# Space Hub Yorkshire: GreenSpace Project

## Landscape Review

Supported by UK SPACE AGENCY

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This Landscape Review was produced in collaboration with Perspective Economics in 2023.

**Perspective Economics** provides strategy, economics, and policy research and advice to public and private sector clients. Perspective Economics uses modern methods and machine-driven analytics to gather and interpret evidence, providing insight and clarity on important economic, social, and global issues.

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# Definitions

## Space Hub Yorkshire (SHY)

Space Hub Yorkshire is one of the UK's recognised regional space clusters and a coordinator of space activity across the Yorkshire Region, funded by the UK Space Agency. Space Hub Yorkshire's mission is to 'unlock space for the people and businesses of Yorkshire, delivering prosperity and opportunities for the region'.

## GreenSpace

GreenSpace refers to a UK Space Agency funded dial moving project led by Space Hub Yorkshire that aims to accelerate the use of space technology and Earth observation and bring finance and nature-based solutions together.

## Earth Observation (EO)

Earth observation (EO) is the term used to describe the collection of data from, and monitoring of Earth by, satellites. EO data can take a range of forms, including (but not limited to) images, radar data, and temperature mapping. EO provides critical data for climate change research, monitoring carbon emissions, deforestation, and sea level rise.

## Green Finance

Green finance refers to the financial products, services, and investment practices that promote environmentally sustainable and socially responsible projects and initiatives. Its primary goal is to support projects and businesses that have a positive impact on the environment, whilst also contributing to social and economic development.

# Introduction

In late 2022, Space Hub Yorkshire, hosted by the University of Leeds, was awarded funding for 'Dial Moving Activities' regarding a GreenSpace Research, Development, and Innovation (RD&I) activity by the UK Space Agency (UKSA) on behalf of a consortium comprising the University of Leeds, the UK Centre for Greening Finance and Investment (CGFI), and Space Hub Yorkshire. The funding is expected to:

1. Establish new networks at the intersection of Space, Agricultural and Financial technology.
2. Deliver industry-led research projects that tackle key challenges in the practical application of GreenSpace-enabled financial models; and
3. Raise the profile of GreenSpace technologies regionally and nationally.

## Strategic alignment

The GreenSpace project focuses on connecting national goals with local expertise and is very closely aligned to the UKSA's 2022-2025 plan for combating climate change using space technology[1]. In Yorkshire, local authorities have recognised a climate emergency, and GreenSpace will use space data to help meet both local and national climate change goals in the UK. Space Hub Yorkshire is seeking to build upon the success of the local space cluster to grow and realise the full economic potential of GreenSpace-related sectors.

## Progress to date

Since the funding award, the Space Hub Yorkshire team has made substantial progress against each of the project's objectives. Following extensive one-to-one relationship building and networking activities, the team have hosted four GreenSpace-centred events[2] to date with additional events planned for the near future. A total of 118 attendees joined those events in person or virtually, including a variety of relevant business stakeholders, government representatives, and academics. The events were dual-purpose, both for raising awareness among local and national stakeholders regarding the GreenSpace opportunity, while at the same time gauging appetite from across the public, private, and academic sectors to undertake tangible GreenSpace RD&I initiatives. Following our first workshop, participants were invited to submit project ideas via an online survey and based on strategic review by senior academics and the SHY team, several GreenSpace projects were taken forward for further development.

Collaborative research projects are being actively worked on or supported by Space Hub Yorkshire personnel with additional projects explored but excluded from further development at this time. These R&D projects cover areas such as: soil health monitoring metrics to support sustainability certification schemes, exploring the opportunities for EO data support in environmental impact monitoring within the financial services sector, and supporting roles in project such as biodiversity monitoring with very high resolution EO data in combination with Machine Learning – a project led by Agtelligence in collaboration

[1] https://www.gov.uk/government/publications/uk-space-agency-corporate-plan-2022-25
[2] See https://spacehubyorkshire.org/greenspace-events/ for additional information on the events held.

with Airbus. Additional project areas we are currently working in include, insurance sector data support, and a deep dive into the broader barriers to ubiquitous EO data uptake in non-traditional users of space technology.

GreenSpace has also been working to extend its network reach and support those within our network secure funding for GreenSpace-related activities; the GreenSpace network now contains more than 340 individuals from more than 220 unique companies[3]. To date, Space Hub Yorkshire has led or supported successful grants securing more than £480,000[4] with several others in development.

## Purpose of this document

This landscape review provides:

- A review of the local, national, and international policy relevant to the GreenSpace project, and therefore an understanding of the contribution that GreenSpace activities may play in addressing salient policy needs.
- A detailed understanding of the region's current space sector strengths, underpinning assets, market opportunities, and local priorities.
- A set of practical actions that could help to directly tackle the challenges, opportunities and any evident gaps identified through the research.

The strategy will also identify how Space Hub Yorkshire can contribute and enhance the networks at the intersection of the GreenSpace network, i.e., of Space Technology, Agriculture and Financial Services.

[3] Correct as of December 2024
[4] Correct as of December 2024

# Policy Review

Based on a review of c.20 strategy and policy documentations within the UK and internationally, this section provides a summary of key findings regarding the policy landscape surrounding GreenSpace-related technologies and offers a high-level assessment of how SHY GreenSpace activities can contribute to associated policy objectives.

## International GreenSpace-Related Policies

The transition to a sustainable global economy necessitates an increase in "green finance" investments, defined by The World Bank as investments that yield environmental benefits and policies that encourage the development of a more sustainable economy. The World Bank has recognised that mobilising financial resources towards environmentally sustainable investments is vital for achieving global climate and environmental goals. Green finance is expected to support the transition to a low-carbon and climate-resilient future, **promoting renewable energy projects, improving energy efficiency, and implementing sustainable development initiatives.** The IMF has also highlighted the potential benefits of green finance in terms of job creation, economic growth, and financial stability. Additionally, **the IMF has supported** the development of **sustainable finance frameworks** and the integration of **climate-related risks into financial sector assessments5.**

As discussed in the United Nations Environment Programme (UNEP) Finance Initiative: Climate Risks in the Agriculture Sector report, financial institutions (i.e. insurers, investors, etc) must consider their portfolio's environmental footprint. The risks associated with certain agricultural practices has increased, with the UN advising that financial institutions should support regenerative agriculture practices and evaluate the greenhouse gas (GHG) emissions of agricultural clients. It is therefore important for investors to assess green finance risks when investing in space technologies, acknowledging the potential dual risk. While space technologies have the potential to improve the environmental efficiency of agricultural practices, there are also technological challenges, uncertainties around market adoption and changing regulatory landscapes. Further, space technologies such as satellite systems require substantial energy consumption and therefore the production and operation of these technologies may contribute to carbon emissions.

## GreenSpace-Related Policy in the EU

Three sectors have been identified by the EU as being crucial to winning the fight against climate change: green finance, space technologies, and agriculture. With a focus on environmental preservation, technological advancements, and food security, the EU has implemented a variety of policies to drive progress and address the challenges posed by climate change and evolving global demands. This analysis explores the key policies, their objectives, and their impact, shedding light on the EU's efforts to foster a greener, more technologically advanced, and resilient Europe.

[5] https://www.imf.org/en/Topics/climate-change/green-finance

The EU Strategy for Financing the Transition to a Sustainable Economy (2021)[6] recognises the need for unprecedented efforts to combat climate change, rebuild natural and social capital, and foster a sustainable recovery from the COVID-19 crisis. It acknowledges that economic actors have diverse starting points and strategies but emphasises the importance of aligning all pathways with the EU's sustainability goals.

