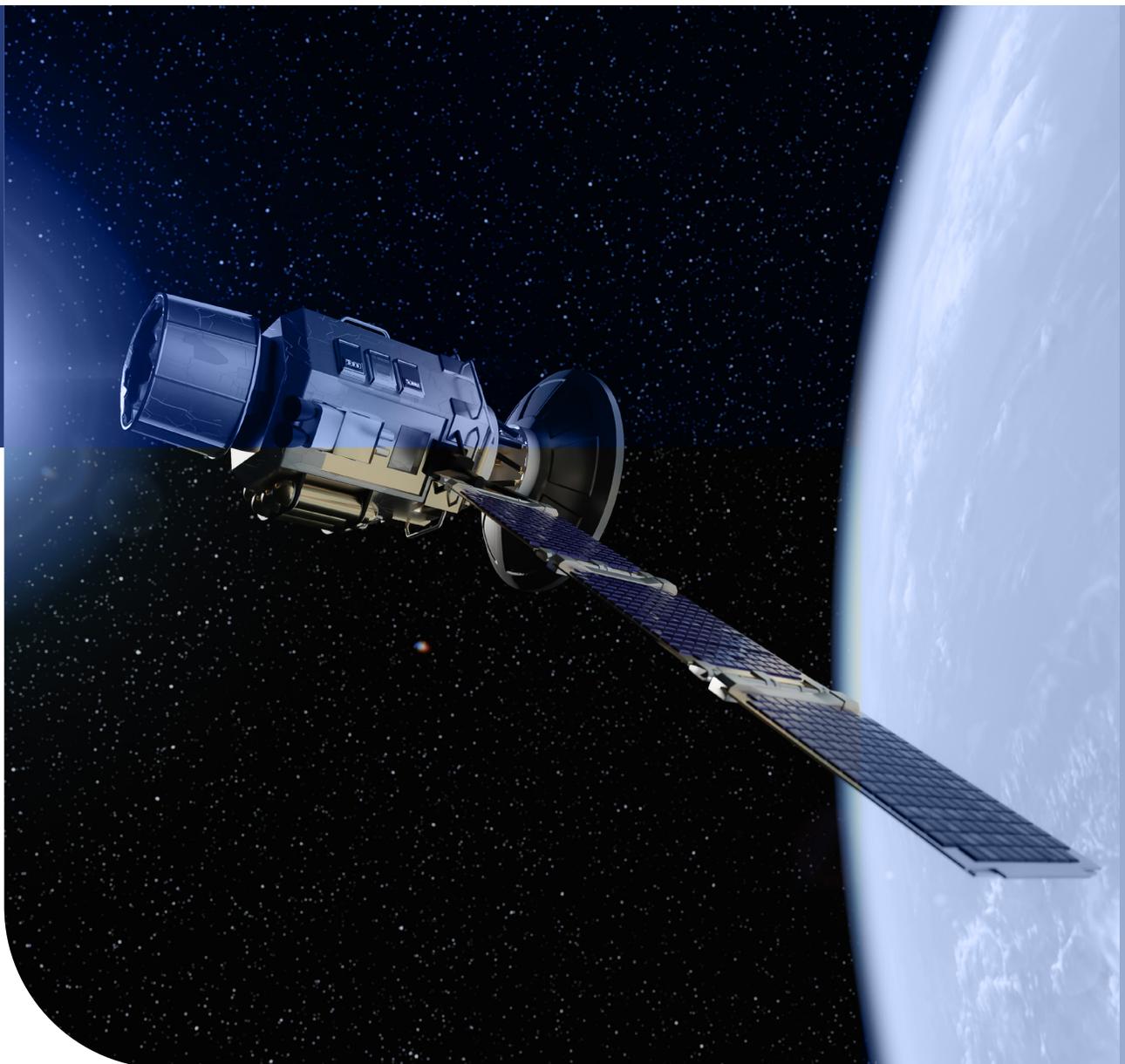


Economic Implications of the European Union Space Act

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LAMA Economic Research is a boutique consultancy founded by Eliana Garcés. LAMA Economic Research provides economic analysis in the field of policy and collaborates with independent academics and researchers for the advancement of good governance in the digital technology space.

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Executive Summary

This report assesses the potential impacts of the EU Space Act (EUSA) proposal on innovation and growth in the European space sector, with a particular focus on low-Earth orbit (LEO) satellites and downstream space-based services.

Space-based technologies underpin a wide range of economic activities. In 2024, the space economy was valued at €471 billion globally, and it is expected to grow significantly in the coming years. Yet, this growth increasingly depends on the deployment and scaling of LEO satellite constellations, which enable new services through lower latency and higher data capacity than traditional satellite systems.

The EUSA risks causing economy-wide effects through delayed adoption of new space-based services across the economy. Slow adoption of productive general-purpose technology has a significant impact on a region's economic trajectory. Speed of technology adoption has been found to explain 75% of the income gap between high- and low-income countries. A delay in the deployment of space enabled connectivity from the higher costs imposed by the EUSA will have an effect that can be assimilated to that of low-quality broadband. Under conservative assumptions, the estimated cost increase from the provisions imposed by the EUSA proposal will **decrease the adoption of space-based connectivity by up to 9%**. Assuming an impact of space-based connectivity on economic growth equivalent to only 10 to 20% that of broadband quality improvements, this slower adoption will lead to the loss of 0.06 to 0.27 percentage points of GDP per capita growth. This results in an **annual loss in EU GDP between €12 billion and €52 billion just from lower space connectivity, with a cumulative effect over time.**¹ In addition, costly access to data has been shown to reduce firms' data intensity and economic activity. More expensive or **curtailed access to space data** is expected to further decrease growth by **decreasing the number of innovative space-based applications** on the European market. (Section V.B)

EUSA risks slowing down the deployment of LEO constellations. The analysis suggests that, under its current design, the EUSA will increase the cost of deploying LEO satellite systems. The proposal contains numerous prescriptive technical requirements that go beyond commercial standards or global guidelines and impose a higher regulatory burden in terms of ex ante planning obligations, monitoring requirements, and reporting obligations. These features will increase manufacturing and operational costs for spacecraft operators and may disproportionately affect smaller and innovative entrants.

- ❖ The provisions in the current EUSA proposal **increase manufacturing and design costs for LEO satellites by at least 10 to 46%**, depending on their mass and the scale of their constellation (Table 3).
- ❖ **Compliance and operational costs** of the EUSA proposal requirements around predicting, monitoring, and reporting range between **€145,000 and €800,000 per year** depending on

¹ "World Economic Outlook (October 2025) - GDP, Current Prices," accessed January 20, 2026, <https://www.imf.org/external/datamapper/NGDPD@WEO>.

the type of constellations being deployed (Table 4). These costs can be absorbed by large operators but represent an additional barrier to entry for small innovative entrants.

Under realistic assumptions, the increases in manufacturing and design costs could **decrease the demand for innovative LEO satellites in the EU by 18% to 48%** depending on satellite type and cost scenarios (Table 6). This represents a loss of annual revenues from spacecraft sales in the EU between €174 - €288 million. **Exports of EU spacecraft would also decrease by 24% - 40%**, representing a loss of €207 - €342 million annually. Taken together, **aggregate annual revenue losses for providers of EU designed satellite systems could range between €381 – €630 million annually.**

Impact on providers of space-based services risks being significant. The slower pace of deployment and scaling of LEO satellites could significantly increase the cost of space-based services, reducing the demand for these services. Revenues of providers of space-based services in the EU could fall between €210 – 311 million annually (Table 7). The **aggregate cumulative loss of revenue from these innovative services for the period 2025 – 2030 would amount to €1.4 billion to €2.1 billion.**

Beyond the mentioned quantified cost and demand effects which are detailed in **Sections IV and V**, the report highlights important structural elements of the EU space sector.

Section II describes a rapidly expanding global space economy increasingly driven by cost reductions, private investment, and the rise of low-Earth orbit (LEO) satellites that enable new data-intensive and connectivity services. While Europe has strong technological capabilities and world-class public space infrastructures such as Galileo, Copernicus, and EGNOS, its sector remains heavily shaped by institutional governance, public procurement, and industrial collaboration among a small number of large incumbents. This model has delivered stability and excellence in traditional space activities but has struggled to adapt to disruptive innovation, rapid scaling, and competitive pressures from more agile, vertically integrated players. As a result, Europe lags in launch capacity, LEO constellations, and data-driven space services, even as a growing New Space start-up ecosystem shows promise but faces barriers related to funding, regulation, and market access. Recommendations so far have centered on an institutional streamlining with more efficient procurement processes and budget allocation at EU level. With concerns around autonomy, little attention has been given to the positive effects of competition.

Section III situates the EU Space Act (EUSA) proposal within the current regulatory debate and the goal to improve the regulatory environment in the EU to support economic growth and innovation. The EUSA proposal harmonizes key aspects of space regulation across the EU by establishing common requirements for safety, resilience, and environmental sustainability and subjecting both EU and non-EU operators to a unified authorization and supervision framework. While these objectives address real and widely shared fragmentation concerns in the European market, the regulatory requirements break from global guidelines with stringent mandated requirements that impose incremental costs on a large number of space operators. The proposal imposes additional costs on mega- and giga- constellations, a novelty that does not appear grounded in risk assessments. The estimated benefits from harmonization are

small compared to the potential costs and economic implications of the proposal. There are indications that the requirements in the EUSA proposal may raise questions of effectiveness and proportionality with concerns about possible regulatory overlaps. The proposal's choice of very prescriptive technical rules, systemic approach, and compliance processes that are both extensive and burdensome make it similar to other EU regulations that have been the subject of criticism and even review (REACH, GDPR, AI Act).

The report concludes that although the EUSA proposal advances important policy goals, its regulatory approach raises questions with respect to its ability to promote industry adaptation in the face of rapid technological change as well as its alignment with broader EU objectives on competitiveness, innovation, and the scaling of new entrants.

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I. Introduction

The EU Space Act proposal (“EUSA proposal”) was formally proposed by the European Commission (“EC”) on 25 June 2025 as a landmark regulation to harmonize key requirements promoting the safety, resilience, and sustainability of space activities across the European Union.² The proposal emerges against a backdrop of rapid expansion of the space sector with the global space economy valued at €471 billion in 2024 and growing at an annual rate of 11%.³ The draft regulation responds to globally shared concerns regarding safety and sustainability of space operations but is also inscribed in the wider EU objectives of securing the competitiveness of the EU space sector and the resilience of its supply chain.⁴ The principal mechanism chosen to support the space industry is the harmonization of key regulatory requirements for space activities, which currently differ across the increasing number of national legislations. The EUSA proposal sets common rules on authorization, registration and supervision, and goes on to establish common requirements for debris and orbit management, cybersecurity, light and radar pollution, and environmental sustainability.

To a certain extent, the EUSA proposal aligns with the direction proposed by Mario Draghi in his report on The Future of European Competitiveness (the “Draghi Report”), aiming to promote a large unified market that promotes cross border scalability as well as security and strategic autonomy.⁵ But the proposal adopts an approach to regulation that is reminiscent of other burdensome EU regulatory instruments characterized by extremely comprehensive, costly, and detailed requirements and burdensome compliance and reporting processes.⁶ In this way, the EUSA proposal represents a continuity in EU regulatory tradition and does not reflect the EC’s objective to simplify regulation and “streamline rules and reduce the administrative burdens for businesses by 25%”.⁷

In its current proposed form, the provisions of the EUSA proposal impose significant costs on those space activities that are unlocking innovation, and particularly activities supported by innovative, small, and cost-effective LEO satellites. Manufacturing costs of microsatellites could increase by 17-27% and costs of large constellation small satellites may increase by 32-46% (Table 3) under the proposed EUSA. The cost of deploying and operating these systems

² European Commission, “Regulation of the European Parliament and of the European Council on the Safety, Resilience and Sustainability of Space Activities in the Union (Proposal), COM(2025) 335 Final,” June 25, 2025. The proposal was followed by a public consultation that closed in November 2025. Formal adoption is anticipated by 2028. After a two-year transitional period, the regulation is set to fully apply from 1 January 2030, covering space assets launched after that date.

³ This figure includes government space budgets, space infrastructure and supporting industries, and commercial space products and services. “Report on the Space Economy 2025,” European Space Agency, 2025, 5, <https://space-economy.esa.int/documents/tJMabTj61KkdGVOtF6SKw6wGSxicen6ajUWamCG3.pdf>.

⁴ “Competitiveness Compass - European Commission,” 6, accessed January 19, 2026, https://commission.europa.eu/topics/competitiveness/competitiveness-compass_en.

⁵ “The Draghi Report on EU Competitiveness,” 59, accessed May 14, 2025, https://commission.europa.eu/topics/eu-competitiveness/draghi-report_en.

⁶ Other similarly crafted EU regulations include Regulation on the registration, evaluation, authorisation and restriction of chemicals (REACH), the General Data Protection Regulation (GDPR), or the EU Artificial Intelligence Act.

⁷ “Simplification and Implementation - European Commission,” October 21, 2025, https://commission.europa.eu/law/law-making-process/better-regulation/simplification-and-implementation_en.

could increase by 4-7% and 7-10% respectively for micro satellites and small satellites in large constellations, with an expected negative impact on the demand for those systems in the EU of -18 to -29% and -33 to -48% respectively (Table 6). Revenue losses for satellite systems providers in Europe could amount to €381 - €630 million annually due to lower demand. The entry costs for New Space firms would be raised by steep compliance costs. The annual value of the market for space-based services including broadband connectivity, earth observation, and augmented position-navigation-timing (PNT) services could fall by 5-8% with a loss of revenue between € 210 - 311 million annually, adding up to €1.4 – 2.1 billion by 2030 (Table 7). Most importantly, the delay in the deployment of innovative satellites such as LEO broadband constellations could lead to an annual loss in EU GDP between €12 billion and €52 billion as well as have important repercussions on Europe’s innovation rate.

It is currently not likely that the EUSA standards will be adopted globally. There may not be consensus about the efficiency of the EUSA approach and provisions in achieving the desired objectives.⁸ Geostrategic objectives may also diverge.⁹ Higher relative costs and lower technological flexibility from the EUSA provisions may unnecessarily burden the most innovative segment of the European space economy, ultimately harming its timely development, its long-term competitiveness and resilience, and the competitiveness of the EU economy as a whole.

Section II provides a quick overview of the space economy and discusses the structure, performance, and challenges of the space sector in Europe. Section III describes the EUSA proposal and provides a qualitative assessment of its approach. Section IV estimates the economic impact of the provisions of the EUSA proposal on the space sector in Europe. Section V describes the economic implications of delayed innovation in space-based services. Section VI concludes.

II. The EU Space Sector: Opportunities and Challenges

Space activities have been delivering significant economic value for several decades. The last few years have seen accelerated technology advancements that have massively lowered the cost of space activities opening new opportunities for space-based connectivity and data transmissions. Private investment is taking an important role in developing these opportunities, a development that is new to the mostly institutional European space sector. Europe’s notable achievements in space technology have historically been the result of institutional collaboration between space agencies and large industrial conglomerates. This context explains the challenges that the EU space sector is likely to face with rapid innovation and entry, and frames the economic and innovation impact from the EUSA proposal.

⁸ Jericho Locke et al., *Cost and Benefit Analysis of Mitigating, Tracking, and Remediating Orbital Debris* (2024), <https://ntrs.nasa.gov/citations/20240003484>; “Active Redundancy, NASA Preferred Reliability Practices, PRACTICE NO. PD-ED-1216,” n.d., accessed December 27, 2025, https://www.klabs.org/DEI/References/design_guidelines/design_series/np1216.pdf.

⁹ Executive Orders, “ENSURING AMERICAN SPACE SUPERIORITY,” The White House, December 18, 2025, <https://www.whitehouse.gov/presidential-actions/2025/12/ensuring-american-space-superiority/>.

