



May 10, 2024

California Air Resources Board  
P.O. Box 2815  
Sacramento, CA 95812  
*[submitted electronically]*

**RE: Comments of Joby Aviation on the April 10th Workshop on the Low Carbon Fuel Standard**

Joby Aviation<sup>1</sup> appreciates the opportunity to provide comments on the April 10, 2024, Low Carbon Fuel Standard (LCFS) Workshop.

**About Joby Aviation**

Joby's mission is to help the world connect faster and more easily with the people and places that matter most by delivering a new form of clean, quiet, electric vertical take-off and landing (eVTOL) aerial transportation. Building on recent advancements in energy storage, microelectronics, material science, and software, we are developing an all-electric aircraft with zero operating emissions that will transport a pilot and four passengers at speeds of up to 200 mph, while also having the ability to take off and land vertically.

Developing sustainable mobility solutions has never been more needed given the threat that climate change poses to our communities and to our planet. According to the U.S. Environmental Protection Agency (EPA), the top source of CO<sub>2</sub> emissions in the U.S. is the transportation sector. We expect the electrification of transportation to accelerate and extend to the skies in the decade ahead, representing a bright spot where technology, economy, and sustainability converge. Applying electrification to small aircraft unlocks new degrees of freedom in aircraft design that were not possible with traditional, combustion engines.

Our aircraft has been specifically designed to achieve a considerably lower noise footprint than that of today's conventional aircraft or helicopter. It is quiet at takeoff and near silent when flying overhead, blending seamlessly into the environment. This will allow us to operate from new skyport locations nearer to where people live and work, in addition to utilizing the more than 5,000 heliport and airport infrastructure facilities already in existence in the U.S. alone.

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<sup>1</sup> See <https://www.jobyaviation.com/>.



Joby is headquartered in Santa Cruz, California, with over 1,400 employees across the state. In 2022, we completed the construction of our pilot production lines in San Carlos and Marina, California, and we began manufacturing our production prototype aircraft. We are excited to support the clean transportation and climate goals of our home state.

## **Zero-Emission Aviation is Key to Meeting California's Climate Goals**

Today, the combustion of aviation and other transportation fuels releases substantial amounts of greenhouse gasses into the atmosphere. The transportation sector has the highest dependency on oil over any other sector, with over 90% of energy coming from fossil fuels.<sup>2</sup> At the same time, the aviation industry is undergoing rapid expansion due to the increasing popularity and accessibility of flying. The rise of low-cost carriers and a growing middle-class population worldwide have fueled a surge in air travel demand. Joby strongly supports the broader accessibility of flying as a mode of transportation. We also believe that eVTOL will play an important role in replacing internal combustion vehicles on the road. However, there is a challenge in minimizing the environmental impacts while also reaping the undeniable benefits of increased mobility and connectivity.

California and CARB have already created goals to reduce emissions from aviation. These include:

1. 20% of aviation fuel demand met by electricity (batteries) or hydrogen (fuel cells) by 2045; and
2. Sustainable aviation fuel meeting most or the rest of the 2045 fuel need.<sup>3</sup>

These goals are ambitious, and Joby and others in the aviation sector are working to ensure that zero-emission aviation becomes a reality in California. To advance these goals, CARB will need to utilize every tool available to unlock zero-emission and sustainable aviation technologies and fuels. This includes the LCFS, which will play an important role in incentivizing a less carbon-intensive aviation industry. CARB should seek to streamline the participation of the aviation sector in the LCFS, such as by creating Tier 1 or Lookup Table participation pathways for electric aviation. It is also important that CARB initiate a rulemaking process to implement its aviation goals.

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<sup>2</sup> See Data from the International Energy Agency: <https://www.iea.org/energy-system/transport>

<sup>3</sup> CARB 2022 Scoping Plan at p.73. Available at: <https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf>



## **Joby Supports a Stronger LCFS Program**

As stated in our comments to the proposed changes to the LCFS in February 2024,<sup>4</sup> Joby supports increasing the carbon intensity (CI) reduction target of the LCFS program to at least 30 percent by 2030 and also increasing stringency in later years. As emphasized in the 2022 Scoping Plan Update, the aviation sector holds an important role in California's ambitious journey toward carbon neutrality by 2045,<sup>5</sup> and the LCFS program is a critical instrument in facilitating the decarbonization of aviation.