While current efforts have primarily supported environmentally sustainable activities, there is a call for **a more supportive framework to finance interim steps towards climate neutrality and environmental objectives.** The EU Strategy for Financing the Transition to a Sustainable Economy highlights that **a comprehensive framework for labelling financial instruments, that would bring clarity, transparency, and coherence to sustainable finance markets is intended as a future development.** This framework would accommodate future market innovation while ensuring a minimum level of credibility and transparency in the sustainability factors of market-developed labels. Additionally, the European Commission intends to explore the possibility of introducing labels for Environmental, Social, and Governance (ESG) benchmarks, as well as minimum sustainability criteria for financial products that promote environmental or social characteristics.

The European Space Agency (ESA) aims to shape the development of Europe's space capability and ensure that investments in space technologies benefit everyone. ESA has supported the applications of space technologies that deliver climate benefits, such as the use of satellites for an improved view of global sea ice including the Copernicus Sentinel Expansion missions[7]. For example, ESA's Finance for a Green Transition initiative aimed to increase the uptake of sustainable practices that ensure that investments work towards a green transition. ESA has supported businesses in the development of GreenSpace technologies, some of which are explored in the following sections.

In the EU's Farm to Fork Strategy, space-based solutions are highlighted as a way for agriculture to become more climate and environmentally friendly. It is also emphasised that these solutions require human and financial investment, investment that will be rewarded by higher returns in the long term through cost efficiency and added value from space technologies that enhance precision agriculture. The Farm to Fork Strategy highlights the importance of access to fast broadband internet in enabling precision farming techniques that utilise the EU's position as a global leader in satellite technology. The strategy sets out the benefit that space technologies, such as precision agriculture, can provide through reduction of fertilisers, pesticides and GHG emissions in agriculture. In this instance, satellites that enable precision agriculture techniques allow farmers to see the variations in soil to identify areas that, for example, require fertilisers for growth, and areas that do not[8].

## GreenSpace Policy in the UK

There is also a growing recognition in the UK of the crucial role that finance and investment can play in supporting the transition to a more sustainable future. As one of the world's foremost financial centres, the UK is committed to being a leader in green finance. This

[6] https://finance.ec.europa.eu/publications/strategy-financing-transition-sustainable-economy_en
[7] https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Copernicus_Sentinel_Expansion_missions
[8] https://eandt.theiet.org/content/articles/2016/02/farming-from-space-space-technology-in-agriculture-1/

commitment is demonstrated in a series of recent policy directives, summarised in the sub-sections that follow.

## Green Finance Policy

The UK's 2023 Green Finance Strategy[9] places great emphasis on the role of the financial services sector in supporting the transition towards a sustainable and low-carbon economy. The strategy highlights the need for private investment to deliver on the country's net-zero ambitions, with an estimated £50-60 billion in additional capital investment required annually. Public finance institutions are anticipated to contribute heavily to early investment, followed by signals that leverage a surge in private investment. The UK Infrastructure Bank (UKIB) is committed to crowd in private green finance by supporting more than £40 billion of investment[10]. This investment will support emerging sectors and technologies, enable traditional sectors to adapt and thrive, and boost the UK economy.

Financial stability is also a key concern, with climate change and environmental degradation posing significant risks to the economy. To manage these risks, an effective green finance framework is needed, which would provide the finance sector with the necessary information. The strategy explicitly incorporates nature and climate adaptation into the government's green finance policy framework, reflecting the progress made on nature finance both domestically and internationally. Finally, the UK is strategically placed to collaborate with international partners to align global financial frameworks with climate and nature objectives, capturing economic opportunities and building closer relationships with emerging and developing markets. For example, Just Energy Transition Partnerships (JETPs) have been launched between the International Partners Group – which includes the UK – and South Africa, Indonesia, Vietnam, and Senegal. These JETPs are designed to support and accelerate the decarbonisation of economies by mobilising climate-related finance, including grants, concessional loans and investments, and risk sharing instruments[11].

The Green Technical Advisory Group (GTAG) is an expert group that provides independent advice to the Government on the UK Green Taxonomy. The 2023 Green Finance Strategy for the UK[12] discusses the Land, Nature, and Adapted Systems (LNAS) Advisory Group, which is a sub-group of the Green Technical Advisory Group (GTAG). The primary function of the LNAS is to provide advice on sustainable agriculture and fishing practices, given the critical role of these industries in achieving the country's nature and climate change goals. In addition, the LNAS will consider the role of infrastructure and nature-based solutions in building a resilient economy. This emphasis on sustainable practices and infrastructure highlights the UK's commitment to promoting a green and sustainable future.

The UK's Green Financing Programme[13], was launched in September 2021 as a key part of the Government's green finance agenda. Through issuing sovereign green bonds and retail

[9] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1149690/mobilising-green-investment-2023-green-finance-strategy.pdf
[10] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf
[11] https://ec.europa.eu/commission/presscorner/detail/cs/ip_21_5768
[12] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1149690/mobilising-green-investment-2023-green-finance-strategy.pdf
[13] https://www.gov.uk/government/publications/uk-government-green-financing

Green Savings Bonds, the Programme raises funds to finance government expenditures aimed at addressing urgent environmental challenges such as climate change and biodiversity loss. Under the Green Financing Programme, the UK government committed to making regular reports that detail how funds are spent and provide an understanding of the impact of this spending. There have been two allocation reports since the Programme's launch, the second of which also contained the first impact report for the programme[14]. These reports set out how private capital is supporting the government's initiatives and impact data on 27 of those allocations. The report also includes methodological case studies for major expenditures, outlining how the government plans to measure and report on the environmental impacts of these projects.

The UK Green Finance Institute is an independent, non-profit organisation established in 2019. Its mission is to accelerate the UK's transition to a net-zero carbon economy by mobilizing capital towards sustainable investments. The Institute works with a range of stakeholders, including financial institutions, corporates, government, and civil society to identify barriers to green finance and develop solutions to overcome them. It also conducts research, provides thought leadership, and advocates for policies that promote green finance. Some of the specific areas of focus for the Institute include energy efficiency, sustainable infrastructure, nature-based solutions, and green fintech. Its work is particularly important given the urgent need to address climate change and the crucial role that finance plays in enabling the transition to a low-carbon economy.

## Space Policy

The UK's National Space Strategy[15] articulates the country's vision, objectives, and roadmap for advancing the space economy. It emphasises the UK's competitive advantages in ground-based manufacturing and services for top-tier navigation systems and satellite communications. Furthermore, the UK possesses a thriving ecosystem of professional services that continues to support the space sector. The strategy aims to establish the UK as a leading global force in innovative space economies, with particular emphasis on high-growth domains like Earth observation applications and services, as well as emerging fields like space-based energy. The National Space Strategy outlines key focal points, one of which is leveraging space technologies to address climate change.

The National Space Strategy was expanded upon in 2023 with the National Space Strategy in Action[16], outlining specific actions and areas of focus the government plans to carry out in line with the National Space Strategy, broken down under four pillars. Within Pillar 4, Earth observation (EO) is listed as a priority capability, to ensure that the UK maintains a strong and secure capacity for gathering EO data for civil and defensive uses and includes a commitment from the government to invest in EO infrastructure (including both data and hardware). This Pillar also includes a focus on terrestrial applications of EO data for the benefit of the population more widely, and a pilot data access scheme for high quality commercial EO data will be run through 2024, allowing users to access data that may otherwise be too costly. Additionally, under Pillar Four is a list of Civil EO National Priorities,

[14] https://assets.publishing.service.gov.uk/media/651446cdb1bad4000d4fd916/HMT-UK_Green_Financing_Allocation_Impact_Report_2023_Accessible.pdf and www.dmo.gov.uk/media/yxtnpt5l/pr260922.pdf
[15] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1034313/national-space-strategy.pdf
[16] https://www.gov.uk/government/publications/national-space-strategy-in-action/national-space-strategy-in-action

including (5) Climate, weather, and environment – "capitalising on UK capabilities to inform and improve national and global resilience to the impacts of climate change, disaster monitoring and extreme weather" and take a leading role in the worldwide flight against climate change. This aligns with the objective of promoting GreenSpace-related capabilities and capitalising on the UK's early successes to attain worldwide leadership in this area.