A. The Space Sector at a Glance

The space sector value chain is comprised of the following segments:

Upstream segment: covers the design and manufacturing of a variety of spacecraft, satellite systems, launch services, ground control services, as well as the operation of satellites and other space infrastructure. The upstream segment was valued globally at €63 billion in 2024.¹⁰

Downstream segment: uses space infrastructure as an input to produce space-based data and communication services. Key downstream markets include Earth Observation (“EO”), geospatial and navigation services (“GNSS”) and positioning-navigation-timing services (“PNT”), and satellite broadcasting and communications (“Satcom”). The market for downstream space services, including markets using space services as a key input, was valued at €408 billion.¹¹

Unlike the upstream sector, which has traditionally been capital-intensive and dominated by a few primes, the downstream is broader, more competitive, and is increasingly linked to the digital economy.¹²

- ❖ **GNSS-PNT.** GNSS constellations supply high-accuracy PNT signals that underpin critical infrastructure and digital services. They enable aviation and maritime operations, provide the timing and synchronization required for secure electronic payments and financial timestamping, support real-time logistics, and form a foundational input for connected and autonomous mobility¹³. Europe provides an important public good with the Galileo and EGNOS systems, which offer state-of-the-art PNT services to users worldwide¹⁴. Traditionally the remit of medium sized or large satellites, PNT services are now being augmented by smaller lower orbit satellites, including new broadband satellites. Total revenue generated globally by the GNSS services was around €262 billion in 2023 with 20%, or €48 billion, originating in the EU.¹⁵
- ❖ **Satellite Communications (Satcom).** Satcom generated around €9.3 billion in revenue globally in 2021.¹⁶ Traditionally, Satcom services have focused on broadcasting and telecommunications, domains in which Europe built strong operators (such as Eutelsat) in the 1980s–1990s¹⁷ through early adoption of GEO broadcasting and Direct-to Home (DTH) services. However, these legacy markets have gradually declined, and demand has

¹⁰ Report on the Space Economy 2025, European Space Agency. 2025.

¹¹ Report on the Space Economy 2025, European Space Agency. 2025.

¹² KENZA BOUSEDRA (2023). “Downstream Space Activities in the New Space Era: Paradigm Shift and Evaluation Challenges,” *Space Policy*, Volume 64, 101553.

¹³ EUSPA EO and GNSS Market Report, European Union Agency for the Space Programme (EUSPA), 2024.

¹⁴ European Radio Navigation Plan 2023, Publications Office of the European Union, 2023.

¹⁵ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report.2024 / Issue 2*. (Publications Office, 2024), 19, <https://data.europa.eu/doi/10.2878/73092>.

¹⁶ Secure SATCOM Market and User Technology Report, European Union Agency for the Space Programme, 2023.

¹⁷ [A history of innovation shaping the future of satellite communications | Eutelsat](#)

shifted toward space based broadband connectivity.^{18,19} New LEO constellations involving hundreds or even thousands of satellites—led by Starlink and followed by OneWeb—have entered this market by offering low-latency satellite internet from much lower altitudes to remote or hard to reach areas. Their rapid scale-up has reshaped the competitive environment for European operators and encouraged new public initiatives, such as EU GOVSATCOM and the planned IRIS² program. The 70% share of Starlink in LEO satcom satellites²⁰ has also driven important restructuring in Europe, most notably the Eutelsat–OneWeb merger, which combines Eutelsat’s legacy GEO broadcasting business with OneWeb’s LEO broadband network.

- ❖ **Earth Observation (EO).** EO is the smallest of the three main sectors, weighing only \$2.8 billion in revenues globally in 2021 but expected to double in size by 2031²¹, EO integrates satellite, airborne, and in-situ measurements to monitor environmental and human systems. The market is structured into two main activities: sales of EO data and sale of services based on these data. Europe’s Copernicus programme has become the benchmark public source of free and open EO data. Other (mostly American) companies sell complementary EO data. These data, free or commercially provided, are in turn used by a rich ecosystem of smaller firms as inputs for different types of applications, ranging from agriculture and energy to finance, urban planning, and disaster response. European firms capture 41% of the global EO market share and are especially strong in subsectors closest to end-clients rather than in the EO data sale.

Space activities generate wide technological **spillovers** with applications in sectors as diverse as agriculture, transport, defence, consumer digital services, and finance.

A note on satellite orbits:

Earth-orbiting satellites operate in three broad regimes:

- ❖ Low-Earth orbit (**LEO**) at 160-2000 kilometers above Earth is used for Earth-observation and increasingly for broadband services. Because they are so close to Earth, such satellites offer low latency, but they each have a smaller coverage of Earth.
- ❖ Medium-Earth orbit (**MEO**) at 2,000–20,000 km, hosts all global navigation systems (GPS, Galileo).
- ❖ Geostationary orbit (**GEO**, 36,000 km) is the backbone of satellite broadcasting and traditional telecommunications. Because of their high altitude, they have more latency but can cover a third of the terrestrial surface.

These orbital regimes are combined by space-based service providers in downstream markets and shape their respective economics.

¹⁸ Secure SATCOM Market and User Technology Report

¹⁹ <https://www.gminsights.com/industry-analysis/satellite-communication-market>

²⁰ <https://www.abiresearch.com/press/over-480-orbital-launches-and-43000-active-satellites-expected-by-2032>

²¹ EUSPA EO and GNSS Market Report, European Union Agency for the Space Programme, 2022.

B. The EU Position in the Space Economy

Europe’s distinctive institutional architecture has produced undeniable successes and established European leadership in some traditional space services. The European institutional landscape is composed of the European Space Agency (ESA), the European Union funded space programs, and a set of powerful national government agencies such as the Centre National d’Etudes Spatiales (CNES) in France. These bodies set strategic priorities, design missions, and finance much of the sector through program related procurement.

Industrial production is concentrated in a small group of large European conglomerates, with Airbus as the largest player alongside Thales (France), Safran (France), and Leonardo (Italy). These firms form the core of Europe’s industrial base and account for roughly half of total upstream employment. The remainder is distributed across mid-sized suppliers (e.g. OHB, Avio, RUAG, GMV) and a long tail of specialized SMEs.

Public–private partnerships bringing large players around ambitious space programs have enabled Europe to build remarkable space infrastructures. including Copernicus for Earth observation, Galileo and EGNOS for navigation, and the upcoming IRIS² secure communications system. But despite its technological depth, Europe remains a relatively small player in the upstream global market.²² Europe’s exports of spacecraft, launch vehicles, and space transport services amounted to €1.3bn, while total imports reached €1.2bn.²³ Europe is instead relatively specialized in the downstream market applications facilitated by the large institutional space infrastructure.²⁴

Institutional collaboration and specialization have prevailed over head-to-head competition. Unlike the U.S., which is increasingly promoting competitive procurement among integrated providers²⁵, the EU space sector continues to be characterized by institutionalized collaboration. A clear illustration is the Ariane 6 launcher, publicly financed by ESA, and contracted to ArianeGroup, a joint venture by Airbus and Safran. The joint venture then coordinates a dense network of tier-1 and tier-2 suppliers providing specialised subsystems, components, and technical expertise.^{26,27} Most smaller firms likewise have traditionally not competed head-to-head, instead operating as niche suppliers within the broader production chain. In fact, ArianeGroup is Europe’s sole provider of heavy-launch service, while Vega/ Vega-C (developed by Avio, in which Leonardo is a major shareholder) are Europe’s sole light-lift launchers²⁸.

²² Report on the Space Economy 2025, European Space Agency, 2025.

²³ Eurostat – European space economy thematic account.

²⁴ Report on the Space Economy 2025, European Space Agency, 2025.

²⁵ Sandra Erwin, “Will Pentagon Procurement Reforms Really Stick This Time?” *SpaceNews*, October 2, 2025, <https://spacenews.com/will-pentagon-procurement-reforms-really-stick-this-time/>.

²⁶ https://www.esa.int/Enabling_Support/Space_Transportation/Ariane/Ariane_6_made_in_France

²⁷ https://www.esa.int/Enabling_Support/Space_Transportation/Ariane/Ariane_6_made_in_Germany

²⁸ Relaunching Europe’s space economy, BRUEGEL, 2025.

Similar patterns hold in satellite manufacturing: Thales and Leonardo pool most of their satellite-manufacturing activities within Thales Alenia Space, effectively forming one of Europe's two satellite primes alongside Airbus. This consolidates the upstream ecosystem into a de facto duopoly for large institutional and commercial satellites.²⁹ Moreover, these three primes (Thales, Leonardo, and Airbus) are considering merging their satellite-manufacturing activities to remain competitive on the global large satellites market.³⁰

The pattern of collaboration is reinforced by ESA's **geo-return principle**, which allocates contracts broadly in line with countries' financial contributions. While it ensures political cohesion, the governance introduces inefficiencies, structurally limits cross-border contestability, and constrains price- and scale-based competition in the upstream sector.

Europe as a private investment destination. After decades of relative stagnation, the space economy has returned to centre stage for both economic and strategic reasons. Global investment grew by 10% in 2025, reaching €129 billion.³¹ Although private investment accounted for only €7 billion, it grew at the higher rate of 20% signalling a trend of increasing privatisation.³² European investment accounted for €14.1 billion of which €1.5 billion were private investment.³³ While institutional investment lagged in the EU, private investment grew by 56% revealing Europe as an attractive market for private investors in space.³⁴ Over the past five years, the share of Europe in global private investment has grown from 3% in 2019 to 22% in 2024.³⁵

Europe now lagging in innovative space infrastructure. Behind this private investment dynamism, lies the reality of a European institutional space sector that has struggled to keep pace. Cost decreases from miniaturization and rapid innovation in launching services, heralded by SpaceX, have paved the way for a new generation of small and cheaper satellites providing broadband connectivity and data-intensive services. This has generated a dramatic increase in the mass launched in space in the last few years.³⁶ Yet, the EU was responsible for only 2% of these global launches in 2023 and has not secured reliable launching capacity to the day.

Europe's traditional markets are reaching maturity as innovative players enter the scene. Europe's market share in the upstream market fell from 16% in 2018 to 6% in 2024 due to the fall of the global demand for GEO communications satellites.³⁷ The role of Europe in

²⁹ The picture is more nuanced in LEO satellite manufacturing, where firms such as OHB also play a significant role.

³⁰ Hollinger, P. and Pfeifer, S. (2025). "Airbus, Leonardo and Thales strike space deal to rival Musk's SpaceX." Financial Times, 23 October 2025. Available at: <https://www.ft.com/content/a490b870-66b0-4745-be21-23f42057462d>

³¹ "Report on the Space Economy 2025."

³² "Report on the Space Economy 2025."

³³ "Report on the Space Economy 2025."

³⁴ "Report on the Space Economy 2025."

³⁵ "Report on the Space Economy 2025."

³⁶ "Report on the Space Economy 2025.". The number of launches increased by 28% in 2022, 18% in 2023, and 18% in 2024 to reach 259 orbital launches in 2024.

³⁷ "Report on the Space Economy 2025."

downstream space services may also come under stress with the entry of new more agile, innovative, and efficient private players.

While still relatively small relative to these established players, start-ups are growing rapidly in this ecosystem. While the European space start-up scene was virtually nonexistent a decade before, it employed around 8,000 people in 2023 (14% of total upstream employment). Mainly funded by VC, space start-ups also benefit from institutional support (including ESABIC incubator program and funding from EU programs EASME and Horizon 2020).³⁸

The EU space sector currently counts with very established space actors that have faced stagnation in public space program budgets and a more dynamic privately financed start-up scene that is yet to create its place.³⁹ Recent disruptions in the space sector present both challenges for incumbents and opportunities for these New Space newcomers.

C. Space Industry Disruption: Challenges and Opportunities

Commercial opportunities may be tied to the deployment of mass-produced LEO constellations^{40,41}. For decades, operators relied on large geostationary (GEO) satellites, located 36,000 km above Earth, for telecommunications and other space services. Large constellations of small satellites in low-Earth orbit (LEO) now offer much lower latency—close to terrestrial levels—but require thousands of units for global coverage. With the advent of Space X and the Starlink constellation, the cost of putting 1kg in orbit decreased from around \$60,000 (with NASA’s Space Shuttle) to \$2,600 (with SpaceX’s Falcon 9) making these constellations commercially feasible.⁴² Orders for commercial GEO telecommunications satellite have collapsed from 24 to only seven in 2024⁴³. Over the same period, LEO constellations expanded rapidly.⁴⁴ The economics of LEO constellations critically depend on cheap launching services, high-volume satellite production, and frequent replenishment, all of which are challenging for the EU industrial configuration. This report assesses that the most negative impact of the EUSA proposal will fall on these large LEO constellations of small satellites (see Section IV.C.1).

Europe’s main entrant in the LEO space has been **OneWeb** (UK), now merged with GEO/MEO-focused **Eutelsat** (FR) to form a multi-orbital operator combining GEO, MEO, and LEO assets. Rather than a LEO centric system oriented towards services development, European operators are integrating LEO capacity into the existing GEO/MEO infrastructures of telecommunications

³⁸ The European space industry Facts & Figures - 28th edition, Eurospace, 2024.

³⁹ “Report on the Space Economy 2025,” 6.

⁴⁰ <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/large-leo-satellite-constellations-will-it-be-different-this-time>

⁴¹ A Techno-Economic Framework for Satellite Networks Applied to Low Earth Orbit Constellations: Assessing Starlink, OneWeb and Kuiper), OSORO and OUGHTON, DOI: 10.1109/ACCESS.2021.3119634 .

⁴² CSIS Aerospace Security Project (2022). Available at: <https://aerospace.csis.org/data/space-launch-to-low-earth-orbit-how-much-does-it-cost/>

⁴³ GEO satellite communications market players must pivot or perish, Dallas Kasaboski, analysismason, 2025.

⁴⁴ OECD (2019), The Space Economy in Figures: How Space Contributes to the Global Economy, OECD Publishing, Paris.

incumbents, absorbing LEO capabilities as complementary assets rather than disruptive technology.⁴⁵

Europe lags in launcher infrastructure. Europe is aiming at maintaining autonomous access to space but still lags in its operational launching capabilities compared to other space regions. The entry into service of the heavy-lift Ariane 6 launcher in 2025 has secured autonomy but still underperforms on price and cadence with reports of backlog exceeding 30 missions in July 2025.⁴⁶ A new ESA program, the European Launcher Challenge (ELC) supports new developers of small and medium launchers in Europe with the objective of ramping up capabilities and potentially evolve towards heavy launchers⁴⁷. In the meantime, the capacity shortfall is being covered by SpaceX even for strategic missions such as Galileo⁴⁸.

Reusable launchers have become a major vector of competitiveness in the launch industry⁴⁹ but full reusability is economically viable only in markets with high and regular launch cadence. Europe's current demand structure—fragmented, policy-driven, and comparatively low-volume—remains a barrier for the fixed-cost investment and launch cadence required for reusable systems.⁵⁰

Public procurement in the EU appears both insufficient and inefficient. Europe's space sector is very dependent on sales to the public sector, which accounts for roughly 70% of industry revenues.⁵¹ Public procurement can be considered relatively low and inefficient. In 2023, Europe's public space spending reached only 0.05% of GDP, far below the U.S. (0.29%) and China (0.11%).⁵² Smaller defence budgets contribute to this difference. Public spending is also highly fragmented and inefficient with ESA's geo-return mechanism dispersing resources by allocating contracts according to member-state contributions rather than industrial performance.⁵³ This results in an ecosystem with strong technical competence but insufficient critical mass, slow decision cycles, limited strategic coherence, and low intra-EU incentives to innovate.⁵⁴

An expansion of the New Space ecosystem can support innovation in Europe. The stark decrease in launching price has spurred a whole new ecosystem of entrants. While the US is still the most attractive VC destination, Europe hosts several significant firms such as Isar

⁴⁵ *The Evolving Role of Leo Satellites 2025*, n.d., 10.

⁴⁶ <https://www.thespacereview.com/article/5018/1>

⁴⁷ European Launcher Challenge, ESA. https://www.esa.int/Enabling_Support/Space_Transportation/European_Launcher_Challenge

⁴⁸ https://defence-industry-space.ec.europa.eu/successful-launch-two-new-galileo-satellites-2024-09-18_en

⁴⁹ <https://chateurope.eu/en/europe-space-esa-reusable-rocket/>

⁵⁰ <https://www.intereconomics.eu/contents/year/2025/number/2/article/the-missing-rocket-an-economic-and-engineering-analysis-of-the-reusability-dilemma-in-the-european-space-sector.html>

⁵¹ Facts & Figures – 28th Edition, ASD-Eurospace, 2024.

⁵² The Space Economy in Figures, OECD 2024.

⁵³ “The Draghi Report on EU Competitiveness,” 60, accessed March 6, 2026, https://commission.europa.eu/topics/competitiveness/draghi-report_en; “European Space Agency and Analysis of ESA's Georeturn Policy, EuroAtlantic Consulting and Investment, May 2024.,” n.d., 17.

