


Concern Grows Over Pollution from Jets

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Aviation and the environment are on a collision course. The number of airline flights worldwide is growing and expected to skyrocket over the coming decades. Aircraft emissions pollute the air and threaten by 2050 to become one of the largest contributors to global warming, British scientists have concluded. 

Much remains unknown about climate change and the role aviation plays, though climate scientists express particular concern about jet emissions in the upper atmosphere, where the warming effect from some pollutants is amplified.

Now, aviation is believed to be less a factor in the Earth's warming than power plants or vehicular traffic. But its emissions are considerable. On a New York-to-Denver flight, a commercial jet would generate 840 to 1,660 pounds of carbon dioxide per passenger. That's about what a typical driver generates with an SUV in a month.

With the projected explosion in worldwide travel, air pollution from aviation is a growing concern among scientists, and it's drawing increased scrutiny from governments, particularly in Europe.

"It's an issue that has to be addressed," says Brenda Ekwurzel, a climate scientist for the Union of Concerned Scientists, an environmental advocacy group.

David Travis, a climate science professor at the University of Wisconsin-Whitewater, says aircraft emissions "are currently one of the fastest-growing contributors to global warming."

The European Union is considering strict controls on aircraft emissions, an action strongly opposed by the White House because of its potential effect on U.S. airlines.

Some members of the British Parliament favor limiting the growth rate in the number of air passengers to the rate at which aviation improves its fuel efficiency. Last month, a local government council rejected a plan to increase flights at London's Stansted airport because of concerns about the environment and global warming.

In the USA, a panel of scientists brought together by NASA and the Federal Aviation Administration agreed in August that the effects of aircraft emissions on the climate "may be the most serious long-term environmental issue facing the aviation industry."

The FAA projects that the number of U.S. airline passengers will nearly double from 739 million last year to 1.4 billion in 2025. Air traffic controllers are expected to handle 95 million flights by all types

of aircraft in 2025, compared with 63 million last year. Worldwide, a growing middle class with the means to travel is spawning new airlines and big orders for new planes. China plans more than 40 new airports to accommodate the growth.

By 2050, emissions from planes are expected to become one of the largest contributors to global warming, according to the Royal Commission on Environmental Pollution, an independent group of scientists that advises the British government.

Although the USA is the largest emitter of carbon dioxide -- a pollutant that scientists believe is a major contributor to global warming -- the Bush administration refuses to ratify the Kyoto Protocol. That 1997 agreement is limiting emissions from such big polluters as power plants and automobiles in more than 160 countries. President Bush says the agreement would hurt the economy. He also says it's unfair because it exempts China, another major polluter.

Aviation emissions are not part of the Kyoto Protocol. Emissions from planes were considered a minor problem when the agreement was negotiated, but several scientific studies have since shown otherwise, says European Commission spokeswoman Barbara Helfferich.

In the USA, aircraft emission standards set by the Environmental Protection Agency mirror those of the International Civil Aviation Organization (ICAO), the group that sets worldwide standards. The FAA enforces the EPA's standards.

Environmentalists and many state and local air pollution officials argue that the standards are too weak. The EPA says limits now in place will slow the growth of aircraft emissions, but more stringent standards "will likely be necessary and appropriate in the future," says Margo Oge, director of the agency's Office of Transportation and Air Quality.

Proposed changes

Last month, FAA Administrator Marion Blakey proposed changes in air traffic control procedures and expansion of U.S. airports to accommodate the projected increase in commercial flights, a strategy widely decried by critics.

"The FAA protects its customers: the airports and the industry," says Jack Saporito, executive director of the Alliance of Residents Concerning O'Hare, a Chicago group that opposes plans to expand O'Hare airport. "It does not protect the public, their families' health or our environment, though it pretends to."

In written answers to questions from USA TODAY, the FAA says aircraft emissions "are not expected to be the fastest-growing contributor to global warming."

Don Wuebbles, a University of Illinois professor of atmospheric science who chaired the panel of scientists brought together by NASA and the FAA, says the projected growth in aviation could make aircraft emissions one of the fastest-growing contributors. But he acknowledges many uncertainties, including aviation's role in global warming and the growth of other pollution sources abroad.

What is known, he says, is that it's "much harder" to reduce carbon dioxide emissions from aviation. Jet engines are already energy efficient, and technology to significantly reduce carbon dioxide from them isn't as far along as it is for land-based pollution sources.

Besides carbon dioxide, jet engines emit many pollutants into the atmosphere, including nitrogen oxides, sulfur oxides, soot and even water vapor. Carbon dioxide and water vapor are called greenhouse gases, because they trap heat and contribute to global warming.

Though planes contribute to air pollution while on the ground, scientists studying global warming are most concerned about pollutants emitted when a plane is airborne. Jets are the major source of emissions deposited into the upper atmosphere, where some pollutants have a greater warming effect than when they are released in the same amount from the ground, according to a 1999 scientific report sponsored by the United Nations.