The UK Space Agency's Corporate Plan 2022-2025 further highlights the National Space Strategy's goal of fighting climate change with space technology[17]. Space plays a vital role in the UK's contribution to tackling climate change, and the UK Space Agency aims to help with the development of technologies, skills, and infrastructure that will help the UK to lead global net zero efforts.

## Real World Applications

Space technologies have revolutionised numerous real-life applications, particularly in agriculture, clean energy, and the fight against climate change. Satellites provide critical data for climate change research, monitoring carbon emissions, deforestation, and sea level rise, aiding in mitigation strategies and policymaking. In the future, space-based solar power systems have the potential to provide a sustainable and clean energy solution by capturing solar energy in space and transmitting it to Earth.

In agriculture, satellite imagery can monitor agricultural lands from space, capturing essential data on crop health, soil moisture levels, and other valuable metrics. This information enables farmers to employ precision farming techniques, optimise irrigation, fertilisation, and crop management, leading to enhanced resource efficiency and more environmentally friendly methods. These data also support informed decision-making by farmers and agricultural stakeholders, boosting productivity and mitigating risks, fostering more resilient and sustainable agricultural practices. Overall, space technologies play a vital role in addressing challenges and fostering innovation in essential fields, highlighting the need for investment in these technologies.

The Department for Agriculture[18] highlighted the ways that farmers and land managers can access payments from both the public and private sector for the environmental benefits they produce. This sets out the ways that the UK government aims to provide new income streams for agriculture and climate change mitigation through public and private sector funding, including private nature markets that fund carbon sequestration, biodiversity enhancement, and water quality improvement.

The UK Government has implemented several strategies to promote sustainable agriculture, environmental conservation, and to combat climate change. The Nature Markets Framework[19] and Green Finance Strategy enable farmers to access private payments for producing environmental benefits, while the British Standards Institution (BSI) develops nature investment standards. The BSI will work nationwide to enable an

[17] https://www.gov.uk/government/publications/uk-space-agency-corporate-plan-2022-25
[18] https://defrafarming.blog.gov.uk/2023/03/30/the-green-finance-strategy-and-nature-markets-framework-what-they-mean-for-you/
[19] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147397/nature-markets.pdf

industry-driven initiative aimed at creating a comprehensive set of interconnected investment standards for ecosystem services. The government provides advice, support, and consistent emission measurement approaches for farms, making it easier for the private sector to fund additional environmental benefits. Investments like the £30 million Big Nature Impact Fund and the Local Investment in Natural Capital programme (with up to £1 million funding for each local authority involved) attract private sector funding for nature projects. The Agricultural Transition Plan[20] focuses on revitalising the agricultural sector, aligning farming practices with environmental goals, and increasing funding for farmers who prioritise environmentally friendly practices. The National Farmers Union[21] emphasises science-based emission reduction targets, and space technologies have the potential to play a crucial role in reaching these targets by accurately measuring and monitoring emissions. The Department for Environment, Food & Rural Affairs (DEFRA) Path to Sustainable Farming plan highlights the significance of sustainable agriculture and agricultural technology systems in achieving environmental objectives and combating climate change. Green finance opportunities and advancements in space technologies contribute to more sustainable agricultural practices and climate change mitigation efforts.

Through the Green Finance Strategy[22], the UK Government collaborates with public financing bodies to promote the commercialisation and financing of green technologies essential for the energy transition. This aligns with the Powering Up Britain initiative, aimed at providing affordable and clean energy sources to heat homes and fuel industries. These combined efforts not only drive economic growth nationwide but also create nearly half a million new green jobs and open opportunities for businesses to export their expertise globally.

The Green Finance Strategy highlights the need to overcome market barriers and stimulate investment into climate resilience. The UK has supported the launch of the Surface Water and Ocean Topography[23] satellite which will survey the Earth's surface to measure and monitor changes in oceans, lakes, reservoirs, rivers, and wetlands. This space technology will improve climate change understanding and advance the understanding of sea levels more generally.

## Summary

Overall, international and EU policies and strategies acknowledge the important role of green finance for space technologies in combating climate change and promoting sustainability. The EU focuses on aligning economic activities with sustainability goals and establishing a supportive financing framework. The EU also plans to develop a comprehensive labelling framework for financial instruments and explore ESG benchmarks and minimum sustainability criteria. In addition, space technologies play a key role in the EU's Farm to Fork Strategy by supporting climate-friendly agriculture and improving precision farming through satellite technology.

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[20] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/954283/agricultural-transition-plan.pdf
[21] https://www.nfuonline.com/archive?treeid=137544
[22] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1149690/mobilising-green-investment-2023-green-finance-strategy.pdf
[23] https://www.gov.uk/government/news/world-first-satellite-to-measure-earths-water-levels-launches

UK policy highlights the role of finance and investment in supporting the transition to a sustainable future. The Green Finance Strategy emphasises the financial sector's contribution to a low-carbon economy, with a focus on private investment and establishing a green finance framework. The UK also emphasises sustainable agriculture, infrastructure and manufacturing practices through the Land, Nature, and Adapted Systems (LNAS) Advisory Group and promotes green finance through the Green Financing Programme and the Green Finance Institute. The National Space Strategy highlights the UK's competitive advantages in the space sector and the potential of space technologies to address climate change by making industries more efficient and optimise resource utilisation.

Both EU and UK policy prioritises green finance and space technologies as essential for achieving climate and sustainability goals. They recognise the need for private investment into GreenSpace and aim to establish frameworks for sustainable finance. Both recognise the potential of space technologies in promoting sustainable agriculture and addressing climate change.

# Industry Landscape

Through the power of data, space technologies revolutionise different industries by providing actionable information for informed decision-making and fostering more efficiency and resilience. This section provides a summary of key findings regarding the industry landscape surrounding GreenSpace-related technologies and an insight into ongoing business activity.

## Overview of the UK GreenSpace Industrial Landscape

To develop an understanding of the specific economic opportunity associated with GreenSpace, the study team identified a list of relevant UK companies using proprietary data sources[24]. The company sample was restricted to UK-headquartered companies whose focus is on GreenSpace related activities. This means that multinational companies such as Airbus and major international banks who are either not headquartered in the UK or whose activities span a multitude of different sectors were not included in this company list.

The initial company search identified over 1000 businesses within a dozen sectors. With the support of proprietary AI algorithms followed by a final manual search, the relevance of each company to GreenSpace was determined, resulting in a shortlist of just over 200 UK companies that are offering products and services relevant to the GreenSpace economic opportunity. These companies have been segmented into categories for analytical purposes (Table 3.1).

Table 3.1 – Categories for UK GreenSpace Organisations

| Classification | Business Focus |
|---|---|
| Space | Satellite Communications<br>Aerospace<br>Geospatial |
| Ag-Tech | Agricultural Technology<br>Crop Health<br>Energy Efficiency |
| Green Finance | Insurance<br>Risk Management<br>Banking |
| Air Quality | Air Quality & Pollution<br>Ecological Consultancy |
| Sea-Level Risk & Coastal Water | Aquaculture<br>Climate Risk<br>Climate Data Specialist |
| Carbon Credits | Carbon Reduction Tech<br>Investment Management |

[24] Beauhurst, FAME, and Crunchbase.

Based on known revenue data, it is reasonable to estimate that the total revenue generated by all GreenSpace-relevant companies could be over £43m annually. Companies in GreenSpace-relevant industries have seen an average employee growth of 47% between 2018 and 2021/22 (depending on availability of most recent figures). Over half of the companies were incorporated in the last 8 years, and a third were incorporated in the last 5 years, suggesting a surge of activity. Table 3.2 sets out the top 10 GreenSpace-related organisations by turnover between 2018 and 2022[25].