Beyond setting a more ambitious yet attainable CI target for 2030, it is imperative to structure the LCFS program to be adaptable to market dynamics, ensuring support for continued investments in the cleanest low-carbon technologies. The inclusion of an "auto-acceleration mechanism," and a more ambitious initial step-down as considered in the April 10 staff presentation will help to expedite investments in low-carbon fuels and serve to maximize California's potential for emissions reduction in the transportation sector. This multifaceted approach aligns with Joby's commitment to sustainable aviation and complements the broader initiatives aimed at achieving California's environmental objectives.

## **Joby Encourages CARB to Explicitly Include Electric and Hydrogen Aviation for Capacity Credits**

Joby supports staff's proposed amendments to the LCFS from December 2023, which expand the existing capacity credits for light-duty to now include medium- and heavy-duty (MHD). Joby is appreciative of both capacity credits: (1) MHD Direct Current (DC) Fast Charging Infrastructure (FCI) and (2) MHD hydrogen refueling infrastructure (HRI). As outlined, the "MHD provisions will provide LCFS credits for the unused refueling capacity at eligible stations and sites, which will naturally phase out as more vehicles become operational and vehicle refueling demand increases."<sup>6</sup>

Joby is particularly supportive of the proposed expansion of the MHD-HRI and MHD-FCI provisions to include private infrastructure in addition to public infrastructure.<sup>7</sup> However, to ensure the LCFS decreases the CI of California's transportation fuel pool and provides

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<sup>4</sup> Joby Aviation Comments to Proposed Low Carbon Fuel Standard Amendments (lcfs2024) - 45 Day. Available at: [https://www.arb.ca.gov/lispub/comm/iframe\\_bccomdisp.php?listname=lcfs2024&comment\\_num=7006&virt\\_num=331](https://www.arb.ca.gov/lispub/comm/iframe_bccomdisp.php?listname=lcfs2024&comment_num=7006&virt_num=331)

<sup>5</sup> CARB 2022 Scoping Plan. Available at: <https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf>

<sup>6</sup> CARB, Staff Report: Initial Statement of Reasons at p. 28. Available at: <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/isor.pdf>

<sup>7</sup> CARB, Staff Report: Initial Statement of Reasons at p. 29. Available at: <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/isor.pdf>



an increasing range of low-carbon and renewable alternatives, Joby believes it is imperative that electric and hydrogen aviation is explicitly included within the relevant definitions. As currently defined, “private MHD-FCI charging site’ means an EV fast charging site that can be limited to be available only to MHD EVs under single ownership.”<sup>8</sup> Additionally, “private MHD-HRI station’ means a hydrogen refueling station that can be limited to be available only to MHD FCEVs under single ownership.”<sup>9</sup> These definitions, as currently stated, are unclear about the eligibility of electric and hydrogen aviation. Therefore, Joby urges CARB to explicitly include electric and hydrogen aviation within both definitions. In doing so, the LCFS program can incentivize the decarbonization of aviation within the transportation sector and, in doing so, drive progress towards achieving California’s climate targets.

The inclusion of electric and hydrogen aviation will likely have national impacts given that California policy frameworks are often used as models for federal legislation. California’s LCFS is also often replicated by other states. To date, four states have adopted similar clean fuel programs and an additional eight states have pending policies.<sup>10</sup> Therefore, the explicit inclusion of electric and hydrogen aviation can help set precedent for a cleaner aviation sector nationally.

## Conclusion

In summary, Joby is appreciative of CARB staff for hosting the April 10, 2024, Workshop and looks forward to working with CARB on achieving California’s zero-emission aviation and larger climate goals.

Sincerely,

/s/ George Kivork

George Kivork

Head of U.S. State & Local Policy

Joby Aviation

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<sup>8</sup> CARB, APPENDIX A-1 Proposed Regulation Order Proposed Amendments to the Low Carbon Fuel Standard Regulation at p. 21. Available at:

[https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/lcfs\\_appa1.pdf](https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/lcfs_appa1.pdf)

<sup>9</sup> Ibid.

<sup>10</sup> David M. McCullough, Matthew W. Morrison, Elorm K. Sallah, Steve R. Brenner, “Revving Up: Eight States in Gear with Low-Carbon Fuel Standard Legislation,” April 2024. Available at:

<https://www.pillsburylaw.com/en/news-and-insights/eight-states-low-carbon-fuel-standard-legislation.html#:~:text=In%20March%202024%2C%20New%20Mexico,fuel%20standard%20legislation%20or%20regulations.>