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Federal Airport Noise Regulations and Programs

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SUMMARY

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Federal Airport Noise Regulations and Programs

Federal regulations mandating quieter aircraft have led to a considerable reduction of aircraft noise exposure over the past few decades. The Federal Aviation Administration (FAA) has estimated that the number of Americans exposed to *significant* levels of aircraft noise has fallen from 7 million in the 1970s to 430,000 in 2018. Nonetheless, aircraft noise remains a contentious issue in many communities.

Congress plays an important role in addressing aircraft noise through legislation and oversight. FAA regulates aviation noise through its standards for certifying new aircraft, management of the air traffic control system consistent with safety standards, and technical and financial assistance to airports for noise reduction planning and mitigation activities.

FAA administers two airport noise programs:

- Airport Noise Compatibility Planning (14 C.F.R. Part 150) was created by the Aviation Safety and Noise Abatement Act of 1979 (P.L. 96-193). FAA established the "day-night average sound level" (DNL) as the noise metric for describing community noise impacts and identified DNL 65 decibels (dB) as the threshold of significant aircraft noise as well as incompatible residential land use. Part 150 is the primary federal regulation directing planning for aviation noise compatibility on and around airports. Airport participation is voluntary. Participating airports are eligible to receive federal funding for noise planning and abatement and mitigation projects.
- Airport Noise and Access Restrictions (14 C.F.R. Part 161) were established under the Airport Noise and Capacity Act of 1990 (P.L. 101-508, Title IX, Subtitle D) to limit uncoordinated restrictions on aviation and airport access and establish a national program for federal review of airport noise and access restrictions. Under Part 161, airports may implement noise-related restrictions on aircraft operations, such as limiting certain types of planes, based on a voluntary agreement with aircraft operators or by obtaining FAA approval of mandatory noise-based restrictions. Airports are required to demonstrate substantial evidence that proposed mandatory restrictions would satisfy six statutory requirements. FAA has never approved such restrictions requested by an airport. Airports also may implement voluntary noise abatement procedures, like "fly friendly" programs under which aircraft operators fine-tune flight procedures and routes to minimize noise impact in certain communities or neighborhoods.

A recent FAA survey of approximately 10,000 people living near 20 representative airports showed that aircraft noise becomes a significant "annoyance" at levels as low as DNL 50 dB and DNL 55 dB. This suggests that the established DNL 65 dB threshold for identifying significant noise problems may no longer be an adequate guide for federal policymakers. Should FAA adjust the DNL 65 dB threshold, there could be policy and budgetary implications.

In the FAA Reauthorization Act of 2018 (P.L. 115-254), Congress directed FAA to conduct several reviews and studies of noise-related issues, including metrics, costs, and benefits of phasing out older and noisier aircraft, and potential health and economic impacts of overflight noise. While several of these studies have been completed, others are ongoing. The results may be of interest to Congress as it reexamines federal aviation and airport noise policies and programs in the context of considering reauthorization of federal civil aviation programs, which is likely to come before Congress in 2023.

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Introduction

Noise is generally defined as "unwanted sound." Aviation noise, arising mostly from aircraft operations in the air and on airport runways, affects many communities, including those around airports or under the flight paths. Despite technological advances in aircraft engine and airframe design that make most jets in operation today much quieter than their predecessors, public concerns over noise often have led to contentious relationships between community groups and airports as well as the Federal Aviation Administration (FAA).

Airport noise is predominantly a local issue, but it often involves multiple stakeholders who have distinctive authorities and shared responsibilities with regard to noise abatement and mitigation. The federal government has authority over airspace use and management, air traffic control, aviation safety, aircraft noise emissions, and airport development policy. However, other major stakeholders have important responsibilities as well in addressing aviation noise:

- state, county, and municipal governments own and operate airports while also exercising authority over local land use planning and development, zoning, and housing regulations;
- airport owners are primarily responsible for airport planning and operations, including airport location and design, land acquisition, and ground procedures that may affect the noise level beyond the airport perimeter;
- aircraft manufacturers and aircraft engine manufacturers must comply with noise criteria in order to obtain the FAA certification required to put aircraft into service; and
- aircraft operators are responsible for managing their fleets and for scheduling and flying in a way that minimizes ground-level noise impact.

In addition to its regulatory role and its management of the air traffic control system, FAA provides financial and technical assistance to airports for noise reduction planning and abatement activities. FAA also has considerable power to influence airport planning and development through the Airport Improvement Program (AIP), which provides federal grants for certain airport capital projects, including noise mitigation. Furthermore, the National Environmental Policy Act of 1969 (P.L.91-190) requires federal agencies, including FAA, to assess, consider, and disclose noise impacts and other environmental effects when considering federal approval or funding of airport development projects and airspace redesign.

This report provides an overview of major federal airport noise-related legislation, regulations, and programs. It focuses on federal resources available to airports and communities and discusses policy issues including findings from recent studies that could have policy implications. It does not address helicopter noise, as helicopters have different noise standards and operation patterns from turbojet-powered airplanes and typically operate away from the major commercial airports discussed in this report.

Federal Aviation Noise Legislation and Regulations

Amid growing concern over noise surrounding airports as a result of the considerable increase in jet aircraft operations in the 1960s, Congress amended FAA's charter in 1968 to direct FAA to address aircraft noise at a national level. The following year, the agency issued its first regulations concerning noise emitted by aircraft (14 C.F.R. Part 36 Noise Standards: Aircraft Type and

Airworthiness Certification), which marked the genesis of noise certification requirements for source control of aircraft noise.

In 1977, FAA amended Part 36 by introducing new noise standards and creating separate noise levels or "stages," each with specific limits. Since then FAA has adopted increasingly stringent standards. The noisiest Stage 1 and Stage 2 airliners, certified prior to 1977, have been phased out. All Stage 2 aircraft, including smaller business jets, have been barred from U.S. airspace since the end of 2015, except those with special permission. Most jets in operation today are Stage 3, Stage 4, and Stage 5 aircraft with much quieter engines. According to an August 2020 Government Accountability Office (GAO) report, the majority of U.S. commercial and general aviation aircraft in operation are able to meet Stage 4 or 5 standards.[1]

Noise control at the source through federal aircraft certification has led to considerable reduction of aircraft noise exposure over the past few decades. FAA has estimated that, in the 1970s, an estimated 7 million people living near airports in the United States were exposed to *significant* levels of aircraft noise. This number decreased to 430,000 in 2018.[2]

The federal government also has provided resources to address noise issues on the ground in airport environs. There are two major laws that led to the two programs administered by FAA specifically for addressing airport noise issues: the Aviation Safety and Noise Abatement Act of 1979 and the Airport Noise and Capacity Act of 1990.

