



General Aviation Manufacturers Association

This paper was endorsed by GAMA's European Leaders Steering Committee (ELS)

Position Paper

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Recommendations for Accelerating the Development of the Electric Aviation Sector in Europe

PIPISTREL 

 VOLOCOPTER

 LILIUM

VERTICAL 



 **Skyports**
INFRASTRUCTURE

 Heart
Aerospace



Executive Summary

Electric aviation encompasses a wide range of innovative and diverse approaches to decarbonizing aviation and ensuring that flying remains one of the most effective, efficient and sustainable forms of transport in the decades to come. **General aviation has a pivotal role here**, as manufacturers continue to demonstrate their role and **significant added value as drivers of scalable innovation** for the wider aviation industry.

As various aviation roadmaps show¹, new technology will contribute to as much as one third of the decarbonisation needed to meet net zero emissions by 2050. Electric innovation is a case in point. Beyond the decarbonisation potential, the appeal of new electric propulsion systems also lies in their streamlined design, containing fewer moving parts and requiring less maintenance.

The technology is already in development, but it will need to be accelerated. For example, **Pipistrel** manufactures the first (and at time of writing the only) certified fixed wing, battery-electric general aviation aircraft that is being used to decarbonize pilot training today. **Heart Aerospace** is focused on developing hybrid-electric solutions to decarbonize regional air travel. Propulsion manufacturers are investing heavily in developing new, innovative, and scalable electric propulsion solutions, including the Eco-Pulse technology demonstrator with **DAHER** and **Airbus**, while others are specialising in full aircraft electrification. For example, **H55** is certifying a customisable full electric propulsion system composed of battery packs fitting the needs of general aviation and commuter aircraft. In turn European electric vertical take-off and landing (eVTOL) aircraft manufacturers like **Volocopter**, **Lilium** and **Vertical Aerospace** are at the forefront of developing new regional and urban mobility solutions of the future, in close collaboration with infrastructure focused companies like **Skyports Infrastructure**. Europe is at the forefront of this new wave of innovation.



The basis of this new industry segment is a highly innovative technology – high-performance batteries – allowing for the development of a future market which will enable the EU to meet its strategic goal of reducing dependencies from third countries, developing technological leadership as well as export-oriented economic growth, creating spill-over effects for other industries.

This white paper highlights some of the most **important recommendations** for European regulators and policymakers to support this sector.

- **Revise public funding related rules:** GAMA recommends strengthening and broadening the scope and the accessibility of existing programs that could provide R&D and manufacturing funding to support electric aviation innovations and bringing products to market. Our recommendations include revising the transport lending policy of the European Investment Bank (EIB) to allow support for emerging, low carbon aviation technologies. It also includes recommendations to revise EU state aid rules so that Member States have more flexibility to fund this industry, recommendations to explore synergies between existing special state aid regimes and funding support to capital-intensive deep tech companies that are pre-revenue. And finally, we recommend revisiting the scope of programs such as the Innovation Fund and EIC Accelerator to enable eligibility of electric aviation players.
- **Strengthening Europe’s supply chains:** Our recommendations focus on finding new synergies between existing programs to support the development and rollout of battery technologies for road transport and the aeronautic sector, while also proactively preparing the recycling and raw material infrastructure that will be needed to support Europe’s decarbonization ambitions.
- **Appropriate policy frameworks:** We highlight the importance of developing robust electric infrastructure and grid capacity and ensuring that dedicated forums like the Alliance for Zero Emission Aviation (AZE) continue their work into the next Commission mandate, with appropriate funding to support their work.
- **EASA:** Our recommendations focus on the need to properly fund the agency, so they have sufficient resources to carry out the critical certification and rulemaking tasks necessary to bring these new products to market in the EU and to export.



Creating the Appropriate Funding Framework

Bringing new aviation products to market typically takes 5-10 years or more. Return on Investment (ROI) calculations for investors therefore need to have a long-term outlook, especially with innovative new technologies. Creating the appropriate funding frameworks to support the success of electric aviation is also in the geopolitical interest of the EU as decarbonizing aviation will remain an imperative political and economic objective over coming decades, with intense competition from other countries around the world looking to attract innovative aviation manufacturing capabilities.