Table 3.2 – Top 10 GreenSpace-Relevant Organisations by Turnover. Source: Fame - Bureau van Dijk Electronic Publishing Ltd, 2023.

| Company name | Classification | Description | Turnover[26] |
|---|---|---|---|
| Pro Cam Europe Limited | Ag-tech/ Green Finance | Provide finance solutions, agronomy and crop production services designed to make arable-based enterprises more efficient. | £1.3b |
| Ordnance Survey Ltd | Space | Ordnance Survey is the national mapping agency for Great Britain providing the definitive spatial database. | £829.6m |
| Syngenta UK Limited | Ag-tech | Leading global provider of agricultural science and technology, such as the myFIELD app that provides farmers with weather warnings and advice tailored to your precise location using maps. | £512.3m |
| Esri (UK) Limited | Space | Provide geographic information systems (GIS), building actionable climate change solutions using location intelligence and GIS based on detailed risk analysis and response. | £287.9m |
| Surrey Satellite Technology Limited | Space | Pioneers in the use of new technologies for satellite platforms, Earth observation spacecraft with an extensive space portfolio including the Disaster Monitoring Constellation. | £278.1m |
| 1spatial Plc | Space | Provide the software solutions and services that manage the world's largest spatial big data. | £109.6m |
| Grosvenor Food & Ag-tech Limited | Ag-tech | Grosvenor Food & Ag-tech is an investor in agriculture businesses that are harnessing new technologies and advancing alternative approaches which benefit both current and future generations. | £100.9m |
| Ocean Signal Limited | Space | Worldwide leader in the design and manufacture of Satellite and Terrestrial Emergency Rescue Beacons based upon VHF/UHF, Iridium, DSC, AIS, GNSS and battery technologies. | £51.7m |
| Sep Limited | Space | Over thirty years of experience in the geospatial and on-site construction industries, specialising in topographical surveys, onsite geospatial, and technical engineering solutions. | £29.1m |
| Envitia Ltd | Space | Divide the data value chain into Data Foundations and Data Exploitation, providing geospatial solutions that non-technical users can benefit from. | £26.1m |

[25] Note: a large proportion of the GreenSpace-relevant company population did not have information available on turnover.
[26] Turnover between 2018 and 2022.

To understand where GreenSpace-related activity was taking place across the UK, we used postcode data to geocode the companies identified and enable geographical analysis. In Figure 3.1, it is evident that there are notable concentrations of GreenSpace-related activity across the UK. The cities with the most prominent clusters are London, Cambridge, Oxford, Manchester, and Leeds. There are also pockets of GreenSpace-related company activity in Edinburgh, Glasgow, Belfast, and Sheffield.

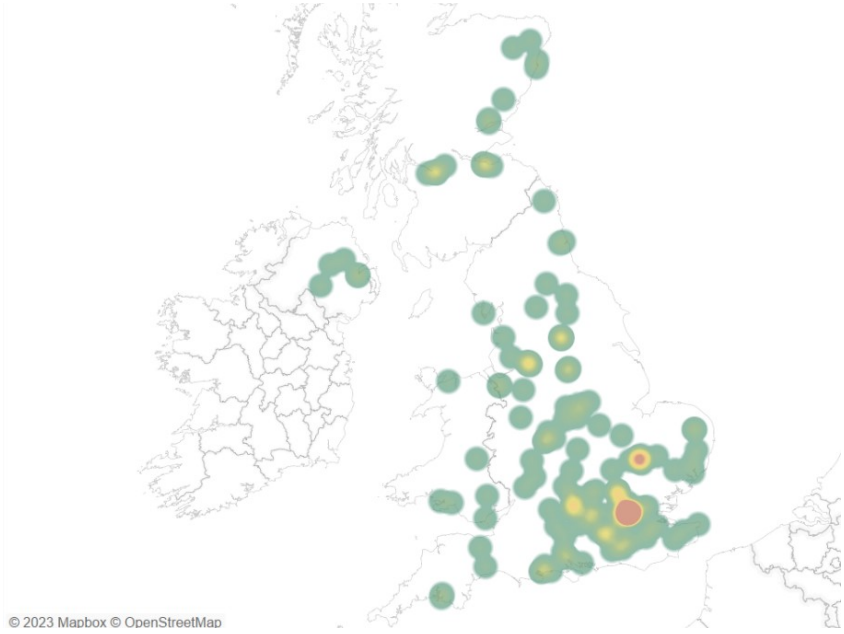


Figure 3.1 – UK GreenSpace-Relevant organisations. Source: Fame - Bureau van Dijk Electronic Publishing Ltd, 2023.

The trajectory of GreenSpace-related company incorporations has been upward over the past two decades. As set out in Figure 3.2, it appears that the rate of growth of these company incorporations has become more pronounced since 2015.

## GreenSpace Sectors

Analysis of company data by sector suggests that the majority (50%) of GreenSpace-relevant companies in the UK are space companies (Satellite Communications, Aerospace & Geospatial), suggesting that Earth observation technologies make up a significant component of the wider GreenSpace industrial landscape in the UK. As shown in Figure 3.3, a further 40% of companies have an ag-tech focus, meaning that they provide agricultural technologies, crop health or energy efficiency solutions. The prevalence of space and ag-tech companies within the dataset suggests an increasing focus in the UK on these areas in addressing climate change, and the importance of the link between Earth observation and agricultural technology.

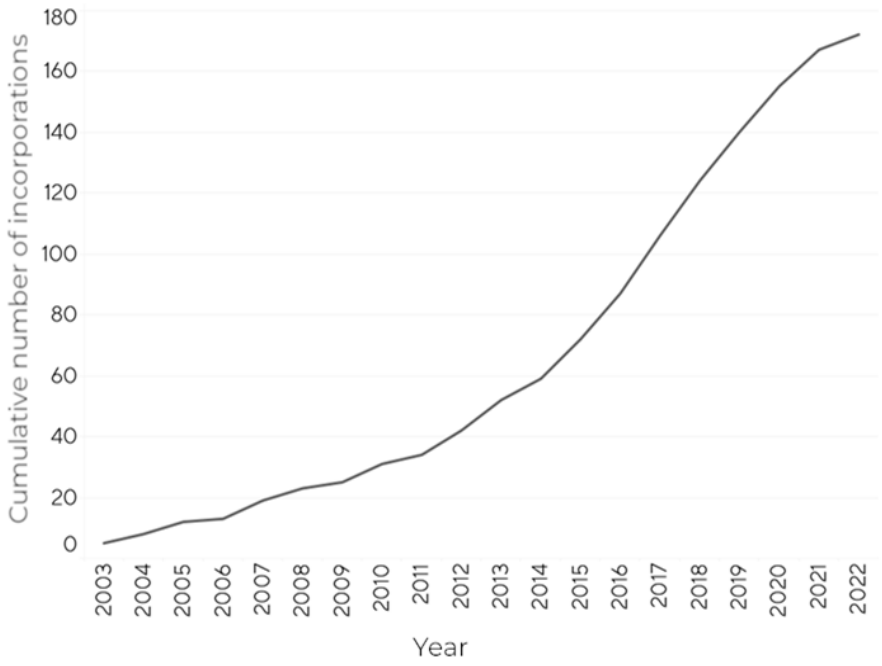


Figure 3.2 – Sum of UK GreenSpace-relevant Company Incorporations.
Source: Fame - Bureau van Dijk Electronic Publishing Ltd, 2023.