⁵⁴ For a discussion of how the fragmentation of the EU space-related public institutions shape the industry, see *Relaunching Europe's Space Economy* (Bruegel, 2025).

Aerospace (DE) and Rocket Factory Augsburg (DE) in the launching segment, D-ORBIT (ES-IT) and ICEYE (FIN) in satellites deployment and production, or Kayrros (FR) for satellite-based analytics in energy, climate, and emissions monitoring. European startups account for 14% of total space employment and exhibit the highest rate of employment growth in the sector.⁵⁵ Small firms in the EU differ markedly from the U.S. in that they often operate as specialized suppliers embedded within the existing industrial networks of Airbus, Thales Alenia Space, and Leonardo rather than as disruptive challengers.⁵⁶ The U.S. New Space model, on the other hand, is led by privately financed, sometimes vertically integrated firms that do not operate as suppliers within incumbent industrial chains. Companies such as Varda Space Industries (in-orbit manufacturing), Vast Space (commercial stations), and Rocket Lab (full-stack launch and spacecraft) act as independent disruptors rather than as components of existing networks. About 72% of firms in Europe declared having received government subsidies, while only 31% had access to VC-funding and 31% to bank loans.⁵⁷

Space data will integrate the digital economy. Modern EO markets have shifted toward large LEO constellations capable of near-continuous monitoring. This segment is dominated by U.S. firms, a fact considered by some as a strategic vulnerability.⁵⁸ As operators migrate toward cloud-based “Ground-Segment-as-a-Service” solutions, U.S. digital firms are well positioned to supply much of the compute, storage, and processing infrastructure that delivers EO value. Amazon’s Leo⁵⁹ (the next major entrant, with a planned large-scale broadband constellation) is conceived to interface naturally with Amazon’s broader digital infrastructure—particularly AWS’s global cloud and edge network^{60 61}. The program illustrates how satellite connectivity can be developed as part of wider digital ecosystems, where cloud services, terrestrial networks, and space-based platforms interact more closely.⁶²

In sum, the picture painted is one of a global space industry entering a phase of expanding technological and commercial opportunities and an EU space sector that is technically proficient but institutionally burdened with industrial arrangements that are suboptimal, reduce efficiency and investment incentives, and stunt disruptive innovation capable of unlocking new demand.

The Draghi Report concurs in the unexploited potential of the space sector in the EU and identifies its barriers to innovation. It focuses on an insufficient level of public spending in both procurement and R&D, as well as inefficient procurement rules as the main reason

⁵⁵ “Report on the Space Economy 2025.”

⁵⁶ Whittle, Mark; Sikorski, Andrew; Eager, James; Nacer, Elias (2021), Space Market: How to Facilitate Access and Create an Open and Competitive Market? Study requested by the ITRE Committee, European Parliament, DG IPOL.

⁵⁷ Space Venture Europe 2021, European Space Policy Institute (ESPI), 2022.

⁵⁸ Blinded by the Light: Strategic Levers to Reclaim Europe’s Industrial Edge in Space, European Space Policy Institute (ESPI), 2025.

⁵⁹ Amazon Kuiper project was renamed Amazon Leo in November 2025. Rajeev Badyal Leo Vice President of Amazon, “Project Kuiper Is Now Amazon Leo,” About Amazon, November 13, 2025, <https://www.aboutamazon.com/news/amazon-leo/project-kuiper-becomes-amazon-leo>.

⁶⁰ <https://www.aboutamazon.com/news/innovation-at-amazon/amazon-project-kuiper-aws>

⁶¹ <https://www.aboutamazon.com/news/amazon-leo/amazon-leo-satellite-internet-ultra-pro>

⁶² Hollinger, P. (2025). “Has Starlink already won the new space race?” *Financial Times*, 22 May 2025. Available at: <https://www.ft.com/content/b635423f-e721-454c-b75c-98d0ad8fedf1>

for European underperformance.⁶³ In response, the Draghi Report recommends more coordination among Member States to avoid duplication and better aggregate demand. It does not recommend unlocking competitive dynamics in the space sector in support of both innovation and market demand. As a result, the Draghi Report limits its proposed reform of public procurement to scrapping the geo-return rules to allow for concentration and does not recommend the promotion of competitive entry. The idea that demand for space infrastructure and services can increase in the face of innovation and can transcend EU procurement is absent from the analysis.

It is in the context presented above that the EC published its proposal for the EUSA.

III. The EUSA proposal in the current regulatory debate

A. The EUSA proposal: Objective and Provisions

The EUSA is being proposed as an **internal market instrument** grounded in Article 114 of the Treaty on the Functioning of the European Union (TFEU). It aims to harmonize rules across Europe’s rapidly expanding commercial space sector to facilitate scaling, promoting intra-EU interoperability and decreasing costs of operating cross border. Importantly, it introduces **common baseline rules for the safety, resilience, and environmental sustainability of space activities**.

Compliance is streamlined with the creation of a **single registration and authorisation** for space activities within the EU. But despite its harmonising ambitions, the EUSA proposal is **not a full harmonisation** regime. Space policy remains a “parallel competence,” and the proposal explicitly preserves Member States’ authority to impose stricter national requirements where justified by safety, resilience, or sustainability considerations (Art. 3). This may still entail multiple authorisations for multi-jurisdictional missions (Art. 6). The EC’s impact assessment estimates the total benefits from the regulatory simplification through the reduced number of filings, including the single registration for constellations, at € 6.3 million annually.⁶⁴ This estimate does not consider the additional regulatory burden from the mandatory provisions.

The EUSA proposal creates a **single point of registration for third-country operators** providing space-based data or services in the EU. These will have to register in the Union Register of Space Objects (URSO) after demonstrating regulatory compliance (Art. 48). The EUSA proposal ensures that third country providers are subject to the **same baseline standards as EU operators**, avoiding competitive distortions and preventing circumvention of EU rules. To facilitate international interoperability, the EC may adopt **equivalence decisions** with third countries, allowing operators covered by such agreements to be presumed compliant with the technical requirements of the Act (Art. 105). The EU can also conclude

⁶³ “The Draghi Report on EU Competitiveness,” pp176-180.

⁶⁴ European Commission, *Annexes to the Impact Assessment Report Accompanying the Document Proposal for a Regulation of the European Parliament and of the Council on the Safety, Resilience and Sustainability of Space Activities in the Union*, 2nd ed., Staff Working Document, SWD(2025) 335 final (2025), pts. 2, Table 6.

cooperation agreements with third countries facilitating mutual recognition of rules, technical assessments, and setting out conditions and procedures for the derogations relating to launch services or the usage in the EU of third countries' space services or space related data (art. 106).⁶⁵

To support a safer and more sustainable orbital environment, the regulation establishes **strict technical standards** across its three pillars: **safety, resilience, and environmental sustainability** (Article 6, Title IV). Compliance with these standards is a prerequisite for URSO registration for all operators, EU and non-EU alike. Moreover, space service providers must obtain an **e-certificate** attesting to the conformity of the relevant space object (Art. 25), ensuring customers can attest compliance with the safety and reliability standards of the service supplied.

The regulation responds to the growing economic importance of constellations: **a single authorisation can be granted for satellite constellations of space operators established in the EU** with the important caveat that satellites must be identical and launched from the same vehicle and launch site (Art. 9). This simplification reduces administrative burden for operators deploying multi-satellite systems.

While the EUSA proposal introduces stringent requirements compared to existing international norms (see III.B), it also provides possible exemptions at the request of Member States. This takes the form of **mission-specific derogations** from certain technical standards that can be granted at the request of a Member State when there are no EU substitutes for the service and demonstrable benefits exist (Art. 19). This mechanism balances regulatory objectives with operational realities—particularly important as Europe remains partially reliant on non-EU launchers.

To finance the new oversight tasks entrusted to the European Union Agency for the Space Programme (EUSPA), the Act establishes a **fee system** proportionate to operator turnover.

Recognising the heterogeneity of Europe's space ecosystem, the EUSA proposal incorporates dedicated **light regimes**. Research institutions and education-sector operators—or missions conducted for research purposes—may benefit from simplified safety requirements (Art. 62). These operators may be exempt from manoeuvrability capabilities if they can provide adequate trackability, and from certain obligations relating to light pollution, redundancy, or service-interface standards. The light regime is granted on a case-by-case basis, considering mission duration and spacecraft characteristics, aligning regulatory expectations with lower-risk or experimental missions.

Similarly, the EUSA proposal foresees **simplified risk-management obligations for small-sized enterprises** and research or education institutions (Art. 79(1)), focusing on core risks such as loss of control of space assets and omitting more sophisticated requirements like full supply-chain audits. SMEs are also exempt from performing an environmental footprint

⁶⁵ Only third country space operators that are governmental entities or operate military assets of space infrastructure are considered in the space service or space related data derogation provision.

calculation when conducting In-Orbit Demonstration and Validation (IOD/IOV) missions—an important reduction of administrative burden for early-stage technologies. This tailoring supports innovation and is consistent with the proposal’s claimed proportional approach.

Overall, the EUSA proposal establishes the first comprehensive internal-market framework for space activities in Europe. By harmonising core regulatory requirements, strengthening supervisory mechanisms, and subjecting EU and non-EU operators to a common set of obligations, it seeks to enhance legal certainty, reduce regulatory fragmentation, and support Europe’s position in an increasingly competitive and strategically contested global space economy.

However, there are concerns that the EUSA as proposed may also generate adverse effects on European competitiveness.⁶⁶ In particular, EU-specific technical requirements, cumulative compliance costs, and an expanded governance structure could disproportionately burden European operators, especially SMEs and emerging firms. Moreover, deviations from internationally established standards may expose EU operators to competitive disadvantages vis-à-vis non-EU actors, thereby weakening rather than reinforcing Europe’s global competitiveness.

B. The proposal requirements compared to current global standards

The provisions of the EUSA proposal address real and widely shared concerns around safety and resilience in space activities. They also reflect a growing consideration of environmental sustainability in the governance of space. The main elements of the EUSA provisions have already been the subject of discussion in global regulatory settings. In this sense the EUSA proposal can be seen as moving the needle in a shared direction.

Current global standards governing space activities are provided by a set of guidelines and best practices including the United Nations Committee of the Peaceful Uses of Outer Space (COPUOS)⁶⁷, the Inter-Agency Space Debris Coordination Committee (IADC), which represents the work of the space agencies in 13 countries as well as ESA⁶⁸, and the international standards set by the International Organization for Standardisation (ISO) that incorporate IADC and UN guidelines as well as commercial best practices⁶⁹. These guidelines and standards have been translated into regulatory requirements or national guidelines by governments or national agencies, which have occasionally set or recommended stricter standards.

⁶⁶ “EU Space Act | Cep - Centre for European Policy Network,” Centrum Für Europäische Politik: Cep.Eu, accessed January 20, 2026, <https://www.cep.eu/eu-topics/details/eu-space-act.html>; Lea Kessler, “Eurospace Position Paper on the ‘EU Space Act,’” *Eurospace*, November 28, 2025, <https://eurospace.org/eurospace-position-paper-eu-space-act/>.

⁶⁷ United Nations Office for Outer Space Affairs, *Guidelines for the Long-Term Sustainability of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space* (United Nations, 2022), <https://doi.org/10.18356/9789210021852>.

⁶⁸ “IADC Space Debris Mitigation Guidelines, Inter-Agency Space Debris Coordination Committee, January 2025,” n.d., accessed December 2, 2025, https://www.unoosa.org/res/oosadoc/data/documents/2025/aac_105c_12025crp/aac_105c_12025crp_9_0_html/AC105_C1_2025_CRP09E.pdf.

⁶⁹ “Best Practices for the Sustainability of Space Operations, Space Safety Coalition, April 2023.,” n.d., accessed December 2, 2025, https://spacesafety.org/wp-content/uploads/2023/04/SSC_Best_Practices_for_Space_Operations_Sustainability_v30.pdf.

This section describes in broad terms the incremental regulatory burden and constraints that will specifically affect space operators active in the EU compared to most of their global peers.

1. Safety

Global guidelines and standards for debris mitigation already work to mitigate the risk of spacecraft accidental fragmentation, the risk of collisions, and the disposal of spacecraft at the end of life. Global standards are provided by UN COPUOS Space Debris Mitigation Guidelines adopted by the General Assembly of the United Nations in 2007 and later updated⁷⁰, the IADC Space Debris Mitigation Guidelines last updated in January 2025⁷¹, and the international standards ISO that incorporate IADC and UN guidelines as well as commercial best practices⁷². These guidelines are supplemented by the U.S. Government Orbital Debris Mitigation Standard Practices developed by NASA and updated in 2019, which include specific quantitative outcomes, such as disposal success rates or collision rates.⁷³ The U.S. Federal Communications Commission (FCC) in charge of setting the requirements for authorizing satellites launched in the U.S. has played an active role in pushing for stricter requirements, sometimes unsuccessfully.⁷⁴ Other agreements and alliances among governments and commercial entities foster international cooperation around debris minimization.⁷⁵ The 13 national space laws within the EU⁷⁶ specify varying provisions on debris and are typically aligned with the European Code of Conduct for Space Debris Mitigation, a non-binding code developed by ESA and national agencies.⁷⁷

The national space legislation of France, the French Space Operations Act, has many nationally binding provisions that are aligned with the EUSA proposal although the overlap concerns only the safety provisions. This is likely to decrease implementation costs for French operators compared to their peers. Even there, the EUSA proposal imposes incremental obligations, such as auditability or automation, and also opens the possibility to tighten requirements such as, for example, shorter terms for deorbiting.⁷⁸ The final requirements are not made clear in the EUSA proposal as it leaves the determination of many technical specifications for future implementing acts. This creates substantial uncertainty for space operators regarding the implications of compliance.

⁷⁰ *Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space*, n.d.

⁷¹ "IADC Space Debris Mitigation Guidelines, Inter-Agency Space Debris Coordination Committee, January 2025."

⁷² "Best Practices for the Sustainability of Space Operations, Space Safety Coalition, April 2023."

⁷³ "US Government Orbital Debris Mitigation Standard Practices-NASA Orbital Debris Program Office, November 2019 Update.," n.d., accessed December 2, 2025, https://orbitaldebris.jsc.nasa.gov/library/usg_orbital_debris_mitigation_standard_practices_november_2019.pdf.

⁷⁴ Michael S. Dodge, *REGULATING ORBITAL DEBRIS: THE FEDERAL COMMUNICATIONS COMMISSION TACKLES SPACE JUNK*, n.d.

⁷⁵ An example is the NASA sponsored Artemis Accords to set principles for the civil exploration of outer space. <https://www.nasa.gov/artemis-accords/>.

⁷⁶ Austria, Belgium, Denmark, Finland, France, Greece, Italy, Luxembourg, Netherlands, Portugal, Slovakia, Slovenia, Sweden

⁷⁷ "European Code of Conduct for Debris Mitigation, 2004," n.d., accessed December 2, 2025, <https://www.unoosa.org/documents/pdf/spacelaw/sd/2004-B5-10.pdf>.

⁷⁸ "Legislative and Regulatory Framework – FSOA," accessed January 22, 2026, <https://spacecare.cnes.fr/en/la-securite-des-vols-spatiaux-english/legislative-and-regulatory-framework/>.

Incremental Provisions of the EUSA proposal. The provisions of the EUSA proposal constitute a legal hardening of safety and debris mitigation requirements in the EU compared to global standards. The EUSA proposal codifies activities that many operators already do but imposes stricter requirements such as design requirements for limitation of debris at launch, operational end of life obligations, systemwide requirements for constellations, mandatory use of designated space services, or disposal obligations under failure. Importantly, it transforms mostly procedural qualitative controls into requirements for quantitative risk modelling with auditable risk metrics across the full life cycle of a mission (design, operations, end-of-life, re-entry), which is not customary and imposes significant compliance costs.

The EUSA proposal diverges from international norms by establishing different requirements for satellites based on the size of their constellation. For constellation operators, especially mega- and giga -constellations, incremental requirements beyond global norms include automation requirements for collision avoidance, and the system-wide risk modelling and reporting obligations, as well as the integration with the EU Collision Avoidance service at scale.

The EUSA proposal tightens the limit on rocket-related debris that may remain in orbit after a launch. The constraint will be mostly felt in constellation launches and rideshare missions, where current practice often leaves multiple adapters, dispenser elements or separation structures in orbit. Under the EUSA proposal, launcher and payload-deployment architectures may need to be redesigned so that these components are either integrated, remain attached to the upper stage, or can be actively disposed of. It should be noted that the EU does not engage in many launches today. Even if EU develops launching capabilities, costly launch-specific mandates may place European launches at a long-term cost disadvantage.