GAMA asks for the following aspects to be considered by the incoming European Parliament, European Commission as well as Member State Governments:

- **European Investment Bank** – The EIB is mandated to deploy loans to further support the “steady development of the internal market in the interest of the Union”.² Accordingly, the EIB’s Board of Governors should revise the EIB’s Transport Lending Policy to include nuanced guidelines on deploying funding directly into companies to support low-carbon aviation technologies. This should also cover guidelines on how the EIB can deploy tailored funds and guarantee tools to consolidate long-term investments in electric aviation, including in eVTOLs and hybrid electric aircraft, recognizing that these will not necessarily generate short term financial returns.
- **State Aid rules (1)** – Over the past years, the EU has put in place several special state aid programs and initiatives to support the green transition. These include the creation of Important Projects of Common European Interest (IPCEIs), or more recently the Temporary Crisis and Transition Framework (TCTF) which has the stated goal of accelerating the green transition³, as well as initiatives like the Strategic Technologies for Europe Platform (STEP). GAMA supports these initiatives, but to enable better access and direct utilization by companies active in the field of electric aviation we call on the incoming European Commission as well as Member States and European Parliamentarians to actively examine and map potential synergies between existing frameworks with the stated goal of furthering the green transition to channel investments to the electrification and hybridization of aviation. This could be done through a European Commission communication and targeted calls for funding by Member State Governments.
- **State Aid rules (2)** – GAMA calls on the European Commission to revisit the criteria of “Undertaking in Difficulty” stipulated in Article 2 (18) of Commission Regulation (EU) No 651/2014. This criterion prevents the application of national aid programs to companies that have lost more than half of their nominal capital due to accumulated losses. Exceptions apply to SMEs that are less than three years old. These requirements are too restrictive and impede capital-intensive deep-tech companies that develop green transition products with long lead times and that have exceeded the SME threshold from accessing most if not all funds at national level that are meant to support these very companies. The financial criterion should be relaxed so that losses of 80% or more are permitted and/or the exemption for SMEs should be revised in such a way that the cap on the number of employees is removed, allowing mid-caps as described above to access funding.
- **State Aid rules (3)** – Finally, GAMA recommends revising the EU State Aid rules in such a way that Member States can develop new technology-neutral programs specifically tailored to the mission of high potential and high risk deep-tech companies, which typically exceed the SME size, develop capital-intensive technology and might be close to market maturity. Such programs should be able to have high funding rates and offer financial support in the form of grants for innovation development costs or direct equity investments.



- **Innovation Fund** – GAMA supports allocating funding to the development of low-carbon aviation fuels. However, the Innovation Fund should also be used to fund innovations in the electric aviation sector in line with Article 10a paragraph 8 of the which stipulates that the fund may “support electrification and actions to reduce the overall climate impacts of aviation”. For example, solutions for electrifying regional aviation connecting peripheral regions to economic hubs can supplement SAF, as SAF availability is likely to remain limited in peripheral regions for the foreseeable future. Given limited SAF availability, electric solutions can, in some cases provide more efficient solutions in these regions thus reducing the overall need for SAF. Additionally, solutions for electric urban air mobility will contribute to the development and commercialisation of the technologies crucial to electrifying aviation, and hence will constitute an important step in achieving the overall goal set by the Innovation Fund. The innovation fund should also be used to finance the development and rollout of eVTOLs, which due to regulatory requirements feature an MTOW below 5700kg, and the development of related infrastructure to allow this industry to mature. For this reason, the scope of the Innovation Fund and in particular the list of activities that are excluded from the scope of the ETS and hence from the scope of the Innovation Fund should be revised to also include flights performed by aircraft performed between aerodromes within one State with a certified maximum take-off mass (MTOW) of less than 5700 kg (see exclusion of this category in Directive 2003/87/EC, Annex I, 6 ”Aviation”, (h)).
- **Horizon Europe / Joint Undertakings (JUs)** – Current rules for JUs mandate that each partner co-finance JU projects through in-kind operating contributions (IKOP) and in-kind additional activities (IKAA). IKOP is a company’s financing of project related costs while IKAA are auditable additional investments a project partner must showcase in line with the project’s Strategic Research and Innovation Agenda (SRIA). Together, IKOP and IKAA contributions must total 2x that of the EU funding to comply with Horizon Europe’s “leverage effect” (1 part EU, 2 parts private financing). IKAA is difficult to showcase for smaller companies, as SMEs do not have large collateral investments. The Clean Aviation JU’s interpretation of IKAA, summing IKAA over a 10 year ‘framework’ scale (containing multiple projects), instead of calculating IKAA per ‘project’ and per partner makes it even more difficult for SMEs to effectively participate in JUs. Adaptations to the implementation and interpretation of IKAA’s should be considered to expand the participation of SMEs. Furthermore, the Clean Aviation JU should be given additional resources to support General Aviation scale R&D projects that can more readily and rapidly demonstrate low carbon aviation technologies that can be proven at this scale and then scaled up to larger aircraft.
- **Horizon Europe** – GAMA calls on DG RTD to treat research projects that aim to develop low-carbon aviation technologies as a priority under the Horizon Europe Strategic Plan 2025-2027.

