combined budget of more than €30M, and at least **8 projects addressing urban heat islands** with a combined budget of nearly €22M.

Climate change poses significant risks to urban areas, including extreme weather events, urban heat islands, and rising pollution levels. EO has emerged as a critical tool in enhancing urban resilience; satellite data enables the real-time tracking of extreme weather patterns, flooding, and droughts, supporting early warning systems and disaster response. EO data is instrumental in identifying urban heat island effects, guiding urban planners to implement **mitigation** strategies such as expanding green infrastructure. Air quality monitoring benefits from EO-powered solutions that provide complementary assessments, tracking pollutants and greenhouse gas emissions to inform and improve public health. R&I projects like H2020's 🔗SMURBS (2017-2020) focus on tackling environmental challenges by increasing urban resilience via air quality, urban growth, resilience to natural disasters, migration and health implications with EO technology. At least **14 projects active in the period analysed are or have been addressing climate change mitigation and adaptation** with a combined budget of more than €32M.

Smart cities leverage digital technologies, including EO data, to optimise urban management and enhance quality of life. High-resolution EO data supports the creation of **Digital Twins** for urban environments, allowing for precise modelling, planning, and management. Augmented Reality (AR) applications powered by EO enhance decision-making and public engagement in urban planning and transportation. Additionally, EO data can contribute to detailed **3D models**, improving infrastructure planning and maintenance, enabling cities to function more efficiently and adapt to changing demands. For the analysed period, at least **10 projects were identified to address EO-enabled urban modelling**, **3D modelling**, **Digital Twins** with a combined budget of more than €18M.

Market Trends

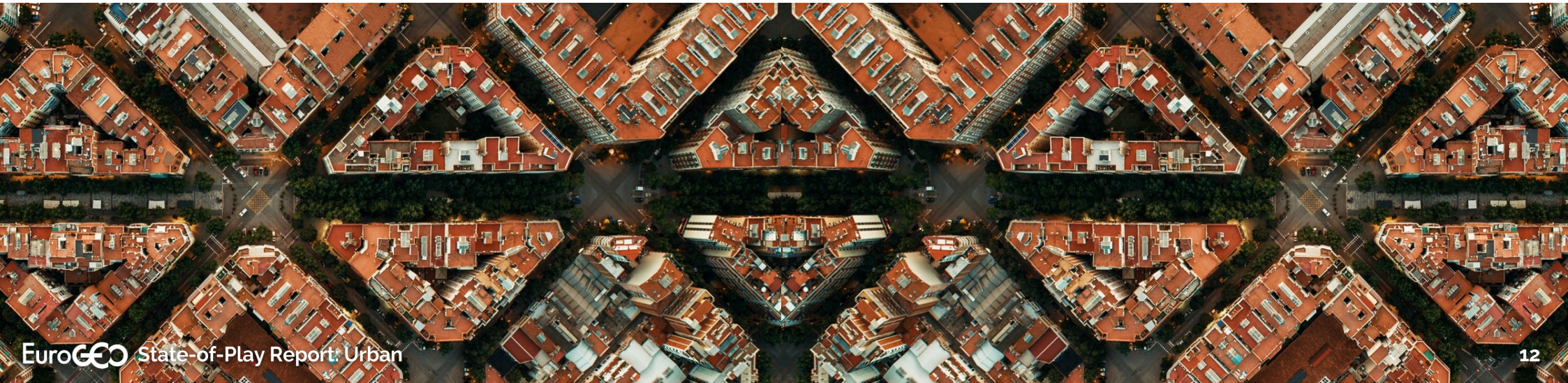
Urban sustainability initiatives increasingly rely on EO to foster **greener cities** and counterbalance the environmental impacts of urbanisation. Monitoring urban green spaces and biodiversity is a key application, as EO helps assess and improve the sustainability of these areas. At least **9 projects have been active during the analysed period that addressed EO-enabled urban greening applications** with a combined budget of nearly €40M. Furthermore, EO-driven insights guide policies for reducing light pollution and improving energy efficiency in urban areas, thereby contributing to broader sustainability goals.

As cities expand, managing **urban sprawl** and ensuring sustainable growth is crucial. EO contributes to controlled urban growth by identifying and tracking the development of **informal settlements**, aiding in their regularisation and planning. Insights derived from EO data support evidence-based zoning and land-use planning, balancing development with conservation efforts. Satellite data also enables **monitoring of adherence** to urban development policies, ensuring that expansion aligns with sustainability objectives and regulations. However, only one project has been identified for the analysed period that is addressing informal dwellings explicitly.

Several additional patterns reinforce the growing role of EO in urban development. **Cultural heritage management** is a significant area, where EO supports the preservation and restoration of heritage sites by monitoring impacts of pollution, subsidence, and conflicts. EO also informs urban design practices that enhance safety, sustainability, and cost-effectiveness. Integrating EO with Building Information Modelling (BIM) enhances the lifecycle management of urban infrastructure, providing a cohesive approach to planning and execution. The increasing availability of open EO data is further driving innovation, with a growing shift towards value-added services that make geospatial insights more accessible and actionable.