While international norms ensure basic cataloguing and encourage cooperation in position sharing, the EUSA proposal establishes enforceable, lifecycle-wide traceability obligations directly on operators.

Providers may supply space-based data or services in the Union only if they hold a valid e-certificate, which must be attached to every service contract. Primary providers may offer data in the Union only if it originates from URSO-registered space objects, and the e-certificate must enable traceability of the data flow from generation to first service use.

2. Resilience

Global Standard for Resilience. The UN COPUOS – Long-Term Sustainability (LTS) Guidelines encourage States and operators to design space systems to be reliable over the lifecycle (guideline A.3), consider the risks related to space weather effects and share information on anomalies and hazards (guideline B.7).⁷⁹ Neither the UN COPUOS nor the IADC guidelines address cybersecurity requirements. Cybersecurity coordination for space systems and

⁷⁹ United Nations Office for Outer Space Affairs, *Guidelines for the Long-Term Sustainability of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space*.

activities currently relies on non-space-specific instruments and on dialogues related to cybersecurity.

Incremental Provisions of the EUSA proposal. While the EU Network and Information Systems (NIS 2) Directive sets cybersecurity requirements for medium and large-sized public electronic communications networks and certain ground-segment operators, it excludes key parts of the space sector, such as spacecraft, earth observation and space situational awareness satellites, micro-operators, launch services from outside the Union, and EU owned constellations.⁸⁰ The Critical Entities Resilience (CER) Directive also imposes supervision and notification obligations for ground-based space infrastructure owned, managed, and operated by Member States or private entities that are designated as critical.⁸¹ Both legislations call for appropriate and proportionate measures and the NIS Directive refers back to the state of the art as well as international standards⁸². The EUSA proposal imports critical-infrastructure resilience obligations to cover previously uncovered space infrastructure and creates a ‘de facto’ sector specific cybersecurity regime that does not have an equivalent in other jurisdictions. Notably, it moves from a ‘best effort’ guidance in the NIS 2 and CER Directives to enforceable cybersecurity obligations, introducing very specific and comprehensive operational monitoring requirements, risk management obligations over the entire mission, onerous redundancy requirements, and continuity duties. In addition, the EUSA proposal requires measures towards the management of supply chain risk including collecting information to assess dependence on foreign suppliers.

3. Sustainability

Global Standard for environmental sustainability. There are no mandatory standards regulating optical brightness of satellites and radio emissions in space although the Radio Regulations of the International Telecommunication Union (ITU) impose radio interference provisions on its signatories. UN COPUOS Long Terms Sustainability guidelines generically advocate for the long-term sustainability of space activities. It also refers to the ITU, that call for the prompt resolution of identified harmful radio frequency interference (guideline A.4). It requests that LEO satellites that have terminated their mission be removed from orbits that interfere with GEO satellites. The ITU has established radio regulation procedures to limit interference from space radio links. Although non-mandatory, the recommendations are widely adopted.⁸³ Light pollution is addressed by recommendations from scientific communities such as the International Astronomical Union (IAU) and the Center for the Protection of Dark and Quiet Sky (CPS).⁸⁴

⁸⁰ “Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on Measures for a High Common Level of Cybersecurity across the Union, OJ L 333, 27.12.2022, Pp. 80–152,” n.d., accessed December 16, 2025, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022L2555>.

⁸¹ Directive (EU) 2022/2557 OF THE European Parliament and of the Council of 14 December 2022 on the Resilience of Critical Entities OJ L 333, 27.12.2022, Pp. 164–198, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022L2557>.

⁸² Art. 21 of the NIS 2 Directive and Art. 13 of the CER Directive.

⁸³ ITU-R Recommendations, ITU, <https://www.itu.int/pub/R-REC>

⁸⁴ Yana Yakushina et al., *National Approaches to the Protection of Dark and Quiet Skies* (Zenodo, 2024), <https://doi.org/10.5281/ZENODO.14566125>.

Incremental Provisions of the EUSA proposal. The EUSA proposal requires adherence to stringent new design standards that reduce light and radio pollution (Article 72). The EUSA proposal's requirement for a visual magnitude for spacecraft of at least 7 (invisible to the naked eye) is currently only an aspiration of the IAU – CPS and is not currently an international standard.⁸⁵ None of the LEO satellites at altitudes less than 1000km currently achieves the brightness requirements of the EUSA proposal, making this a particularly challenging provision for low altitude LEO satellites.⁸⁶ ⁸⁷ In addition, Space operators are required to calculate and report the environmental footprint of their missions, using a space-specific life cycle assessment (LCA) methodology (Article 98).

4. Current level of compliance with global standards.

Compliance rates with global guidelines are already relatively high. About 85% of GEO and 90% of LEO satellites end in successful disposal at 25 years (80% at 5 years) as recommended by global guidelines.⁸⁸ For LEO constellation satellites, compliance with clearance of protected region at 25 year is at 99% compared to a little above 85% for non-constellation LEO satellites.⁸⁹ LEO satellites with payloads less than 10kg have a 99% compliance rate while between 13 and 15% of LEO satellites with payloads between 10 and 1000kg do not comply with any form of end of life deorbiting be that active deorbiting or natural decay.⁹⁰ Non-compliance with deorbiting requirements increases to 46% for LEO satellites with payloads over 1000kg.⁹¹

It is still worth noting that compliance with global guidelines by commercial LEO satellites is high. Only 1-2% of current commercial LEO satellites do not comply with de-orbiting guidelines at 25 years.⁹² Only 20% of commercial missions in LEO proceed to active de-orbiting after 25 years with most complying with natural decay.⁹³ Constellation LEO satellites proceed more frequently with active deorbiting with 30% doing active deorbiting at both 5 and 25 years lifetime limits compared to only 1% of non-constellation LEO satellites.⁹⁴

⁸⁵ International Astronomical Union (IAU) and Centre for the Protection of the Dark and Quiet Sky from Satellite Constellation Interference(CPS), *Call to Protect the Dark and Quiet Sky from Harmful Interference by Satellite Constellations* (2024).

⁸⁶ Anthony Mallama and Richard E. Cole, "Satellite Constellations Exceed the Limits of Acceptable Brightness Established by the IAU," *Monthly Notices of the Royal Astronomical Society: Letters* 544, no. 1 (2025): fig. 1, <https://doi.org/10.1093/mnrasl/slaf094>.

⁸⁷ This provision would also impact rocket upper bodies during the ascent/disposal phase and satellites undergoing orbit raising/disposal, which would require them to travel through the lower altitudes.

⁸⁸ ESA Space Debris Office, *ESA's Annual Space Environment Report* (2025), 99,133, https://www.sdo.esoc.esa.int/environment_report/Space_Environment_Report_latest.pdf.

⁸⁹ ESA Space Debris Office, *ESA's Annual Space Environment Report*, 103.

⁹⁰ ESA Space Debris Office, *ESA's Annual Space Environment Report*, 113–15.

⁹¹ ESA Space Debris Office, *ESA's Annual Space Environment Report*, 113–15.

⁹² ESA Space Debris Office, *ESA's Annual Space Environment Report*, 103.

⁹³ Most LEO satellites de-orbit through natural decay. ESA Space Debris Office, *ESA's Annual Space Environment Report*, 103. "Space_Environment_Report_latest.Pdf," n.d., 103, accessed December 23, 2025, https://www.sdo.esoc.esa.int/environment_report/Space_Environment_Report_latest.pdf.

⁹⁴ ESA Space Debris Office, *ESA's Annual Space Environment Report*, 103,117.

As for the environmental requirements, only about 40% of space operators in the EU conduct an environmental plan assessment (“EPA”), mostly because some jurisdictions require it for authorisation.⁹⁵

C. A qualitative assessment of the EUSA proposal

On several dimensions, the EUSA proposal aligns with widely accepted principles of good regulations. It targets well-documented market failures (e.g. debris accumulation, collision risk, and environmental externalities) that are unlikely to be addressed effectively through fragmented national action. It also operates at a level where EU intervention is justified by cross-border spillovers and scale effects. In this sense, the EUSA proposal is at the same time relevant, potentially effective in advancing safety, resilience, and sustainability objectives, and broadly consistent with several stated EU priorities.

For all its merits, the EUSA proposal raises issues of proportionality and cost-effectiveness. It also raises questions regarding its interaction with other key EU policy objectives, notably competitiveness, innovation, and SME scale-up. Concerns do not stem from the goals pursued by EUSA proposal but from the regulatory mechanisms chosen to achieve them. Rather than relying primarily on outcome-based requirements, per OECD principles⁹⁶, the EUSA proposal makes extensive use of prescriptive technical rules, ex ante planning obligations, continuous monitoring, and detailed reporting requirements. In a sector characterized by rapid technological change, highly specific technical mandates and a directive approach may not be the optimal way to achieve the proposal’s objectives.

1. An incomplete harmonization

The EUSA proposal correctly identifies the current proliferation of national space laws as a structural impediment to Europe’s competitiveness. As a result of diverging definitions, procedures, or timelines, firms may face unnecessary costs or barriers for scaling and expansion. The EUSA proposal unifies the authorization process for space activities (Title II), sets common minimum risk- and safety-mitigation standards (Title IV), or ensures consistent supervision practices across Member States (Title III). These measures will likely reduce costs for firms to operate in multiple countries, enhancing competition in the sector. The impact assessment accompanying the EUSA proposal estimates the benefits of regulatory simplification at € 6.3 million annually.⁹⁷

⁹⁵ European Commission, “Regulation of the European Parliament and of the European Council on the Safety, Resilience and Sustainability of Space Activities in the Union (Proposal), COM(2025) 335 Final.”

⁹⁶ OECD (2012), Recommendation of the Council on Regulatory Policy and Governance, OECD Publishing, Paris, <https://doi.org/10.1787/9789264209022-en>.

⁹⁷ European Commission, *Annexes to the Impact Assessment Report Accompanying the Document Proposal for a Regulation of the European Parliament and of the Council on the Safety, Resilience and Sustainability of Space Activities in the Union*, pts. 2, Table 6.

However, the Act does not impose full harmonization since harmonization of the laws and regulations of the Member States is explicitly forbidden by Art. 189 of the Treaty on the Functioning of the European Union (TFEU).⁹⁸

While the EUSA proposal represents a significant advance in establishing a baseline regulatory level-playing field, Article 3(2) opens the possibility for Member States to impose stricter rules or sanctions in their own jurisdictions. While it deepens the Single Market in important ways through harmonization, it remains to be seen whether it will be truly transformative.

2. Proportionality

Besides the deepening of the Single Market, the Draghi Report also highlights how regulations should be designed to facilitate entry of new players and enable firms to scale and compete on global markets. However, several provisions of the Act, especially under Title IV (Technical Requirements), risk moving in the opposite direction by excessively increasing costs for operators.

Manufacturing and design costs. Several safety and resilience provisions in the EUSA proposal translate directly into specific design mandates. These precise mandates are likely to harm adaptability and will constrain innovation, including for addressing the regulatory objectives. They impose uniform solutions across a wide range of operators and spacecraft, where a modular approach might be more reasonable. An example is the requirement that spacecrafts must be designed to be maneuverable (Article 66). This is likely to translate into mandatory propulsion and control capabilities, in ways that are only loosely tied to risk level. While some exemptions are granted and while the EUSA proposal does not provide the technical specifications to be determined later, it leaves room open for requirements that go much beyond what current legal frameworks require, with unproven benefits.⁹⁹ Another example are the mandatory redundancy and backup requirements for resiliency purposes (Article 86). These obligations require expensive duplication of systems and recovery capabilities even where marginal resilience gains may be limited. For example, a NASA study estimated that most of the risk from small debris affects only a small minority of spacecraft and that over 90% of the benefits from a mitigation measure such as shielding come from shielding just 10% of the spacecraft in orbit.¹⁰⁰

The impact assessment published with the EUSA proposal does not provide a proper cost benefits analysis of alternative approaches to achieve the goals of the regulation. Most of the estimated benefits are the described as the general result of an improved safety and resilience environment.¹⁰¹ There is no analysis of the merits of the actual provisions in the EUSA proposal.

⁹⁸ Consolidated Version of the Treaty on the Functioning of the European Union, Article 189. OJ C 202, 7.6.2016, Pp. 131–132, 202 OJ C (2016), art. 189, http://data.europa.eu/eli/treaty/tfeu_2016/art_189/oj.

⁹⁹ European Space Policy Institute (ESPI) (2025), *Bold Words, Blurred Lines: A Reflective Look at the EU Space Act*, ESPI Policy Brief No. 74, Vienna.

¹⁰⁰ Locke et al., *Cost and Benefit Analysis of Mitigating, Tracking, and Remediating Orbital Debris*, 38.

¹⁰¹ European Commission, *Annexes to the Impact Assessment Report Accompanying the Document Proposal for a Regulation of the European Parliament and of the Council on the Safety, Resilience and Sustainability of Space Activities in the Union*, pt. 2, p.42.

Operational costs. A second group of provisions imposes ongoing operational costs, particularly affecting firms operating at scale or relying on lean operational models. Requirements are only weakly differentiated by operator size and risk profile. For example, the EUSA proposal requires that all space operators present at least five different detailed plans documenting different aspects of their mission, some of which must include complex modelling and risk assessments.¹⁰² These are documentation-heavy processes that must be prepared, justified, and kept available for supervision. The proposal also requests three separate management systems (quality management system, lifecycle information system management, supply chain risk management). Operators are also required to calculate the environmental footprint of their space activities, collect environmental data from suppliers via contractual obligations, and submit a formal Environmental Footprint Declaration supported by a detailed study and datasets (Article 96). Regarding safety, the EUSA proposal also mandates subscription to a collision avoidance service (Article 64): instead of requiring operators to meet collision-risk performance criteria, it obliges them to rely on a third-party provider. This effectively mandates complex organizational frameworks. While such systems may be appropriate for large operators, they impose substantial fixed organizational costs (e.g. from audits, documentation, or staffing) that might disproportionately impact smaller firms. While benefits exist from each of these articles' objectives, the articles rely predominantly on procedural compliance rather than measurable risk thresholds and create large compliance costs. They also introduce legal uncertainty as the scope of required assessments may evolve over time.¹⁰³

3. Effectiveness

There are indications that very prescriptive measure and **“command and control” regulations may not be the most efficient** way to increase the safety of space activities and that incentive-based policies focused on outcome and performance may be more effective, particularly in the regulation of common pool resources.¹⁰⁴

The **practical effectiveness of some of the measures proposed may also need to be scrutinized.** For example, a NASA cost-benefit study finds that investing more resources into broad (rather than targeted) explosion mitigation measures in addition to what is currently done may not be cost-effective. In their simulation, the costs would need to be about 10 times lower than estimated to ensure positive benefits.¹⁰⁵ Similarly, some experts consider that redundancy decisions should be based on analysis of reliability and test data and advocate for methods other than costly duplication, such as improvements, to increase reliability.¹⁰⁶

¹⁰² The EUSA requires detailed plans for debris control, debris mitigation, failure response, maneuvers, light and radio pollution mitigation.

¹⁰³ International Center for Law & Economics (ICLE) (2025), *Comments on the Proposal for a Regulation of the European Parliament and of the Council on the Safety, Resilience and Sustainability of Space Activities in the Union (EU Space Act)*, Comments submitted to the European Commission, COM(2025) 335, 7 November. Authors: Kristian Stout and Eric Fruits.

¹⁰⁴ OECD, *The Economics of Space Sustainability: Delivering Economic Evidence to Guide Government Action* (OECD Publishing, 2024), 38, <https://doi.org/10.1787/b2257346-en>.

¹⁰⁵ Locke et al., *Cost and Benefit Analysis of Mitigating, Tracking, and Remediating Orbital Debris*, 41.

¹⁰⁶ “Active Redundancy, NASA Preferred Reliability Practices, PRACTICE NO. PD-ED-1216.”

Regulatory overlap can also create uncertainty, increase the cost of compliance, and possibly distort the market. For example, operators of broadband services satellites may be subject to both telecommunications and space sector regulations leading to duplicative and possibly inconsistent requirements. Similarly, overlapping general and sector specific regulation, for example in cybersecurity matters, may create inefficiencies and add unnecessary regulatory burden.