- **European Innovation Council (EIC) Accelerator** – Current eligibility criteria require that the applicants must be either an SME or a single company classified as a small mid-cap (up to 499 employees) established in a Member State or an Associated Country. The cap on employee numbers is arbitrary and such strict requirements impede numerous companies developing innovative products in line with the scope of the Accelerator from accessing its funds. A relaxation of the small mid cap requirement should be considered to also allow deep-tech companies who develop innovative, technologically complex products requiring larger development teams and longer lead times to apply for the funds. This would allow such companies to remain ambitious and committed to scale up in the near future by successfully delivering their innovative products and creating new markets.

KEY RECOMMENDATIONS

- The European Investment Bank should revise its transport lending policy to include support for low-carbon aviation technologies, including hybrid-electric aircraft as well as dedicated facilities for eVTOLs.
- Member States, in collaboration with the Commission, should explore synergies between existing programs and special state aid regimes with the stated aim of accelerating the green transition to enable these funds to channel investments to the electrification and hybridization of aviation.
- EU State Aid rules, in particular the criterion “Undertaking in Difficulty”, should be revised to also allow deep tech companies to access Member State funds.
- Allow the Innovation Fund to support the development and rollout of urban and regional electric aviation and eVTOLs, recognizing that these technologies will supplement CO2 reductions from the rollout of SAF.
- Review and potentially adapt JU’s interpretation of IKAA financing contributions to enable better SME participation and expand funding to include General Aviation scale R&D programmes.
- Review and potentially adapt eligibility criteria for accessing funds from the European Innovation Council (EIC) Accelerator.

Building a Robust and Resilient European Supply Chain to Ensure a Swift Uptake of New Technologies by the Market

Ensuring stable supply chains for the strategic and (critical) raw materials necessary to support the European aviation sector writ large is crucial for creating business certainty and supporting the EU’s industry policy ambitions as electric aviation will be at the forefront of the global competition to deliver low-carbon mobility solutions.

Electric battery systems for aviation propulsion require specific attention as these have several different specificities compared to, for example, automotive batteries. Due to its relatively small market share, it is particularly difficult for the aeronautics sector to secure its specific needs on the battery, semi-conductors, and raw materials markets in sufficient volumes. If remained unaddressed, such a lack of strategic autonomy is highly likely to hamper the European development and production at industrial scale of electric and hybrid aircraft.

GAMA asks for the following recommendations to be considered by the incoming European Parliament, European Commission as well as Member State Governments to strengthen key supply chains supporting the rollout of hybrid and electric aviation:

- **Exploring synergies with existing battery industry** - While the European Commission has been very active over the past years to support and regulate the road transport battery

industry, the current framework and initiatives should be assessed and reviewed, where relevant, with a view to ensure that the needs of the aeronautics industry are appropriately addressed. Moreover, Member States and the Commission, in partnership with the industry, should identify potential synergies in order to maximise public and private investment. The Alliance for Zero Emission Aviation and the European Battery Alliance could be instrumental in this regard to develop a joint work stream.

