

Space Benefits for Earth

Understanding the remarkable value of Europe's achievements in space

December 2024

Space Benefits for Earth

→ Examples from the remarkable value of Europe's achievements in space

Impact of space

Impact of ESA

Impact of ESA programmes

→ A space infrastructure that is still based on a rather limited public investment



Space Benefits for Earth

Examples from the remarkable value of Europe's achievements in space

- Impact of space
- on critical infrastructure
 - on Europe's policies
 - on European SMEs
 - on European startups
 - on European trade balance

Space-based systems already support more than half of critical infrastructures

- Space technologies today support 11 of the 16 most frequently designated critical infrastructures in OECD countries, which include transport, energy and food supply, but also health, defence and public safety.
- In several countries, such as Belgium, France, Spain and the United Kingdom, the space sector itself is classified as critical infrastructure.

Space-based observations are essential support to Europe's policies

- Europe's space assets and capabilities support critical policies, addressing global challenges in the face of climate change and extreme environmental events.
- Space-based observations provide more than half of the essential climate variables that are used to monitor climate change.

Europe's space programmes significantly support the competitiveness of European SMEs

- European space SMEs employed >33,000 people in 2022, 12,000 more than in 2015.
- European space SMEs generated >€4 billion of turnover in 2022, posting growth of more than 50% since 2015.
- The innovation competitiveness of European space SMEs, through the total value of their intangible fixed assets, has tripled from 2015 to 2021, notably through intellectual property.

Europe's space programmes help European startups' access capital and talent

- European space startups raised nearly €1 billion in 2023, posting remarkable growth in less than a decade (€18 million raised in 2014).
- Over 60% of space private investment in 2023 was raised by startups involved in space infrastructure.
- European space startups generate >8,500 jobs in 2023, posting the most significant employment growth of the industry.

Europe's space infrastructure industry is a net positive contribution to the European trade balance

- Despite Europe being the largest importer of space systems worldwide, Europe benefitted from an average annual trade surplus of nearly €1 billion over the period 2013-2022 (59% from Spacecraft Systems, 28% from Equipment and subsystems and 13% from Launch services), thanks to its space infrastructure industry.



Europe's Columbus

 laboratory on the

 Space Station

Space Benefits for Earth

Examples from the remarkable value of Europe's achievements in space

→ Impact of ESA

- on Europe's economy
- on Europe's employment

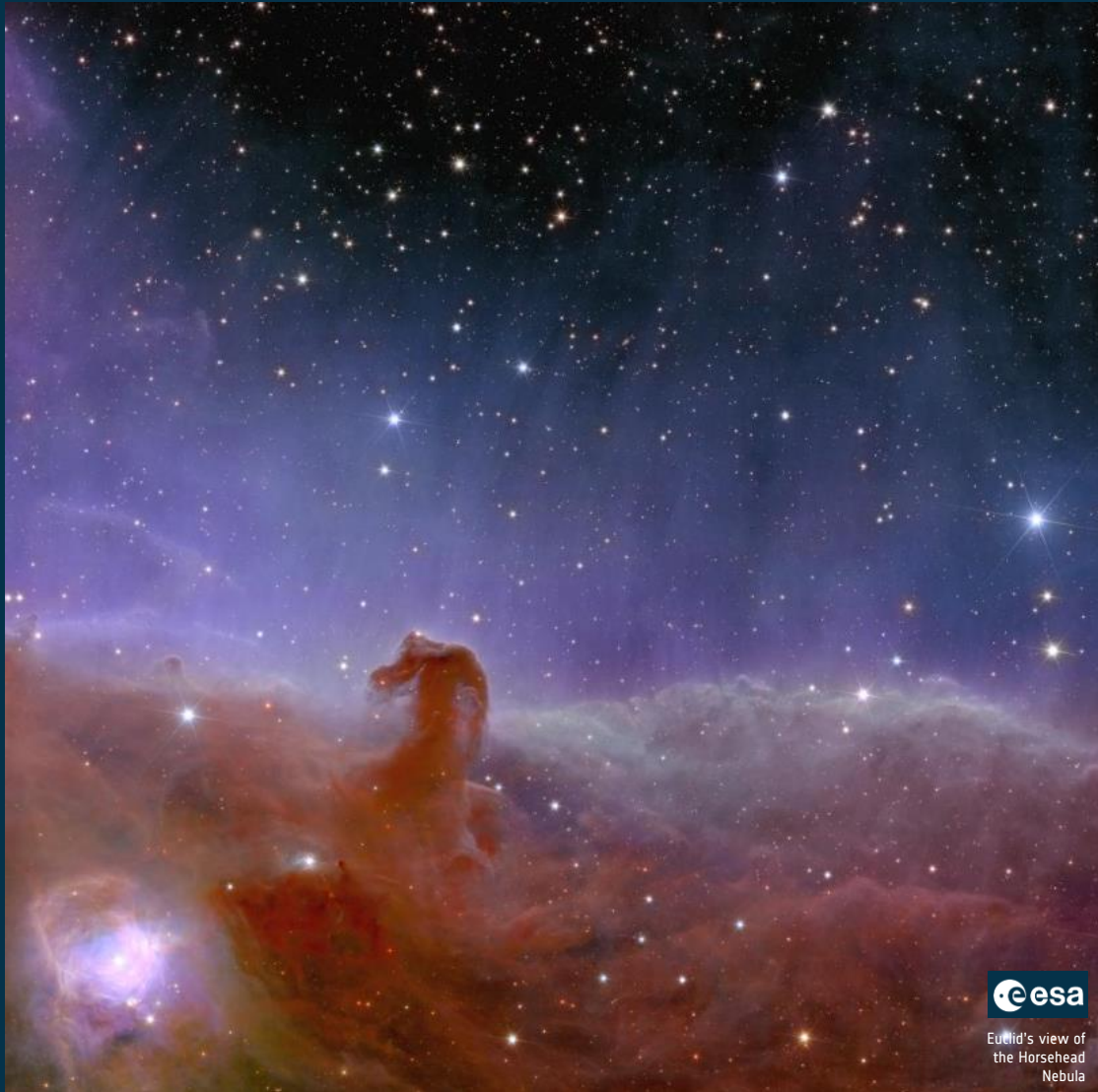
Europe's space programmes contribute to Europe's economic growth