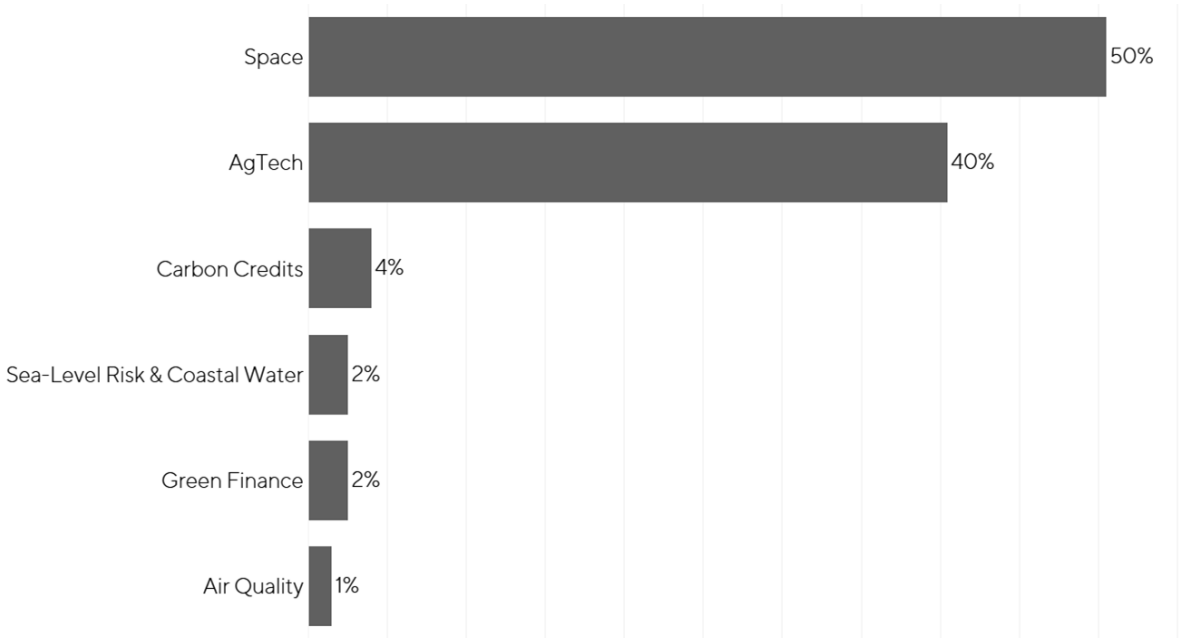


Figure 3.3 – Proportion of UK GreenSpace-Relevant Organisations by Category. Source: Fame - Bureau van Dijk Electronic Publishing Ltd, 2023.

# GreenSpace Investment Analysis

The increased adoption of space technologies and Earth observation can aid in tackling the challenges of climate change and benefit the environment by enabling climate monitoring, natural resource management, biodiversity conservation, and disaster response. The data obtained from satellites and other space technologies can provide a deeper understanding of environmental shifts and facilitate the creation of more effective methods for protecting and preserving our natural resources.

Space technologies and products that make practices greener are emerging and innovative. This means that substantive funding and investment is required to develop and commercialise these products, as explored by the investment data in the following section.

## International Investments

The paragraphs below summarise findings from a 2023 Crunchbase search into GreenSpace-relevant firms in the UK, the US, France, and the Netherlands. These companies have been categorised into the thematic areas identified by Space Hub Yorkshire's GreenSpace academic leads: Ag-Tech, Green Finance, Air Quality, Sea-Level Risk & Coastal Water, Carbon Credits, and Space.

The analysis suggests that total equity funding for these firms in the UK ($619m across 330 companies) is substantially lower than the US ($13b across 1,642 companies) and France ($913m across 130 companies), but higher than the Netherlands ($308m across 110 companies). **The US has the highest average total equity funding at $30m. The UK has the lowest average total equity funding at $9m, $14m lower than France and $2m lower than the Netherlands.**

In the UK, 48% of the firms are categorised as Ag-tech organisations. However, despite receiving the highest total equity investment overall, average equity investment in Ag-tech firms is lower than that made in other sectors. By measure of average investment, Ag-tech firms rank 2nd after space, despite total equity investment in Ag-tech being $123m greater than that of space companies. Ag-tech organisations also made up the largest proportion of companies in the US, France, and the Netherlands. Again, despite receiving the highest total equity investment overall, the average equity investment in Ag-tech & Crop Health firms is lower than other sectors. Compared to international investment in GreenSpace-related activities, UK investments are decidedly modest.

## UK Investments

A further search into the UK companies who have received investments and funding was completed on Beauhurst in 2023. This search indicated that since 2018, UK-based GreenSpace-relevant companies have secured almost £73m in grant funding and over £683m in private investment. The following sets out select companies with notable grant funding and private investment figures:

- All Space is the world's only communication platform that gives access to multiple satellite and terrestrial networks concurrently from a single device[27]. Its use cases include mission communications for government and defence, enhancing air passenger experience, maximising mobility operations, and accessing remote locations. They have secured **£124m in private investment and £922k in grant funding** between incorporation in 2013 to 2023.

- SatVu captures high resolution thermal data from space with the goal of contributing towards a safer and more sustainable Earth. Their technology addresses sustainability challenges through high-resolution thermal imaging by helping to ensure that buildings are energy efficient and thus, helping businesses to reduce their carbon footprint. SatVu is a high-growth tech company and has secured over **£31m in private investment and £2m in grant funding** between 2016 and 2023.

- Dendra Systems provides ecosystem analysis at scale using data science, machine learning and drone swarms, aimed at improving and accelerating ecosystem restoration and enhancing environmental management. Through their data driven insights, they provide in-depth information on ecosystems and biodiversity. Dendra have secured **£15k in grant funding and over £20m in private investment** between 2014 and 2023.

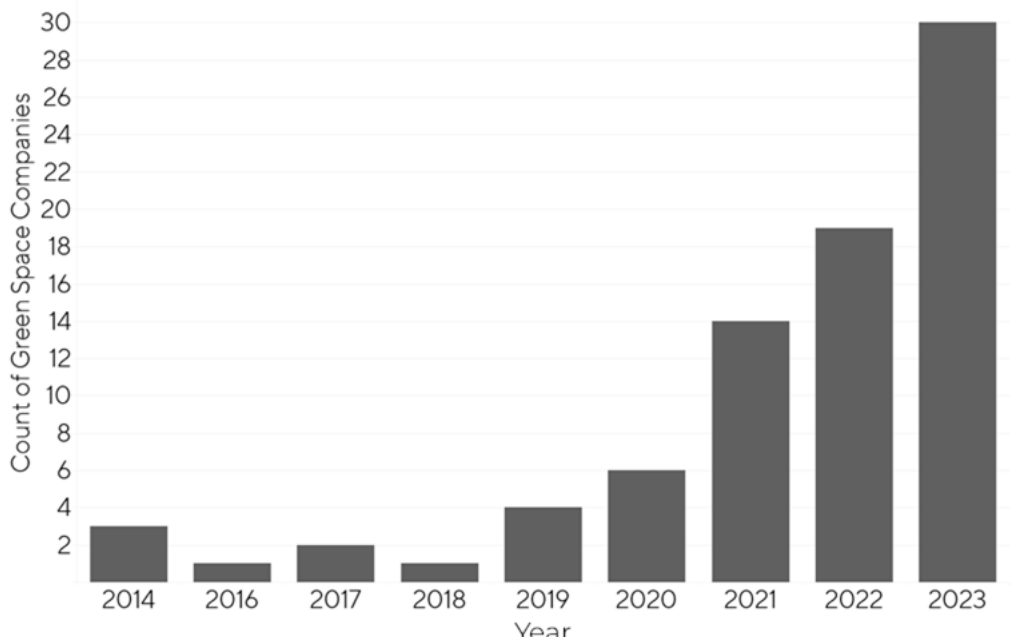


Figure 4.1 – Date of latest private investment fundraising. Source: Beauhurst, 2023.

The following (Figure 4.1) sets out the number of companies that secured their latest round of private investment by year between 2014 and 2023. This highlights that a large number (60) of GreenSpace-relevant companies have received their most recent private investment in 2021, 2022 and in the first half of 2023.

[27] https://www.all.space/products-services

# Case Studies

Public and private sector funding is already being directed towards a wide range of space technologies, including but not limited to Earth observation driven technologies. The sub-sections below provide an illustration of recent ESA investments into GreenSpace-relevant technology companies, and private companies work in GreenSpace-relevant areas both inside and outside the UK. These case studies are intended to offer an illustration of the scale and breadth of funding and activity being directed into these technologies and to raise awareness of the potential for further investment in Earth observation driven technologies.