- **Recycling infrastructure** - Given the rate of battery use in aeronautics, European recycling facilities compatible with the needs of the sector will have to be set up immediately, especially with a view to reduce and/or avoid the creation of new third-country dependencies. Support should also be granted to businesses looking to recycle and reuse aerospace batteries. While these have to be replaced close to 80% state of health, they contain thermal runaway propagation meaning they are ideal for a second life application.
- **International Partnerships** - The Commission and Member States should continue developing strategic partnerships with relevant third countries to secure critical raw materials for aeronautics. While international cooperation is an important way to address the current market failure, efforts should also focus on advanced materials for battery and fuel cells to improve performance and reduce dependencies on critical raw materials not available in the EU.
- **Chips and Critical Raw Materials Act** - As new electric and hybrid aircraft will require a secure supply of raw materials and new generations of semiconductors that will make it possible to drastically increase the power of electric motors, Member States and the European Commission should make full use of the provisions of the newly adopted Chips Act and CRM Act, with a view to secure the needs of the aeronautics sector. This is especially critical as the sector is facing the same lack of strategic autonomy as for batteries, which makes it very difficult to secure its needs on the market.

KEY RECOMMENDATIONS

- Explore synergies between the aeronautics sector and existing frameworks to support the development of batteries and fuel cells, including improving recycling technologies.
- Invest in recycling infrastructure and R&D in advanced materials to minimise external dependencies.
- Build international partnerships with likeminded third countries on raw materials for aeronautics.



Policy and Regulatory Environment

The EU's regulatory environment has to encourage investment and innovation, while safeguarding and promoting the highest possible safety standards for the electric aviation industry to live up to its potential in the medium to long term. The outgoing Commission and Parliament has set out many important political goalposts in this regard while the European Union Aviation Safety Agency (EASA) has been actively developing the technical rules and standards that will enable electric aviation. Regulators should look to build on the strong foundations already in place during the 2024-2029 political cycle.

GAMA asks for the following recommendations to be considered by the incoming 2024-29 European Parliament, European Commission as well as Member State Governments:

European Union

- **Alternative Fuels Infrastructure Regulation (AFIR)** – Major investments will be needed on and off airports to make electric aviation a reality. AFIR requires Member States to deliver a “National Policy Framework (NPF)” setting out plans to develop alternative fuels infrastructure by 2026 (Article 13), with a requirement to take stock of the development and deployment potential of hydrogen and electric recharging infrastructure at airports. These NPFs should set ambitious and achievable targets to deploy such recharging capacity at scale, and governments should commit the necessary public funding to deliver on these goals. In parallel, agreeing on standards for ground charging stations at airports should be prioritized as this unresolved issue is greatly hampering the development of electric and hybrid aviation.
- **Alliance for Zero Emission Aviation (AZEAA)** – AZEAA's work is ambitious but effective at bringing together key stakeholders developing roadmaps and strategies across 6 working groups to prepare the market for the entry into service of zero emission aircraft. However, the work of the alliance is almost entirely conducted by the industry and member organisations, many of which are start-ups and SMEs who struggle to cover the time and costs associated with AZEAA. No funding or significant resources have been made available to support AZEAA's work other than the secretariat provided by DG DEFIS. The work of the alliance should continue under the 2024-29 European Commission but for it to be a success, it needs to be supported by additional resources.
- **EU Drones Strategy 2.0** – published in 2022 with strong support from industry the strategy covers a broad range of electric aviation activities, including passenger-carrying eVTOL aircraft, and related critical enabling activities and services. The 19 flagship actions of the Strategy should continue to benefit from funding and support from the European Commission, EASA, Clean Aviation JU, SESAR JU, and the EIB.

European Union Aviation Safety Agency (EASA)

EASA plays a pivotal role in developing the regulations and standards that will enable the safe integration of electric and hybrid propulsion aircraft into the aviation system as set out in the European Plan for Aviation Safety (EPAS). This includes, for example, the definition of new design and safety requirements for aircraft and propulsion systems, as well as the readaptation of requirements applicable to aerodromes, air traffic management, air navigation services, flight crew licensing or operations.