Stages of Airplane Noise Levels

Civil airplanes are certificated to be in compliance with FAA noise standards. This occurs as part of the airplane certification process, under which manufacturers must demonstrate that an airplane is in compliance with all applicable airworthiness, noise, fuel venting, and exhaust emissions standards.

FAA classifies civil jet aircraft in one of five stages, with Stage 1 being the loudest and Stage 5 the quietest. Stage 1 airplanes have been prohibited from operating in the United States since 1985, and Stage 2 aircraft have not been permitted in U.S. airspace since the end of 2015. Regardless of the country in which they are registered, all civil aircraft operating in U.S. airspace must be certificated at Stage 3 or higher.

The Stage 3 standards for takeoff, landing and sideline measurements range from 89 to 106 decibels, depending on an airplane's weight and number of engines. Meeting the more stringent Stage 4 standards requires a cumulative decrease of 10 decibels from the Stage 3 standard. Stage 5 requires a further cumulative decrease of 7 decibels from the Stage 4 requirement.

Since December 31, 2020, all new airplane type designs submitted for FAA certification must meet Stage 5 noise requirements.

Aviation Safety and Noise Abatement Act of 1979

The Aviation Safety and Noise Abatement Act of 1979 (ASNA; P.L. 96-193) directed FAA to (1) establish a single system of noise measurement to be applied uniformly in measuring noise at airports and surrounding areas on the ground; (2) establish a single system for determining the noise exposure resulting from airport operations and its impact on individuals; and (3) identify land uses that are incompatible with various noise exposures.

FAA promulgated 14 C.F.R. Part 150 to implement these requirements. Part 150 established the "day-night average sound level" (DNL) as the noise metric. DNL is an aggregate measure of aviation noise over a 24-hour period, with 10 decibels (dB) added to nighttime noise events to account for increased human sensitivity at night.[3] Further, FAA identified DNL 65 decibels as the

[1] Government Accountability Office, *Aircraft Noise: Information on a Potential Mandated Transition to Quieter Airplanes*, GAO-20-661, August 2020 (https://www.gao.gov/products/gao-20-661).

[2] FAA, *Report to Congress: National Plan of Integrated Airport System (NPIAS) 2021-2025*, September 30, 2020, at https://www.faa.gov/airports/planning_capacity/npias/current/, p. 35. Significant noise level is defined in 14 C.F.R. Part 150 as day/night sound level (DNL) of 65 decibels (dB) or higher.

[3] The decibel is the unit used to measure the intensity of a sound, which is energy transferred through the air that human ears detect as small changes in air pressure.

significance threshold of noise effects on the ground as well as for determining whether residential land uses are compatible with operations at a nearby airport.

Supported by funding from AIP, 14 C.F.R. Part 150 also established standards for airports to document noise exposure and to develop measures that reduce or prevent incompatible land uses. The Part 150 program is discussed in further detail under "Airport Noise Compatibility Planning (14 C.F.R. Part 150)."

Airport Noise and Capacity Act of 1990

Congress enacted the Airport Noise and Capacity Act (ANCA; P.L. 101-508) in 1990,[4] during a time when community noise concerns led to uncoordinated and inconsistent restrictions on aviation that were said to impede the nation's airport system. ANCA called for establishment of a national aviation noise policy. The law increased FAA's authority over noise matters and authorized a local charge on departing passengers as an additional source of airport revenue, known as a "Passenger Facility Charge" (PFC).

ANCA and its resulting regulations, 14 C.F.R. Part 161, impose stringent requirements on airports seeking to implement certain types of noise rules or restrictions, including night curfews, caps on maximum noise levels, numbers of aircraft operations, and noise-based fees. The Part 161 Program is discussed in further detail under "Airport Noise and Access Restrictions (14 C.F.R. Part 161)."

FAA Airport Noise Policy and Program

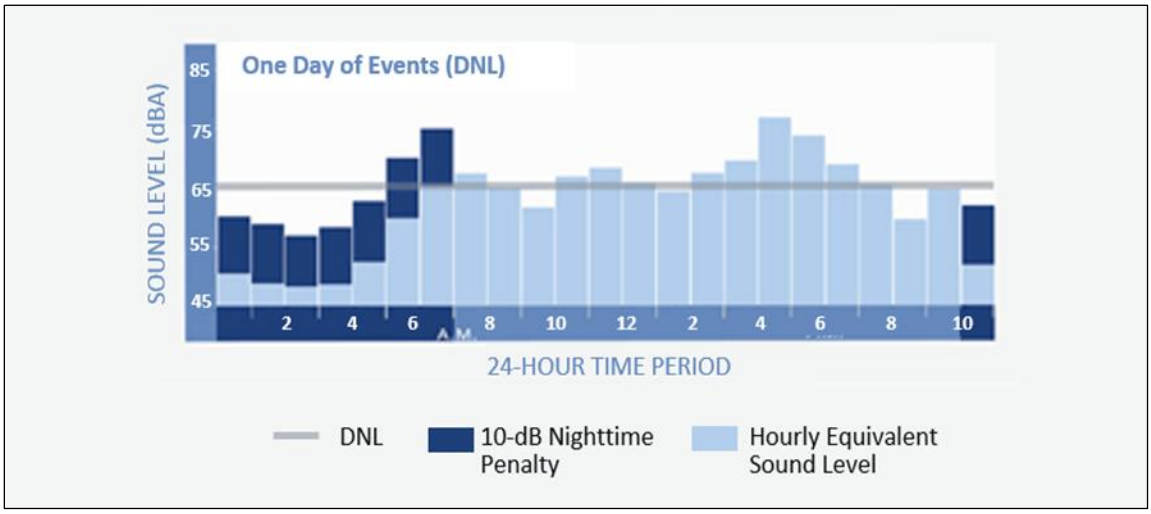
The impact of aircraft noise is usually analyzed in terms of the extent to which the noise annoys people by interfering with daily activities such as sleep, speech, relaxation, school, and business operations. Annoyance is an attitudinal response conveying an adverse reaction to noise. In assessing community response, FAA assesses the proportion of a community predicted to be *highly annoyed* by aircraft noise levels based on historical attitudinal response data.

