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STATE OF AVIATION *Decarbonization*

State Policy Options to Regulate Carbon Emissions from Aviation and Federal Preemption Risk

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MARCH 2025 | POLICY REPORT

STATE OF AVIATION DECARBONIZATION

State Policy Options to Regulate Carbon Emissions from Aviation and Federal Preemption Risk

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I. INTRODUCTION & EXECUTIVE SUMMARY

Aviation is a significant and growing source of greenhouse gas emissions, but the federal government in the United States has failed to address it so far. In response, some states are now considering legal avenues to effectively require the use of sustainable aviation fuels, which emit less carbon than traditional jet fuel when burned. Opponents will undoubtedly argue that such initiatives conflict with federal law. This report provides an in-depth analysis of these legal issues. It ultimately concludes that well-designed state initiatives have a good chance of surviving legal challenges, and it offers strategies to reduce the likelihood of successful challenges.

The significance of the problem is clear. The global aviation sector emits approximately 915 million metric tons of carbon dioxide (CO_2) each year, accounting for 2.5 percent of global carbon dioxide (CO_2) emissions and growing.[1] Non-CO_2 emissions, such as emissions of fine particulate matter (PM 2.5) that cause contrails that reflect and trap solar radiation and create a warming effect, raise the total impact further, accounting for approximately two-thirds of aviation's overall climate impact. As demand for air travel increases with global economic development, the need to decarbonize this sector to meet state, national and global climate goals will only become more urgent.

The sector is notoriously difficult to decarbonize, as no clear, commercially available technological solution exists to reduce all types of aircraft emissions, given the weight of the planes, energy density required of jet fuel, and vast distances between many destinations. Yet the industry has multiple options to pursue, with a need to begin investment now so that commercially available, affordable lower-carbon flight options will be ready in the coming decades.

These options largely depend on the advancement of sustainable aviation fuel, or SAF (as well as new zero-emission aviation technologies such as battery- or hydrogen-powered aircraft).[2] While no single definition exists, sustainable aviation fuel that reduces carbon emissions from jet engines comes in two basic categories:

- Biogenic fuel made from non-petroleum-based ingredients, such as woody biomass and fats, greases, and oils, which can be blended with conventional jet fuel at different levels.[3]
- Synthetic hydrocarbon jet fuel, utilizing zero-emission hydrogen and captured carbon (such as from direct air capture facilities or biomass) to create a

synthetic hydrocarbon jet fuel that could burn in conventional jet engines without requiring any modifications.

Despite the urgent climate need and promising technology solutions, policymakers in the United States have not passed major legislation requiring the use of these alternative fuels. Some international action has occurred through the International Civil Aviation Organization (ICAO), a United Nations (UN) agency made of 193 member countries that agreed to a long-term aspirational goal of net-zero carbon dioxide (CO_2) emissions from aviation by 2050. Participants at the third meeting of ICAO's Conference on Aviation Alternative Fuels (CAAF/3) further agreed to a global aspirational goal to reduce greenhouse gas emissions by 5% by 2030 via sustainable aviation fuel. In addition, some airline companies have pledged various decarbonization targets and begun to procure biogenic-based sustainable aviation fuel to blend into conventional jet fuel. The federal government and some states have also begun offering incentives for the production of sustainable aviation fuels.

But a voluntary or incentive-only approach will have limits in achieving the goal of long-term decarbonization. Given federal inaction, states like California have begun exploring mandates for the use of sustainable aviation fuel. Yet states can only require sustainable aviation fuel if they can avoid having federal courts declare these approaches preempted under the U.S. Constitution and other federal and international laws governing aviation. Preemption is a broad doctrine that essentially prevents state and local governments from passing laws or regulations in areas where the federal government has already acted, unless they have explicit approval to proceed.

This report presents three major possible state-based approaches to decarbonizing aviation:

1. regulation via a low carbon or clean fuel standard (which creates a carbon intensity target for all fuels, with low-carbon fuels that fall below the threshold generating credits that can be sold, while those above the benchmark create deficits);

2. state and local plans that implement the federal Clean Air Act (specifically, indirect source rules on airports that would require reduction of co-pollutants from airport mobile sources, including aircraft emissions due to burning high-carbon fuels); and

3. state authority to tax and impose fees on high-carbon aviation fuel, in order to discourage their consumption and instead provide revenue that can fund use and deployment of lower-carbon alternatives.

The report then assesses the risk to each of these approaches of federal preemption or constitutional claims. Specifically, it analyzes the potential preemptory scope of the three major federal statutes related to aviation:

- Federal Aviation Act;
- Airline Deregulation Act; and
- Clean Air Act.

It also examines how a legal doctrine referred to as the Dormant Commerce Clause could affect these approaches.

Ultimately, this analysis concludes that all three approaches could be viable and withstand judicial scrutiny of preemption risks under the three statutes and the Dormant Commerce Clause, provided policymakers include a number of safeguards. These safeguards include:

1. refraining from any distinction between intra- and interstate flights;
2. regulating fuel – not emissions – from aircraft or jet engines;
3. avoiding any reference to routes or services and gathering evidence that the proposed policy will not have a significant effect on airfare retail prices;
4. omitting any fuel requirements that may implicate aircraft safety; and
5. ensuring that any regulation does not facially discriminate against out-of-state interests while documenting the important environmental problems in the state that aviation regulations could help alleviate.

The three possible state-based policy approaches entail differing levels of risk and potential impact:

STATE POLICY	RISK OF PREEMPTION	POTENTIAL IMPACT
LOW CARBON FUEL STANDARD	Highest risk given the novelty of this approach	Most impactful to advance sustainable aviation fuel deployment
CLEAN AIR ACT REGULATION	Least risk given the established nature of this approach	Potentially least impactful given the indirect nature of this type of regulation on aviation fuel
INCREASED TAXATION OR FEES ON HIGH-CARBON JET FUEL	Moderate legal risk, depending on its structure	Could have a significant impact on sustainable aviation fuel if revenues support deployment of low-carbon alternatives

To act on these options, states could:

- Develop a low carbon fuel standard (if they do not already have one in place) and require jet fuel providers to meet the standard as part of a generally applicable rule for all fuel sold in the state, rather than distinguishing between intra and interstate flights; and require a corresponding reduction in the carbon content of fossil jet fuel that would not significantly impact prices or routes, affect safety, or require any modification to jet engines.[4]
- Use their indirect source rule authority under the Clean Air Act to incorporate local air district indirect source rule requirements on airports into the state implementation plan, which would require co-pollutant reductions from aircraft that could also decrease greenhouse gas emissions, provided the requirements do not significantly impact prices, routes and services.

- Promulgate a statewide indirect source rule on all airports and incorporate it into the state implementation plan.

State legislatures, local governments, and airports could:

- Institute and increase taxes and/or landing fees on high-carbon jet fuel and use the revenue to fund sustainable aviation fuel incentives, provided that any fees are commensurate with likely impacts from the use of high-carbon fuels.

Local air districts could:

- Impose an indirect source rule on airports within their jurisdiction that would target "criteria pollutants" under the Clean Air Act and potentially result in greenhouse gas emissions reductions from aircraft as a co-benefit, provided the impact is not significant on prices, routes and services.

Finally, these preemption risks could all be avoided if the U.S. federal government were to develop a comprehensive and meaningful national program to require decarbonization of the aviation sector.

The following sections provide a more detailed overview of the constitutional provisions, federal laws, regulation of analogous sectors, and specific solutions with safeguards for California and other state policymakers to pursue.

II. PREEMPTION: CONTEXT & OVERVIEW OF THREE FEDERAL AVIATION-RELATED STATUTES & CONSTITUTIONAL PROVISION

This section provides a basic overview of federal preemption. It then describes the three main federal statutes related to aviation (Clean Air Act, Aviation Deregulation Act, and Federal Aviation Act) and a legal doctrine (the Dormant Commerce Clause) that could implicate federal preemption of state action on sustainable aviation fuel. None of these statutes would clearly preempt state-based jet fuel regulation on their face, although courts have not yet addressed this question directly. In addition, California's signature fuels regulation (the Low Carbon Fuel Standard) has already survived a challenge under this constitutional doctrine.

PREEMPTION BACKGROUND: US CONSTITUTION AND FEDERAL STATUTES

Federal preemption is rooted in the Supremacy Clause (Article 6, Clause 2) of the United States Constitution, which nullifies state laws that "'interfere with, or are contrary to,' federal law."[5] Preemption may be either "express," in which Congress preempts state law by stating so in express terms in federal law,[6] or "implied," where a statute has no explicitly preemptive language, but courts assume Congressional intent to preempt state law where "the scheme of federal regulation is sufficiently comprehensive to make reasonable the inference that Congress 'left no room' for supplementary state regulation."[7] Courts can also infer congressional preemption of a whole field where "'the federal interest is so dominant that the federal system will be assumed to preclude enforcement of state laws on the same subject.'"[8] And finally, state law is also preempted where it conflicts with federal law, such that compliance with both is impossible.[9]

The risk of preemption for states like California that want to address aviation emissions is greater than with other transportation sectors, given the three major federal statutes related specifically to aviation and the lack of a waiver provision in federal law for California (and other states that join it to exceed federal standards) to regulate mobile source tailpipe emissions under the Clean Air Act. However, the scope of federal

preemption in the aviation context is still unclear, and multiple pathways exist for states to develop policies to begin the process of decarbonizing this sector in the absence of federal leadership.

STATUTE #1: FEDERAL CLEAN AIR ACT

The federal Clean Air Act, which governs emissions of air pollutants including greenhouse gases, includes an express preemption clause related to independent state or local regulation of aviation emissions, though not of jet fuel. Section 233 states that "[n]o State or political subdivision thereof may adopt or attempt to enforce any standard respecting emissions of any air pollutant from any aircraft or engine thereof unless such standard is identical to a standard applicable to such aircraft under this part."[10] The term "air pollutant" is defined as "any air pollution agent or combination of such agents… which is emitted into or otherwise enters the ambient air" and any precursors to air pollutants (and has also long been understood to include greenhouse gases).[11]

While the exact scope of Section 233 preemption is unclear, as few federal courts have analyzed it and few cases cite it, the primary and most relevant case indicates that this preemptive effect would only implicate state regulation of air pollution that affects aircraft engine design, operation, or performance – as opposed to the fuels used in the engine. Notably, the statute does not mention state regulation of fuel. In fact, the U.S. Environmental Protection Agency (EPA), which implements the Clean Air Act, has concluded in multiple documents over the years that it does not have jurisdiction over jet fuel.[12]

The most relevant case testing this provision is *California v. Dep't of Navy*, 624 F.2d 885 (9th Cir. 1980), in which the state of California attempted to regulate emissions from aircraft engines being tested by the U.S. Navy. At several locations in California, the Navy tested standalone jet engines within large concrete "U" shaped structures called test cells, which held the engine in place during testing and housed the testing equipment. Standard cells were 85 feet long with 60-foot-tall towers at each end for air to enter and exhaust to exit. The engine testing produced emissions through the towers, which sometimes violated local clean air standards incorporated in the State Implementation Plan under the Clean Air Act, leading California to sue for compliance. The district court found no preemption because while the state could not regulate emissions from aircraft or aircraft engines and therefore could not regulate – either directly or indirectly – modifications to aircraft "engine design or attachments" for pollution control, the state could regulate emissions from the physical test cell structure.[13]

The U.S. Navy argued that the emissions exiting the test cells were from the jet engines themselves and therefore could not be regulated by the state. The district court, however, analogized the test cells to factories that emit pollution,[14] and it concluded that regulating emissions from the test cells, like regulating factory emissions, was permissible[15] as "the focus of Section 233 is preemption of state regulation of the *engine* [emphasis in original] and not preemption of state regulation of emissions once they have left the engine."[16]

The district court granted equitable relief, ordering the Navy to meet the relevant air quality standards. The Navy then appealed. The Ninth Circuit upheld the District Court's preemption analysis and reasoning and synthesized the District Court's test as follows:

"if …state pollution regulations can be met without affecting the design, structure, operation, or performance of the aircraft engine, then the state emission regulations are not preempted by § 233."[17] Because federal law was designed to promote aviation safety and uniform standards, and the state regulations at issue did not necessitate alteration of the aircraft engine, the court found no preemption.[18]

The result in this case indicates that federal law would not preempt a state emission regulation that does not affect engines. Though the facts regarding testing equipment are somewhat distinct from a regulation governing fuels, presumably this analysis would similarly extend to any fuel regulation as well.