4. Strategic alignment: competitiveness and innovation focus

As part of its innovation, competitiveness and sovereignty agenda, the EC has committed to removing regulatory barriers to growth.¹⁰⁷ Initiatives such as REFIT, Fit for Future, the SME Relief Package, or the Omnibus Simplification agenda all reflect this broader agenda toward deregulation and simplification.¹⁰⁸ Yet, the EUSA proposal **does not deliver deregulation and simplification**, and may work against the competitiveness objectives. Its prescriptive approach and choice of provisions may interact directly with rapid innovation and technological change in the space industry.

Loss of Adaptability. The EUSA proposal mandates strict design specifications, for example for launchers, which must ensure they generate at most two separate debris and so must fit payload in shared bases. Regulated designs are not fit for evolution and may impede the adoption of innovations. Similarly, some provisions of the EUSA proposal risk cementing supply chains, increasing the costs associated with adaptation and quick reaction to market needs. Supply-chain risk management obligations (Article 92), the requirement for operators to ensure supplier compliance with EUSA through contractual arrangements (Article 74), and lifecycle-wide risk management systems requiring organization-wide governance (Article 76) increase the costs for firms to change suppliers. As a result, new entrants proposing innovative products might face higher barriers to entry and to scale up, while incumbents might face higher costs of switching to more efficient suppliers.

Cost of scaling in LEO markets. EUSA proposal's constellation-specific provisions (Article 73) risk making innovation in LEO markets disproportionately expensive, including by imposing additional measures on mega- and giga- constellations. The constellation-specific provisions (Article 73) impose different requirements according to constellation size, which is unique and does not appear grounded in outcome-based or risk metrics, potentially imposing unjustified costs on very large constellations. Also, some provisions such as the brightness requirements favour high altitude satellites over lower orbit ones, creating a possible distortion in LEO satellite deployment. Finally, while the proposal requires only one authorization for a whole constellation, this applies only for identical spacecrafts launched by the same launcher. This poses a significant challenge in a sector where rapid iteration and experimentation is a driver of innovation.¹⁰⁹ Together, the strict provisions in the EUSA proposal risk making European LEO

¹⁰⁷ See for example: European Commission (2025), *A Competitiveness Compass for the EU*, COM(2025)30.

¹⁰⁸ Kauffmann, C. (2025), *Reframing simplification in support of a sustainable EU*, Policy Brief, IDDRI.

¹⁰⁹ Cooley LLP (2025). "The Proposed EU Space Act: 10 Key Implications". Available at: <https://www.cooley.com/news/insight/2025/2025-07-24-the-proposed-eu-space-act-10-key-implications-us-and-non-eu-satellite-operators-should-know?referrer=grok.com>

satellite operators less agile and able to scale in a market that is both strategically important and where Europe currently lags.

5. The EUSA proposal represents continuity of the EU regulatory approach

The EUSA proposal is well in line with the regulatory approach the EU appears to want to reconsider. It is overly prescriptive, excessively comprehensive, and burdensome for smaller companies. It focuses on the precise design of remedial actions and the demonstration of compliance rather than on the regulatory goal. This type of regulatory design is recognizable in previous regulations such as REACH, GDPR, the Medical Devices Regulation, NIS2, and in the AI Act.¹¹⁰

What these regulations have in common are the following elements:

- ❖ **Over-specification** of measures and compliance pathways.
- ❖ **Process-based regulation** rather than outcome based.
- ❖ Emphasis on auditability leading to heavy reliance on **documentation, plans, and internal governance** requirements.
- ❖ High **compliance costs**.
- ❖ Disproportionate **impact on smaller or innovative actors**.

One could add to the list the possibility of punitive fines. Fines must be deterrent to be effective, and high fines are not a problem per se. They may become an issue only in the face of unclear legal texts leading to compliance uncertainty. The EUSA proposal foresees administrative fines or periodic payments for infringements considered to have been committed intentionally (Art.56). The amount of the fine is twice the amount of the profits that have been gained or twice the amount of losses that have been avoided because of the breach, where those can be determined, or, where this determination is not possible, 2 % of the total worldwide annual turnover.

The EU has frequently taken the leadership in regulating innovative spaces, most recently, in the digital and technology space. The General Data Protection Regulation (GDPR) adopted in 2016 was the first general privacy regulation globally and generated a necessary international discussion. Its regulation of online digital markets, notably through the Digital Market Act (DMA) has similarly set the stage for global discussions. This came to be known as the “**Brussels effect**”: the idea that the EU would set global standards by being a first mover. But the reality is that few jurisdictions have adopted the mechanisms and level of prescription imposed by the regulations the EU is claiming to export. The EU’s increased lag in innovation

¹¹⁰ Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH); Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data; Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices; Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union; Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations.

and global competitiveness in the technology space has detracted from its ability to export its regulatory model. Rather, as global competition intensifies, the EUSA may just decrease EU's global competitiveness in space. At the same time, some of the EUSA's requirements may leak into other jurisdictions in selective ways, raising barriers to trade.

Case Study: Regulating excellence in a strategic sector.

The EUSA proposal asserts that compliance with safety and sustainability standards will provide a competitive edge to the European Space industry. The European car industry offers a cautionary tale.

The EU has long adopted a policy to promote sustainability in the car industry. It imposed tight pollutant limits and emissions reductions on car manufacturers as early as the 1990s. Over the years, it progressively tightened limits on pollutants like nitrogen oxides (NOx), particulate matter (PM), and hydrocarbons from vehicles. Although the primary goal was to address very real environmental problems, a 2015 European Commission document evaluating mandatory CO2 emission standards for cars and vans named fostering the competitiveness of the European automotive industry and encouraging research into sustainable technologies as one objective of the regulatory drive.¹¹¹ Compliance was supported with vast amounts of EU R&D funds, which were notably directed at "clean diesel" technologies in the 2000s. But incremental improvements in the emissions of diesel engines turned out to be particularly expensive.¹¹² This technology path, chosen to meet strict regulatory objectives, consumed resources and led to the "Dieselgate" fraud scandal. Most importantly, it failed to anticipate the electric vehicle (EV) revolution. European car manufacturers did not gain from the shift to sustainable transportation. Instead, in the technology strategy chosen to comply with strict environmental standards, they lost technological edge and commercial presence. EU shares of global automotive markets dropped from 25% in 2010 to 16% in 2025.¹¹³ Despite 34% of all EU R&D going to the automotive sector in 2021¹¹⁴, China overtook the European Union in 2024 to become the world's largest car exporter, benefiting from large cost efficiencies notably in electric vehicles.¹¹⁵

¹¹¹ European Commission. Directorate General for Climate Action. et al., *Evaluation of Regulation 443/2009 and 510/2011 on the Reduction of CO2 Emissions from Light-Duty Vehicles: Final Report*. (Publications Office, 2015), 23, <https://doi.org/10.2834/64489>.

¹¹² Estimated Cost of Emission Reduction Technologies for Light-Duty Vehicles, International Council for Clean Transportation, 2012. https://theicct.org/wp-content/uploads/2021/06/ICCT_LDVcostsreport_2012.pdf.

¹¹³ "Changes in Global Car Industry Raise Key Questions for Economies and Energy Sector - News," IEA, November 18, 2025, <https://www.iea.org/news/changes-in-global-car-industry-raise-key-questions-for-economies-and-energy-sector>.

¹¹⁴ Nicola Grassano et al., *The 2021 EU Industrial R&D Investment Scoreboard* (Publications Office of the European Union, 2022).

¹¹⁵ "China Drives to the Top," accessed January 22, 2026, <https://www.mckinsey.com/featured-insights/week-in-charts/china-drives-to-the-top>.

IV. Quantifying the Economic Impact of the EUSA Proposal on the EU Space Sector

Summary of main costs and figures. The EUSA proposal would significantly increase costs for EU LEO satellite operators, particularly those deploying micro and small satellites in commercial constellations. Incremental design and manufacturing costs are estimated to rise by **10–46%** depending on satellite type and constellation scale. For new entrants operating five satellites, total entry costs increase by **3–13%**, while annual fixed compliance and operational costs range between **€145,000 and €800,000** per constellation. At industry level, higher costs are expected to reduce EU demand for spacecraft by **11–48%**, leading to annual revenue losses for EU satellite manufacturers of **€381–630 million**. Downstream satellite service providers would also face suppressed demand from higher costs and could face additional annual revenue losses of **€210–311 million**, with cumulative losses of **€1.4–2.1 billion** over 2025–2030, weakening the competitiveness of Europe’s New Space ecosystem.

The implementation costs of the provisions of the EUSA proposal will be higher for smaller satellite and LEO operators than for traditional incumbents operating GEO satellites that are already compliant with international standards and have a higher capacity to meet new requirements. None of the space operations in the EU are currently compliant with all the provisions of the EUSA proposal per the Legislative Financial and Digital Statement of the EUSA proposal. We describe the following assumptions and premises for the estimation of the economic impact of the EUSA proposal on the EU space sector.

Most relevant effect of the EUSA proposal is on micro to medium sized LEO satellites. We consider that the economic impact of the EUSA, if adopted as in the proposal, will be mostly channelled through the impact on commercial LEO satellites. GEO satellites missions typically involve large, sophisticated players and, in the EU, typically involve extensive public support. Such missions are likely not primarily cost and efficiency driven. Due to their high cost, they also typically adopt sophisticated risk control approaches.

The most visible economic impact of the EUSA is likely to occur through the effects on operators of micro (less than 100kg) and small satellites (between 100kg and 500 kg) placed in LEO constellations. LEO satellites accounted for 73% of the total satellite manufacturing market value in 2024.¹¹⁶ Small satellites between 100-500kg represented a 65% market share of the global satellite manufacturing market in 2024.¹¹⁷ These satellites can effectively compete with larger satellites across multiple applications and are increasingly deployed in LEO for high quality data collection related to earth observation as well as low latency and low interference communications.¹¹⁸ As miniaturization advances, smaller satellites of even lower mass (less than 10kg) are also being deployed for similar data collection capabilities and offer faster deployment. The 500-1000kg segment continues to specialize in communication

¹¹⁶ “Satellite Manufacturing Market Size & Growth to 2030,” Mordor Intelligence, January 8, 2025, <https://www.mordorintelligence.com/industry-reports/global-satellite-manufacturing-market>.

¹¹⁷ Mordor Intell., “Satellite Manufacturing Market Size & Growth to 2030.”

¹¹⁸ Mordor Intell., “Satellite Manufacturing Market Size & Growth to 2030.”

and surveillance applications while large satellites above 1000kg are still used in complex military and commercial missions requiring extensive payload capacity and longer operational lifespans.¹¹⁹ Notwithstanding the increase in LEO constellation deployments, MEO satellites are experiencing a particularly fast growth (albeit from a much lower base) due to the demand for wide and reliable coverage of certain earth observation and communications activities. This report focuses on the commercial segment, which represents 68% of satellite manufacturing.¹²⁰

Cost of a LEO satellite: The cost of a satellite varies greatly depending on its mass and functionalities. Current estimates for off-the-shelf small LEO satellites can be as low as \$500,000 but these low costs are associated with short life spans and high replacement rates.¹²¹ At the other extreme, complex GEO satellites can cost much more than \$100 million. Industry experts rely on cost estimation models to turn mission characteristics into cost predictions.¹²² Analysing a broad set of missions, Kim and Hyde (2025) find that the dry mass of a spacecraft is the main driver of the spacecraft cost with a 1% increase in dry mass converting into a 0.5% increase in cost.¹²³ Other studies infer the cost per satellites from the total cost of missions and the type and number of spacecraft they operate. We use such studies to estimate the cost of small and medium sized LEO satellite.¹²⁴ The representative costs in Table 1 include the cost of manufacturing of the satellite bus, mission specific payload, and launch. The cost of manufacturing alone for small commercial LEO satellites are estimated at 1-1.5 M and 450M for bespoke medium sized LEO satellites. The large variance in costs results from differences in the mass and complexity of the satellites launched, the use of standardized components versus bespoke (and complex) ones, and from the cost of launch which is also related to mass. Serial production in the case of very large constellations greatly decrease the costs per satellite. Rapid innovations in batteries, electronics, and in the overall design of satellites have led to sharp cost decreases and more recent designs have been significantly more cost effective.

¹¹⁹ Mordor Intell., “Satellite Manufacturing Market Size & Growth to 2030.”

¹²⁰ Mordor Intell., “Satellite Manufacturing Market Size & Growth to 2030.”

¹²¹ “COTS Components in LEO Satellites,” TE Connectivity, accessed December 22, 2025, <https://www.te.com/en/industries/aerospace/insights/cots-components-in-leo-satellites.html>.

¹²² Moon J. Kim and Tupper Hyde, “In and Out: Comparative Analysis of NASA and Industry Spacecraft Costs,” *Journal of Spacecraft and Rockets*, ahead of print, August 28, 2025, world, <https://doi.org/10.2514/1.A36406>.

¹²³ Kim and Hyde, “In and Out,” tbl. 3. Cost is also significantly lower for near earth operations (-27%) and low risk class, where standardized satellite buses are more likely to be used.

¹²⁴ These costs correspond to estimates in Patricia F. Bronson and Brian G. Gladstone, *Schedule and Cost Estimating Analysis for LEO Satellite Constellations (Conference Paper)*, n.d.; Thomas J. Colvin et al., *Cost and Benefit Analysis of Orbital Debris Remediation*, n.d. We estimated the costs of LEO satellites from the data in Table 1 in Bronson et al. and Appendix A in Colvin et al. Given technological progress, we only consider the cost of constellations launched since 2017.

Table 1 - Representative costs of LEO spacecraft.

Spacecraft Type	Satellite Mass	Constellation Size	Cost of Satellite System	Application
Micro Satellite	<100 kg	Small	\$6M	IoT, EO imaging
Small Satellite	~278kg	Small	\$39M	EO, Weather monitoring, Communications
	150-260kg	Large	\$6M	
Medium Satellite	~850kg	Bespoke	\$500M	Geo-spatial intelligence
	~850kg	Large	\$40M	Data connectivity

Notes: Cost include Manufacturing and Launch. The cost of small constellation Nano satellites is based on Appendix A in Colvin et al. (2023). The cost of small constellation small satellite is based on the cost of the COSMIC-2 satellites in Bronson et al, (2023). The cost of small satellite in large constellations is based on the average of the costs of Starlink and OneWeb satellites estimated in Bronson et al. (2023) and Colvin et al. (2023). The cost of large constellation medium satellite is based on the second-generation Iridium satellites in Bronson et al. (2023). The cost of bespoke medium satellites is from Colvin et al. (2023). The spacecraft considered typically has manoeuvre capability.

A. Cost implications of the EUSA proposal provisions for LEO Space Operators

The provisions foreseen in the EUSA proposal introduce considerable new costs for space operators active in the EU. Design and procedural requirements are likely to weigh in on lean operators of large constellations of small LEO satellites that will have to ensure compliance at satellite level. Costly elaboration of reports for compliance will particularly burden smaller operators and start-ups.

An analysis of the costs of the EUSA proposal for spacecraft operators is presented in Table 2 below. The cost of satellites is very dependent on the characteristics of both the spacecraft and the mission, and each component or subsystem may be highly customized. Table 2 presents estimates of the cost implications by satellite size and, where applicable, constellation composition. The cost estimates presented come from various cost modelling studies and research on the cost of mitigation measures similar to those of the EUSA proposal.¹²⁵ Given the diversity of spacecraft and missions, the costs presented are meant to be an approximation within a range of plausible costs for the type of spacecraft and mission. They are presented as a measure of the potential significance of the cost of the different provisions to spacecraft operators, rather than exact estimates that would be impossible to calculate generically.

For the estimation of costs of the EUSA proposal, we assume spacecraft operators active in the EU meet global guidelines with respect to debris mitigation. The report makes the following assumptions and related incremental costs as representative of required investments:

- ❖ The control provision demanded in point 3 of Annex 5 of the EUSA proposal is equivalent to the incremental request of active disposal. Table 2 presents a low-cost scenario with active deorbiting at 25 years and a high-cost scenario with active deorbiting at 5 years (current ESA standard for LEO).¹²⁶

¹²⁵ Kim and Hyde, “In and Out”; Colvin et al., *Cost and Benefit Analysis of Orbital Debris Remediation*; Patrick Besha et al., *Cost and Benefit Analysis of Mitigating, Tracking, and Remediating Orbital Debris*, n.d.; Bronson and Gladstone, *Schedule and Cost Estimating Analysis for LEO Satellite Constellations (Conference Paper)*.

¹²⁶ ESA Space Debris Office, *ESA’s Annual Space Environment Report*, 7.