Airport Noise Compatibility Planning (14 C.F.R. Part 150)

When FAA promulgated Part 150, "Airport Noise Compatibility Planning," in 1984, the agency set out standards for airport operators to use in documenting noise exposure in their airport's environs and for establishing programs to minimize noise-related land use incompatibilities. FAA adopted DNL as the noise metric.

[4] P.L. 101-508, Omnibus Budget Reconciliation Act of 1990, Title IX, Subtitle D.

Figure 1. Day-Night Average Sound Level (DNL)



Source: FAA, *Fundamentals of Noise and Sound*, at https://www.faa.gov/regulations_policies/policy_guidance/noise/basics/.

Notes: Abbreviations in figure are as follows. dB=decibel; DNL=day-night average sound level; dBA= A-weighted noise level that has been adopted by FAA as the accepted measure for aircraft noise. dBA accounts for differences in how people respond to sound by focusing on those parts of the frequency spectrum that people hear most.

As shown in **Figure 1**, the DNL noise metric captures all the acoustic energy attributable to aircraft during each hour of a 24-hour span. The metric adds an additional weight of 10 dB (bars in deep blue) to sounds occurring between 10:00 p.m. and 7:00 a.m. to account for a higher sensitivity to noise exposure at night. The horizontal line indicates the day-night average, which is the average sound level within a 24-hour period.

The DNL noise metric is used to reflect a person's cumulative exposure to sound over a 24-hour period. It is expressed as the noise level for the average day of the year on the basis of annual aircraft operations so that it captures all the variable operational conditions over the course of a year. Since DNL describes the effects of environmental noise in a simple and uniform way, it has become the standard metric used for all FAA studies of aviation noise exposure at ground level.

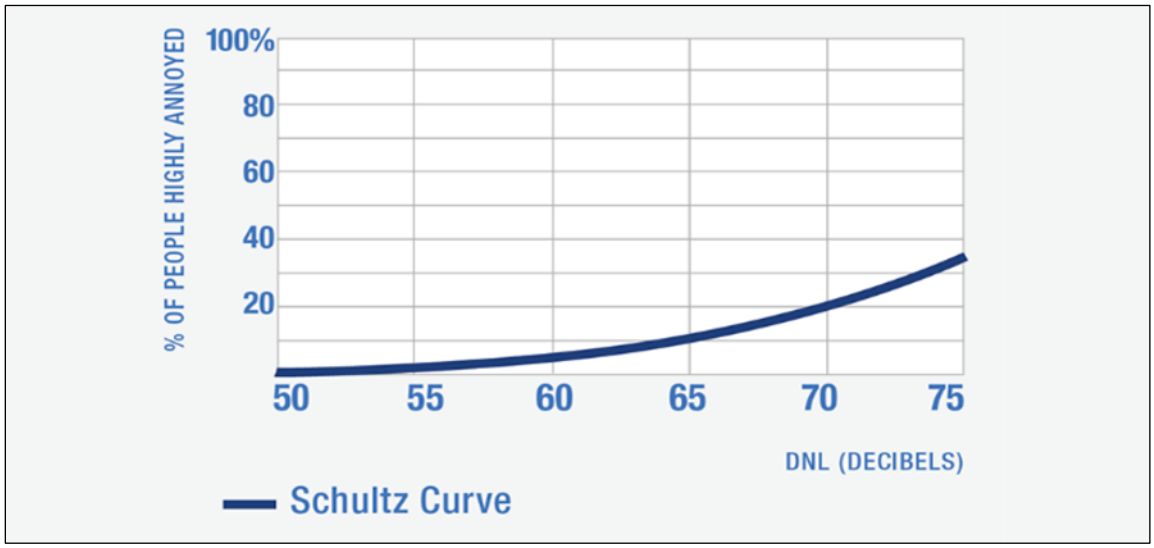
DNL, and an earlier Community Noise Equivalent Level (CNEL) metric adopted for use in California, are similar. However, they differ in how noise is treated during the evening and nighttime. CNEL adds a 10-times weighting (equivalent to a 10 dB "penalty") to each aircraft operation between 10:00 p.m. and 7:00 a.m. and a three-times weighting (equivalent to a 4.77 dB penalty) for each aircraft operation between 7:00 p.m. and 10:00 p.m. Although DNL is the primary metric FAA uses to determine noise impacts, FAA accepts CNEL when assessing aviation noise in California because the State of California adopted that metric prior to FAA adopting DNL.

A 1978 study by T. J. Schultz, a research scientist and acoustics consultant who worked at the U.S. Naval Research Laboratory and Douglas Aircraft Company, provided the generally accepted model for assessing the effects of noise exposure.[5] The noise thresholds used to develop and implement FAA noise policy are based on a dose-response curve known as the "Schultz Curve."

[5] T.J. Schultz, "Synthesis of Social Surveys on Noise Annoyance," *Journal of the Acoustical Society of America* 64(2) August 1978, pp. 377-405.

Based on the data available at the time, the Schultz Curve (**Figure 2**) provided a useful method for representing the community response to sound exposure, showing that individuals reported a noticeable increase in annoyance when those sound levels exceed DNL 65 dB.[6]

Figure 2. The "Schultz Curve"



Source: FAA, Source: FAA, Neighborhood Environmental Survey, at https://www.faa.gov/regulations_policies/policy_guidance/noise/survey/#results.

Note: DNL=day-night average sound level.

The Federal Interagency Committee on Noise (FICON) was formed in 1990 to review FAA's methodology for assessing airport noise impacts in reviews pursuant to the National Environmental Policy Act and 14 C.F.R. Part 150, and to recommend potential improvements. In its 1992 in-depth review of human annoyance to noise, FICON adopted the dose-response curve known as the FICON curve. The FICON curve showed that 12.3% of persons are highly annoyed by DNL 65 dB. This result, similar to the Schultz Curve, supported FAA's choice of DNL 65 dB as an appropriate threshold for significant community aircraft noise exposure.[7] The FICON curve has since served as the basis for FAA policy regarding community impacts to aircraft noise.