STATUTE #2: AIRLINE DEREGULATION ACT (ADA)

The Airline Deregulation Act (ADA) of 1978 was an effort to prevent states from attempting to economically oversee airline companies; it was passed to deregulate the airline industry and create a nationwide level playing field.[19] To achieve this end, the Airline Deregulation Act contains an express preemption clause prohibiting a state from enacting or enforcing a law or regulation "related to a price, route, or service of an air carrier."[20] This report will refer to such impacts as "operational," and thus state or local laws or regulations that are "non-operational" in nature (i.e. not "related to a price, route or service") would likely not be preempted under the Airline Deregulation Act.

A large body of caselaw addresses airline-related issues and preemption under the Airline Deregulation Act. Ninth Circuit caselaw clearly carves out generally applicable regulations on matters such as employment practices and environmental regulations of trucks that serve multiple uses (including airlines)[21] from Airline Deregulation Act preemption. In particular, one Ninth Circuit decision defined the Airline Deregulation Act preemption test as whether a state law either "bears a reference to rates, routes, or services" or "directly or indirectly, *binds* the carrier to a particular price, route, or service and thereby interferes with the competitive market forces within the industry."[22] If not, the Airline Deregulation Act does not preempt the state regulation.

A clear body of Ninth Circuit case law concerning employment law exists in which state regulation does not trigger Airline Deregulation Act preemption, due to its general (i.e. non-aviation specific) applicability and lack of significant impacts on prices, routes and services.[23] For example, in *Ward v. United Airlines*, 986 F.3d 1234 (9th Cir. 2021), the court explained that "although the ADA has a 'broad pre-emptive purpose,' it does not preempt state laws that affect airline rates, routes, or services in only a 'tenuous, remote, or peripheral' manner."[24] As the court summarized: "Laws that apply to airline employees only as they apply to all members of the general public typically fall into [a] non-preempted category."[25] Similarly, in *Air Transp. Ass'n of Am., Inc. v. Wash. Dep't of Labor & Indus.*, 859 F. App'x 181 (9th Cir. 2021), the court held that a Washington state paid sick leave law was not preempted by the Airline Deregulation Act because the state law did not concern the relationship between the carrier and the customer, or prescribe specific prices, routes, or services.[26]

Thus, whether state regulation merely affects prices does not seem to be determinative. Rather, the test in the Ninth Circuit Court of Appeals appears to be whether or not the regulation is generally applicable; whether it has a "significant impact" on prices, routes, or services; whether it attempts to regulate the relationship between the

carrier and the customer; or whether it binds the airlines or prescribes specific prices, routes, or services.

While the Ninth Circuit has shielded state employment laws from Airline Deregulation Act preemption, other types of complaints seem less clear-cut. A few examples from other circuits help illustrate that state or local laws that significantly affect pricing are preempted:

- State law negligence claims, perhaps due to the significant economic costs that liability could bring (in this case, a passenger alleged negligence under state law for lack of adequate leg room to prevent deep vein thrombosis [DVT] and failure to warn about DVT).[27]
- State wage claims directly targeting prices and services (in this case, skycaps alleged under state law that Jet Blue's mandatory curbside check-in fee had caused their pay to drop substantially, but the court held the claim was preempted under the Airline Deregulation Act because the plaintiffs sought to change "the airline's setting [and collecting] a *price* for a *service* provided to its customers.") (emphasis in original).[28]

On the other hand, courts have decided that the following were *not* preempted under the Airline Deregulation Act:

- A common law contract claim related to an airline's points program, perhaps due to its relatively minimal impact on pricing.[29]
- Alleged misconduct by employees of air carrier unrelated to price, route, or service.[30]

These cases underscore that courts typically find that generally applicable laws and regulations that do not have a significant operational effect on airlines typically are not preempted by the Airline Deregulation Act. As a result, state regulations that do not directly target aviation but rather fuels in general or a variety of co-pollutants from airports are much more likely to avoid preemption.

STATUTE #3: FEDERAL AVIATION ACT

The Federal Aviation Act (FAA) vests general regulatory authority over airlines and aircraft in the Federal Aviation Administration.[31] The Federal Aviation Act was first enacted in 1958 and recodified under the Federal Aviation Administration Authorization Act of 1994.

The agency plays an important role in regulating aviation safety, including jet fuel. Under federal law (through 49 U.S.C. § 44714), the Federal Aviation Administrator "shall prescribe" certain standards and regulations "for the composition or chemical or physical properties" of "aircraft fuel or fuel additive" when the U.S. Environmental Protection Agency (EPA) has made an endangerment finding regarding certain aircraft emissions.[32] Thus, after EPA makes an endangerment finding and sets emission standards, the Federal Aviation Administrator is required to issue standards and regulations for enforcement of those standards.

EPA issued an endangerment finding on aircraft greenhouse gas emissions in 2016[33] and promulgated a rule in consultation with the Federal Aviation Administration addressing greenhouse gas emissions from certain aircraft in 2021.[34] EPA also issued a draft endangerment finding on leaded aviation fuel in October 2022,[35] which was finalized in October 2023.[36] Lastly, EPA has issued final rules regarding particulate matter (PM) emission standards and test procedures for some engines used by civil subsonic jet airplanes.[37]

To ensure compliance with EPA's greenhouse gas emission standards, the Federal Aviation Administration has initiated[38] (but not concluded)[39] a rulemaking on these emissions from aircraft. The scope of the proposed rule is the same as the International Civil Aviation Organization aircraft carbon dioxide standard[40] and applies to 1) covered aircraft that are manufactured after January 1, 2028; 2) new type certification; and 3) an airplane modification that triggers the criteria.[41] Aircraft that would be covered under this new regulation include: the future Boeing 777-X; new versions of the 787 Dreamliner; the Airbus A330-neo; business jets such as the Cessna Citation; and civil turboprop airplanes such as the ATR 72 and the Viking Limited Q400.[42] Importantly, the Federal Aviation Administration's rule would not apply to planes already in service.[43]

The Federal Aviation Act could theoretically enable a broad application of preemption doctrine on the rationale that Congress intended to centralize in federal authority the power to frame rules for the safe and efficient use of the nation's airspace. However, case law on the scope of the preemption effect of the Federal Aviation Act is not directly on point for state regulation of sustainable aviation fuel. For example, a 1973 U.S. Supreme Court case found preemption under the Federal Aviation Act when the city of Burbank banned overnight departures from its airport.[44] In its decision, the Court pointed to the record showing that ordinances banning overnight flights would in fact increase congestion, decrease efficiency, and increase noise – areas in which the Federal Aviation Administration had already regulated in a "pervasive nature." [45]

Furthermore, the Ninth Circuit found in at least one case that federal regulations of aviation safety were not comprehensive enough to preempt state employment law. In *Bernstein v. Virgin Am., Inc.*, 3 F.4th 1127, 1141 (9th Cir. 2021), in which flight attendants sued their employer for violations of California employment law, including minimum wage, overtime, and meal and rest break violations, the Court concluded that "federal regulation governing maximum duty periods for flight attendants, does not resemble the type of comprehensive regulation or contain the pervasive language that we consider necessary to discern congressional intent to occupy the field."[46] The Court furthermore found that "[w]hen a single regulation has triggered field preemption, our court has highlighted the regulation's 'exhaustive' level of detail."[47]

As a result, given the lack of Federal Aviation Administration action to date on fuels regulations, particularly for low- or no-carbon fuels (either a rulemaking or completed rule), field preemption likely would not apply. Furthermore, state regulation of fuels would likely implicate Federal Aviation Act preemption only if such regulations raised safety concerns.

U.S. CONSTITUTION: DORMANT COMMERCE CLAUSE CHALLENGE

State-based regulation of sustainable aviation fuel could be challenged as unconstitutional under the Commerce Clause, which granted Congress exclusive authority over interstate commerce. It limits the regulatory authority of states to intrastate commerce through the "Dormant Commerce Clause'" doctrine. "[A]lthough a state has power to regulate commercial matters of local concern, a state's regulations violate the Commerce Clause if they are discriminatory in nature or impose an undue burden on interstate commerce . . . ."[48]

To determine if a state regulation violates the Dormant Commerce Clause, courts ask if the regulation directly burdens interstate commerce or explicitly discriminates against out-of-state interests. If so, the regulation typically will be struck down. On the other hand, if the regulation only incidentally burdens interstate commerce, courts review it under the "*Pike* balancing test" to determine if the burdens it imposes so outweigh the benefits as to render the regulation unreasonable or irrational.[49]

California's signature fuels regulation (the Low Carbon Fuel Standard, or LCFS) has already faced and survived a constitutional challenge under this provision, providing a basis for extending that regulation to jet fuel. When the California Air Resources Board first promulgated the Low Carbon Fuel Standard, industry petitioners challenged it as a violation of the Dormant Commerce Clause. They argued that it interfered with interstate commerce because it discriminated against products made in other states, such as corn-based ethanol. A district court found that the standard violated the Dormant Commerce Clause, but the Ninth Circuit disagreed, ruling that the standard's ethanol regulation did not facially discriminate against out-of-state commerce; that its initial crude oil provisions did not discriminate against out-of-state crude oil in purpose or practical effect; and that it did not violate the Dormant Commerce Clause prohibition on extraterritorial regulation.[50]

In response to renewed industry challenges to a revised version of the standard, the Ninth Circuit again held that the standard did not run afoul of the Dormant Commerce Clause.[51] The court rejected the argument that the standard was motivated by a concern for environmental harms in other states, stating: "California did not enact the LCFS because it thinks that it is the state that knows how best to protect Iowa's farms, Maine's fisheries, or Michigan's lakes."[52] The court said California's interest in lifecycle emissions arose from its concern about climate change's impacts on California and that the Low Carbon Fuel Standard was therefore "a classic exercise of police power."[53] The court emphasized that California was attempting "to address a vitally important environmental issue with vast potential consequences" and that it could not offer "a potential solution to the perverse incentives that would otherwise undermine any attempt to assess and regulate the carbon impact of different fuels … without the ability to differentiate the different production processes and power generation that are used to produce those fuels."[54]

California's regulation of ocean-going vessel fuels also survived a challenged under this provision, further underscoring the constitutionality of state-based regulation of jet fuel. The California Air Resources Board in 2007 began enforcing its "Marine Vessel Rules," which aimed to curb emissions from the auxiliary diesel engines of ocean-going vessels within twenty-four miles of California's coast by mandating that operators use low-sulfur fuel or otherwise limit emissions at or below the level of

emissions that would result from using low-sulfur fuel. The Marine Vessel Rules were initially invalidated based on Clean Air Act and Submerged Lands Act preemption challenges, as the Ninth Circuit found the rules to be emission standards and not in-use requirements.[55] (Rather than simply regulating the content of the fuel used by ships, the rules prohibited the operation of engines which would have higher emissions than engines using low-sulfur fuel—thus imposing a quantifiable emissions limit which was preempted by Section 209(e) of the Clean Air Act.)

California subsequently adopted new "Vessel Fuel Rules," which limited the sulfur content of marine gas oil and marine diesel oil used by oceangoing vessels within 24 miles of the state's coastline and provided that the limits would sunset as soon as federal sulfur limits went into effect. The board then took additional steps to limit shipping-related emissions, by issuing its "At-Berth Rule" in 2022, an expansion of a 2007 rule. The regulation requires that vessels coming into a regulated California port either use shore power (e.g., plug in to the local electrical grid) or a CARB-approved control technology to reduce harmful emissions like a capture-and-control technology (for example, a duct that connects to a vessel's exhaust and "captures" emissions).