- Subscriptions to ESA programmes at the Ministerial Council 2022 of €17 billion are projected to contribute to €22 billion to Europe's GDP and €6 billion of taxes across ESA Member States, Associate States and Canada.

Europe's space programmes support

high value-added jobs in European economies

- Subscriptions to ESA programmes at the Ministerial Council 2022 of €17 billion are estimated to support >260,000 job-years across ESA Member States, Associate States and Canada.
- The economic sectors in Europe receiving ESA funding are primarily R&D and manufacturing, which show significantly higher productivity than Europe's average.



Space Benefits for Earth

Examples from the remarkable value of Europe's achievements in space

→ Impact of ESA programmes

- on Europe's research
- on Climate action
- on Europe's strategic autonomy
- on Europe's competitiveness
- on Europe's public safety

Advancements achieved through ESA science, exploration and Earth Observation missions are highly valuable to Europe's generation of research

- The scientific research based on data from ESA-led science missions has posted growth of >80% in the past decade.
- In 2023, >1,600 scientists conducted research through Terrae Novae's SciSpacE investigations on the ISS and analogue platforms.
- Terrae Novae enables groundbreaking research at the destinations, including scientific firsts, such as the most detailed analysis of Martian atmospheric gases.

ESA's Earth Observation programme has an overarching impact on Europe's capability to empower **climate action**

- With subscriptions received at the Ministerial Council 2022, ESA's Earth Observation programme implements activities that develop climate-relevant capabilities in Member States' industries, leading to the support of 30,000 job-years, associated to more than €2.4 billion of GDP and €780 million of taxes.

The independent capability to fly Europe's missions through ESA space transportation and space operations is essential to Europe's strategic autonomy as a space power

- ESA's Space Transportation activities subscribed to at the Ministerial Council 2022 develop critically enabling capabilities in Member States' industries, supporting >40,000 job-years, of which 19,000 for Ariane 6 and Vega activities.
- During Covid-19 lockdowns across the world, ESA's mission controllers continued to operate Europe's space missions, overseeing critical manoeuvres and safeguarding the continuous delivery of data and vital services.

ESA's
commercialisation
activities contribute
to Europe's
competitiveness

- Commercialisation activities implemented through several ESA directorates support the European space industry to:
 - Develop products fit for the commercial and export market;
 - Secure highly skilled workforce;
 - Leverage additional funding;
 - Develop essential intellectual property;
 - Build foundational partnerships.

ESA's Space Safety programme is essential to Europe's public safety

- An asteroid on collision course with Earth can cause dramatic damages to people and infrastructure, estimated at up to €3 trillion for a 1km object.
- Critical infrastructure is also highly vulnerable to potential space weather events, such as the power sector which bears a risk of disruptions potentially causing billions of euros of damages.
- All satellites and space stations are exposed to space debris. The global value of economic activity at risk is estimated to be US\$190 billion in 2022, and orbits with the highest exposure are mainly occupied by publicly funded space infrastructure.



esa

PariSat experiment
on Ariane 6 - GAREF
AEROSPATIAL

Space Benefits for Earth

The development of space infrastructure is based on a rather limited public investment, representing:

- A small share of Europe's GDP
- A small share of European public expenditures

Governments remain the foundation of space infrastructure, and its primary customer

- In Europe, government demand accounted for >70% of space infrastructure in 2023, with the European Space Agency as its largest single customer (>40% of total sales).
- Globally, governments accounted for >80% of the demand for space infrastructure in value in 2023, mainly driven by the US and China's ambitious defence and spaceflight programmes.

Europe's public expenditures in space still account for a limited share of GDP

- In 2023, Europe's public space expenditures in space accounted for 0.06% of GDP, dropping from third place to China, with 0.08% of GDP. The US leads with public space expenditures at 0.26% of GDP, followed by Russia at 0.17%.

European space government expenditures account for **0.12% of total public expenditures**

- Europeans strongly overestimate the scale of public investment in space at €245 per year per citizen, a level more than twenty times the actual amount (around €12).
- Europe's government expenditures in space equalled about 8% of spending in defence in 2023.

ESA Space Economy

space-economy.esa.int