As the DNL measure reflects the average of all of the noise energy occurring during a 24-hour time period, it may fail to reflect the high-level noise events of individual aircraft operations, which may be considerably louder. Another common criticism is that the DNL 65 dB threshold may not be an accurate indicator of how an individual or a particular community responds to aircraft noise and, therefore, it could be overly simplistic to rely solely on this threshold for regulatory purposes.[8]

[6] In 1992, the Federal Interagency Commission on Noise (FICON) reviewed the DNL annoyance relationship depicted on the Schultz curve and concluded that it "is an invaluable aid in assessing community response as it relates the response to increases in both sound intensity and frequency of occurrence. Although the predicted annoyance, in terms of absolute levels, may vary among different communities, the Schultz curve can reliably indicate changes in the level of annoyance for defined ranges of sound exposure for any given community."

[7] FICON, 1992, at https://fican.org/. FICON recommended that "a standing federal interagency committee should be established to assist agencies in providing adequate forums for discussion of public and private sector proposals, identifying needed research, and in encouraging the conduct of research and development in these areas." The Federal Interagency Committee on Aviation Noise (FICAN) was formed in 1993 to fulfill this recommendation.

[8] Sanford Fidell, "A Review of US Aircraft Noise Regulatory Policy," *Acoustics Today*, vol. 11, no. 4, Fall 2015.

FAA identified DNL 65 dB as the threshold of noise significance. Under Part 150 guidance, residential land use is considered not compatible with airport operations when cumulative noise levels on the ground are greater than DNL 65 dB. Also, DNL 65 dB is generally the minimum average noise level for residential properties to be eligible for federal funds for noise mitigation. Although airports may make their own decisions whether or not to address noise complaints when the measured noise level is below the DNL 65 dB threshold, FAA generally gives priority to projects that would address noise levels above DNL 65 dB.

Part 150 Components

Once an airport decides to participate in FAA's Part 150, it must formally submit a Noise Exposure Map (NEM) and a Noise Compatibility Program (NCP).[9]

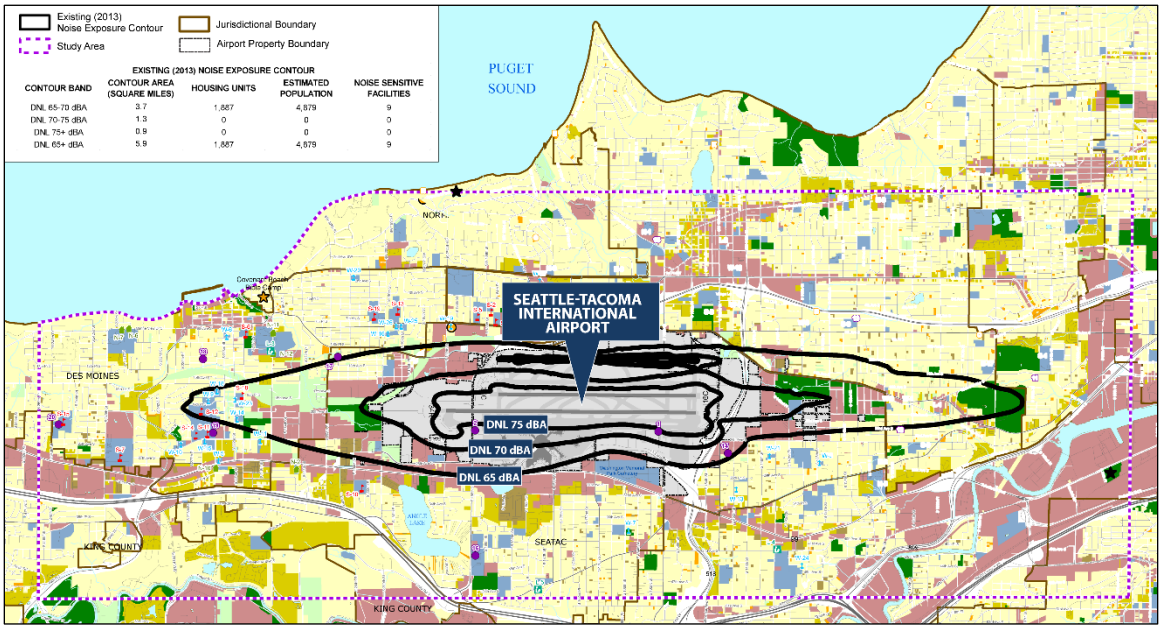
An airport's NEM (49 U.S.C.§47503) is a scaled geographic visualization of an airport, its noise contours,[10] and the surrounding area that depicts existing and future community noise exposures (**Figure 3**). It typically includes the layout of the airport property, runway location, and continuous DNL noise contours at the 65, 70, and 75 dB levels, as well as the location of noise-sensitive public buildings nearby. The NEM may be updated periodically when needed to reflect changes in airport noise levels. Based on NEM identification of areas of incompatible land use, an airport then proposes noise mitigation projects for FAA review and approval. Since Part 150 defines a voluntary program, decisions regarding whether and when to update NEMs are left up to the individual airports.

FAA land-use determinations under Part 150, however, do not change or displace the land uses determined to be appropriate by local authorities (such as cities and counties) that have the authority over local land-use decisions. An airport's participation in Part 150 is strictly voluntary.

[9] 14 C.F.R. Part 150 at https://www.ecfr.gov/cgi-bin/text-idx?SID=f8e6df268e3dad2edb848f61b9a0fb51&mc=true&node=pt14.3.150&rgn=div5.

[10] Noise metric results, such as DNL, are drawn on maps in terms of lines connecting points of the same decibel, and form continuous lines that become "noise contours." This is similar to topographical maps showing the elevation of terrain in an area.

Figure 3. Example of Airport Noise Exposure Map



Source: CRS adaption of 2013 Port of Seattle Seattle-Tacoma International Airport Noise Exposure Map from FAA, Airport Noise and LandUse Information, including Noise Exposure Maps (NEMs), at https://www.faa.gov/airports/environmental/airport_noise/noise_exposure_maps/.