Industry interests then raised Dormant Commerce Clause arguments in challenges to California's Vessel Fuel Rules. They argued that the rules violated the Dormant Commerce Clause because they required ocean-going vessels to switch to cleaner fuels 24 miles from California's coast, which is outside the 3-mile state territorial limit set by the Submerged Lands Act. The Ninth Circuit upheld the rules, holding that they do not apply to commercial activities occurring "wholly outside" of the territorial limits of California; rather, they continue to govern the fuel use of ocean-going vessels traveling to and from California's ports while they are within the state's own territorial waters.[56] It emphasized the state of California's "especially powerful interest in controlling the harmful effects of air pollution resulting from the fuel used by ocean-going vessels while they are within 24 miles of the state's coast" and highlighted the "highly damaging and even life-threatening effects of this air pollution on the people of California as well as the clear benefits resulting from the regulations adopted by CARB."[57] It found that California's exceptionally powerful state interest in protecting the environment far outweighed any countervailing federal interests, and thus held that the Dormant Commerce Clause did not bar California from exercising its own police powers in order to combat severe environmental problems.[58]

These precedents reinforce the need for any state regulation to avoid facially discriminating against out-of-state interests. At the same time, state policy makers need to document the important environmental problems that aviation pollution causes to the state that regulations could help alleviate, with any harm caused by the regulation to be outweighed by the benefits.

Ultimately, this analysis indicates that there is no open-and-shut case for preemption under the three statutes or the Dormant Commerce Clause. State regulators may be best served by:

1) refraining from any distinction between intra and interstate flights to avoid Airline Deregulation Act preemption risk by making the regulation more generally applicable;

2) regulating fuel, not emissions from aircraft or jet engines, to avoid Clean Air Act preemption, which implicates regulations that affect engines but not fuels;

3) avoiding any reference to routes or services and gathering evidence to show minimal impact to prices to avoid Airline Deregulation Act preemption of state or local policies that reference or impact these operational aspects;

4) omitting any requirements that implicate aircraft safety that would otherwise trigger Federal Aviation Act preemption (for example, a stringent regulation that might result in high [<50% by volume] sustainable aviation fuel blending, which some experts believe might trigger engine safety concerns); and

5) ensuring that any regulation does not facially discriminate against out-of-state interests and documenting the important environmental problems in the state that aviation regulations could help alleviate, while arguing that those benefits clearly outweigh any incidental burdens on out-of-state commerce, to avoid Dormant Commerce Clause challenges.

The following sections assess the three major possible state-based approaches to decarbonizing aviation (a low carbon or clean fuel standard, state and local implementation of the federal Clean Air Act, and tax and fees on high-carbon aviation fuel) and how state policymakers could craft them to mitigate preemption risk under the three major federal statutes and Dormant Commerce Clause.


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III. THREE STATE POLICY OPTIONS TO REGULATE JET FUEL: LOW CARBON FUEL STANDARD, CLEAN AIR ACT REGULATION, AND TAXATION OF FOSSIL JET FUEL

This section assesses three potential pathways for state-based regulation of aviation fuel, analyzing various options given the potential preemption risks described above.

The first policy option is to initiate or expand a low carbon fuel standard for aviation fuel. This policy would be the most impactful in terms of advancing deployment but potentially entails the most legal risk of the three pathways, given the novelty of the approach and potential impacts on aircraft operation. The second option is Clean Air Act regulation of aviation co-pollution, which might have the least legal risk given the established nature of this approach but also potentially the least impact in terms of actually ensuring uptake of sustainable aviation fuel. The third option is increased taxation of (or fees on) high-carbon jet fuel, which only faces a moderate amount of legal risk, depending on its structure, and could have a significant impact on promoting sustainable aviation fuel, depending on its form and if the revenues support sustainable aviation fuel research and deployment.

STATE POLICY OPTION 1: A LOW CARBON FUEL STANDARD FOR ALL FUELS INCLUDING AVIATION, PROVIDED THE STANDARD AVOIDS OPERATIONAL IMPACTS ON AIRCRAFT

As part of efforts to reduce the state's greenhouse gas emissions, the California Air Resources Board (CARB) pioneered the Low Carbon Fuel Standard (LCFS). This program, one of a suite of efforts to improve air quality and curb global warming in California, is intended to lower the carbon intensity of transportation fuels sold in the state and promote low-carbon and renewable alternatives. The regulation was approved in 2009 and initiated in 2011.[59] Since then, Oregon, Washington and New Mexico have also implemented a version of the low carbon fuel standard. Importantly, any state is legally able to adopt a similar policy and apply it to aviation fuel.[60]

In California, the Low Carbon Fuel Standard works on a credit-based system. Fuels are given a carbon intensity score and then compared with a carbon intensity benchmark, which decreases annually. Low-carbon fuels that fall below the benchmark create credits, while those above the benchmark create deficits. Fuel suppliers in California must meet the carbon intensity benchmark each year through a variety of means, including by earning credits or buying credits that offset their deficits.[61]

Currently, California policymakers exempt jet fuel from the Low Carbon Fuel Standard. Consequently, jet fuel providers do not create deficits under the standard,[62] although they can voluntarily produce jet fuel alternatives like sustainable aviation fuel to generate credits, which they can then sell.[63] If included in the Low Carbon Fuel Standard, fossil jet fuel would create deficits for producers, who would then need to offset those deficits. They could do so by buying and using a blend of fuels that includes a jet fuel replacement, like sustainable aviation fuel; using alternative technologies for jet propulsion, such as battery-powered motors or hydrogen fueled-aircraft; or by purchasing credits from fuel producers. As a result, folding jet fuel into the standard could be one pathway to ensure reduced carbon emissions from aircraft and help promote greater investment in sustainable aviation fuel more broadly.[64]

In December 2023, California Air Resources Board staff released a proposal to eliminate the exemption for *intrastate* conventional jet fuel (defined as fuel consumed during any flight that takes off and lands within the state) to include it as a regulated fuel in the Low Carbon Fuel Standard.[65] However, in August 2024, agency staff reversed course, reinstating the jet fuel exemption. Agency personnel explained that under the initial proposal, jet fuel suppliers could have avoided needing to actually provide low-carbon fuel to airplanes by buying credits from an entity with surplus credits to sell. However, they emphasized that the agency "remains committed to finding effective ways to reduce emissions from the aviation sector through the production and use of cleaner aviation fuels and other low-carbon alternatives to fossil jet fuel." The agency's board then approved the final amendments in November 2024.

Any future amendments to the standard that obligates jet fuel could engender legal challenges. This section of the report provides recommendations for the California Air Resources Board and any other state regulator considering developing a similar policy. It then assesses the risk of preemption risks under the three major federal statutes related to aviation, with a focus on Ninth Circuit case law.

Recommendation: Extend the Low Carbon Fuel Standard to all fuel, including aviation, provided it does not significantly impact aircraft operations

Based on relevant federal statutes and case law, state regulation of aviation fuel through inclusion in the Low Carbon Fuel Standard program does not seem to be automatically preempted by federal law. If state regulators seek to move forward with a regulatory program, key issues for further analysis and factual development would include:

- Whether use of sustainable aviation fuels (as well as any other means of low carbon fuel standard compliance) would affect the "design, structure, operation, or performance of the aircraft engine" under the Clean Air Act and related case law. While no case law appears to discuss the relationship between fuels and aircraft engines, opponents could argue that at least some

of the means of compliance, such as blending sustainable aviation fuel with fossil jet fuel, will affect engine performance by identifying differences in efficiency or by pointing to reduced emissions as a measure of "performance." Regulators would likely need to develop technical evidence demonstrating the like-for-like capacity of sustainable aviation fuel as a drop-in fuel.

- The extent to which compliance with the Low Carbon Fuel Standard, such as by purchasing more sustainable aviation fuel, using alternative propulsion technologies, or buying credits, would directly and significantly impact airlines' prices and routes under the Airline Deregulation Act and related case law.
- The extent to which compliance with the standard would directly affect aviation safety under the Federal Aviation Act and related case law.
- Tracking the Federal Aviation Administration's rulemaking on greenhouse gas emissions from aircraft[66] and leaded jet fuel from piston engine aircraft[67] and developing further analysis with respect to potential preemption challenges under 49 U.S.C.S. § 44714.

Crafting the regulation with these factors in mind would help limit preemption risk from the three major aviation-related statutes (Clean Air Act, Aviation Deregulation Act, and Federal Aviation Act), analyzed in the following section.

Clean Air Act Analysis: Preemption avoided by regulating fuel, not jet engine emissions

As discussed, under Section 233 of the Clean Air Act (42 U.S.C. § 7571 et seq.), states are prohibited from regulating emissions from aircraft or aircraft engines.[68] To steer clear of Clean Air Act preemption, a low carbon fuel standard rule encompassing aviation would need to avoid any requirements that impact the design, structure, operation, or performance of the aircraft engine.

The airline industry group Airlines for America (A4A) has challenged this approach, citing Section 233 in comments to the California Air Resources Board as evidence that the Clean Air Act bars the agency from regulating conventional jet fuel in the Low Carbon Fuel Standard:

> [S]ection 233 of the Clean Air Act explicitly preempts states and their political subdivisions from 'adopt[ing] or attempt[ing] to enforce any standard respecting emissions from any aircraft or engine thereof unless such standard is identical to a standard' established under section 231, which requires that the FAA be consulted on any aircraft engine emission standards proposed by the U.S. Environmental Protection Agency (EPA).[69]

Yet the plain language of 42 U.S. Code § 7573 implies that if a state is not regulating "emissions," but rather regulating fuel, then preemption does not apply. Ninth Circuit caselaw has not addressed this question directly beyond the aforementioned *California v. Dep't of Navy* (which involved state regulation of emissions from aircraft engines being tested in standalone concrete "test cells"). Because the court's decision in *California v. Dep't of Navy* largely turned on the specific facts of the case, it noted that lower courts should evaluate preemption on a case-by-case basis. As mentioned, the court emphasized that test cells are stationary sources, and thus preempting state

regulation of test cells would not serve the purpose underlying the Clean Air Act's "federal 'moving source' preemption" – i.e., the need for uniform emissions standards for mobile sources.

Given that the Clean Air Act preempts direct state regulation of aircraft emissions and the design and performance of the engine, rather than regulation of fuel content, proponents of aviation fuel regulations could rely on expert technical opinions showing that compliance with the Low Carbon Fuel Standard would not affect aircraft engines. For example, compliance by purchasing credits or using alternative propulsion technologies does not relate to engine design or performance. Furthermore, compliance via sustainable aviation fuel blending already occurs in existing aircraft at specific blend levels, with a number of airlines already running sustainable aviation fuel-powered commercial routes.

Airline Deregulation Act analysis: Preemption potentially avoided by not referencing routes and minimizing impact on prices

The Airline Deregulation Act (ADA) expressly preempts a state from enacting or enforcing a law or regulation "related to a price, route, or service of an air carrier" (abbreviated here as "operational impacts").[70] Airlines for America cited § 41713 as evidence that California regulation of conventional jet fuel is preempted but declined in its March 15, 2023, comment letter to the California Air Resources Board to elaborate on its analysis, beyond citing the statute.[71]

However, Title 49 section 41713(b)(3), reserves some powers to state and local control:[72]

> This subsection does not limit a State, political subdivision of a State, or political authority of at least 2 States that owns or operates an airport served by an air carrier holding a certificate issued by the Secretary of Transportation from carrying out its proprietary powers and rights.

The U.S. Supreme Court and Ninth Circuit have not yet created a judicial test for whether or not a state or local regulation is "related to" a price, route, or service, yet they have noted that any policy that has a "significant impact" could be preempted. The U.S. Supreme Court held in *Morales v. TWA* that state guidelines governing advertisements of fares "quite obviously" were "related to" fares.[73] Furthermore, Justice Scalia, writing for the majority, noted that the plain language of the Airline Deregulation Act preemption clause "express[es] a broad pre-emptive purpose."[74] The opinion did register, and subsequent opinions have noted, the Supreme Court's disapproval of the "significant impact" that the advertising guidelines in question would have had upon "the airlines' ability to market their product, and hence a significant impact upon the fares they charge."[75] The detailed history of the Airline Deregulation Act chronicled in *Morales* further makes it clear the Court understood that Congress's focus in the act was squarely on commercial practices and the aviation industry as a whole, rather than on specific aspects of aviation such as aircraft engines and fuels.