- ❖ The report assumes 100% compliance with prevention of fragmentation from collision with 1mm and 0% compliance with an assumed incremental request for the prevention of fragmentation from collision with 2mm debris. The report uses this stylized assumption to approximate the incremental cost of future implementing measures that will be adopted by the EC.
- ❖ The report assumes the specific EUSA proposal design requirements to actively prevent accidental fragmentation from explosions are not currently met.
- ❖ The report assumes that the full extent of redundancies required in the proposal, the level of system and subsystem monitoring requested, or cryptographic obligations are not common practice. A percentage cost increase from compliance with all these obligations is assigned to all operators.
- ❖ The report assigns a percentage cost increase from the requirements for extensive planning, testing, and validation of the design and manufacture of satellite systems and subsystems.

The assumptions do not aim to accurately represent reality. The objective is to estimate the cost of incremental provisions from a base close to current international guidelines.

The cost estimation exercise aims to be conservative. The EUSA proposal imposes some additional costs that are not considered in Table 2 and not part of the assessment. For example, the requirements for anti-reflective coating are considered to be integrated in the shielding costs in Table 2. The cost of propellers for manoeuvrability is omitted under the assumption that manoeuvrability is becoming customary in LEO satellites. The cost of additional manoeuvres to limit reflection or to respond to warnings are not included for lack of data but they require additional fuel and lower the available mission payload. The cost of monitoring at different stages of the mission are calculated with hours of personnel without including the potential cost of software or components needed to perform such tasks. These costs may be negligible for some operators but may add to the estimates presented in this report in other cases.

This report estimates the cost of provisions and does not assess their practicality. Some commentators, while supporting the EUSA, have considered some of the requirements ‘unworkable in practice’¹²⁷. This includes provisions that require management of the entire supply chain, including software, in a context of a multiplicity of subcontractors, often international. This report assumes that full compliance with the EUSA provisions is a matter of cost and can be achieved with the appropriate resources. A very complex process would increase costs to smaller and less sophisticated players that would not find it feasible to comply due to insufficient capabilities.

¹²⁷ “Regulating the Final Frontier: Why the EU Space Act Matters - CELIS Institute - Investment Screening | National Security | Competitiveness,” <https://www.Celis.Institute/>, n.d., accessed December 3, 2025, <https://www.celis.institute/celis-blog/regulating-the-final-frontier-why-the-eu-space-act-matters/>.

Table 2 - Plausible costs of the provisions on the EUSA proposal.

Design Requirements	
Provision	Incremental Cost by Satellite Type
Manoeuvrability for end-of-life disposal and high-risk collision events (compulsory for orbits >400km and “mega constellations”).	<u>Propeller</u> : ¹²⁸ 5% of small satellite manufacturing cost <u>Added Propellant Cost</u> ¹²⁹ : Micro: \$2,175 - \$5,500 Small: \$24,500 - \$59,750 Medium: \$70,750 - \$172,500
Limit debris generation, limit accidental fragmentation and fragmentation from collision.	<u>Reduce electrical explosions</u> : ¹³⁰ Micro: \$4,000 Small: \$144,000 Medium: \$244,000 <u>Reduce propulsion system explosions</u> : \$80,000
Limit debris generation; protect disposal capabilities from debris; low reflectivity coating or shielding.	<u>Shielding for 2mm steel debris (cost of added mass)</u> : ¹³¹ Micro: \$1250 Small: \$25,000 Medium: \$75,000
Redundancies for functional passivation, critical components for continuation.	Micro: 5 -10% of spacecraft costs Small: 5 -10% of spacecraft cost Medium: 1-5% of spacecraft cost
Cryptographic equipment (cost of components, added mass); enabling monitoring of subsystem; no residual radio emissions after passivation.	Micro: 1% of spacecraft costs Small: 0 -1% of spacecraft cost Medium: 0% of spacecraft cost
Design, testing, and validation of design and manufacture of spacecraft, system, and subsystems.	5-10% of spacecraft costs
“Mega Constellations”: Enable automated collision avoidance.	N/A

¹²⁸ Dan Barkmeyer et al., “Review of Three Small-Satellite Cost Models,” *SPA/SCEA Joint Annual Conference and Training Workshop*, 2010, slide 11. The range represent the cost of end-of-life LEO satellite disposal within 25 years (ISDA standard) and the cost of end of life disposal within 5 years (ESA standard).

¹²⁹ Locke et al., *Cost and Benefit Analysis of Mitigating, Tracking, and Remediating Orbital Debris*, 112.

¹³⁰ Locke et al., *Cost and Benefit Analysis of Mitigating, Tracking, and Remediating Orbital Debris*, 121. We take the average of the range proposed for each satellite size.

¹³¹ Locke et al., *Cost and Benefit Analysis of Mitigating, Tracking, and Remediating Orbital Debris*, 118. The cost is estimated applying a shield for 2mm steel debris weighing 1kg/m² to the bus surface area in Appendix A.

Operation and Compliance Costs	
Provision	Incremental Cost by Satellite Type
<p>Quality management system, lifecycle information security management system, supply chain risk management assessment, and monitoring functions:</p> <p>Monitoring of subsystems that may cause debris generation; Monitoring and controlling of deviations; Check communications and tracking capabilities are available during disposal; 24/7 contact point; fulfilling reaction time requirements; Manage security and vulnerability across supply chain.</p> <p><u>“Mega Constellations”</u>: Periodic reporting of collision risk performance including report intra and inter-constellation collision probabilities compared to initial authorization. Demonstrate the effectiveness of measures to limit light and radio pollution after one year of operation.</p>	<p>0.25 -1 FTE/year senior space engineer¹³²; depending on level of automation and size of constellation 0.25-1 FTE compliance officer/year¹³³.</p> <p>\$61,000 - \$244,017/year¹³⁴</p> <p><u>“Mega-constellations”</u>: 1-2 FTE/year senior space engineer + 1-2 FTE compliance officer. \$244,017/year – \$488,034/year</p>
<p>Plans and documentation for compliance: Debris Control Plan for the mission Space Debris Mitigation Plan Failure Response Plan Plan containing measures that are adequate to limit light and radio pollution Calculate environmental footprint space activities using the Union methodology. Inventory of at least the critical assets of non-EU origin to support evaluation of dependency Share manoeuvre plans with the EU collision-avoidance service;</p>	<p>0.25 - 1 FTE/year senior engineer and 0.25 - 1 FTE/year junior engineer for modelling, computation, drafting, including updates (\$43,875- \$175,500); 0.25 - 1 FTE/year compliance officer for drafting, compliance review, communications (\$31,754 - \$127,018/year)¹³⁵</p> <p>\$75,629 – \$302,518 /year¹³⁶</p>
<p>Requirements for passivation procedure: Update passivation procedures before end of life; deplete energy reserve, deactivation.</p>	<p>Negligible with adequate design.</p>
<p>Requirements regarding visual magnitude for spacecraft during the entire lifetime. Operational measures to minimise the impact of satellites on astronomical observations</p>	<p>N/A</p>

¹³² “New Space Economy - Job Positions,” *BBS*, n.d., accessed December 29, 2025, <https://www.bbs.unibo.it/en/new-space-economy-job-positions/>; Colvin et al., *Cost and Benefit Analysis of Orbital Debris Remediation*. It takes a few minutes to a few hours to respond to a warning depending on the level of automation. The yearly salary for a senior space engineer in Europe is estimated at €100,000 or \$117,000. A junior space engineer in Europe is estimated at €50,000 or \$58,500.

¹³³ “Compliance Officer Salary in Germany (2025),” accessed December 29, 2025, <https://www.eries.com/salary/job/compliance-officer/germany>. The average salary for a German compliance officer is €108,562/year or \$127,018/year.

¹³⁴ The cost is assumed to be similar whether the company internalizes or subcontracts some of the processes (modeling, risk assessments computations, drafting).

¹³⁵ “Compliance Officer Salary in Germany (2025).” The average salary for a German compliance officer is €108,562/year or \$127,018/year.

¹³⁶ The cost is assumed to be similar whether the company internalizes or subcontracts some of the processes such as modeling, risk assessments computations, drafting, or legal services.

Operation and Compliance Costs	
Provision	Incremental Cost by Satellite Type
Resilience and cybersecurity training of staff	20h training per year at \$50/hour plus 200 productive hours lost (at an average of \$35/hour): \$8,000 / year
Administrative fee	N/A

Note: Sources are referenced in the table. Unsourced estimates are the author’s assessment based on previous regulatory assessments.

B. Quantification of the direct cost of the EUSA for LEO space operators

The cost estimates in Table 2 imply the following manufacturing and design costs per spacecraft for the different types of spacecraft operators (Table 3).

Table 3 - Design costs for LEO spacecraft operators from the incremental provisions in the EUSA proposal.

Satellite type	Constellation Size	System Cost per Satellite (\$M)	Manufacturing Cost (\$M)	Cost of EUSA Proposal (\$)	% of Manufacturing Cost	% of Satellite System Operation Cost
Micro	Small	6	0.5-2.4	246,925 - 395,250	17 - 27%	4 - 7%
Small	Small	39	7.8	1,053,500 - 1,946,750	14 - 25%	3 - 5%
	Large	6	1.25	398,500 - 571,250	32 - 46%	7 -10%
Medium	Bespoke	500	100	10,469,750 - 20,571,500	10 - 21%	2 - 4%
	Large	40	16	2,069,750 - 3,771,500	13 - 24%	5 - 9%

Notes: System operation cost includes manufacturing cost, cost of payload, launch, and ground operations. Low range assumes end of life deorbiting at 25 years and lower estimates for other design cost components. High range assumes end of life deorbiting at 5 years and higher estimates for other design cost components. Manufacturing costs are estimated as follows: cost of micro satellite is the average of \$500,000 (off the shelf components) and 40% of cost of satellite system.¹³⁷ Manufacturing cost of bespoke or small constellation satellites is estimated at 20% of cost of system. Manufacturing costs for large constellations satellites are estimated at 40% of the cost of system. The cost of small satellites in large constellations is estimated with the average of the manufacturing costs of Starlink and OneWeb.

The cost of the design requirements for a spacecraft operator that only complies with global standards represents an increase in manufacturing costs of a spacecraft between 10-21% for medium sized bespoke satellites and 32-46% for otherwise efficient small satellites operating in large LEO constellations. These costs are substantially higher than the 3-10% estimate provided in the impact assessment of the EUSA proposal published by the EC.¹³⁸ There are no details grounding the impact assessment estimates, which appear to be based on interviews

¹³⁷ TE Connect., “COTS Components in LEO Satellites”; Kim and Hyde, “In and Out.” “Spacecraft cost accounts for 40% of the total project cost on average”

¹³⁸ European Commission, *Annexes to the Impact Assessment Report Accompanying the Document Proposal for a Regulation of the European Parliament and of the Council on the Safety, Resilience and Sustainability of Space Activities in the Union*, 148.

that were conducted before the proposal was actually published and likely average LEO and GEO cost impacts.

Table 4 – Operation and compliance costs for LEO spacecraft operators from the incremental provisions in the EUSA proposal.

Satellite type	Constellation Size	System Cost (\$M)	Annual Operating and Compliance Cost of EUSA Proposal (\$)	% Increase in Cost of Satellite System Operation (5 satellites)
Micro	Small	6	\$144,629 - \$554,535	0 - 2%
Small	Small	39	\$144,629 - \$554,535	0 - 0%
	Large	6	\$327,646 - \$798,552	1 - 3%
Medium	Bespoke	500	\$144,629 - \$554,535	0 - 0%
	Large	40	\$327,646 - \$798,552	0 - 0%

Notes: The cost is the sum of the incremental and design costs per satellite system and the operation and compliance costs for a constellation of five active satellites, equivalent to an entry stage for large constellations.

Table 4 presents the total cost of operations and compliance processes presented in Table 2 for different spacecraft operators. These fixed compliance costs are relatively small for operators of costly bespoke or medium sized and large LEO satellites systems. Within large constellations of smaller spacecraft, they also get diluted. But for an entrant starting to launch an efficient small-sized spacecraft, the cost can amount to 1-3% of the cost of launching and operating the first five spacecrafts. The cost of incremental operations and compliance processes raises the entry costs for operators of micro satellites in small constellations such as those performing earth observation or localized data transmissions. It also raises entry costs for operators entering with small efficient satellites and aiming to build a large constellation such as those providing broadband and connectivity services.

Table 5 presents the total cost per satellite system for a spacecraft operator starting a mission with about five satellites. The EUSA proposal raises entry costs by an average of 6.5% for operators of micro satellites and 10.5% for a small satellite operator. The EUSA proposal may discourage spacecraft operators of small efficient satellites who are not looking or capable to scale fast.

Table 5 - Total cost increase for entrant LEO spacecraft operators from the incremental provisions of the EUSA proposal.

Satellite type	Constellation Size	Satellite System Cost (\$M)	Manufacturing Cost (\$M)	Cost of EUSA Proposal (\$)	% Increase in Cost of Satellite System Operation (5 satellites)
Micro	Small	6	0.5-2.4	391,554 – 949,785	4 – 9%
Small	Small	39	7.8	1,053,500 - 1,946,750	3 - 5%
	Large	6	1.25	726,146 – 1,369,802	8 - 13%
Medium	Bespoke	500	100	10,469,750 - 20,571,500	2 - 4%
	Large	40	16	2,069,750 - 3,771,500	5 - 9%

Notes: The cost is the sum of the incremental and design costs per satellite system and the operation and compliance costs prorated for one satellite system under the assumption of a total of five active satellites per constellation, i.e., entry stage for large constellations.

For the aggregate calculation of the impact of the EUSA proposal, we consider only the design and manufacturing costs as these appear to be the most significant incremental regulatory burden.

C. Economic Impact of the EUSA Proposal for the EU Space Industry

The impact of the EUSA proposal on the EU space industry can be estimated by considering the impact of the estimated cost increases on the revenues or profits of the space services operators. The report considers the impact on satellites manufacturers as well as on space service systems providers. We focus on the impact of the proposal on providers of commercial communications, EO, and GNSS services.

There are no detailed official statistical data for the size of the EU space industry. Although there is ongoing work to define and measure the EU space economy, this work is still preliminary.^{139,140} For the estimation of sales revenues, this report relies on the data published by ESA and Eurospace, the European trade association for the space industry.

1. Impact of the EUSA proposal on EU satellite systems providers

Cost increases from the provisions of the EUSA proposal, **could lead to an annual loss of revenue for EU providers of satellite systems between €381 million and €630 million, representing between 10% and 17% of total satellite systems sales**, depending on the level of requirements finally imposed and based on the volume of spacecraft sales in 2023. This includes the loss of European demand from the higher manufacturing costs and the loss of revenues from lower cost competitiveness in global markets – assuming other regions do not

¹³⁹ “European Space Economy Thematic Account | Eurostat CROS,” accessed January 9, 2026, <https://cros.ec.europa.eu/book-page/space-economy-thematic-account>.

¹⁴⁰ OECD Handbook on Measuring the Space Economy, 2022, OECD

impose similar binding requirements. The largest drops in sales would be in LEO constellations and notably commercial sales of new generation communications and EO satellites.

The manufacturing costs of micro satellites systems designed in the EU could increase by 17 - 27% from design requirements in the EUSA proposal. The manufacturing cost of small satellites could see cost increases in the range of 14 - 46% depending on whether the spacecraft is to be operated in small or large constellations, on the number of subcomponents, and on the concrete redundancy and resilience requirements ultimately adopted (Table 3). Manufacturing cost increases for medium sized satellites could amount to 10 - 24%.

Europe sales of satellites systems and parts amounted to **€3.8 billion in 2023**, of which **€2.9 billion were sold to European customers** and about **€860 million were export sales** to the rest of the world.¹⁴¹ Within Europe, 49% of sales or about €1.4 billion in 2023 originate from the sale of EO satellite systems and 34% of sales, or €700 million, come from the sale of satellite communication systems. The remaining 20% come from navigation (11%) and scientific systems (11%). EO and communication satellite systems cover both micro, small, or medium sized satellites.

The impact on the revenue of satellite systems providers originating in the EU will come from the lower demand caused by higher manufacturing costs. Public entities represent 73% of all European space industry sales and a third of all the revenues comes from ESA procurement contracts alone.¹⁴² In contrast, customers outside Europe are almost exclusively commercial satellite operators.¹⁴³ For simplification, the report assumes that space agencies' demand for satellite systems behaves like that of commercial entities.