To undertake this work, significant resources are needed in terms of budget allocation and recruitment/retention of staff with the relevant expertise. EASA is primarily funded by fees & charges paid by industry applicants (59%) to cover costs associated with certification projects and approvals; as well as the EU subsidy (19%) to cover rulemaking, standardisation oversight and administrative costs.



To date, EASA has played a leading role in developing regulations and standards for the electric aviation sector, but this lead is now being jeopardised by a lack of resources to complete all the necessary rulemaking tasks at the pace needed by industry.

- **Increase the EU subsidy** – The EU subsidy currently totals €40million, which is significantly less than what the Agency is understood to need for the coming years to complete all its rulemaking tasks. This underfunding is delaying upcoming critical rulemaking and international harmonization processes for electric aviation, both of which will be crucial enablers for electric aviation’s success.
- **International harmonisation of standards** – The development of rules and standards for electric aviation cannot and should not be done by Europe alone. Aviation is a globalised industry with supply chains spreading across the globe. The harmonization of standards with other leading aviation regulators in the USA, Canada, and Brazil, is a strategic imperative that directly impacts the export potential of European products and the sustainability of high-tech jobs across Europe. It is of utmost importance that the EU increases its funding to ensure EASA retain its relevance and influence in global standardisation. Efforts to harmonise with bilateral partners do put additional resource burdens on the Agency, but the necessary investment is minimal compared to the benefits successful harmonization would bring to the European industry, job market and economy.
- **Easier access for SMEs (Innovation Funding)** - To support applicants with new projects ahead of full certification, EASA has introduced the highly welcome concept of “Innovation Partnership Contracts” allowing potential applicants to work with EASA experts to determine the feasibility of concepts and identify potential certification constraints early in the product development process. This is funded via applicants paying the EASA hourly rate, as determined by its fees & charges regulation, of €295/hour (2024). This rate represents a significant impediment for SMEs and start-ups.

The Agency should be granted an additional annual subsidy from the EU to fund Innovation Partnership Contracts and related services to accelerate the Agency’s technical support for disruptive innovative technologies in advance of them entering formal certification application processes. This will serve to expedite the development and market introduction of new sustainable projects such as electric aviation systems, thereby maintaining Europe’s technological edge in the aviation sector, one of the Union’s most successful exports. It would also ensure that the Agency has the adequate resources across all its domains.

KEY RECOMMENDATIONS

- Ensure that National Policy Frameworks developed under AFIR are ambitious and well-funded when it comes to the rollout of charging and hydrogen infrastructure at airports.
- Recognizing the important work being carried out under the AZEA framework, provide additional dedicated funding to support companies (often SMEs and startups) to develop AZEA roadmaps and strategies.
- Ensure that EASA is properly funded to efficiently and effectively carry-out rule making tasks set out in the EPAS and that EASA has the ability to retain expert staff vital to the success of rulemaking tasks.
- Allocate new EU funding to support EASA's Innovation Partnership contracts to support SMEs, start-ups and accelerate the deployment of disruptive technologies such as electric aviation.
- Promote harmonization of certification standards for electric aviation with bilateral aviation partners, such as the US, UK, China, Canada and Brazil, to support the export of products.



About GAMA

“General Aviation is the cradle of innovation for aviation.”

The General Aviation Manufacturers Association (GAMA) represents more than 150 of the world's leading manufacturers of Business and General Aviation aeroplanes, rotorcraft, engines, avionics, components, and related services and technologies. GAMA members are also providers of maintenance and repair services, fixed-based operations, pilot and maintenance training, and aircraft management. Additionally, GAMA represents companies in the emerging sector of new air mobility, which includes the development of vertical take-off and landing (VTOL) aircraft as well as electric, hybrid and hydrogen propulsion and autonomous systems for civil purposes. GAMA member companies have facilities in over 60 countries.

This paper was endorsed by GAMA's European Leaders Steering Committee (ELS).

GAMA members contributing to this white paper included: Daher, H55, Heart Aerospace, Lilium, Pipistrel, Safran, Skyports Infrastructure, Vertical Aerospace, Volocopter.