The NCP (49 U.S.C. §47504) generally is considered the principal part of an airport's overall noise abatement and mitigation effort. It requires an airport not only to identify and evaluate noise issues but also to present to FAA potential and actionable measures for noise abatement and/or mitigation. It also provides an opportunity for community involvement.

More specifically, FAA requires an airport operator preparing a Part 150 NCP to analyze alternatives that may include both operational measures (such as directing air traffic over less populated areas and reducing aircraft engine run-up noise) and land-use mitigation measures (such as acquiring land, constructing noise barriers, and providing sound insulation for residences and schools). The airport operator must develop a noise compatibility program that[11]

1. reduces existing noncompatible uses and prevents or reduces the probability of the establishment of additional noncompatible uses;
2. does not impose an undue burden on interstate and foreign commerce;
3. does not derogate safety or adversely affect the safe and efficient use of airspace;
4. to the extent practicable, meets both local interests and federal interests of the national air transportation system; and
5. can be implemented in a manner consistent with all of the powers and duties of the FAA Administrator.

FAA encourages a balanced approach to address noise issues and generally discourages airports from restricting aircraft operations except as a last resort. When FAA conducts compliance reviews of noise compatibility programs, it must evaluate whether a restriction on airport use would affect the airport's ability to fulfill its federal obligations. These include requirements

[11] FAA Order 5190.6B, Chapter 13 Airport Noise and Access Restrictions, accessible at https://www.faa.gov/airports/resources/publications/orders/compliance_5190_6/.

(known as grant assurances) that airports receiving AIP grants make the airport available for public use on reasonable conditions and without unjust economic discrimination (against all types, kinds, and classes of aeronautical activities); charge air carriers making similar use of the airport comparable amounts; and expend airport revenue only on capital or operating costs at the airport.[12] These assurances are in furtherance of FAA's mandate to maintain the efficiency and capacity of the national air transportation system.[13]

Part 150 Program Funding

Commercial airports have multiple funding options to address noise issues: AIP grants, PFC revenue, and, in some cases, their own operating revenues. FAA oversees two programs that fund airports' capital development projects, including noise-related spending, from AIP and PFC revenue.

Airport Improvement Program

AIP provides federal grants to airports for airport development and planning, with a portion of funding derived from a local match.[14] Participants range from large commercial airports to small general aviation airports. AIP funding usually is limited to construction of improvements related to aircraft operations, such as runways and taxiways. The structure and allocation of AIP funds reflects congressional priorities and the objectives of assuring airport safety and security, increasing airport capacity, reducing congestion, helping fund noise and environmental mitigation costs, and financing small state and community airports.

AIP funding distribution is based on a combination of formula grants (also referred to as apportionments or entitlements) and discretionary funds. Each year the entitlements are first apportioned by formula to specific airports or types of airports. Once the entitlements are satisfied, the remaining funds are awarded as discretionary funds that airports may apply for.

Although AIP funding for airport noise projects predominantly comes from the AIP discretionary fund, some airports use their AIP formula funds for noise projects as well. According to FAA data, between FY2011 and FY2020, AIP provided over $1.2 billion for airport noise projects, with over 97% of that amount from the discretionary funds and the remainder from airports' entitlements. Of total AIP spending on noise projects, over 88% went to noise mitigation projects such as sound insulation for buildings; nearly 9% on land acquisition; and 3% on noise compatibility studies and planning.

Airports, as part of the easement and mitigation process, may establish a voluntary program to install sound insulation in homes subject to specific noise levels. In order to be eligible for AIP funding, a building or home generally must have a current or forecast exterior noise exposure of DNL 65 dB or higher and an existing interior noise exposure of DNL 45 dB or higher. Many

[12] For more information about AIP grant assurances, see CRS Report R43327, *Financing Airport Improvements*, by Rachel Y. Tang, p. 12; and FAA, Grant Assurances (Obligations), at https://www.faa.gov/airports/aip/grant_assurances/.

[13] Ibid. FAA interprets the requirement in 49 U.S.C, §47107(a)(1) that a federally funded airport will be "available for public use on reasonable conditions" as requiring that a regulation restricting airport use for noise purposes (1) be justified by an existing noncompatible land use problem; (2) be effective in addressing the identified problem without restricting operations more than necessary; and (3) reflect a balanced approach to addressing the identified problem that fairly considers both local and federal interests.

[14] The typical federal share of AIP projects at large and medium hub airports is 75%; for noise compatibility projects the federal share is 80%.

airports in the United States have implemented a residential sound insulation program. FAA reported to Congress in 2019 that

> As of September 2019, the FAA has funded over $6.91 billion on sound insulation programs through AIP grant program and has approved over $4.4 billion through the PFC program. Through these programs, over 143,000 homes have been sound insulated, as well as other noise sensitive locations such as schools and churches. The costs for sound insulation at a typical single-family home can run from $15,000 to $65,000 per residence (and higher), along with up to $1,800 per residence for testing of noise levels.[15]

Passenger Facility Charge (PFC)

PFCs, as an additional funding source available to commercial airports, are user fees imposed by commercial airports on passengers boarding aircraft. Noncommercial facilities, such as general aviation airports, do not collect PFCs. PFCs are not federal funding but must be used to finance eligible airport-related projects, subject to FAA approval. Unlike Part 150 noise projects funded by AIP, PFCs may fund noise projects that are independent of Part 150. Airports can set their own priorities for project funding and may use PFCs to pay for their local share of AIP grants. Airports may use their own operating revenues from commercial leases, parking charges, and other sources to fund noise projects as well, but FAA does not keep track of such spending. Between calendar year 2011 and calendar year 2020, FAA approved more than $247 million in PFCs to be used for airport noise-related projects, with over 86% at large hub airports. Of the $247 million of PFC noise spending, more than 76% was for mitigation measures such as sound insulation; over 18% for land acquisition; and the rest for noise compatibility studies and planning.