Lower courts have since attempted to define the scope of *Morales* and the subsequent *American Airlines v. Wolens*, 513 U.S. 219 (1995), and the Ninth Circuit has its own string of cases interpreting *Morales* and related Supreme Court case law on Airline Deregulation Act preemption. In the Ninth Circuit, the key inquiry seems to be how directly and significantly the state regulation impacts an airline's prices, routes, or

services. Modeling that sheds light on how much state regulation of conventional jet fuel would realistically affect the airlines' economics (assuming access to data like airline financial records) would likely be helpful in deciding this question. While the industry will argue that any increase will fundamentally affect their bottom lines, they would have to present credible evidence and overcome case law that illustrates that the effect must be "significant." To prevail, a state would likely need to be able demonstrate that the impacts on operations are minimal and that regulation of conventional jet fuel is closer to a generally applicable law, like the employment laws at issue in *Ward v. United Airlines*,[76] because the regulation applies to all fuels sold, supplied, or offered for sale in the state.

A court could potentially view state regulation of jet fuel, if broadly applied to all fuel sold in the state, as similar in kind to general employment law standards. Ninth Circuit caselaw indicates that generally applicable local and state regulation of sick leave, meal and rest breaks, and other employment laws do not trigger Airline Deregulation Act preemption, whereas using state law specifically to challenge airline pricing is preempted. To argue that state fuel regulation is similar to employment standards, a state would likely need to show that the inclusion of jet fuel in any regulatory scheme like the Low Carbon Fuel Standard ensures that the rule regulates all fuel in order to further the goals of improving the state's air and climate, whether the fuel goes into airplanes, trucks or any other currently regulated use.

Arguably, a regulation on jet fuel that does not set a fixed price but allows the market to determine compliance costs would not run afoul of preemption based on being 'related to price,' with potentially the same logic applying to a market-based regulation of fuel that does not specify specific routes or services. But perhaps the legally safest construction of a low carbon fuel standard that applies to aviation fuel would require setting a relatively low standard to ensure that the rule has a less-than-substantial, indirect impact on airline prices and routes to avoid Airline Deregulation Act preemption.

To minimize price impacts, one expert suggested in an interview for this report setting a low carbon fuel standard that would result in a compliance pathway involving a blend of 30% sustainable aviation fuel. This standard might then lead to per-gallon compliance costs for conventional jet fuel of 35 cents, or even less if airlines purchased credits to comply, given recent credit prices of approximately $50 per tonne. This amount arguably would not have a major impact on airlines' bottom line and therefore consumer prices.[77] A study of a hypothetical nationwide low carbon fuel standard generally showed that the costs of blending in sustainable aviation fuel tend to be higher than in-road sector fuels, with some potential "pass-through" costs, though aviation fuel producers can also comply by purchasing credits from other sectors.[78] States would have to show that these pass-through costs are ultimately less than significant. More modeling could help indicate this range, potentially building on existing modeling work by UC Berkeley engineers[79] and separately by ICF.[80] Evidence regarding wholesale price fluctuations and ticket prices could also be instructive (see Figure 1).

Figure 1: Jet fuel price variation from 1990-2023. Source: US Energy Information Administration, U.S. Gulf Coast Kerosene-Type Jet Fuel Spot Price FOB, USD per gallon.[81]

Prices and routes could also be potentially affected by airlines deciding to carry more fuel from out of state to avoid refueling in states with a sustainable aviation fuel mandate, called "tankering." While tankering can add some costs because it increases the weight of the plane through the extra fuel, airlines would employ it as a means to avoid the higher costs and potentially increased ticket prices from fueling in the state with the low carbon fuel standard. An International Council on Clean Transportation (ICCT) study on the risks of tankering under ReFuelEU (which sets requirements for aviation fuel suppliers to gradually increase the share of sustainable aviation fuel they blend into the conventional jet fuel at European Union airports) found that a 2 percent sustainable aviation fuel mandate in Europe would encourage tankering on flights less than 500 km, while a 5 percent mandate would prompt tankering on flight greater than 2,000 km.[82] Ultimately, ICCT found that this tankering would lead to a negligible price increase for consumers from the extra fuel burn associated with carrying the tankered fuel. Based on that study, states like California could potentially show similar less-than-significant price impacts from tankering, depending on the requirement and economics regionally with undetermined impacts on routes.

Out of an abundance of caution, in order to avoid preemption under the Airline Deregulation Act, some advocates have proposed that states like California avoid any mention of aviation at all.[83] State leaders could simply include all aviation fuel as part of the Low Carbon Fuel Standard with no separate carbon reduction target. The idea is that any reference to the word "aviation" would trigger a preemption inquiry into impact on routes and prices.

However, in terms of policy design, this approach of including jet fuel with all other fuels for the purposes of decarbonization targets may not be feasible, given that a uniform all-fuels target could result in price increases for aviation fuel that could start affecting engine design or adversely impacting low-carbon fuel markets for other

transportation modes. If a low carbon fuel standard obligation on aviation fuel raised fuel prices by, for example, one cent a gallon, airlines would likely have a hard time prevailing in court on the argument that this would substantially and directly impact their routes and prices. However, airlines might still opt to alter their routes and refuel outside of states with the standard to avoid the higher fuel prices, which could raise preemption concerns.

In order to avoid that outcome, state policymakers board could potentially carve out a separate Low Carbon Fuel Standard for off-road engines (which would include aircraft), with a lower target than for on-road emissions, at least until other US jurisdictions or the federal government institute their own jet-related low carbon fuel standard. This approach would avoid the outcome of combining on-road light duty vehicles and off-road jet fuel in the same regulatory pool, when far more options for reducing greenhouse gas emissions over the next 10-20 years exist for on-road transportation than for aviation. By developing a separate category for off-road fuels, state entities like the California Air Resources Board could also ensure that the regulation is of general applicability for these uses and not directly targeting aviation specifically, which could also help avoid preemption challenges.

This type of generally applicable approach to regulating fuel could mirror the kinds of regulation that affect aviation that courts ultimately found not to be preempted. The majority of preemption caselaw under the Airline Deregulation Act in the Ninth Circuit Court of Appeals seems to consist largely of contract, tort, and employment law cases that do not single out aviation or affect aircraft operation. Whether a court would determine that aviation fuel is a matter of general applicability (like wage statements, as in *Ward v. United Airlines*, 986 F.3d 1234 [9th Cir. 2021]), or on the other hand, a matter like skycap tips (as in *Travers v. JetBlue Airways Corp.*, No. 08-10730-GAO, 2009 U.S. Dist. LEXIS 63699, [D. Mass. July 23, 2009], where a Massachusetts court found tips were directly related to airlines' pricing for services), has not yet been tested.

Finally, the state could avoid any mention of either intra-state or inter-state flights, to avoid any reference to "routes." As a practical matter, ICCT has noted that regulating intra-state fuel alone will have little effect on the promotion of sustainable aviation fuel: "Expanding the LCFS to regulate both on-road and aviation fuel could accelerate the production of SAF but, as it turns out, not by much… [R]ecent ICCT research estimates that expanding the coverage of the LCFS to aviation fuels consumed for intra-state flights will barely move the needle on deficits in the LCFS program."[84] Yet perhaps even an incremental approach could add value to promotion of sustainable aviation fuels and create the foundation for further policy action in subsequent years.

Federal Aviation Act Analysis: Preemption avoided with sustainable aviation fuel requirements that do not implicate aircraft safety

The Federal Aviation Act would arguably preempt fuels regulation if the Federal Aviation Administrator, following an endangerment finding by the U.S. EPA, has issued standards for the "composition or chemical or physical properties of an aircraft fuel or fuel additive to control or eliminate aircraft emissions" as well as "regulations providing for carrying out and enforcing those standards." However, as discussed, the Federal Aviation Administration has not promulgated carbon standards for aviation fuel, leaving the field open for state-based regulation.

The industry group Airlines for America (A4A) pointed to 49 U.S.C.S. § 44714 as evidence of the Federal Aviation Administration's exclusive authority over jet fuel and federal preemption over regulating jet fuel as part of the California Air Resources Board's Low Carbon Fuel Standard. But the group did not elaborate on its reasoning regarding this particular statutory provision.[85] For example, the A4A January 7, 2023, comment letter stated that "CARB remains subject to federal law that clearly preempts any authority other than the Federal Aviation Administration (FAA) from regulating aviation fuel… Federal law has for many decades made clear that the FAA has exclusive jurisdiction over jet fuel…." and cited to 49 U.S.C. § 44714. As explained above, this section of the U.S. Code details the Federal Aviation Administrator's duty to issue standards for the composition and properties of jet fuel and fuel additives to control or eliminate aircraft emissions, which under section 231 of the Clean Air Act (42 U.S.C. 7571) have been found by the EPA to endanger the public health or welfare.[86]

Pursuant to 49 U.S.C.S. § 44714, the Federal Aviation Administrator is required to regulate aircraft fuel to control or eliminate certain aircraft emissions only if the EPA has made an endangerment finding under Section 231 of the Clean Air Act that those emissions endanger public health or welfare.[87] Although EPA issued a Proposed Finding on leaded aviation fuel in October 2022,[88] which was finalized in October 2023,[89] this fuel is employed by only a small subset of small non-commercial planes and therefore likely not a preemption threat for state regulation of jet fuel more broadly.[90]

EPA's endangerment finding regarding greenhouse gas emissions, if acted upon by the Federal Aviation Administration via a final emissions rule, could pose a preemption problem for the Low Carbon Fuel Standard. Industry may argue that the goal of adding jet fuel to the standard would be to reduce the carbon content of the fuel,[91] and since the EPA endangerment finding and Federal Aviation Administration rule also seek to reduce greenhouse gas emissions from aircraft engines,[92] a court could find that there is a conflict. However, a state could argue in response that the regulation does not seek to alter the "composition or chemical or physical properties of an aircraft fuel or fuel additive" but rather to set standards for the lifecycle emissions of that fuel. For example, an airline could comply with the standard by adopting e-fuels, which contain the same carbon levels as fossil jet fuel but with carbon captured from the atmosphere, making it carbon neutral under a lifecycle analysis but otherwise largely identical to fossil fuel in chemical makeup. Furthermore, a trade association representing biofuels companies submitted a comment to EPA in 2020 to request inclusion of sustainable aviation fuel as a compliance mechanism under the aircraft CO2 standard, but EPA denied it, arguably leaving states free to implement sustainable aviation fuel regulations in the absence of federal regulation. For these reasons, the EPA's aircraft greenhouse gas endangerment finding and any subsequent Federal Aviation Administration regulation may be limited in scope, giving states like California that may want to regulate existing jet fuel greenhouse gas emissions a pathway to avoid preemption.

Industry challengers may also point to the potential safety implications of sustainable aviation fuel as a reason for preemption under the Federal Aviation Act, given that the Federal Aviation Administration regulates safety exclusively for this sector. Accordingly, courts have found that the statute can preempt state and local laws if they jeopardize safety (although in areas of state regulation that have no "direct bearing on the field of aviation safety," such as flight attendant breaks, the court has not found preemption, and no Ninth Circuit cases identified for this report have addressed jet fuel safety).[93] For example, Airlines for America apparently argued in a 1992 case that field preemption

applies to aviation fuel under the Federal Aviation Act because airplane fuel factors into airplane safety. While research has not uncovered any specific A4A arguments to this effect, the industry group's comment letter cited *Burbank-Glendale-Pasadena Airport Auth. v. Los Angeles*, 979 F.2d 1338 (9th Cir. 1992), in which a Ninth Circuit panel struck down a city's attempts to subject runway construction to city approval.[94] In the case, the airport had planned a construction project to lengthen a runway in order to increase safety and decrease noise.[95] The court noted that regulating runways and taxiways directly conflicted with aircraft operation and safety and was therefore preempted.[96]

By contrast, no direct connection exists between the use of sustainable aviation fuels as a possible compliance pathway for the Low Carbon Fuel Standard and aviation safety. Aircraft have already been flying with biofuel-based jet fuel alternatives, and at current blend levels, no safety problems have arisen. Assuming state government leaders can show there are no safety issues, a sustainable aviation fuel requirement would seem to evade federal preemption.