## Centre for Greening Finance and Investment[28]

The UK Centre for Greening Finance and Investment (CGFI) is a national centre set up with the goal of fast-tracking the use of climate and environmental data and analytics internationally. CGFI is funded by UKRI and brings together a consortium of partners including the University of Oxford, the Alan Turing Institute, the University of Bristol, Imperial College London, the University of Leeds, the University of Reading, the Spatial Finance Initiative, and the Satellite Applications Catapult.

CGFI's overarching goal is for financial institutions to be able to access and use reliable, up-to-date, and complete climate and environmental data and analytics for every major sector, anywhere in the world, covering the past, present, and projected into the future. To achieve this goal, CGFI will:

- provide high-quality, robust, and openly accessible climate and environmental data,
- develop flagship use cases with financial institutions to demonstrate the benefits of integrating climate and environmental analytics into their organisations,
- serve as a hub for UK and international outreach, providing access to services, training, data, and capabilities,
- integrate 'spatial finance' into standard financial theory and practice.

Using satellite-derived information, financial institutions gain access to an unbiased and clear dataset that aids companies in transitioning towards a net-zero economy. These datasets can attract vital capital and investment for organisations' transition plans and investment requirements, thereby informing and influencing their investors and stakeholders.

CGFI also has a long-term partnership with the European Space Agency (ESA) as part of ESA's Finance for a Green Transition initiative which aims to increase the use of space-based data and geospatial solutions in supporting the financial sector with the green transition. The collaboration merges ESA's technical, commercial, and financial support of space solutions with CGFI's knowledge of green finance and climate science. This partnership aims to assist organisations in effectively addressing climate risks, enhancing their environmental footprint, and promoting growth in the sector.

[28] https://www.cgfi.ac.uk

## European Space Agency funded technologies.

ESA, through the Open Space Innovation Platform[29] (OSIP), has supported the development of space technologies that have the potential to boost Europe's green future. As an exhibition of the diverse potential of space technologies in addressing climate change, three examples of funded projects are summarised below.

Maana Electric received funding in towards their in-situ resource utilisation prototype system[27]. The implementation of this system can enable the manufacturing of steel using low-grade materials extracted in proximity to construction sites. This would result in decreased costs associated with the supply chain, minimise the environmental impact of mining sites, tackle the fast depletion of high-grade iron ore, and establish Europe as a frontrunner in green technologies. Ultimately Maana Electric expects to use its in-situ resource utilisation technology to produce power in space.

ESA also provided funding towards the SweetAir project, led by Wageningen University[27]. The SweetAir project is adapting technology from the International Space Station to capture carbon dioxide from the atmosphere. They will use enzymes, which are normally limited by the size of cells, to convert carbon dioxide into sugars more efficiently. This innovation aims to create a sustainable source of food ingredients to combat climate change and preserve Earth's ecological balance. It could also benefit spaceflight missions by providing a more efficient method to produce fresh food ingredients and recycle essential resources.

To tackle the risks of declining biodiversity, ESA provided funding to Biodiv-Watch[27]. Biodiv-Watch utilises cutting-edge sensor technology, Earth observation data, and digital technologies like artificial intelligence and cloud computing to analyse plant biodiversity patterns on a regional scale across various locations worldwide. By comparing satellite observations of different land uses with nearby natural environments, the project aims to establish connections between changes in local plant biodiversity and land use practices. This valuable information will guide land management decisions, providing a data-driven reference for understanding the impact of expanding agricultural production on plant biodiversity.

## Oxbury Bank: on-farm carbon sequestration pilot study

Oxbury Bank[30], an agricultural bank based in Chester, was founded in 2019 to address the need for agricultural finance in the UK and to support the UK's food and farming communities. Oxbury Bank has relationship managers across the country and provides tailored support to farmers.

As part of their ongoing activities to support their efforts towards Net Zero, and as a leader in the adoption of the Taskforce on Nature-related Financial Disclosures, they are running a series of pilot projects. One such project is designed to measure on-farm carbon

[29] https://www.esa.int/Enabling_Support/Preparing_for_the_Future/Discovery_and_Preparation/Space_for_the_future_green_steel_sweet_air_happy_plants
[30] https://www.oxbury.com/

emissions and carbon sequestration using remote sensing data in combination with farmer-provided records[31].

The carbon emissions portion was carried out using a carbon footprint tool that identified the largest areas of emission on the pilot arable farm, highlighting areas where the farmer can focus their carbon emission reduction efforts for maximum impact. More than 80% of the carbon footprint was related to fertiliser use, including its production, transport to, and use on the farm. The carbon storage portion of the pilot study used spectral remote sensing data from satellites in combination with soil, weather, and farmer provided records to model and calculate soil carbon levels in the top 30cm of soil since 2017.

Using the results of both portions of the pilot study together with tree carbon measurements for the farmland, an accurate overall value of the carbon footprint of the farm was calculated. The total carbon sequestered into the soil varied annually depending upon external factors such as rainfall and therefore the overall carbon footprint of the farm had significant annual variation. The farm was carbon negative in 2023, but that was not the case for all years. This pilot project provided a more complete understanding of the overall carbon footprint of an arable farm and Oxbury Bank intends to expand this pilot study in the future.

## UK-based technology companies

### Watermarq[32]

Watermarq, formerly Oxford Earth Observation or OxEO, founded in 2018 by Alex Money and Lucas Kruitwagen is UK-based company with a mission to revolutionise the way organisations perceive and value water. Watermarq recognises that water is vital for human health, ecosystems, and economic development, yet it is often undervalued and underfunded globally. Watermarq aims to change this.

Watermarq's novel approach creates a dynamic "shadow", or "internal", water price for each water basin they study. This price adapts to the location, timing, and user of the water, ensuring precise and impactful valuation. To create this shadow water price, Watermarq integrates satellite and other remote sensing data with in-situ data, contextual information, and peer-reviewed research with AI and machine learning. The company generates detailed, basin-specific data on water availability, quality, value, and access. The information provided to organisations helps to promote sustainability by providing a value indicator of water, encouraging collective action and investment in water security and basin resilience. These data are provided in high resolution to both public and private sector organisations, with a particular focus on the needs of financial services organisations. For qualifying organisations, Watermarq is committed to sharing key data for free to reduce data inequality and increase inclusion.

Between 2019 and 2023, Watermarq secured more than £400k in grants, including a significant grant from Innovate UK in March 2023. The company also received support through a pre-seed round, raising $75,000 from investor J Brant Arseneau, and additional consultancy-related revenue. Watermarq has also benefited from non-equity assistance

[31] Oxbury Bank Natural Capital Report, 2023, p20-67, https://www.oxbury.com/media/hicmfzoj/oxbury-natural-capital-report-2023.pdf
[32] https://www.wtrmrq.com/

from the Creative Destruction Lab (CDL), further validating its potential and positioning it for growth and success.

Watermarq's goal is to transform the way people and organisations value water. Using Earth Observation, AI, and machine learning, they generate basin-specific information on water availability, quality, and value, culminating in a dynamic shadow price. Their approach promotes sustainability, encourages investment, and supports water security across a range of sectors. They also share key data freely with qualifying organisations to foster inclusivity and reduce information asymmetry. With grants, investments, and support from organisations such as Innovate UK and Creative Destruction Lab (CDL), Watermarq is well-positioned to continue delivering data-driven solutions that contribute to a more resilient and sustainable future.

### Mantle Labs[33]

Mantle Labs

Founded in 2016, Mantle Labs is an innovative agri-fintech company that combines artificial intelligence (AI) and Earth observation technology to bridge the gap between AI, Earth observation, and the agricultural and carbon project sectors.