EO is reshaping the urban landscape, addressing challenges in **resilience** and **sustainability** and enabling **monitoring**, **planning** and **development** accordingly. EO alongside other technologies can help cities to transition toward **smarter**, **greener**, and **more inclusive** futures. As policies like the EU Green Deal and the SDGs prioritise urban resilience and sustainability, EO will remain a cornerstone of urban planning and development.

Using the RIO as a source, we have identified the key stakeholder groups driving innovation in the development of R&I EO solutions for urban applications in order to assess the uptake and awareness maturity of the sector. We have found that Small and Medium-sized Enterprises (SMEs) are the most prevalent in R&I, followed by academia. Larger private companies and public institutions are relatively less involved in such initiatives.



Projections

Local governments are at the forefront of improving **social welfare** and driving **sustainable urban change**. To date, they have reported **over 20,170 actions** to address climate risks, set adaptation targets and are leading this critical effort. In addition, developments in **digital twins** are expected soon to further support predictive planning and heritage preservation through the use of geospatial data🔗.

In terms of policy changes and the segment's projected adaptation to them, European cities are committed to reducing their GHG emissions to achieve **climate neutrality by 2050**. Further, 1,631 🔗 Covenant signatories aim to reduce GHG emissions by 55.2% by 2030, targeting key sectors such as energy use. This is compliant with the EGD regulatory framework, as it puts emphasis on energy efficiency as well as **GHG emissions reduction**. In addition, authorities aim to align with the 🔗EU Adaptation Strategy and the New Leipzig Charter via smarter, swifter, and more systemic climate change adaptation at all governance levels.

Since 2022, there has been a growing demand for **municipal tools**, such as appointing heat officers to address the urban heat concerns and implementing urban greening strategies, which indicate an increasing reliance on satellite-driven solutions🔗.

Future trends indicate that **more turnkey, tailored solutions are required**, paired with **capacity building** to enable urban actors integrating EO information into their workflows.

EuroGEO Contribution

Following the discussion at the EuroGEO Workshop 2024 in Kraków on the Expert Study developed for the Knowledge Centre for Earth Observation (KCEO) of the Joint Research Centre (JRC), EuroGEO should prioritise implementing the new Earth Intelligence perspective by integrating **AI** and **large language models** (LLMs). In the long run, this would make **exchanges among stakeholders** much more efficient because of automation and dedicated open communication channels. This would also contribute to the overall EuroGEO goal of enhancing the initiative's visibility in the EO unban sector.

There is further the opportunity to support The EU's Mission of Climate-Neutral and Smart Cities. Cities participating in the mission are experimenting with innovative, cross-sectoral strategies to enhance citizen engagement, manage stakeholders, and improve internal governance, all aimed at accelerating their transition to climate neutrality. EuroGEO could demonstrate its support by **providing financial and regulatory assistance**, as well as **facilitating coordination** with related initiatives and funding streams to relevant cities and countries.

It would be beneficial for EuroGEO to utilise its intermediary position between stakeholders to inform the European Commission about the latent need for dedicated funding opportunities that enable cities to fully operationalise and implement the group's products, thus ensuring a tangible, on-the-ground impact. Additionally, there is a latent need for structured capacity-building efforts in training city officials and decision-makers on EO data interpretation where UrbAG could play a prominent role. Lastly, supporting or engaging in initiatives focused on high-demand R&I urban applications such as urban greening and air quality monitoring would be particularly relevant.

Glossary

AG	EuroGEO Action Group
AI	Artificial Intelligence
AR	Augmented Reality
BIM	Building Information Modelling
CEMS	Copernicus Emergency Management Service
CLMS	Copernicus Land Monitoring Service
EC	European Commission
EGD	European Green Deal
Envisat	Environmental Satellite
EO	Earth Observation
ERDF	European Regional Development Fund
ERS	European Remote Sensing
ESA	European Space Agency
EU	European Union
EuroGEO	Europe's part of the Group on Earth Observations
EUSPA	European Agency for the Space Programme
GEO	Group on Earth Observations
GHG	Greenhouse gases
GNSS	Global Navigation Satellite System
H2020	Horizon 2020
HE	Horizon Europe
IPCC	Intergovernmental Panel on Climate Change
JRC	Joint Research Centre
KCEO	Knowledge Centre on Earth Observation
LLMS	Large Language Models
LST	Land Surface Temperature
ML	Machine Learning
NGO	Non-governmental Organisation
OECD	Organisation for Economic Cooperation and Development
R&I	Research & Innovation
RIO	R&I Observatory for Earth Observation
SAR	Synthetic Aperture Radar
SDGs	Sustainable Development Goals
SMEs	Small and Medium-sized Enterprises
SNAP	Sentinel Application Platform
UN	United Nations
UrbAG	EuroGEO's Urban Action Group

This report has been developed by **Evenflow** under the **EuroGEOSec** project. Further reviewers include EuroGEO's Urban Action Group leaders and EuroGEOSec's project management team.

Funded by the European Union

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