Notably, some experts have acknowledged that a hypothetical non-blended pure 100% sustainable aviation fuel might present safety concerns because a high percentage of biogenic sustainable aviation fuel can result in insufficient aromatics for the engine to safely operate (although such a high percentage would require an amount of low-carbon biofuel likely not currently available to meet all jet fuel needs in the United States).[97] If accurate, an aviation-applicable standard rule would therefore need to refrain from encouraging compliance via blends above 50 percent[98] or some other agreed-upon limit according to experts. For example, states like California could rely on the list of sustainable aviation fuel pathways certified under the American Society for Testing Materials (ASTM) standard number D7566 by the International Air Transport Association (IATA), which includes a blend limit that addresses safety concerns.[99]

Dormant Commerce Clause Analysis: Avoid facially discriminating against out-of-state interests

While Dormant Commerce Clause arguments have already been resolved in the context of the Low Carbon Fuel Standard, any other aviation-related regulations would likely face similar arguments from industry challengers. However, based on the Low Carbon Fuel Standard and shipping regulation precedent, state agencies like the California Air Resources Board could likely overcome these arguments without much difficulty by ensuring that any regulation does not facially discriminate against out-of-state interests and by documenting the important environmental problems in the state that aviation regulations could help alleviate, while arguing that those benefits clearly outweigh any incidental burdens on out-of-state commerce.[100]

STATE POLICY OPTION 2: UTILIZE CLEAN AIR ACT AUTHORITY TO PROMOTE SUSTAINABLE AVIATION FUEL THROUGH STATE IMPLEMENTATION PLAN INCORPORATION OF INDIRECT SOURCE RULES AT AIRPORTS

California and other states could regulate aviation under their federally delegated Clean Air Act authority, specifically through indirect source rules imposed by local air districts or the state on airports, which could potentially require aircraft to reduce their emissions. The state could then incorporate these rules into their Clean Air Act-required "State Implementation Plans," which are developed to bring areas within the state that are otherwise not meeting air quality standards into compliance with federal air quality standards for specific pollutants.

When a State Implementation Plan (SIP) is authorized by EPA pursuant to its authority in the federal Clean Air Act, the plan takes on the "force and effect" of federal law.[101] Thus, state regulations incorporated into the plan cannot run afoul of the preemption doctrine once the plan is approved by EPA. Instead, it takes on the power of federal law, because one federal statute cannot preempt another.[102]

Furthermore, when there is a potential conflict between two federal laws, such as potentially between the Clean Air Act and the later-adopted Airline Deregulation Act, courts conduct a "harmonization analysis" to resolve the conflict, looking to Congressional intent to determine whether a later-enacted statute has expressly or impliedly repealed existing federal law.[103] Courts disfavor repeals, and find that one federal statute repeals another only where the intent of the legislature to repeal is "clear and manifest" or where "the earlier and later statutes are irreconcilable."[104] As the U.S. Supreme Court concluded in *Morton v Moncari*, "[C]ourts are not at liberty to pick and choose among congressional enactments and when two statutes are capable of co-existence, it is the duty of the courts, absent a clearly expressed congressional intention to the contrary, to regard each as effective."[105]

Recommendation: Impose local air district indirect source rule requirements on airport co-pollutants and incorporate them into the State Implementation Plan under the Clean Air Act, provided the requirements do not significantly impact aircraft operations

Clean Air Act analysis: State-based Clean Air Act regulation directly avoids federal preemption under this statute

Because state-based regulation of aviation emissions stems directly from the federal Clean Air Act and would be harmonized with it, the statute poses no preemption risks for this approach.

Airline Deregulation Act Analysis: Preemption avoided by harmonizing state-based regulation of jet emissions with the federal Clean Air Act

Industry challengers might argue that the Airline Deregulation Act precludes any Clean Air Act-based state regulation of aircraft emissions. They might claim that a harmonization analysis of state or local jet fuel regulation should prioritize the Airline Deregulation Act, which would then presumably lead to preemption of such regulations. Yet this act was passed in 1978, eight years after the Clean Air Act ("CAA"), and it did not expressly repeal the act; in fact, it does not contain any reference to the Clean Air Act or even to environmental regulation in general. Thus, to determine whether the statutes can be harmonized, courts must determine whether the two statutes are irreconcilable.

A court would likely find that the Clean Air Act and Airline Deregulation Act can coexist in the context of state environmental regulations of aviation that are authorized under the Clean Air Act. Congress passed the Airline Deregulation Act to deregulate the airline industry. Congress was particularly concerned with preventing states from enacting or enforcing laws or regulations "related to a price, route, or service of an air carrier."[106] In contrast, Congress's purpose in passing the Clean Air Act was "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare" and "to encourage and assist the development and operation of regional air pollution prevention and control programs."[107] The Clean Air Act's requirement that states develop state-level pollution control strategies does not constitute an "unreasonable interference" with the Airline Deregulation Act's prohibition on state regulation of matters related to interstate air travel. The legislative history of the Airline Deregulation Act confirms this protection from preemption, showing that the preemption section was "added to make clear that no state or political subdivision may defeat the purposes of the bill by regulating interstate air transportation" while "leav[ing] unimpaired the states' authority over intrastate matters."[108]

States and local air districts could take advantage of their sovereignty under the Clean Air Act by using a provision that can control concentrated mobile source emissions at certain stationary sources like airports, which may be a helpful tool for regulating aircraft emissions. Section 110(a)(5) of the Clean Air Act authorizes states to adopt indirect source rules ("ISRs") to include in State Implementation Plans for "indirect sources" that attract emissions from mobile sources.[109] Indirect sources include "a facility, building, structure, installation, real property, road, or highway which attracts, or may attract, mobile sources of pollution."[110] Airports are considered indirect sources, as buildings that attract a significant volume of varied mobile sources (planes, passenger cars, heavy-duty trucks, etc.).[111] States using this provision can regulate emissions from the indirect sources on a facility-by-facility basis in order to maintain or come into compliance with national ambient air quality standards ("NAAQS"), even when the cause of those emissions is mobile sources (trucks or construction equipment, for example).[112] Section 40604 of the California Health and Safety Code expressly extends this authority to local air districts as well, permitting them to adopt and implement regulations to "[r]educe or mitigate emissions from indirect and areawide sources of air pollution."

Because indirect source rules are specifically intended to facilitate compliance with the NAAQS, which consist of six "criteria pollutants" and do not include any greenhouse gases, indirect source rules cannot directly address climate change-inducing greenhouse gas emissions. However, decreasing certain NAAQS pollutants could have the co-benefit

of reducing greenhouse gas emissions. Airplane emissions of two criteria pollutants, nitrogen oxides ("NOx") and particulate matter ("PM"), constitute a significant amount of aviation's impact on the climate.[113] Thus, a limit on PM and NOx at airports to help bring California into compliance with the NAAQS could prompt airlines to implement changes that would also reduce climate impacts.

Recent academic research has documented the co-pollutant reductions from increased use of sustainable aviation fuel, which bolsters the case for using Clean Air Act regulation to encourage more blending of this fuel. Specifically, researchers have found that sustainable aviation fuel has "particularly significant" impacts on reducing emissions from sulfur oxides (SOx) and particulate matter (PM), along with lesser reductions (or at a minimum no increase) in carbon monoxide (CO), unburned hydrocarbons (UHC), hazardous air pollutants (HAP), and nitrogen oxides (NOx).[114] Airlines could reduce PM emissions by using more low- to no-sulfur fuel such as sustainable aviation fuel (along with reducing aromatics in fossil jet fuel or imposing idling limits).[115]

In California, two air districts have issued indirect source rule regulations, and so far, both indirect source rule programs have survived legal challenges. In 2005, the San Joaquin Valley Air Pollution Control District promulgated an indirect source rule aiming to reduce NOx and particulate matter emissions in the district to NAAQS-compliant levels by capping emissions from construction projects. The National Association of Homebuilders challenged the rule, arguing that it was preempted by Section 209(e) of the Clean Air Act as a regulation of mobile sources, because it impacted vehicles at construction sites. The Ninth Circuit upheld the rule, finding that the Clean Air Act expressly authorized the indirect source rule at issue, and therefore cannot also preempt it.[116] Then in 2021, the South Coast Air Quality Management District adopted an indirect source rule program for warehouses, aiming to minimize toxic emissions from the high daily volume of diesel truck trips to and from warehouses by encouraging the use of zero-emission trucks.

The California Trucking Association and Airlines for America challenged the South Coast rule, arguing that it was preempted by both the Clean Air Act and Airline Deregulation Act. A federal district court rejected both arguments in an order granting summary judgment to South Coast and upholding the rule. Like in the construction indirect source review case, the court found that the Clean Air Act Section 209(e) could not preempt the indirect source rule because "[i]t would be odd if the [CAA] took away from the states with one hand what it granted with the other."[117] The industry challengers also argued that the warehouse indirect source rule was a standard mandating the purchase of zero-emission trucks, which would be preempted by the Clean Air Act as a "command and control" regulation exclusively in Congress's domain.[118] The court disagreed, evaluating the indirect source rule's purpose and effect and concluding that the rule was motivated by a desire to reduce emissions from warehouses and did not mandate a particular method of compliance with the rule. The court also held that the rule was not preempted by the Airline Deregulation Act because it did not impact the services, rates, or routes of air carriers.[119] South Coast recently finalized an indirect source rule for railyards[120] and is drafting one for ports, which are both likely to face industry challenges.[121]

In the aviation context, indirect source rules developed by local air districts could be an effective way to reduce greenhouse gases by targeting PM, NOx, and possibly other co-pollutants covered by the NAAQS at airports. The International Civil Aviation

Organization (ICAO), the UN entity which is responsible for setting emission measurement procedures and compliance standards worldwide, estimated that the average sustainable aviation fuel blend in fossil jet fuel emits 87.4% of the NOx and 55% the PM2.5 that fossil jet fuel emits.[122] Because airports are significant sources of these and other harmful pollutants as well as greenhouse gas emissions, due to the high volume of planes and other vehicles, caps on airport-wide emissions could therefore require airlines to make meaningful changes. However, air districts would need to carefully craft their indirect source rules to avoid preemption.

The airline industry may argue that any airport indirect source rule would be preempted by Section 233 of the Clean Air Act, which broadly preempts state regulation of aircraft emissions, because aircraft are a major mobile source contributing to the air pollution at airports. However, this argument can likely be overcome by applying the same logic the court employed in *California Trucking* when it concluded that the warehouse indirect source rule is not preempted by Section 209(e)'s prohibition of state regulation of vehicle emissions: because the Clean Air Act expressly permits states and localities to develop indirect source rules to address air pollution at hubs for mobile sources, it cannot also preempt such a rule.

At the same time, indirect source rules cannot directly impact rates, routes, or services without running afoul of the Airline Deregulation Act. While a district court found that South Coast's warehouse indirect source rule (which arguably impacts air freight) did not impact rates, routes, or services, it reached this conclusion, in part, because "[t]he Rule is not limited to warehouses used by air carriers; it applies to all warehouses in the District."[123] An airport-specific indirect source rule may therefore have a higher barrier to clear when it comes to Airline Deregulation Act preemption challenges: the airline industry may argue that *California Trucking* is distinguishable and that an indirect source rule targeting airports would require airlines to incur compliance costs, which would necessarily impact rates. However, the court in *California Trucking* held that the available evidence that regulation increases the cost of doing business for airlines was not sufficient to show Airline Deregulation Act preemption unless the regulation "interferes with the relationship between air carriers and their customers." It also noted that "[l]aws are more likely to be preempted when they operate at the point where carriers provide services to customers at specific prices."[124] Thus, air districts could ensure that their indirect source rules on airports do "not control the prices, schedules, origins and destinations offered by air carriers to their customers beyond affecting the compliance costs of those air carriers."[125]

Local air districts could potentially develop indirect source rules for airports throughout the state, which the state could then incorporate into its State Implementation Plan to avoid preemption challenges.[126] As discussed, indirect source rules developed by local air districts could be an effective way to reduce greenhouse gases by targeting particulate matter (PM), nitrogen oxides (NOx), and possibly other co-pollutants covered by the NAAQS at airports. Sustainable aviation fuel has "particularly significant" impacts on reducing emissions from sulfur oxides (SOx) and PM, along with lesser reductions (or at a minimum no increase) in carbon monoxide (CO), unburned hydrocarbons (UHC), hazardous air pollutants (HAP), and NOx. As a result, indirect source rules could target these pollutants specifically. Airlines could then reduce PM emissions by using more low- to no-sulfur fuel such as sustainable aviation fuel (along with reducing aromatics in fossil jet fuel or imposing idling limits).