Part 150 Participation

A total of 280 airports have participated in the Part 150 program, among which 26 are general aviation airports that do not handle commercial flights, according to FAA.[16] Unlike large commercial airports that are in densely populated metropolitan areas, these airports tend to have a relatively small number of flight operations, particularly by large jet aircraft. The estimated aggregate noise levels around many general aviation airports do not warrant Part 150 participation, especially where the amount of jet traffic is relatively limited.

Part 150 funding and participation levels, however, do not appear to be good indicators of airports' noise-control needs, largely because participation is voluntary and affected by airports' own plans and priorities. Part 150 funding requests often fluctuate from year to year due to a variety of circumstances, including changes in local procurement needs and project implementation, currency of NEMs, and changes in airline schedules and fleet mix. Noise projects that did not receive funding in a current year usually were deferred for discretionary funding in subsequent years.

The Part 150 program is not the only option airports have to reduce noise affecting the surrounding community. Some airports may choose to work directly with multiple stakeholders without relying on a federal regulatory process and establish voluntary noise abatement or mitigation programs outside of the Part 150 process.

[15] FAA, *Report to Congress: Aging of Sound Insulation*, November 2019, p. 3, at https://www.faa.gov/about/plans_reports/congress/media/FAA-190312-007-Aging-Sound-Insulation-Report-to-Congress.pdf.

[16] FAA email to CRS on March 5, 2021.

Airport Noise and Access Restrictions (14 C.F.R. Part 161)

ANCA was enacted in 1990 to establish a national program for federal review of airport noise and access restrictions. The law called for the phase-out of Stage 2 aircraft weighing more than 75,000 pounds. It also permitted airports to implement Stage 2 aircraft restrictions that were proposed as well as Stage 3 restrictions that were in effect before enactment of ANCA. Hence, airport noise and access restrictions that were in place before October 1, 1990, typically are "grandfathered" under ANCA.

ANCA, implemented by 14 C.F.R. Part 161, requires airport proprietors that propose to implement noise and access restrictions on Stage 2 aircraft operations to comply with specific notice, economic cost-benefit analysis, and public comment requirements. Under Part 161, airports may implement noise-related restrictions based on a voluntary agreement with aircraft operators. Alternatively, an airport may pursue mandatory noise-based restrictions that require FAA approval. Restrictions on Stage 3 aircraft operations, however, must fulfill more stringent requirements.

Further, ANCA requires that airports proposing to implement noise and access restrictions on Stage 3 aircraft operations provide a detailed economic cost-benefit analysis, demonstrate satisfaction of six statutory criteria, and obtain FAA approval prior to implementation of any such restrictions, unless they are agreed upon by all affected aircraft operators.

Airports' mandatory noise and access restrictions must satisfy the following six criteria:

1. be reasonable, nonarbitrary, and nondiscriminatory;
2. do not create an undue burden on interstate or foreign commerce;
3. are not inconsistent with maintaining the safe and efficient use of the navigable airspace;
4. do not conflict with a law or regulation of the United States;
5. are imposed following an adequate opportunity for public comment; and
6. do not create an undue burden on the national aviation system.

14 C.F.R. Part 161 regulations further outline the evidence FAA considers essential to show that a proposed restriction satisfies these six conditions.[17] The regulations also require the applicant to describe the noise level at the airport and surrounding areas, and the noise exposure of individuals as a result of operations at the airport, in accordance with the specifications and methods prescribed under Part 150, including use of computer models to create noise contours.

Airports generally tend to take an incremental approach and employ non- or less restrictive alternatives to Part 161 that often effectively address their noise issues. Noise compatibility studies and planning under Part 150 that assist airports in their incremental efforts would be eligible for federal funding, while stand-alone Part 161 efforts generally are not eligible to receive federal funding. Also, starting with non- or less restrictive alternatives could help support the justification for a mandatory restriction, though FAA has not granted approval under Part161 to any restrictions on Stage 3 aircraft operations proposed by an airport.

A total of 24 Part 161 studies have been conducted at 21 different airports.[18] Three of these resulted in formal applications to implement restrictions. The only one of those cases that moved

[17] 14 C.F.R. §161.305(e)(2).

[18] FAA, "Part 161—Notice and Approval of Airport Noise and Access Restrictions," at https://www.faa.gov/airports/

beyond the application stage involved proposed restrictions in 2001 on Stage 2 jet operations at Naples Municipal Airport in Florida. Since Stage 2 restrictions do not require FAA approval as long as the applicant meets the procedural requirements, the Naples airport application was not granted an approval, but rather it successfully completed an FAA review to ensure that the airport had fully complied with Part 161.[19]

The other two applicants, both in Southern California—Los Angeles International Airport and Bob Hope Airport in Burbank—sought to impose restrictions on Stage 3 aircraft. Both applications were disapproved, as FAA found the applicants had not provided sufficient evidence that the proposed restrictions met all six statutory conditions.[20]

Part 161 regulations technically only reference Stage 2 and Stage 3 aircraft, not the newer, quieter generations of Stages 4 or 5. FAA has expressed, however, that it would be consistent with congressional intent to apply ANCA and Part 161 requirements to any restrictions proposed by airports on Stage 4 and 5 aircraft.[21]

NextGen Metroplex Controversies

FAA has made changes to its air traffic control system and flight procedures as part of its comprehensive air traffic modernization initiative, referred to as the Next Generation Air Transportation System (NextGen). NextGen relies on more precise satellite-based navigation and tracking to increase airspace utilization and improve efficiency in flight operations. One of the key objectives is to allow commercial airplanes to fly more efficient arrival and departure routes and thereby reduce fuel consumption and carbon emissions.

FAA has been reconfiguring airspace by adjusting flight routes and creating new approach and departure procedures at airports. The agency has implemented these NextGen procedures by redesigning terminal airspace around large metropolitan areas with multiple airports and complex air traffic flows, which it refers to as Metroplexes.[22]

These changes, however, have triggered opposition from some communities where multiple overflights may have increased aggregate noise. This is because certain new flight procedures may have routed airplanes over areas not previously overflown; or because the greater precision of satellite-based navigation tends to concentrate arriving and departing flights along narrower paths below which some neighborhoods experience more frequent overflights. Complaints from these communities have prompted legislative action regarding FAA's approaches to measuring aircraft noise, assessing impacts, and conducting community outreach.

environmental/airport_noise/part_161/.