Empirical literature on the pass-through rates of costs imposed by regulation consistently notes the ambiguous effects of factors such as market structure and report large confidence intervals.¹⁴⁴ The regulation's EU-wide coverage of all spacecraft providing services in the Union makes cost pass-through more feasible. On the other hand, the presence of high fixed costs may lead to price suppression to retain demand. Consistent with the range discussed in empirical studies of industry passthrough of regulatory costs, the reports conservatively estimate a cost pass-through rate of 70%, implying that prices will increase by 70% of the cost increase.¹⁴⁵

¹⁴¹ "The European Space Industry Facts & Figures - 28th Edition," 23.

¹⁴² "The European Space Industry Facts & Figures - 28th Edition," 24.

¹⁴³ "The European Space Industry Facts & Figures - 28th Edition," 23.

¹⁴⁴ Nathan H. Miller et al., "Pass-through in a Concentrated Industry: Empirical Evidence and Regulatory Implications," *The RAND Journal of Economics* 48, no. 1 (2017): 69–93, <https://doi.org/10.1111/1756-2171.12168>; Karsten Neuhoff and Robert A. Ritz, *Carbon Cost Pass-through in Industrial Sectors* (Energy Policy Research Group, University of Cambridge, 2019), <https://www.jstor.org/stable/resrep30282>.

¹⁴⁵ Miller et al., "Pass-through in a Concentrated Industry"; Neuhoff and Ritz, *Carbon Cost Pass-through in Industrial Sectors*. "Empirical support for pass-through in excess of unity is common, though far from ubiquitous, in this literature. Of particular relevance is Fabra and Reguant (2014), which finds that costs imposed by the emissions trading scheme of the European Union are almost fully passed through to consumers in the form of higher electricity prices." (Miller et al.) "On balance, the available evidence suggests that, in most cases, carbon cost pass-through for industry is likely to be low probably less than 50%." (Neuhoff and Ritz)

The rapid increase in the number of launches of LEO satellites that has accompanied sharp decreases in cost implies a demand for LEO satellite systems that is very reactive to cost and prices. A conservative demand price elasticity of -1.5% is used to reflect the elastic demand.

The EUSA proposal could increase manufacturing costs by 10% to 46% depending on satellite characteristics and final specification requirements. This implies that the **EU demand for micro, small, and medium sized spacecrafts could fall on average by 18% to 30%** depending on the cost increase scenario. The potential fall in the demand for spacecraft particularly impacts very dynamic and innovative segments in the space industry, notably large LEO constellations providing broadband connectivity and micro satellites enabling a vast array of innovative cost-effective EO and sensor data services. **Demand for small broadband satellites designed for large constellations could see a 33-48% demand decrease.**

Table 6 presents the expected percentage drop in demand for spacecrafts in the EU as well as the revenue impact by type of spacecraft and cost impact scenario.

Table 6 - Decrease in demand and revenues in the spacecraft industry in the EU due to estimated cost increases from the EUSA proposal.

Satellite type	Constellation Size	Change in Demand for Spacecraft in the EU		Change in Revenue from Spacecraft Sales in the EU	
		Low Manufacturing Cost Increase Scenario	High Manufacturing Cost Increase Scenario	Low Manufacturing Cost Increase Scenario	High Manufacturing Cost Increase Scenario
Micro	Small	-18%	-29%	-6%	-10%
Small	Small	-14%	-26%	-5%	-9%
	Large	-33%	-48%	-11%	-16%
Medium	Bespoke	-11%	-22%	-4%	-7%
	Large	-14%	-25%	-5%	-8%

Notes: the decrease in demand revenues are calculated by assuming an elasticity of demand of -1.5 and a 70% pass-through of the cost increases estimated in Table 3. The percentage change in revenue is calculated as: $\Delta R/R = (1-\epsilon) \theta \Delta c$, where R is the revenue, ϵ is the absolute value of the demand elasticity, Δc is the percentage cost increase, and θ is the percentage pass-through rate.

Under a 70% pass-through rate and a demand elasticity assumption of - 1.5, **revenues from the sale of spacecraft across categories would fall on average between 6-10% in the EU** leading to a **loss of annual revenues from the sale of spacecraft in the EU between €174 - €288 million** based on the volume of spacecraft sales in 2023. Europe’s current commercial specialization is in large geostationary communication satellites, but this demand is decreasing while that of smaller systems is increasing.¹⁴⁶ Forward looking estimation can assume an increase in the prevalence of small and medium sized spacecraft. These estimates of the loss of potential revenue could be mitigated by technological advancements and positive demand shocks in downstream services.

¹⁴⁶ “The European Space Industry Facts & Figures - 28th Edition,” 25.

It cannot be taken for granted that a “Brussels effect” will lead to the global adoption of the provisions stipulated in the EUSA proposal. It is possible that some countries promote an “innovation first” approach. Other countries may consider different and more flexible approaches to safety and resilience measures. In such realistic scenarios, EU spacecraft manufacturers would lose global competitiveness and up to €860 million of exports could be at risk. Assuming a realistic demand elasticity of -3 for sales outside of Europe due to global competition, **revenues from sales of spacecraft to the rest of the world could fall by 24% - 40% with a loss of annual revenues between €207 - €342 million.** This fall could be mitigated by other regions or spacecraft operators adopting similar standards to those imposed in the EU.

Aggregate annual revenue losses for providers of satellite systems from the EUSA provisions could range between €381 – €630 million.

2. Impact of the EUSA proposal EU on satellite service providers

European private investment has focused primarily on space infrastructure and only 18% went to space applications in 2024. In contrast space applications attracted 72% of private investments in the U.S..¹⁴⁷ The dynamism in the US shows there is potential growth in space service applications that the EU could be well placed to capture, notably given ESA Copernicus constellation’s supply of EO data and the private investment building satellite infrastructure that improves on Copernicus capabilities.¹⁴⁸

(1) Broadband and Connectivity

Satellite communications is the highest value satellite service with \$108 billion (€92 billion) revenues globally in 2024 from consumer satellite TV, radio and broadband, business satellite fixed and mobile communications, and remote sensing.¹⁴⁹ Most of this revenue comes from traditional satellite TV and radio broadcasting services, which could be considered legacy and are in decline.¹⁵⁰ The sector is currently under rapid transformation with the rapid development of satellite broadband services, which saw revenues grow by 29 percent globally in 2024, and new IoT applications.¹⁵¹ Global revenues from LEO supported connectivity for 2024 are \$16.9 billion (€14.4 billion) from services and \$24.3 billion (€20.5 billion) from equipment.¹⁵² Revenues from satellite connectivity services in Europe represented \$3.7 billion (€3.2 billion)

¹⁴⁷ “Report on the Space Economy 2025,” 11.

¹⁴⁸ See for example Deimos and OBH. <https://deimos-space.com/satellite-systems/>; <https://www.ohb.de/en/space-systems/satellites>

¹⁴⁹ Satellite Industry Association, “2024 Global Satellite Industry Revenues,” 2024, SSIR25-2025-SSIR-FY2024-1-Page-Exec-Summary-1.pdf.

¹⁵⁰ “Main Trends & Challenges in the Space Sector 4th Edition,” PWC, 2024, 51, https://contents.pwc.com/etudePwC-maintrendsandchallenge/sinthepacesector?utm_medium=website.

¹⁵¹ Satellite Industry Association, “Historic Number of Launches Powers Commercial Satellite Industry Growth – Satellite Industry Association Releases the 28th Annual State of the Satellite Industry Report,” *Satellite Industry Association*, May 13, 2025, <https://sia.org/historic-number-of-launches-powers-commercial-satellite-industry-growth-satellite-industry-association-releases-the-28th-annual-state-of-the-satellite-industry-report/>.

¹⁵² “Satellite Communication Market Size | Industry Report, 2030,” accessed January 13, 2026, <https://www.grandviewresearch.com/industry-analysis/satellite-communication-market>.

or 22% of the global revenues in 2024.¹⁵³ Revenues from satellite connectivity equipment in Europe represented \$5.5 billion (€4.7 billion) or 27% of global sales. **Total revenues in 2024 from satellite connectivity services in the EU amounted to €7.9 billion.**

Satellite broadband and connectivity services are **expected to grow globally at an annual rate of 14.5%.**¹⁵⁴

In 2023, satellite communication systems were mostly composed of small LEO satellites (84%), large geostationary satellites (8%), and micro satellites (4%).¹⁵⁵ The impact of the provisions in the EUSA proposal on the cost of a large geostationary satellite mission can be considered to be negligible. Given this configuration, the EUSA proposal will lead to **cost increases of satellite communication systems between 6.2% and 9%**. Maintaining the assumption of a 70% pass-through and a demand elasticity of -1.5, the **annual fall in demand for satellite connectivity services in the EU would be 7-9%**. This leads to an **annual revenue loss of 1-2% or €171 - €248 million in Europe alone from the EUSA proposal**. Given the expected annual growth rate of 14.9% and a discount rate of 10%, **the satellite connectivity revenue in Europe lost between 2025-2030 would amount to €1.2-€1.7 billion.**

In addition to the negative impact of cost increases on revenues generated in Europe, a **6-9% cost disadvantage from European-designed satellite systems** will make European satcom service providers **less competitive** in the global satellite connectivity market, jeopardizing its ability to capture a share of the **€27 billion** annual revenues generated outside of Europe in 2024, expected to grow by 11-15% annually.

(2) Earth Observation

Europe accounts for 20% of the global market for EO data and services behind the United States.¹⁵⁶ Applications include climate, environment, and weather monitoring, disaster management, land surveying and management, crop monitoring, as well as intelligence services. The global revenues from EO data and value-added services amounted to €3.4 billion in 2023.¹⁵⁷ The EO services sector in Europe is comprised of a wide array of small companies: 772 entities in 2023 across 34 countries (an increase of 3.5% compared to the 2022 survey).¹⁵⁸ More than half of all earth observation satellites globally are commercially operated.¹⁵⁹ Companies offering services or selling EO-derived data and services generated a

¹⁵³ "Satellite Communication Market Size, Share & Growth Report, 2029," MarketsandMarkets, accessed January 14, 2026, https://www.marketsandmarkets.com/Market-Reports/satellite-communication-satcom-equipment-market-159285646.html?gad_source=1&gad_campaignid=272040196&gbraid=0AAAAADxY7SxN6G9gDcnkomJM8zDc5rHDw&gclid=CjwKCAiAmp3LBhAkEiwAJM2JUE9yVeOkn5Z1IP-mK-BW41dUdrtwT1JPcLTBdd4sepVhJNUdOHj1oBoC3uwQAvD_BwE.

¹⁵⁴ "Satellite Communication Market Size | Industry Report, 2030."

¹⁵⁵ "Satellite Database | Union of Concerned Scientists," accessed January 14, 2026, <https://www.ucs.org/resources/satellite-database>.

¹⁵⁶ ESA Space Debris Office, *ESA's Annual Space Environment Report*, 21.

¹⁵⁷ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report.2024 / Issue 2*. (Publications Office, 2024), 12.

¹⁵⁸ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report.2024 / Issue 2*. (Publications Office, 2024), 14, <https://data.europa.eu/doi/10.2878/73092>.

¹⁵⁹ "The Space Economy in Figures Responding to Global Challenges," OECD, 2023, 39, https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/12/the-space-economy-in-figures_4c52ae39/fa5494aa-en.pdf.

total of **€1.7 bn revenues in Europe in 2022** (driven by Copernicus data and information), an increase of 10.9% compared to the previous year.¹⁶⁰ Approximately 96% of these companies have less than 50 employees, whereas 66% have less than 10 employees.¹⁶¹ In 2020, meteorological applications accounted for 90% of the derived value of EO.¹⁶²

In 2023, EO systems comprised micro satellites (59%), small (14%) and medium (7%) LEO satellites, as well as large LEO (16%) and GEO (4%) satellites.¹⁶³ The impact of the provisions in the EUSA proposal is considered negligible for large spacecraft missions. The **cost increase of EO systems** from the EUSA proposal is estimated **between 2.9% and 5.1%**. Maintaining the assumption of a 70% pass-through and a demand elasticity of -1.5, the annual fall in demand is 3-5%. This leads to an **annual revenue loss of 1-2% or €17 - €30 million in Europe alone from the EUSA proposal**. Given the expected annual growth rate of 11%, **the EO services revenue in Europe lost between 2025-2030 would amount to €107-€186 million**. In addition, European-designed satellite systems would face a **cost disadvantage in the non-European market valued at €1.7 bn**

(3) Navigation

Although GNSS services have traditionally been provided by large MEO satellites (such as ESA Galileo), new LEO PNT (Positioning- Navigation- Timing) services are being deployed to augment the GNSS architecture to provide more accurate and resilient signals.¹⁶⁴ This higher precision is needed for autonomous systems, particularly in urban settings or indoor environments. More precise positioning coupled with AI and IoT sensors will enable future adaptive navigation solutions. Both public and private investments in LEO PNT are currently planned, including to support autonomous driving.¹⁶⁵ Demand is expected to be driven by the automotive sector, smart city projects, agriculture, as well as defence. The European market for GNSS augmentation services was valued at **\$1.2 billion (€1.02 billion) in 2022, growing at a CAGR of 7.7%**.¹⁶⁶

LEO constellations built for communication systems can be easily equipped with sensors to deliver positioning and timing and they are evolving to be PNT capable.¹⁶⁷

¹⁶⁰ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report.2024 / Issue 2*. (Publications Office, 2024), 14.

¹⁶¹ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report.2024 / Issue 2*. (Publications Office, 2024), 14. *Communications-PNT Integration: A New Architectural Layer for Resilient and Ubiquitous Navigation - GPS World*, Opinions, January 13, 2026, <https://www.gpsworld.com/communications-pnt-integration-a-new-architectural-layer-for-resilient-and-ubiquitous-navigation/>.

¹⁶² "The Space Economy in Figures Responding to Global Challenges," 50.

¹⁶³ "Satellite Database | Union of Concerned Scientists."

¹⁶⁴ "Main Trends & Challenges in the Space Sector 4th Edition," 58.

¹⁶⁵ "Main Trends & Challenges in the Space Sector 4th Edition," 58.

¹⁶⁶ "(26) Europe GPS and GNSS Correction Services Market Size 2026 | Key Highlights, Sustainability Scope 2033 | LinkedIn," accessed January 13, 2026, <https://www.linkedin.com/pulse/europe-gps-gnss-correction-services-market-size-2026-key-8ejhf/>.

¹⁶⁷ *Communications-PNT Integration*; Inside GNSS, "A Look at the Stars: Navigation with Multi-Constellation LEO Satellite Signals of Opportunity," *Inside GNSS - Global Navigation Satellite Systems Engineering, Policy, and Design*, August 1, 2023, <https://insidengss.com/a-look-at-the-stars-navigation-with-multi-constellation-leo-satellite-signals-of-opportunity/>.

In 2023, GNSS - PNT systems comprised micro satellites (60%), small LEO satellites (5%), medium MEO satellite (31%) as well as large GEO satellites (8%).¹⁶⁸ We assume an equal share of micro satellites and large constellation small satellites in the provision of PNT augmentation services. The **cost increase of PNT augmentation systems** from the EUSA proposal is between **5.1% and 8%**. Maintaining the assumption of a 70% pass-through and a demand elasticity of -1.5, the annual fall in demand for PNT augmentation services in the EU is 5-8%. This leads to an **annual revenue loss of 1.8-2.8% or €21 - €33 million in Europe alone from the EUSA proposal**. Given the expected annual growth rate of 7.7%, **the EO services revenue in Europe lost between 2025-2030 would amount to €119-€186 million**. This may be an underestimate as some analysts foresee annual growth for the global PNT market of 50%.¹⁶⁹

If we combine the impact of the provisions of the EUSA proposal on all satellite services combined, we obtain an **aggregate annual loss of revenue between €210 – 311 million** and an **aggregate cumulative loss of revenue from satellite services between 2025 and 2030 of €1.4 billion to €2.1 billion**. In addition, a 5-8% cost disadvantage for European providers of PNT services will put them at a disadvantage in a key fast growing global market.

Table 7 - Loss of revenue for EU providers of satellite services from the provisions of the EUSA proposal.