The most likely means for state and air districts to avoid federal preemption would be to keep the indirect source rule broadly focused on high-level emission reduction goals, because prescribing detailed compliance strategies would be more likely to implicate (and conflict with) the complex federal regulatory regime for aviation. In particular, air districts could avoid specifying a mandatory means of compliance in an indirect source rule; as with the warehouse rule at issue in *California Trucking*, any airport indirect source rule should allow airports and airlines several avenues for compliance that could all achieve the goal of lowering emissions at airports. This approach makes indirect source rules a highly imprecise tool for targeting emission reductions from aircraft themselves, and especially for reducing greenhouse gas emissions. However, because providers are continuing to develop, incentivize and scale sustainable aviation fuel, it may end up being a primary voluntary method of compliance with an indirect source rule that applies to airlines, which would result in significant climate benefits, alongside the localized public health benefits that indirect source rules are aimed at achieving.

In addition, state policymakers, such as at the California Air Resources Board, could exercise their authority under the Clean Air Act to issue a statewide airport indirect source rule, which would tackle airport emissions in a standardized way across the state. The board has never issued a statewide indirect source rule; rather, it has left such rule development to local air districts and then adopted the local indirect source rules into the State Implementation Plan (SIP). However, the board could potentially promulgate a statewide indirect source rule regulation (though agency leaders have expressed reluctance to do so in the past[127]) and directly incorporate it into the SIP, or the California legislature could pass a law to implement a statewide indirect source rule. The New York state legislature is in the process of doing so with a pending bill, Senate Bill S2127A, which would establish a statewide rule for warehouses.[128] Of note, the board and local air districts may need to avoid enforcing any such rule until it is incorporated into the SIP and EPA acts to authorize the SIP. Once EPA has approved a SIP, it would become federally enforceable, so preemption challenges would not be appropriate, and instead, courts would analyze whether it irreconcilably conflicts with other federal laws.

Federal Aviation Act Analysis: Preemption avoided by harmonizing state policy with the federal Clean Air Act

State-based regulation of aviation emissions stems directly from the federal Clean Air Act and would be harmonized with it, and because the Federal Aviation Act does not preempt the Clean Air Act, this approach does not risk preemption under the statute.

Dormant Commerce Clause Analysis: Clean Air Act regulation does not implicate this provision

State-based regulation of aviation emissions, like other state emissions controls, are sanctioned by the federal Clean Air Act and therefore become federal policy, not state policy that could raise Dormant Commerce Clause challenges.

STATE POLICY OPTION 3: IMPOSE AND INCREASE FUEL TAXES AND LOCAL AIRPORT LANDING FEES FOR AIRPLANES WITH CARBON-HEAVY JET FUEL AND PROVIDE SAF INCENTIVES

State may be able to utilize their state taxation authority as another potential avenue for regulating aviation. States have broad power to impose taxes on income, goods and services, and personal property, among other things, under the Tenth Amendment of the U.S. Constitution, which provides that states have all powers not expressly delegated to the federal governments or prohibited to the states. This power is constitutionally limited in two relevant ways. First, the Supremacy Clause provides that federal law preempts state law whenever the two conflict; thus, states may not collect taxes that would clash with and be expressly or impliedly preempted by federal law. Second, because the Commerce Clause empowers Congress to regulate interstate commerce, states may not collect taxes that would unduly burden interstate commerce.

Recommendation: Institute and increase taxes and/or landing fees on high-carbon jet fuel, while using the revenue to fund sustainable aviation fuel incentives, provided that any fees are commensurate with likely impacts from the use of high-carbon fuels.

States like California have a straightforward option to impose an excise tax on the traditional, carbon-heavy jet fuel sold within the state. This practice of collecting taxes on jet fuel is already well-established and widely accepted.[129] At the agency level, the Federal Aviation Administration (FAA) explicitly allows states to collect "sales or use taxes on the sale of goods or services."[130] Furthermore, the U.S. Supreme Court has upheld this practice. In *Wardair Canada, Inc. v. Florida Dep't of Revenue*, the court upheld Florida's jet fuel tax against a challenge from a Canadian airline.[131] The airline had argued that the tax was preempted because Congress has "occupied the field" of aviation regulation. The Court disagreed, stating that the language of the FAA shows that:

> "To the degree that Congress considered the power of the States to tax air travel, it expressly and unequivocally permitted the States to exercise that authority. In other words, rather than prohibit state regulation in the area, Congress invited it. This is not the stuff of pre-emption."[132]

The court also held that the tax did not violate the Dormant Commerce Clause, and in fact, because Congress "affirmatively acted, rather than remained silent, with respect to the power of the States to tax aviation fuel . . . the case does not call for Dormant Commerce Clause analysis at all."[133] The airline attempted to argue that the Chicago Convention on International Civil Aviation prohibits states from taxing jet fuel; however, the court clarified that the Convention "precludes the imposition of local taxes on fuel only when the fuel is 'on board an aircraft … on arrival … and retained on board on leaving' a contracting party; it does not prohibit taxation of fuel purchased in that country."[134]

Many states already tax jet fuel.[135] California currently has a sales tax and an excise tax for jet fuel; however, it exempts some uses. According to the California Department of Tax and Fee Administration's website, "[i]n general, the sales of aircraft jet fuel for propulsion of aircraft are subject to tax unless it is sold to . . . [a]n aircraft

common carrier engaged in the business of transporting persons or property for hire or compensation under a certificate of public convenience and necessity issued according to the laws of this state, of the United States or any foreign government."[136] The state could therefore eliminate this exception and increase the tax overall.

Finally, states like California could use the tax revenue to fund an additional incentive, such as a tax credit program, for the use of sustainable aviation fuel. Because federal law requires that states distribute any revenue from jet fuel taxes to airports or to state aviation programs,[137] states must structure the incentives to comply with this airport-focused directive. While the federal government has issued several incentive programs, such as the Sustainable Aviation Fuel Grand Challenge and two consecutive tax credit schemes in the Inflation Reduction Act (IRA), additional state incentives would complement, rather than conflict with, the federal initiatives, and thus would not be preempted.[138] Several states are developing and implementing incentive programs, most of which are targeted at producers of the fuel. However, most relevant here, Illinois' new sustainable aviation fuel tax credit creates a $1.50 per gallon tax incentive for air carriers using SAF.[139] States like California could pay for this tax credit through the imposition of an aviation-wide excise tax on high-carbon jet fuel for all aircraft.

Clean Air Act Analysis: State taxation does not implicate the Clean Air Act

State or local tax policy does not constitute a conflict with the federal Clean Air Act, as it does not impose an effort to regulate engines or emissions.

Airline Deregulation Act Analysis: Preemption avoided by taxing at a level that does not interfere with aircraft operation

To avoid federal preemption, state and local governments would need to avoid setting landing fees or other aviation taxes at a level that would significantly impact aircraft operations through impacts to rates, routes, or services.

Federal Aviation Act Analysis: Preemption avoided by keeping any taxes or fees reasonable

States wishing to impose additional taxes should take heed of the three federal statutes already discussed in this report, plus two additional federal statutes that are particularly pertinent to taxation. First, the federal Anti-Head Tax Act, encompassed within the Federal Aviation Act, provides that states "may not levy or collect a tax, fee, head charge, or other charge on—

1. an individual traveling in air commerce;
2. the transportation of an individual traveling in air commerce;
3. the sale of air transportation; or
4. the gross receipts from that air commerce or transportation."[140]

The Supreme Court has interpreted this provision to apply to taxes on airlines as well as on individuals.[141] Thus, the statute prohibits state taxes on interstate passengers, ticket sales, and airline income.[142] However, the statute does permit states to "levy or collect a tax on or related to a flight of a commercial aircraft or an activity or service on the aircraft only if the aircraft takes off or lands in the State or political subdivision as part of the flight."[143] It also permits states to collect "reasonable rental charges, landing fees, and other service charges from aircraft operators for using airport facilities of an airport owned or operated by that State or subdivision."[144] Any such charge is "reasonable" if it "(1) is based on some fair approximation of use of the facilities, (2) is not excessive in relation to the benefits conferred, and (3) does not discriminate against interstate commerce."[145] Second, as discussed, the Airline Deregulation Act provides that no state "shall enact or enforce any law, rule, regulation, standard, or other provision ... relating to rates, routes, or services of any air carrier...."[146]

States or local governments could impose landing fees on higher-carbon flights if they avoid an attempt to impact aircraft operation. In *New England Legal Found. v. Massachusetts Port Authority*, the First Circuit held that an airport's landing fees did not violate the Anti-Head Tax Act because they were not a head tax.[147] The court emphasized that, "[a]lthough the new landing fee may have the effect . . . of increasing the average fare per passenger, this is an increase in the operational cost unrelated to the Anti–Head Tax Act prohibitions." However, it did affirm a prior finding that the landing fees were "unreasonable" and preempted by the Federal Aviation Act, because they constituted an attempt to control "rates, routes or services."[148] In this case, the effect of the landing fee structure was "to drastically increase the landing costs of smaller aircraft while conversely decreasing that of larger ones," which the court held was "an attempt to modify conduct (e.g., control air traffic) rather than to recover operational costs, and [was] thus an incursion into an area of regulation preempted by [the FAA]."[149] By contrast, in *Northwest Airlines, Inc. v. County. of Kent, Michigan*, the Supreme Court upheld "user fees" imposed on commercial airlines, private plane users, and airport vendors at different rates as reasonable because they were proportionate to each group's use of an airport.[150]

States could therefore impose landing fees to tax airplanes that use carbon-heavy jet fuel and land at in-state airports at a higher rate than planes using sustainable aviation fuel or otherwise reducing emissions. The state would need to base any increased landing fee for higher-emitting planes on the use of the airport, e.g., to the increase in pollution that they cause. This report did not uncover any case law on this type of landing fee, so it is unclear how a court would weigh this type of environmental impact when determining whether a fee is fairly apportioned.

Dormant Commerce Clause Analysis: State taxes must be reasonable and commensurate with the benefits

To determine whether a state tax violates the Dormant Commerce Clause, courts ask four questions: whether the tax applied to an activity with a substantial nexus with the taxing state; whether the tax is fairly apportioned; whether the tax discriminates against interstate commerce; and whether the tax is fairly related to the services provided by the state.[151] Courts have recognized that this test is the same as the test for "reasonableness" under the Anti-Head Tax Act exemption for reasonable rental charges or landing fees.[152]

To avoid running afoul of the Dormant Commerce Clause, which occurs if the regulation directly burdens interstate commerce or explicitly discriminates against out-of-state interests, the tax would need to only incidentally burden interstate commerce and ensure the benefits outweigh any burdens. State leaders would therefore need to ensure that the fees are "reasonable," meaning that the fees are fairly apportioned and do not discriminate against out-of-state commerce, and that the tax has a substantial nexus to the state. The state could show that this type of landing fee or tax would not discriminate against out-of-state interests by arguing, for example, that it applies equally to all flights landing in the state, regardless of whether they come from in- or out-of-state. If anything, the fee or tax would likely benefit other states at the taxing state's expense if airlines choose to land outside of the state to avoid paying the levy.

IV. CONCLUSION: STATES HAVE MULTIPLE OPTIONS WORTH PURSUING TO DECARBONIZE AVIATION WHILE WAITING FOR FEDERAL ACTION

The urgency of the climate crisis and meeting global, national and state-based decarbonization goals will require more aggressive policy action on aviation. Incentives alone will likely not achieve the rapid pace of technological change required to decarbonize this sector along the timelines required by various climate laws and agreements, such as California's law to achieve carbon neutrality by mid-century. However, states have the legal tools and sovereignty needed to act in ways that have a strong chance of avoiding preemption challenges.