With a global presence spanning the UK, Austria, and India, and operational access to Asia, Africa, Europe, and the Americas, Mantle Labs is a leading provider of risk assessment solutions and crop monitoring platforms, particularly for nature-based carbon projects. By harnessing the power of satellite data and proprietary AI algorithms, Mantle Labs aims to transform the lives of millions of farmers worldwide.

The Geobotanics platform, developed by Mantle Labs, provided an extensive risk management tool tailored for financial to help manage their agricultural portfolios. This innovative solution leveraged a cutting-edge satellite data processing technique that combined optical and radar satellite imagery with Mantle Labs' proprietary AI engine to deliver a daily, cloud-free data stream. Farmers could access this platform through the 'Simba' mobile app, allowing them to precisely monitor their fields and take proactive steps to mitigate potential losses. This real-time monitoring capability significantly improved crop management, reduced risks, and optimised farming operations, and enabled financial institutions to effectively manage their agricultural portfolios and make data-driven decisions.

Geotree, developed by Mantle Labs, is a state-of-the-art system for monitoring, reporting, and validating nature-based carbon solutions, including but not limited to forestry, regenerative farming, and methane reduction. Using a range of satellite data, environmental science, and proprietary AI and machine learning algorithms, Geotree delivers an advanced analytics platform for carbon project developers and natural capital investors. It offers early-stage feasibility assessments, risk analysis, and continuous, reliable monitoring, while reducing costs and enhancing trust and transparency in carbon projects. In 2023, Mantle Labs used Geotree to support Verra, a non-profit sustainable development standard setter based in the US, by providing assurance and verification for five projects requiring additional quality control checks.

[33] https://www.mantle-labs.com/

Mantle Labs, with its fusion of AI, remote sensing technology and advanced analytics capabilities, is offering innovative solutions across a range of environmentally vital industries. Mantle labs supports risk assessment, crop monitoring, and data-driven decision-making for agricultural portfolios as well as monitoring, reporting, and verification of carbon projects. The Geobotanics platform enabled farmers to optimise their crop management and minimise losses while financial institutions and agri-firms benefited from risk reduction, and improved operational efficiency. Geotree supports carbon project developers with consistent monitoring and reliable assessments to improve outcomes and reduce costs. By leveraging satellite data and cutting-edge AI algorithms, Mantle Labs aims to transform the lives of millions of farmers worldwide.

## Non-UK-based technology companies

### URSA Space System[34]

URSA SPACE

URSA Space Systems, founded in 2014 by Adam Maher, Derek Edinger, Julie Baker, and Evan Kurtz, is a US-based satellite intelligence company. URSA Space Systems provides business and government leaders with on-demand analytical solutions and real-time insights into the physical world using their radar satellite network and expertise. URSA analyses patterns and identifying critical shifts to enable decision-makers to understand events and situations at a deeper level, facilitating informed decision-making and transparency. USRA offers subscription and custom services that provide access to satellite imagery and analytical results without geographic, political, and weather-related limitations.

Over the years, URSA has experienced significant growth. The company developed an oil inventory data product that can calculate the volume of oil in storage tanks, based on synthetic aperture radar data (a type of satellite data) and proprietary algorithms. URSA expanded their oil inventory measurement capabilities to more than 900 locations worldwide. Though this product isn't directly related to GreenSpace activity, the techniques developed can be used to measure clean water reserves and detect volumes of oil spills.

URSA also formed a strategic partnership with Amazon Web Services (AWS), a collaboration that allows URSA to provide near real-time access to satellite-based insights, garnering interest from commercial and government customers. This partnership enhances the speed and efficiency of accessing valuable data, providing users with actionable information in a timely manner.

Satellite data imaging plays a crucial role in assisting emergency response crews and utilities, especially in the aftermath of severe storms and other natural disasters. URSA's high-resolution satellite imagery provides detailed information on the exact location(s) with the most significant damage. These data enable emergency responders and utility companies to expedite response times, allocate resources effectively, and streamline recovery operations. URSA Space Systems was tasked with providing support after the magnitude 7.6 earthquake that hit Japan on 01/01/24. Ursa Space Systems detected and evaluated issues such as damaged and blocked roads, ground shifts, damaged buildings,

[34] https://ursaspace.com/

derelict vessels, flooded regions, displaced populations, and damage to essential infrastructure.

URSA Space Systems has positioned itself as a leading provider of satellite intelligence, with a strong focus on real-time analytics and actionable insights. The company's commitment to continuous technological advancements, strategic partnerships, and customer-centric approach bodes well for its future growth. As the company continues to innovate and expand its capabilities, URSA Space Systems is set to reshape the landscape of real-time decision-making for businesses and governments alike.

### Orbital Insight[35]

Orbital Insight was founded in 2013 by Dr. James Crawford, a former NASA scientist and engineer with extensive experience in remote sensing, Earth observation, and geospatial data analysis. Since Orbital Insight's founding, it grew and gained recognition as a leading provider of geospatial analytics solutions. In May 2024, Orbital Insight became a wholly owned subsidiary of Privateer[36]; its geospatial analytics capabilities and platforms – described below - will be integrated with Privateer's data engines in the future.

Orbital Insight specialised in collecting and analysing satellite data, aerial imagery, as well as other geospatial data sources. The company used machine learning and computer vision techniques to extract valuable information from the vast amounts of data available. Orbital Insight aimed to help businesses, governments, and organisations make informed decisions with:

**Geospatial Analytics:** Orbital Insight used satellite and other geospatial data to provide detailed analytics and information for a range of applications. These include the analysis of infrastructure, tracking changes in land use, monitoring of supply chains, and consumer behaviour predictions.

**Energy Infrastructure Monitoring:** The company helped energy companies monitor and analyse their infrastructure, including oil and gas facilities, pipelines, and solar farms. This enables organisations to conduct proactive maintenance, thorough risk assessments, and efficient resource allocation.

**Financial Markets Analysis:** Orbital Insight used satellite data in combination with other data sets to provide information on global economic trends and market behaviour. This could then be applied by investors, traders, and financial institutions to make data-driven investment decisions to the benefit of their organisations.

**Risk Management:** Orbital Insight helped organisations identify and assess risks related to natural disasters and climate change through the application and analysis of geospatial data. This information could be used to support disaster response planning, insurance underwriting, and the development of risk mitigation strategies.

**Supply Chain Analytics:** Orbital Insight offered solutions to optimise supply chains by tracking and analysing global trade flows, inventory levels, and infrastructure disruptions.

[35] https://www.orbitalinsight.com/
[36] https://www.privateer.com/

These data supported businesses to improve logistics, minimise disruptions, and enhance overall efficiency.

Orbital Insight used geospatial data to provide valuable insights to a range of industries and sectors, enabling them to make better decisions, mitigate risks, and capitalise on opportunities.

### Planet[37,38]

Planet is a US-based aerospace and data analytics company, and a leading provider of daily satellite imagery and Earth data. Its mission is to use space to help life on Earth by imaging the Earth's landmass every day. Planet makes observable changes accessible, visible, and actionable for industries, research institutes, and governments worldwide. With an impressive array of capabilities, Planet offers a diverse product suite that includes monitoring, tasking, advanced analytics, hyperspectral imaging, and a variety of basemaps.

In addition to the capabilities above, Planet also offers a line of products under the Planetary Variables™ umbrella, based on the extensive scientific expertise of industry-leading remote sensing scientists. The algorithms leverage data from across the electromagnetic spectrum, taken from Planet's own data as well as public constellations, to produce usable and actionable insights into water resource and drought monitoring, crop growth and field boundaries, forest carbon, and land surface temperature monitoring.