[19] Letter from Paul L. Galis, FAA Deputy Associate Administrator for Airports, to Theodore D. Soliday, Executive Director of City of Naples Airport Authority, October 31, 2001.

[20] Letter form Benito De Leon, FAA Deputy Associate Administrator for Airports, to Gina Marie Lindsey, Executive Director, Los Angeles World Airports, November 7, 2014; and Letter from Catherine M. Lang, FAA Acting Associate Administrator for Airports, to Dan Feger, Executive Director of Burbank-Glendale-Pasadena Airport Authority, October 30, 2009.

[21] FAA email to CRS on December 12, 2019.

[22] For more information about the Metroplex initiatives and controversies, see https://www.faa.gov/air_traffic/community_involvement/ and CRS Insight IN10947, *Categorical Exclusions, Metroplexes, and Aircraft Noise Complaints*, by Bart Elias.

Noise-Related Provisions in 2018 FAA Reauthorization Act

In the FAA Reauthorization Act of 2018 (P.L. 115-254), Congress included a number of aviation noise-related provisions to address noise issues. It also mandated a number of studies that eventually may contribute to new approaches in dealing with aviation noise.

Evaluation of Alternative Metrics to DNL 65 and Alternative Airplane Noise Metric Evaluation

Section 173 of P.L. 115-254 required FAA to complete its ongoing "evaluation of alternative metrics to the current Day Night Level (DNL) 65 standard." Section 188 directed FAA to "evaluate alternative metrics to the current average day-night level standard, such as the use of actual noise sampling and other methods, to address community airplane noise concerns."

On April 14, 2020, FAA submitted a report to Congress addressing both requirements. It compared 11 noise metrics and concluded that, while no single noise metric is able to cover all noise situations, the DNL metric and similar versions such as CNEL are being used worldwide to assess aircraft noise effects on communities. The study maintained that noise modeling is the "only practical way to predict geospatial noise effects in a surrounding community when analyzing proposals related to aviation noise."[23] FAA further stated that "Noise modeling is also necessary for a wide variety of other proposed federal actions, such as those resulting from airfield changes or changes in airspace management. The assessment of these actions requires the review of future case proposals and can therefore only be considered through predictive modeling."[24]

Review of Noise Exposure Impact

Section 187 of P.L. 115-254 directed FAA to conclude its ongoing review of the relationship between aircraft noise exposure and its effects on communities around airports. It further required FAA to submit a report including the review results and preliminary recommendations, if appropriate, for revising the land use compatibility guidelines in 14 C.F.R. Part 150.

FAA conducted a nationwide survey to measure the relationship between aircraft noise exposure and annoyance in communities near airports. This multiyear research surveyed a large number of residents living near 20 representative airports and received about 10,000 responses. In January 2021, FAA released the results in a study, *Analysis of Neighborhood Environmental Survey.*[25]

Based on the responses, FAA created a new national curve that differs considerably from the Schultz curve in its estimation of the level at which aircraft noise becomes a significant annoyance to people on the ground. The new national curve (**Figure 4)** shows a substantial increase in the percentage of people who are highly annoyed over the entire range of noise levels,

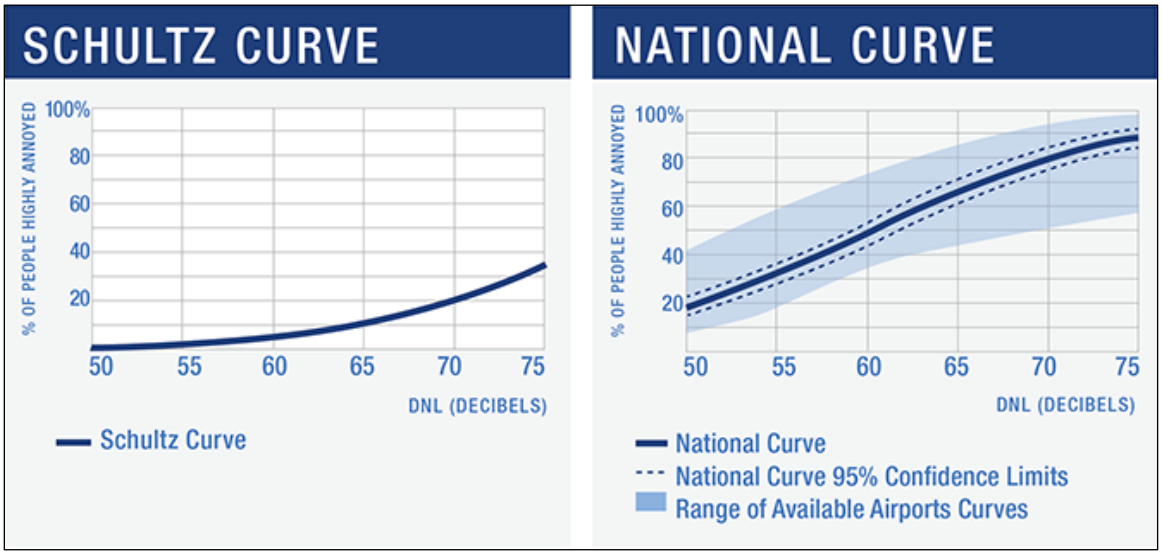
[23] FAA, *Report to Congress: FAA Reauthorization Act of 2018 (*P.L. 115-254*) Section 188 and Sec 173*, April 14, 2020, at https://www.faa.gov/about/plans_reports/congress/media/Day-Night_Average_Sound_Levels_COMPLETED_report_w_letters.pdf.

[24] Ibid., pp. 19-20.

[25] *Analysis of the Neighborhood Environmental Survey* is accessible at https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/ArtMID/3682/ArticleID/2845/Analysis-of-NES. More information about the survey, including an FAA introduction, overview of the methodology, results, and public comments requested, can be found at https://www.faa.gov/regulations_policies/policy_guidance/noise/survey/#results.

including at lower noise exposure levels such as DNL 50 dB and DNL 55 dB. This suggests that the Schultz Curve, which identified DNL 65 dB as the level at which many people become highly annoyed by aircraft noise, may no longer be an adequate guide for national policy on aircraft noise.