Satellite Service	Annual Sales in the EU	Impact on Demand in the EU	Loss of Annual EU Revenue	Loss of EU Revenue (2025-2030)	Value of compromised market in RoW
	€ billion		€ million	€ million	€ billion
Satellite Connectivity	7.9 (2024)	-7 to -9%	171 - 248	1187-1715	27 (2024)
EO	1.7 (2022)	-3 to -5%	17.3 – 30.1	107 - 229	1.7 (2022)
GNSS-PNT	1.2 (2022)	-5 to -8%	21.4 – 33.5	119 - 186	-
Total	10.8	-3 to -9%	210 - 311	1400 - 2130	>30

Notes: Calculations are based on a pass-through rate of 70%, a demand elasticity of -1.5, and a discount rate of 10%. Navigation services only include PNT augmentation services delivered in equal shares with micro and broadband constellation satellites.

D. Dynamic implications of the EUSA Proposal on the EU Space Sector

Cost increases and the consequent lower demand for satellite systems and services in Europe will negatively impact the nascent New Space sector in Europe. A smaller market both within and outside of Europe and a lack of external competitiveness will likely reduce start-up investment. Most importantly, the high degree of specificity of the regulatory requirements as well as excessive standardisation may limit investment in alternative and possibly more efficient safety and resilience solutions and constrain the technology path.

¹⁶⁸ “Satellite Database | Union of Concerned Scientists.”

¹⁶⁹ “LEO PNT Market Size, Share, Industry Analysis and Market Forecast to 2030,” MarketsandMarkets, accessed January 14, 2026, <https://www.marketsandmarkets.com/Market-Reports/leo-pnt-market-20724107.html>.

Proponents of the EUSA have argued it creates an opportunity for investments in new generation spacecraft and new services directed at compliance. It is unclear these effects will materialize or dominate as the regulatory requirements may also dampen investment, innovation, and entry.

Investment and Innovation. While institutional investment is relatively stagnant, Europe is currently attracting significant private investment in space. Private investment in the European space sector reached €1.5 billion in 2024, up 56% from the previous year.¹⁷⁰ A region-specific drop in market size in the range of 5-8% can be significant for investment decisions and returns.

Speed and agility have become increasingly important in the face of increasing commercial competition. Some companies revise satellite designs every 18 months.¹⁷¹ Flexibility facilitates innovation and innovation adoption. Evidence from literature and workshops indicate that the imposition of standards may reduce innovation in the space sector.¹⁷² Imposing onerous compliance requirements and procedures on all hardware and services used by a space operator reduces operational flexibility and is likely to disincentivise diversification of suppliers, which reduces prospects for market entry.

Start-ups and New Space. Small firms often rely on cheap standardized components for their typically small satellites.¹⁷³ Besides the increased regulatory burden, regulatory constraints on the design of small spacecraft are likely to limit their access to globally available off-shelf solutions, with potentially dramatic impact on their efficiency.

New Space start-ups are heavily reliant on private capital.¹⁷⁴ Around 15% of EU space startups are backed by US-based venture capital.¹⁷⁵ This type of investment may easily relocate to more commercially efficient environments when faced with lower expected returns.

V. Economic Impact of the EUSA Proposal on the Competitiveness of the EU Economy

Satellite services enhance the productivity of a variety of economic sectors. This has long been the case for the broadcasting, agriculture, and transport sectors. Two factors are expanding the economic opportunities around space-based data and services. First, innovation relating to the miniaturisation and standardisation of technology allowed for new players to enter space activities with smaller, lighter, and cheaper spacecraft and satellite systems. Second, digitalisation, mobile devices, and AI related innovation is generating new commercial

¹⁷⁰ ESA Space Debris Office, *ESA's Annual Space Environment Report*, 11.

¹⁷¹ Debra Werner, "Working around Ongoing Supply-Chain Bottlenecks," *SpaceNews*, March 11, 2025, <https://spacenews.com/working-around-ongoing-supply-chain-bottlenecks/>.

¹⁷² OECD, *The Economics of Space Sustainability*, 38.

¹⁷³ "The Space Economy in Figures Responding to Global Challenges," 23.

¹⁷⁴ "The Space Economy in Figures Responding to Global Challenges," 23.

¹⁷⁵ Space Venture Europe

downstream markets. Seizing this opportunity will require the deployment of new satellite systems. Lower appetite for such investments in Europe caused by higher costs from regulation risks delaying the deployment of crucial space capabilities, which has a potentially significant impact on the pace of innovation.

This report estimates an increase in the cost of micro and small satellite systems of 4-13% (Table 5), generating a fall in demand for those satellites systems most needed for the next generation of space based services between 18-29% (Table 6). Lower demand will lead to the slower deployment of an innovation enabling service. Literature shows that delaying innovation has a material impact on economic performance and GDP growth.

A. The Expanding Role of Space Based Services in the Economy

Space based connectivity and data enable a variety of providers that offer digital services and applications used across various economic industries. These services are economically significant and are expected to experience accelerated innovation and growth.

The global **value of EO value-added services was €2.8 billion in 2023**.¹⁷⁶ European providers currently specialize in established EO based services for transport and finance with more than 65-85% market share in those segments.¹⁷⁷ They are far less present in the newer fast growing consumer application segments with only 10% of the global market share.¹⁷⁸

The **global value of GNSS-PNT enabled services was €262 billion in 2023**, with a large share going to consumer services and GNSS enabled devices.¹⁷⁹ This value is expected to reach €4.6 trillion in 2030 powered by growth in consumer services and connected and automated driving.¹⁸⁰ Here also, European companies lead in traditional transport services (maritime segment) but lag in the more dynamic segments of consumer solutions, aviation and drones, and urban development.¹⁸¹

Innovative space-based services from technology advances in satellites systems are impacting large parts of the economy:

Consumer devices. Consumer devices—particularly smartphones—rely on satellite services for connectivity in areas with limited terrestrial coverage or in flight. PNT has enabled the mass market of navigation apps with frequent and regular updates, turn-by-turn navigation on mobile devices, sport tracking, or social-network location features. EO data and services are used as inputs for digital twins in gaming.¹⁸² GNSS-PNT enabled functionalities accounted for more than €100 billion in app revenues globally in 2023, while EO-enabled functionalities,

¹⁷⁶ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2*. (Publications Office, 2024), 10.

¹⁷⁷ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2*. (Publications Office, 2024), 14.

¹⁷⁸ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2*. (Publications Office, 2024), 14.

¹⁷⁹ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2*. (Publications Office, 2024), 21.

¹⁸⁰ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2*. (Publications Office, 2024), 22.

¹⁸¹ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2*. (Publications Office, 2024), 24.

¹⁸² European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2*. (Publications Office, 2024), 70.

such as measures of air quality or UV monitoring, accounted for an additional €200 million. The value generated by space-based services in consumer devices is expected to roughly triple by 2033.¹⁸³

Insurance & Finance. The insurance sector relies on space EO data for the estimation and pricing of risk, including security risks and environmental risks. It also relies on space imaging for loss assessment. This increases not only the efficiency of insurance services but also that of all the other sectors that are better able to cover such risks. EO data also helps the broader financial sector monitor production and shipping at key locations. The insurance and financial sectors are expected to become the leading contributor to global EO revenues, reaching almost €900 million in 2033.¹⁸⁴ Europe generates around 10% of those global revenues from value added EO services sold to the financial sector with expectations of strong growth.¹⁸⁵

Transport. Satellite-based connectivity complements terrestrial networks by increasingly supporting Intelligent Transport Systems (ITS), enabling real-time vehicle tracking and data exchange between vehicles and transport hubs. Broadband connectivity in aviation is expected to become ubiquitous. Autonomous systems and drones will also generate demand for continuous, high-precision, and authenticated positioning. Transport related sales and value-added services accounted for €80bn revenues globally in 2023 for road and automotives alone.¹⁸⁶

Infrastructure. EO data and services supporting the operation and maintenance of civil infrastructure amounted to more than €250m globally in 2023, with space imagery being used for activities as diverse as site selection or pipeline monitoring.¹⁸⁷ The PNT market has been even more transformational reaching over €4bn globally in 2023.¹⁸⁸ Applications include construction monitoring where precise PNT signals allow for machine control and equipment monitoring, energy grid systems relying on high-precision PNT satellite data to operate and stabilize the grid, or mining companies evaluating pit or tailing slope stability.¹⁸⁹

Agriculture. EO data and enabled-services help monitor cultivated fields, forecast crop yield, and optimize production costs including the use of fertilizers. Global EO data and enabled-services sales amounted to almost €450m in 2023.¹⁹⁰ GNSS-PNT is also widely deployed in precision agriculture, while future farm “digital twins” are expected to further increase the integrated use of EO and GNSS-enables services.

¹⁸³ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2.* (Publications Office, 2024), 75-76.

¹⁸⁴ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2.* (Publications Office, 2024), 142.

¹⁸⁵ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2.* (Publications Office, 2024), 145.

¹⁸⁶ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2.* (Publications Office, 2024), 172.

¹⁸⁷ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2.* (Publications Office, 2024), 129.

¹⁸⁸ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2.* (Publications Office, 2024), 134.

¹⁸⁹ “The Space Economy in Figures Responding to Global Challenges,” 17; European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2.* (Publications Office, 2024), 123.

¹⁹⁰ European Union Agency for the Space Programme, *EUSPA EO and GNSS Market Report. 2024 / Issue 2.* (Publications Office, 2024), 39.

Urban development. Space-enabled activities have also become central tools in the development of smart cities. EO provides essential information for urban planning and environmental monitoring (including light pollution or air quality monitoring), while coupled with PNT augmentation, it enables centimetre-level positioning, surveying and mapping of urban areas.

Besides these main sectors, space data allowed for a wider range of activities, in more mature sectors such as communications and TV and radio satellite broadcasting as well as in non-commercial sectors such as humanitarian aid, disaster management, or environmental protection.

B. Economic Impact of Diminished Access to Innovative Space Based Services

Low rates of adoption of new technologies causes significant harms to long-term economic growth and productivity. Research has found that cross-country variation in technology adoption over the last two centuries explains around 25% of per-capita income differences across 166 countries.¹⁹¹ Speed of technology adoption has been found to explain 75% of the income gap between high- and low-income countries.¹⁹²

To the extent that the EUSA could reduce the incentives or ability to adopt innovative space-based technologies, one could expect an impact on European economic trajectory. Space-enabled technologies impact and augment **connectivity** and **data availability**, two inputs that the empirical literature consistently identifies as important drivers of productivity and growth.

Estimates of the **positive economic effects of better access to broadband connectivity** are informative, given that Satcom connectivity is expected to represent the main driver in the growth of satellite based services. Research of OECD countries over 1996-2007 showed that a 10% increase in broadband infrastructure penetration increased GDP per capita growth by 0.9-1.5 percentage points.¹⁹³ Using a larger sample over the 2002-2014 period, another study found that a 10% increase in mobile broadband adoption increases GDP by 0.8 percent.¹⁹⁴

Micro-level studies largely confirm the importance of faster connectivity. Downgrading an average UK property from a high-speed broadband connection was found to depreciate its value by 2.8%.¹⁹⁵ Another study combined firm-level micro data with internet speed and showed that moving from the slowest to the fastest speed localities increased productivity

¹⁹¹ Comin, Diego, and Bart Hobijn. 2010. "An Exploration of Technology Diffusion." *American Economic Review* 100 (5): 2031–59.

¹⁹² Comin, Diego, and Martí Mestieri. 2018. "If Technology Has Arrived Everywhere, Why Has Income Diverged?" *American Economic Journal: Macroeconomics* 10 (3): 137–78.

¹⁹³ Nina Czernich, Oliver Falck, Tobias Kretschmer, Ludger Woessmann, *Broadband Infrastructure and Economic Growth*, *The Economic Journal*, Volume 121, Issue 552, May 2011, Pages 505–532.

¹⁹⁴ Harald Edquist, Peter Goodridge, Jonathan Haskel, Xuan Li, Edward Lindquist, *How important are mobile broadband networks for the global economic development?*, *Information Economics and Policy*, Volume 45, 2018, Pages 16-29.

¹⁹⁵ Gabriel Ahlfeldt, Pantelis Koutroumpis, Tommaso Valletti, "Speed 2.0: Evaluating Access to Universal Digital Highways," *Journal of the European Economic Association*, Volume 15, Issue 3, July 2017, Pages 586–625.

growth by 2%. Crucially, the positive effect of internet speed on productivity can be entirely offset by a reduction in the stability of the internet connection of one standard deviation.¹⁹⁶

Similar to the connectivity, **data access is also a significant factor of productivity** and growth. This is relevant as new space-enabled services will make available space generated data to a variety of industries. Empirical economic literature has quantified the impact of data availability on productivity. Recent research on cloud computing usage found that EU's GDPR increased the cost of data by 20% and is associated with EU firms decreasing data storage by 26% and data processing by 15% relative to comparable US firms. This was found to lead to a 0.1-0.5% decline in overall production costs but, most importantly, the regulatory burden turned EU firms into less data intensive businesses.¹⁹⁷ GDPR effects on innovation have been documented in the consumer applications space, with finding of a reduction in the number of new apps by half on the Google Play Store, reducing consumer welfare by a third.¹⁹⁸

Benchmarking economy-wide effects of lower adoption of innovative space-based services. In the long run, space-enabled broadband applications have the potential to expand connectivity improve the reach, speed, and stability of broadband connectivity in a variety of new applications. The broadband literature suggests that a 10% improvement in broadband access is associated with a 0.9–1.5 percentage point increase in per capita GDP growth. Although space-based connectivity could be seen as a general-purpose technology, the report assumes conservatively a lower marginal impact in the medium term. Satcom-driven improvements currently impact a limited (but growing) spatial and sectoral subset of economic activity, and it often provides resilience and redundancy of connectivity rather than average connection speed for the median user. We assume that innovative applications could lead to space-based connectivity having 10–20% of the impact of improved internet broadband.

Under these assumptions, regulation causing a 7 to 9% decrease in the adoption of space-based connectivity (Table 7) corresponds to a medium-run effect on annual GDP per capita growth in the order of - 0.06 to -0.27 percentage points. The EU GDP in 2024 was €19.25 trillion (\$22.52 trillion) so **the annual loss for the EU from a 7-9% drop in access to space based connectivity would amount to between €12 -52 billion, with a cumulative effect over time.**¹⁹⁹ In addition more expensive or curtailed access to space data would significantly **curtail the number of innovative space-based applications** on the European market.

¹⁹⁶ Emmanouil Tranos, Tasos Kitsos, Levi John Wolf, "Fast and furious: the productivity effects of the geography of experienced internet speeds," *Journal of Economic Geography*, 2025.

¹⁹⁷ Mert Demirel, Diego J. Jiménez Hernández, Dean Li, and Sida Peng, "Data, Privacy Laws and Firm Production: Evidence from the GDPR," NBER Working Paper 32146 (2024).

¹⁹⁸ Rebecca Janßen, Reinhold Kesler, Michael E. Kummer, and Joel Waldfogel, "GDPR and the Lost Generation of Innovative Apps," NBER Working Paper 30028 (2022), <https://doi.org/10.3386/w30028>.

¹⁹⁹ "World Economic Outlook (October 2025) - GDP, Current Prices."

VI. Conclusion

The European institutional space sector has remained largely stagnant over the past decade, reflecting the technological maturity of its products and services. Europe's space industry has traditionally specialized in medium and large spacecraft, and its commercial activity has been centered on geostationary telecommunications systems that have benefited from institutional programmes. At the same time, innovation in space technology is increasingly attracting venture capital toward new commercial opportunities and toward scaling services enabled by low-cost, small-sized spacecraft in low Earth orbit. These constellations are expected to support efficient new broadband and data services across a wide range of economic sectors. The EUSA proposal, if adopted in its current form, could limit the benefits of this emerging opportunity.

The significant cost increases that the provisions of the EUSA proposal would generate for small, innovative spacecraft would reduce demand and revenue in the space industry and could slow the development of space-based service providers that contribute to more efficient technological progress across the wider economy. This report estimates declines in demand for space-based services in the range of 3 to 9%. Access to space-based connectivity is estimated to fall by 7 to 9%, with a potential annual revenue loss in the EU, from that effect alone, in the range of €12 billion to €52 billion.

The objectives of the EUSA proposal are widely shared, and it is likely that national jurisdictions around the world with active space sectors will move in a similar direction. However, the excessive rigidity and regulatory burden embedded in the EUSA proposal risk curtailing the development of new space services in Europe. The high degree of specificity and prescription in the means by which the objectives must be achieved is likely to interfere with innovation and may lock the European space sector into inefficient solutions. Lower rates of innovation, slower adoption of space-based services, and higher costs for the use of space-derived data are therefore to be expected in the EU unless greater flexibility is built into the regulatory approach.