**Soil Moisture Monitoring:** Planet's state-of-the-art technology uses passive microwave sensor data from satellites to measure soil moisture. By combining these data with optical data, Planet precisely assesses soil water content at 100m and 1000m resolutions. Soil moisture affects agricultural productivity, hydrological modelling, weather forecasting, and climate research. It also empowers stakeholders in agriculture, water management, insurance, and climate change adaptation to make informed decisions around their business activities. Farmers can optimise irrigation strategies, monitor drought conditions, and enhance crop yield and water use efficiency based on this information. Water management authorities can improve resource planning and allocation, while insurance companies can better assess agricultural risks and offer tailored policies to farmers. By leveraging accurate and timely data, public and private sector organisations can optimise their operations, mitigate risks, and contribute to sustainable resource management.

**Crop Monitoring:** Planet's fusion of microwave and optical satellite data, combined with proprietary algorithms, provides daily measurements of above-ground crop biomass at 10m resolution, regardless of cloud cover. These biomass measurements enable farmers to track crop growth and development, inform decision-making around inputs and targeted interventions such as fertiliser and pesticide applications which also have environmental and financial implications, and to optimise harvest planning and efficiency.

Planet's innovative technologies empower stakeholders across various sectors to make informed decisions and optimise their operations. Offering an impressive suite of capabilities based on advanced algorithms and an array of data types, Planet's data insights can be used to enhance agricultural productivity, improve water resource management,

[37] https://www.planet.com/company/
[38] Planet acquired the EU-based company VanderSat in late 2021, enhancing its capabilities and providing additional expertise in water and agricultural data analytics from EO data.

and support sustainable practices. This information enables businesses, organisations, and governments to mitigate risks, enhance efficiency, and contribute to a more sustainable future.

## Kinéis[39]

Kinéis, founded in 2018, is a pioneering satellite operator and global connectivity provider that aims to offer easy and ubiquitous access to valuable satellite data. Leveraging the expertise of the Argos system, originally established by the French Space Agency (CNES), and operated by CLS (Collecte Localisation Satellites), Kinéis has developed a robust and reliable technology that enables location tracking and connectivity for objects worldwide. Their work is based around the concept of Internet of Things (IoT), a network of objects embedded with sensors and technology that can collect and exchange data.

Kinéis has successfully secured €100m from public and private investors to fund a range of strategic initiatives. These include the development, production, and launch of a constellation of 25 nanosatellites, the establishment of 20 satellite ground stations across the globe, and the enhancement of computer infrastructure to support system renewal. The company has been recognised for its achievements and is now part of the FrenchTech120 program, following two consecutive years of participation in the FrenchTech40 program.

**Innovative Solutions:** Drawing upon 40 years of experience with the Argos system, Kinéis combines the best aspects of space technology and IoT to offer ground-breaking solutions. The company collaborates with partners like STMicroelectronics to develop chipsets that facilitate satellite connectivity for devices. Its seamless integration and ease of use enable object geolocation anywhere on the planet. By providing reliable satellite connectivity, Kinéis empowers businesses and individuals to unlock the full potential of IoT applications.

**The IoT Constellation:** Kinéis is in the process of launching the first European constellation of 25 nanosatellites specifically designed for IoT connectivity in 2024. After three 2024 launches, 15 of the 25 satellites are in orbit. This state-of-the-art constellation, developed in collaboration with partners, represents a significant milestone in satellite technology. Thales Alenia Space, renowned for its cutting-edge technology and innovation across a multitude of sectors, is the system architect for the constellation. Nexeya, specialising in platform development and manufacturing, guarantees robust and reliable satellite platforms. Syrlinks, a trusted payload construction company, plays a crucial role in delivering the cutting-edge payload technology. Together, these partners are bringing the Kinéis IoT constellation to fruition, which will enable millions of objects to connect seamlessly to open new possibilities for industries, businesses, and individuals worldwide.

Kinéis, a satellite operator and global connectivity provider, is revolutionising the way objects are located and connected across the planet. By combining expertise from the Argos system with the power of IoT, Kinéis aims to make space accessible to all through its nanosatellite constellation. Kinéis' commitment to accessibility and innovation positions it as a leading force in the satellite and IoT ecosystem, unlocking vast potential for a connected future.

[39] https://www.kineis.com/en/about-us/

# Conclusions & Future Actions

## Conclusions

In the context of addressing climate change and advancing sustainable agricultural practices, the convergence of space technologies and environmental initiatives provides vast opportunities. This landscape review examines this intersection, exploring the impact that space technologies can have. This comprehensive analysis underscores the pivotal role of integrating space technologies into other industries.

The increasing focus on climate change in worldwide policy emphasises the importance increasing awareness and knowledge dissemination of the potential of opportunities around the use of space technology. National and local level strategies are increasingly focused on ways to minimise emissions and become net zero, with the UK aiming to use its space expertise to do this as efficiently as possible. Space technologies that enhance agricultural practices have the potential to help the UK meet climate targets, whilst managing to provide for a growing population. Space technology's potential in this arena is gaining global recognition as an important focus area and, whilst the UK has a supportive policy environment, efforts are siloed.

The GreenSpace project aligns national goals with local expertise, providing innovative and greener approaches to technology in different sectors. This Landscape Review indicates that there is growing investment in these areas of activity globally, with finance targeting technologies and innovations that have the potential to alleviate emissions. Further, Earth observation technologies are being utilised more and more to change the way we do things, from making agricultural practices more efficient to monitoring sea level and flooding risks. The use of space data has the potential to help meet both local and national climate change goals.

## Future Actions

A series of specific actions are needed to fully realise the potential of the GreenSpace project. These actions are categorised into short (up to 1 year), medium (1-3 years), and long term (3+ years) actions and detailed in the table on the following page. The actions are also described in terms of expected difficulty, with a mixture of easy, medium, and challenging actions included.

Table 6.1 – GreenSpace Actions

| Actions | Timeline | Difficulty |
|---|---|---|
| Deliver **pilot projects and case studies** – demonstrate the applications of satellite data in a variety of markets through industry and academic collaborative research projects. | Short | Medium |
| Facilitate **knowledge exchange events and workshops** – designed to bring different sectors together to raise awareness of the opportunities around satellite data, connect providers to current and future users, and facilitate wider training. | Short | Easy |
| Create a **GreenSpace network** spanning the space, financial services, agricultural sectors and beyond. Bring local champions and specialist networks such as Bankers for Net Zero into the GreenSpace network to facilitate wider connections. | Short | Easy |
| **Extended pilot studies** – extend successful pilot and case studies to address broader problems or the same problems at scale. Ensure the solutions developed are scalable but tailored to their users or environments. | Medium | Medium |
| **Training** – support the development of training schemes or workshops that can be deployed to address skills shortages that act as a barrier to wider EO use in non-space or space-adjacent sectors. | Medium | Medium |
| **Funding and investment** – support public and private sector organisations pursuing funding grants or investment opportunities for GreenSpace related activity. | Medium | Medium |
| **Market Monitoring** - monitor and track the GreenSpace-related markets to identify trends and opportunities, adjust stakeholder engagement strategies, and support targeted government lobbying. This will enhance project impact, drive innovation, and maximise the commercial and environmental benefits of GreenSpace technologies. | Long | Medium |
| **Scale successful pilot projects** to a national and, if appropriate, international levels. Convert successful pilot projects into commercially viable products or services in collaboration with industry. | Long | Challenging |
| **Regulatory** – identify and support the development of policy initiatives that would support GreenSpace activity, including data access, skills shortages, and sustainable development. | Long | Challenging |
| **Investment** – identify, support, and where appropriate lobby for, longer term funding and investment opportunities for GreenSpace related activity in the UK. Support commercial and academic organisations in their bids for funding. | Long | Medium |

# Getting Involved

If you or your organisation would like to join the GreenSpace network, participate in ongoing GreenSpace activities, or explore funding opportunities for GreenSpace-related initiatives with support from Space Hub Yorkshire, please email us at:

SpaceHubYorkshire@leeds.ac.uk

To be kept informed about upcoming activities, events, and opportunities:

- Follow Space Hub Yorkshire's LinkedIn page: www.linkedin.com/company/spacehubyorks
- Visit our website: spacehubyorkshire.org/about-greenspace

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