Figure 4. Schultz Curve and the New National Curve



Source: FAA, Neighborhood Environmental Survey, at https://www.faa.gov/regulations_policies/policy_guidance/noise/survey/#results.

Note: DNL=day-night average sound level.

The survey results generated considerable public interest. FAA published a *Federal Register* notice on January 13, 2021,[26] inviting public comments on its aircraft noise research program, including the survey. The agency received more than 4,000 comments during the 90-day comment period. FAA has not announced whether it will adopt the national curve as a policy guide or propose other policy changes as a result of the survey.

Stage 3 Aircraft Study

Section 186 of P.L. 115-254 directed GAO to review a potential phase-out of Stage 3 airplanes, the loudest aircraft currently operating in the United States.

GAO indicated in its August 2020 report that, although most U.S. large commercial jet airplanes are certified at the minimum required Stage 3 noise standards, about 96% of these aircraft already are able to meet Stage 4 or 5 standards. With respect to the generally smaller regional commercial jets and general aviation fleet, 86% of the regional commercial jets and 73% of the general aviation fleet are able to meet Stage 4 or 5 standards.[27] GAO concluded that, since only a small percentage of Stage 3 fleet in the United States does not already meet more stringent Stage 4 or 5

[26] FAA notice, Overview of FAA Aircraft Noise Policy and Research Efforts: Research Activities to Inform Aircraft Noise Policy, January 13, 2021, at https://www.regulations.gov/document/FAA-2021-0037-0001.

[27] Government Accountability Office, *Aircraft Noise: Information on a Potential Mandated Transition to Quieter Airplanes*, GAO-20-661, August 2020 (https://www.gao.gov/products/gao-20-661).

standards, phasing out Stage 3 aircraft could be costly without accomplishing substantial noise reduction.[28]

Airport Noise Mitigation and Safety Study

Section 179 of P.L. 115-254 directed FAA to report the results of an Airport Noise Mitigation and Safety Study. In December 2020, FAA submitted to Congress a study prepared by the Massachusetts Institute of Technology International Center for Air Transportation.[29] The report pointed out that although engine noise historically has been the dominant aircraft noise source and regulatory focus, airframe noise has become an increasingly important consideration as aircraft engines have become quieter due to technological advancements.

The report concluded that while airframe noise sources are highly sensitive to airspeed when taking off or on approach, changes in aircraft climb speed do not have an appreciable impact on overall aircraft departure noise due to the dominance of engine noise. However, changes in approach airspeed from delaying the deceleration of arriving aircraft could have a noticeable noise reduction of 4 dB to 8 dB at relatively large distances from touching down. The study suggested that additional work was required to validate this potential benefit and to resolve implementation challenges.

Study of Potential Health and Economic Impacts of Overflight Noise

Section 189 of P.L. 115-254 directed FAA to study the impacts of noise from aircraft flights on residents exposed to overflight noise. The provision required the study to be focused on the impact on residents "in the metropolitan area of Boston, Chicago, District of Columbia, New York, the Northern California Metroplex, Phoenix, the Southern California Metroplex, Seattle and other such area as may be identified by the Administrator."

FAA has contracted with Boston University and the Massachusetts Institute of Technology for a three-year study that is scheduled to be completed in 2022.[30]

Community Engagement

Multiple provisions of P.L. 115-25 required FAA to work with airport communities to educate, engage, and implement noise control measures. FAA has formalized the process of addressing community noise concerns and increased community involvement in its NextGen Metroplex projects.[31] As directed, FAA also has placed ombudsmen in each of its regional offices to serve as its community engagement officers.

Policy Considerations

Aviation noise remains a major concern to some airport communities and environmental advocacy groups, despite measurable technological improvements and abatement and mitigation

[28] Ibid., pp. 18-22.

[29] FAA, Report to Congress: FAA Reauthorization Act of 2018 (P.L. 115-254) Section 179: Airport Noise Mitigation and safety Study, June 1, 2020, accessible at https://www.faa.gov/about/plans_reports/congress/.

[30] FAA letter to Rep. Eleanor Holmes Norton, January 24, 2020.

[31] FAA, "Community Involvement," at https://www.faa.gov/air_traffic/community_involvement/.

efforts to address it. Multiple factors may have contributed to lingering concerns over aviation noise and could continue to influence national and local policy. They include the following:

- population growth and pressure for housing construction around major airports, especially in metropolitan areas;
- increases in air traffic and changes in flight operations that intensify existing noise exposure or raise noise levels in areas that may not have experienced annoyance from aircraft noise previously;
- elevated public awareness of the adverse effects of aircraft noise on individuals and communities, leading to greater community engagement with noise issues; and
- continuing debate over whether there should be an alternative noise metric other than the current DNL and whether or not the DNL 65 dB threshold should be lowered to reflect increased community sensitivity to aircraft noise.

The new national curve developed with information from the FAA's *Neighborhood Environmental Survey* shows that substantially more people are highly annoyed by a given DNL aircraft noise exposure level than the five-decade-old Schultz Curve indicated. Pending FAA decisions and recommendations and the ongoing overflight noise study may reignite policy discussion or contribute to proposals for policy adjustment.

If FAA's findings and recommendations based on these studies support an adjustment to the 65 dB threshold, this could have policy and budgetary implications. For example, lowering the current threshold would expand the number of eligible airport noise projects and increase funding needs should additional airports choose to participate in the FAA Part 150 program. This could lead to efforts to make more resources available to airports and help address noise issues. Such a shift also might foster concern among some local authorities because of the implications for local land use and development. A lower federal noise threshold or standard, if put in place, is likely to apply to all land within the new lower noise contour and could reduce the amount of land available for commercial or residential development around particular airports. This in turn could affect the tax bases of local jurisdictions, especially if the land has been previously zoned for residential development.

Additionally, it may be helpful to conduct formal evaluations of the effectiveness of existing noise measures. For example, detailed and quantifiable cost-benefit analysis of home noise insulation projects may provide some indication of the overall and incremental costs of interior noise reduction, as well as of the cost-effectiveness of insulation compared to other noise mitigation measures.

In the past, Congress generally has addressed airport noise issues in reauthorizing FAA programs and aviation-related taxes and fees. The current authorizations are set to expire on September 30, 2023.

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