While the industry has pledged various decarbonization targets among individual companies, its trade association has vigorously lobbied against any mandates and presumably will likely challenge any state-based regulatory approach in court. Yet the analysis conducted in this report indicates that states may be on solid ground to withstand these challenges by utilizing specific safeguards.

Ultimately, national and international action will be needed to set this sector on a global course to decarbonize. But states will have a strong role to play in forcing this action and demonstrating and deploying the technologies that are most effective and affordable, just as states have done in the context of boosting renewable energy and battery-electric vehicles, among others, which are now dramatically less expensive due in large part to early state policies requiring their use.

States like California now have an opportunity to play a similar role, helping to decarbonize one of the truly "hard to decarbonize" sectors of the economy while allowing its economy to grow and residents to continue to access the flights that connect economies, communities, places, and families across the world.

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3 U.S. Department of Energy, "Sustainable Aviation Fuel" (webpage). Available at: https://afdc.energy.gov/fuels/sustainable_aviation_fuel.html (accessed February 5, 2025).

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5 *Hillsborough Cty. v. Automated Med. Labs., Inc.*, 471 U.S. 707, 712 (internal citations omitted).

6 Id. at 713.

7 Id.

8 Id.

9 Id.

10 42 U.S. Code § 7573.

11 42 U.S.C. § 7602(g).

12 *See* "Advance Notice of Proposed Rulemaking on Lead Emissions from Piston-Engine Aircraft Using LeadedAviation Gasoline," Environmental Protection Agency, Federal Register, Vol. 75, No. 81, April 28, 2010, p. 7. "EPA's authority to regulate fuels under section 211 does not extend to fuels used exclusively in aircraft, such as leaded avgas, that are not also used in motor vehicles or nonroad vehicles or engines (excluding fuel used in vehicles exclusively). Instead, fuels used exclusively in aircraft engines are to be regulated by the FAA." Available at: https://www.govinfo.gov/content/pkg/FR-2010-04-28/pdf/2010-9603.pdf (accessed January 14, 2025). *See also* "Regulating Greenhouse Gas Emissions under the Clean Air Act," Environmental Protection Agency, July 11, 2008, at p. 216. "Section 211(c) authorizes regulation of vehicle fuels and fuel additives (*excluding aircraft fuel*) [emphasis added] as appropriate to protect public health and welfare…" Available at: https://www3.epa.gov/climatechange/Downloads/anpr/ANPRPreamble.pdf (accessed January 14, 2025).

13 *Cal. ex rel. State Air Res. Bd. v. Dep't of Navy*, 431 F. Supp. 1271, 1281 (N.D. Cal. 1977), aff'd, *California v. Dep't of Navy*, 624 F.2d 885 (9th Cir. 1980).

14 Id. at 1282.

15 The court reasoned: "Where, as part of the manufacturing process (hypothetical or real), engine exhausts mingle with and ultimately emanate along with other factory emissions, it would stretch Section 233 absurdly to say that states are preempted from requiring screens to be placed in the factory smoke stacks because to do so would be, at least in part, to regulate exhausts 'from' engines. Yet, it is precisely this *type* of preemption which defendants urge here." Id. at 1283 (emphasis in original).

16 The district court thus articulated part of its preemption test as hinging upon whether state regulation attempted to modify the jet engine itself: "The most sensible facial reading of Section 233 is that it focuses, preemptively, upon standards for aircraft engine emissions in a way which implies modification of the engine so as either to prevent creation of certain emissions (via internal alteration) or to prevent those emissions from leaving the engine (via external attachment of antipollution devices, etc.)" Id. (emphasis in original).

17 "Examining the text and apparent purpose of § 233, the district court concluded that § 233 is concerned with direct state regulation of aircraft or aircraft engines or with other state regulation which would affect the aircraft or engine. This was the intended scope of § 233. It was not intended to be preclusive of all state regulation of the field of aircraft engines. We agree. The district court then established the fundamental rationale of its preemption test, namely, if the state pollution regulations can be met without affecting the design, structure, operation, or performance of the aircraft engine, then the state emission regulations are not preempted by § 233. We agree with this underlying preemption principle, finding it completely in accord with the scope of § 233." *California v. Dep't of Navy*, 624 F.2d 885, 888 (9th Cir. 1980) (quoting *City of Burbank v. Lockheed Air Terminal, Inc.*, 411 U.S. 624, 638 (1973)).

18 "The test cells here are substantial concrete structures. Even though the pollution comes from a jet engine, if the pollution can be abated before it leaves the test cell by means which do not require modification of the engine, then there is no reason why state regulation may not apply. The purposes of federal preemption in this area namely, aviation safety and uniformity of standards are preserved where it matters: engine regulation. State regulation, insofar as it is allowed under the test developed by the district court, will not impair the federal interests because those interests would be impaired only if the aircraft or engine must be altered to accommodate state law." *California v. Dep't of Navy*, 624 F.2d 885, 889 (9th Cir. 1980).

19 "Federal Preemption of State Regulation of Airline Pricing, Routes, and Services: The Airline Deregulation Act," 10 FIU L. Rev. 435, 435.

20 "Except as provided in this subsection, a State, political subdivision of a State, or political authority of at least 2 States may not enact or enforce a law, regulation, or other provision having the force and effect of law related to a price, route, or service of an air carrier that may provide air transportation under this subpart [49 USCS §§ 41101 et seq.]." 49 U.S.C.S. § 41713.

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22 *Bernstein v. Virgin Am., Inc.*, 990 F.3d 1157, 1169 (9th Cir. 2021) (emphasis in original).

23 See *Bernstein v. Virgin Am., Inc.*, 3 F.4th 1127, 1141 (9th Cir. 2021) (quoting *Dilts v. Penske Logistics, LLC*, 769 F.3d 637, 646 (9th Cir. 2014)). See also *Air Transp. Ass'n of Am., Inc. v. Wash. Dep't of Labor & Indus.*, 859 F. App'x 181, 184 (9th Cir. 2021) (emphasis in original). *See also*, *Bernstein v. Virgin Am., Inc.*, 3 F.4th 1127, 1141 (9th Cir. 2021). See also *Air Transp. Ass'n of Am. v. City & Cty. of S.F.*, 266 F.3d 1064, 1074-75 (9th Cir. 2001).

24 *Ward v. United Airlines*, 986 F.3d 1234, 1243 (9th Cir. 2021) (citing *Morales v. Trans World Airlines, Inc.*, 504 U.S. 374, 383, 390 (1992)).

25 Id. at 1243.

26 *Air Transp. Ass'n of Am. v. City & Cty. of S.F.*, 266 F.3d 1064, 1074-75 (9th Cir. 2001).

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29 *West v. NW. Airlines*, 995 F.2d 148 (9th Cir. 1993)

30 *Kalantar v. Lufthansa German Airlines*, 402 F. Supp. 2d 130, 133 (D.D.C. 2005).

31 See 49 U.S.C. § 40101 et seq.

32 The standards and regulations include: (1) standards for the composition or chemical or physical properties of an aircraft fuel or fuel additive to control or eliminate aircraft emissions the Administrator of the Environmental Protection Agency decides under section 231 of the Clean Air Act (42 U.S.C. 7571) endanger the public health or welfare; and (2) regulations providing for carrying out and enforcing those standards. 49 U.S.C.S. § 44714.

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83 Zoom call between Katherine Hoff, Research Fellow, Center for Law, Energy, & the Environment (CLEE), and Ethan Elkind, Climate Program Director, CLEE, and Pedro Piris-Cabezas, Senior Director, Global Transportation & Lead Senior Economist, Environmental Defense Fund (Aug. 4, 2023).

84 Jane O'Malley, The International Council on Clean Transportation, "Will California Rise to The Biden Administration's SAF Grand Challenge?" (Blog post), January 25, 2023. Available at: https://theicct.org/ca-sustainable-aviation-fuels-jan23/ (accessed February 5, 2025).

85 "CARB remains subject to federal law that clearly preempts any authority other than the Federal Aviation Administration (FAA) from regulating aviation fuel… Federal law has for many decades made clear that the FAA has exclusive jurisdiction over jet fuel…" (citing 49 U.S.C. § 44714)). There is no further analysis of the statute. The comment letter then goes on to cite cases discussed elsewhere in this memo such *Burbank v. Lockheed Air Terminal, Inc.*, 411 U.S. 624, 639 (1973). Airlines for America, Comment Letter to CARB (January 7, 2022), at pp. 4-5. Available at: https://www.arb.ca.gov/lists/com-attach/71-lcfs-wkshp-dec21-ws-VzZTYV09BAhWMwZp.pdf (accessed February 5, 2025). See also, Airlines for America, Comment Letter to CARB (March 15, 2023), at p. 2. Available at: https://www.arb.ca.gov/lists/com-attach/87-lcfs-wkshp-feb23-ws-VDVUZgBgVFgEYVQ7.pdf (accessed February 5, 2025).

86 49 U.S.C.S. § 44714 states: "The Administrator of the Federal Aviation Administration shall prescribe—(1) the composition or chemical or physical properties of an aircraft fuel or fuel additive to control or eliminate aircraft emissions the Administrator of the Environmental Protection Agency decides under section 231 of the Clean Air Act (42 U.S.C. 7571) endanger the public health or welfare; and (2) regulations providing for carrying out and enforcing those standards."

87 49 U.S.C.S. § 44714. In general, EPA has characterized the regulatory scheme as follows: "CAA section 231(a)(2)(A) directs the Administrator of the EPA to, from time to time, propose aircraft engine emission standards applicable to the emission of any air pollutant from classes of aircraft engines which in his or her judgment causes or contributes to air pollution that may reasonably be anticipated to endanger public health or welfare. CAA section 231(a)(2)(B) directs the EPA to consult with the Administrator of the Federal Aviation Administration (FAA) on such standards… Thus, as in past rulemakings, the EPA notes its authority under the CAA to issue reasonable aircraft engine standards with either technology- following or technology-forcing results, provided that, in either scenario, the Agency has a reasonable basis after considering all the relevant factors for setting the standard. Once the EPA adopts standards, CAA section 232 then directs the Secretary of Transportation to prescribe regulations to ensure compliance with the EPA's standards. Finally, CAA section 233 vests the authority to promulgate emission standards for aircraft or aircraft engines only in the Federal Government. States are preempted from adopting or enforcing any standard respecting aircraft or aircraft engine emissions unless such standard is identical to the EPA's standards." Fed Reg Vol. 87, No. 225, November 23, 2022, at p. 72315- 72316.

88 Environmental Protection Agency, "Proposed Finding That Lead Emissions from Aircraft Engines That Operate on Leaded Fuel Cause or Contribute to Air Pollution That May Reasonably Be Anticipated to Endanger Public Health and Welfare," 87 Fed. Reg. 62753 (Oct. 17, 2022). Available at https://www.govinfo.gov/content/pkg/FR-2022-10-17/pdf/2022-22223.pdf (accessed February 5, 2025).

89 "Today, the U.S. Environmental Protection Agency (EPA) announced its final determination that emissions of lead from aircraft that operate on leaded fuel cause or contribute to air pollution which may reasonably be anticipated to endanger public health and welfare under the Clean Air Act." Environmental Protection Agency, "EPA Determines that Lead Emissions from Aircraft Engines Cause or Contribute to Air Pollution" (news release, Oct. 18, 2023). Available at: https://www.epa.gov/newsreleases/epa-determines-lead-emissions-aircraft-engines-cause-or-contribute-air-pollution#:~:text=WASHINGTON%20%E2%80%94%20Today%2C%20the%20U.S.%20Environmental,under%20the%20Clean%20Air%20Act (accessed February 5, 2025). *See also* Federal Aviation Administration, "FAA Statement on EPA Finding Regarding Lead Emissions from Piston Engine Aircraft," (Oct. 18, 2023). Available at: https://www.faa.gov/newsroom/faa-statement-epa-finding-regarding-lead-emissions-piston-engine-aircraft (accessed February 5, 2025).

90 Environmental Protection Agency, "Regulations for Lead Emissions from Aircraft" (webpage). Available at: https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-lead-emissions-aircraft (accessed February 5, 2025).

91 "Under the AB 32 Scoping Plan, the Board identified the Low Carbon Fuel Standard (LCFS) as one of the nine discrete early action measures to reduce California's greenhouse gas (GHG) emissions that cause climate change."

California Air Resources Board, "Low Carbon Fuel Standard: About" (webpage). Available at: https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/about (accessed February 5, 2025).

92 "The EPA rule references GHGs in recognition of airplane emissions of CO_2 and another GHG, nitrous oxide (N_2 O). The EPA did not set limits on N_2 O emissions, noting that they are small and are proportionally reduced as CO_2 is reduced. The FAA describes these same limits and procedures as measures of fuel efficiency since this proposed rule prescribes a measurement of aircraft performance determined by the specific air range (SAR) parameter to determine fuel efficiency. The three concepts—FAA's proposed fuel efficiency, the EPA's GHG emissions, and ICAO's CO_2 emissions—are to be considered equivalent for purposes of implementation." 87 Fed. Reg. 36076, 36077 (June 15, 2022), available at: https://www.federalregister.gov/d/2022-11556/page-36077.

93 *Burbank-Glendale-Pasadena Airport Auth. v. Los Angeles*, 979 F.2d 1338, 1339 (9th Cir. 1992)).

94 *Burbank-Glendale-Pasadena Airport Auth. v. Los Angeles*, 979 F.2d 1338, 1340-41 (9th Cir. 1992).

95 Id.

96 Id. at 1341.

97 Email from Nikita Pavlenko, Fuels Program Lead, The International Council on Clean Transportation, to Katherine Hoff, Research Fellow, Center for Law, Energy, & the Environment (CLEE) (Sept. 11, 2023) (on file with author).

98 Zoom call between Katherine Hoff, Research Fellow, Center for Law, Energy, & the Environment (CLEE), and Ethan Elkind, Climate Program Director, CLEE, and Pedro Piris-Cabezas, Senior Director, Global Transportation & Lead Senior Economist, Environmental Defense Fund (Aug. 4, 2023).

99 *See* "Fact Sheet 2: Sustainable Aviation Fuel: Technical Certification," IATA. Available at: https://www.iata.org/contentassets/d13875e9ed784f75bac90f000760e998/saf-technical-certifications.pdf (accessed June 7, 2024).

100 Notably, California faced a Dormant Commerce Clause challenge to its now-withdrawn In-Use Locomotive Regulation. The California Air Resources Board issued the regulation to limit rail pollution by limiting locomotive idling. It would have eventually required all new short- and long-distance locomotives operating in California to use zero-emission technology. Railroad industry challengers raised Dormant Commerce Clause arguments, claiming that railroad companies' only options for complying with the locomotive rule are to change locomotives at the California border, or to replace their entire nationwide fleets, which would substantially increase the costs and burdens on railroads. Airlines may try to make similar arguments against a state-based aviation fuel regulation, claiming that a mandate for lower-carbon jet fuel could require them to change their operations at the border, such as refueling out-of-state or avoiding certain in-state markets. However, unlike railroads, sustainable aviation fuel is already blended into existing jet fuel and does not require technology or engine alterations. The court denied the Air Resources Board's motion to dismiss the railroad industry challengers' as-applied Dormant Commerce Clause claim, finding that their allegations that the regulations will burden interstate commerce are sufficient to state a claim. In January 2025, the Air Resources Board withdrew the regulation.

101 *See El Comite Para el Bienestar de Earlimart v. U.S. E.P.A.*, 786 F.3d 688, 692 (9th Cir. 2015) ("Once approved by the EPA, a SIP has the 'force and effect of federal law.'") (citing *Safe Air For Everyone v. EPA*, 488 F.3d 1088, 1091 (9th Cir. 2007).

102 *Swinomish Indian Tribal Cmty. v. BNSF Ry. Co.*, 951 F.3d 1142, 1153 (9th Cir. 2020) (citation omitted); *see also Ass'n of Am. Railroads v. S. Coast Air Quality Mgmt. Dist.*, 622 F.3d 1094, 1098 (9th Cir. 2010) (suggesting that a local locomotive idling rule may survive ICCTA preemption if it is incorporated in an EPA-approved "state implementation plan" under the Clean Air Act because, once the EPA approves a State Implementation Plan, the plan has "the force and effect of federal law.") (citation omitted).

103 *Morton v. Mancari*, 417 U.S. 535, 550-51 (1974).

104 *Id.*

105 *Grindstone Butte Project v. Kleppe*, 638 F.2d 100, 103 (9th Cir. 1981) (citation omitted).

106 49 U.S.C. § 41713(b)(1).

107 42 U.S.C. § 7401(b).

108 Hearings on H. R. 8813 before the Subcommittee on Aviation of the House Committee on Public Works and Transportation, 95th Cong., 1st Sess., pt. 1, p. 243 (1977).

109 42 U.S.C. § 7410(a)(5).

110 *Id.*

111 *See, e.g.*, *Manchester Env't Coal. v. E.P.A.*, 612 F.2d 56, 57 (2d Cir. 1979) (describing indirect sources as "facilities such as shopping centers, sports complexes, highways and airports which are likely to induce or attract significant motor traffic, thereby increasing the amount of mobile source generated air pollutants.").

112 *Id.*

113 David S. Lee, The current state of scientific understanding of the non-CO2 effects of aviation on climate, Manchester Metropolitan University (December 2018). Available at: https://assets.publishing.service.gov.uk/media/5d19c4fc40f0b609cfd97461/

non-CO2-effects-report.pdf (accessed February 5, 2025).

114 Booz Allen Hamilton, McLean, VA, "Alternative Jet Fuels Emissions: Quantification Methods Creation and Validation Report," Final Report for ACRP Project 02-80, August 2019. Available at: https://onlinepubs.trb.org/onlinepubs/acrp/acrp_wod_41.pdf (June 20, 2024).

115 In addition, a 2021 study found that a 5% to 50% blend of sustainable aviation fuel resulted in a nationwide 1% to 18% reduction, respectively, in PM2.5-attributable premature deaths, corresponding with a 19% decrease in PM2.5 damages per ton of fuel burned and a 2% decrease in total damages per ton of fuel burned, compared to the damages from fossil jet fuel. Calvin A. Arter, Jonathan J. Buonocore, Chowdhury Moniruzzaman, Dongmei Yang, Jiaoyan Huang, Saravanan Arunachalam, "Air quality and health-related impacts of traditional and alternate jet fuels from airport aircraft operations in the U.S.," Environment International, October 2021. Available at: https://www.sciencedirect.com/science/article/pii/S0160412021005833 (accessed June 20, 2024).

116 *Nat'l Ass'n of Home Builders v. San Joaquin Valley Unified Air Pollution Control Dist.*, 627 F.3d 730, 740 (9th Cir. 2010).

117 *California Trucking Ass'n v. S. Coast Air Quality Mgmt. Dist. et al.*, 2023 WL 9622548, at *20 (C.D. Cal. Dec. 14, 2023) (quoting *Nat'l Ass'n of Home Builders*, 627 F.3d at 737).

118 *Id.* at 22.

119 *Id.* at 28-29 ("Unless the Rule 'significantly affect[s] rates, routes, or services,' it is not sufficient that the law 'implicitly reference[s] … rates, routes, or services.'") quoting *Nationwide Freight Sys., Inc. v. Illinois Com. Comm'n*, 784 F.3d 367, 375 n.4 (7th Cir. 2015).

120 See "Proposed Rule 2306" documentation from the California Air Resources Board, August 2, 2024. Available at: https://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2024/2024-aug2-026.pdf?sfvrsn=6&source=email (accessed September 29, 2024).

121 *See* South Coast AQMD Proposed Rule 2306, Freight Rail Yards websites. Available at: https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-2306 (accessed June 7, 2024). *See also* Proposed Rule 2304, Commercial Marine Ports - Container Terminals website. Available at: https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-2304 (accessed June 7, 2024).

122 *See* "Appendix C-1: Standardized Regulatory Impact Assessment (SRIA), Proposed Amendments to the Low Carbon Fuel Standard Regulation," California Air Resources Board, September 9, 2023, p. B-6 to B-7. Available at: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/appc-1.pdf (accessed June 12, 2024).

123 2023 WL 9622548 at 29.

124 *Id.* (internal citation omitted).

125 *Id.*

126 Rather than pursuing an indirect source rule for airports, South Coast Air Quality Management District entered into a voluntary memorandum of understanding with the major commercial airports in its district in 2018 to address emissions reduction efforts. More research could illuminate how effective this approach has been, whether other air districts have taken a similar approach, and whether and to what extent the MOU prevents South Coast from developing an airport indirect source rule.

127 Meeting Minutes, California Air Resources Board, March 22, 2018, Riverside, California, at p. 291. Available at: https://ww2.arb.ca.gov/sites/default/files/barcu/board/mt/2018/mt032218.pdf?_ga=2.261130249.526223967.1723057738-187488224.1698761190 (accessed January 13, 2025)

128 For more information about Senate Bill S2127A, visit: https://www.nysenate.gov/legislation/bills/2023/S2127/amendment/A (accessed February 18, 2025).

129 *See Wardair Canada, Inc. v. Fla. Dep't of Revenue*, 477 U.S. 1, 6 (1986) ("not only is there no indication that Congress wished to preclude state sales taxation of airline fuel, but, to the contrary, the Act expressly permits States to impose such taxes").

130 49 U.S.C. App. § 1513.

131 477 U.S. at 6.

132 *Id.*

133 *Id.*

134 *Id.* at 10 (internal citation omitted).

135 *See* a list of state taxes on jet fuel: https://www.eia.gov/petroleum/marketing/monthly/xls/aviationtaxes.xlsx (accessed June 7, 2024).

136 Aircraft Jet Fuel – Frequently Asked Questions (FAQs), California Department of Tax and Fee Administration. Available at: https://www.cdtfa.ca.gov/taxes-and-fees/aircraft-jet-fuel-faq.htm (accessed June 7, 2024).

137 According to 64 Fed. Reg. 7696, which implements the several federal statutes governing aviation taxes: "State or local taxes on aviation fuel (except taxes in effect on December 30, 1987) are considered to be airport revenue subject to the revenue-use requirement. However, revenues from state taxes on aviation fuel may be used to support state aviation programs or for noise mitigation purposes, on or off the airport." Available at: https://www.govinfo.gov/content/pkg/FR-1999-02-16/pdf/FR-1999-02-16.pdf (p. 233, accessed January 30, 2025).

138 "Fact Sheet: Biden Administration Advances the Future of Sustainable Fuels in American Aviation," White House website, September 9, 2021. Available at: https://www.whitehouse.gov/briefing-room/statements-releases/2021/09/09/fact-sheet-biden-administration-advances-the-future-of-sustainable-fuels-in-american-aviation/ (accessed June 7, 2024).

139 "New Sustainable Aviation Fuel Purchase Credit Enacted," Illinois Department of Revenue, June 2023. Available at: https://tax.illinois.gov/content/dam/soi/en/web/tax/research/publications/bulletins/documents/2023/fy-2023-23.pdf (accessed June 7, 2024).

140 49 U.S.C.A. § 40116(b) (West)

141 *Aloha Airlines, Inc. v. Dir. of Tax'n of Hawaii*, 464 U.S. 7, 11 (1983).

142 *See, e.g.*, *Aloha Airlines, Inc. v. Dir. of Taxation of Hawaii*, 464 U.S. 7, 12-13 (1983) (holding that held that a Hawaii statute that imposed a tax on the annual gross income of airlines operating within the state was preempted by the Anti-Head Tax Act, as a tax on "gross receipts").

143 49 U.S.C.A. § 40116(c).

144 *Id.* § 40116(e)(2).

145 *Nw. Airlines, Inc. v. Cnty. of Kent, Mich.*, 510 U.S. 355, 369 (1994) (internal citation omitted).

146 49 U.S.C.App. § 1305(a).

147 883 F.2d 157, 173 (1st Cir. 1989).

148 *Id.*

149 *Id.* at 159, 174.

150 510 U.S. at 374.

151 *Complete Auto Transit, Inc. v. Brady*, 430 U.S. 274, 279 (1977).

152 *Northwest Airlines, Inc. v. County. of Kent, Michigan*, 510 U.S. 355, 374 (1994).

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