Some pollutants emitted from engines during flight warm the Earth by adding to the heat-trapping gases, both natural and man-made, already in the atmosphere. Also, jet contrails -- the vapor trails they leave in the sky -- add to cloud cover and may contribute to the warming of the planet. A contrail forms when water vapor from the engine cools and mixes with air and the humidity becomes high enough for condensation.

NASA scientist Patrick Minnis has studied contrails and believes they may have a prominent role in global warming. A 2002 report by the British scientific commission agrees, concluding that "aviation-induced cirrus clouds will be a significant contributor to warming." But Minnis says another NASA study concludes that the contrails have little effect on global warming. Further research is being done.

Carbon dioxide is a heat-trapping gas that can remain in the atmosphere about 100 years. Scientists say planes' engines emit up to 3% of all carbon dioxide that contributes to global warming, but the figure appears to be on the rise.

'Significant uncertainties'

University of Washington scientist Richard Gammon says carbon dioxide emissions from aircraft are rising more rapidly than those from any other source.

Nitrogen oxides emitted from aircraft engines react with other gases in the air to form another heat-trapping gas, ozone. Their effect on global warming is unclear because nitrogen oxides have another effect that may be beneficial: They remove methane, which can cool the air.

Except for carbon dioxide's contribution to global warming, "There remain significant uncertainties on almost all aspects of aircraft environmental effects on climate," according to the report this year by Wuebbles and other scientists.

Though uncertainties about global warming abound, there's no doubt that jet engines must have stricter emission standards, says the National Association of Clean Air Agencies, which represents pollution control officials in 49 states and 165 metropolitan areas. The group is suing the EPA.

The EPA has failed "to put stringent controls on aircraft emissions," says William Becker, the group's executive director. In its court filing, the EPA says it meets international law by adopting standards that "are at least as stringent" as ICAO's.

Unlike European governments, the FAA doesn't see an immediate threat. "Compared to other sources of emissions, aviation represents a relatively small source" of air pollutants and greenhouse gases, the FAA said in response to USA TODAY questions. "Cars and trucks generate seven times the amount of emissions that aviation produces."

American Airlines, the world's No. 1 carrier, would not comment, referring all questions about its planes' emissions to the Air Transport Association, the main trade group representing U.S. carriers. The ATA says U.S. airlines reduced greenhouse gas emissions by improving fuel efficiency 23% since 2000 and 70% in the past 30 years.

"Our record demonstrates that we are committed to managing our growth responsibly," says John Meenan, executive vice president.

But those gains don't offset the effect of more travel, scientists say.

More-efficient engines and fuel savings from improved flow of air traffic "will not fully offset the effects of the increased emissions resulting from the projected growth of aviation," the 1999 scientific report by the U.N. concluded.

Jet manufacturer Boeing says it's working with engine manufacturers to develop more environmentally friendly engines. Technological advances, says Bill Glover, Boeing's director of environmental performance, could reduce the amount of carbon dioxide and other pollutants emitted from jet engines.

Whether climate concerns will require limits on the growth in aviation is not for his company to decide, he says. "There's great economic value in aviation," says Glover. "Society has to decide where to cut emissions and how to retain the lifestyle we enjoy."

Nobody sees easy solutions for reducing aircraft emissions. Wuebbles, the Illinois professor, says more money for research is part of the answer.

Piers Forster, a professor at the University of Leeds in England, suggests putting additional taxes on jet fuel, using alternative fuels and redesigning aircraft. Britain's Royal Commission on Environmental Pollution says high-speed rail could replace short-haul flights.

Boeing is studying new fuel-cell technology that can power an aircraft and reduce emissions by combining hydrogen and oxygen to produce electricity. Such technology may be 10 years away, says Glover. Until then, "Our role is to keep building the most efficient, best airplanes on the planet."

Other possible solutions

Some other areas where solutions may lie:

*Jet engines. The most modern engines on new jets have reduced carbon dioxide emissions, but they've increased nitrogen oxide emissions. A 2003 report by the Government Accountability Office estimates that some new engines emit at least 40% more nitrogen oxides than older engines they're replacing. NASA is developing technology that would permit Boeing 737 and Airbus A320 jets, in 2018, to burn 25% less fuel and reduce nitrogen oxide emissions by 80%.

*Airports. Environmentalists and some European lawmakers and government agencies say airports should not be allowed to expand to accommodate more flights. The FAA disagrees. "Providing sufficient airfield capacity increases the efficiency of operations and tends to reduce, rather than increase, emissions," the FAA said.

U.S. airports are not going to lose business and halt runway or terminal expansion plans because

planes are emitting pollutants, says Dick Marchi, senior vice president of Airport Council International-North America. Instead, the federal government "needs to adopt more aggressive standards on emissions," he says.

Virgin Atlantic Chairman Richard Branson, an activist for moving aggressively against global warming, favors constructing jet parking bays closer to runways and using tugs to tow them.

University of North Carolina professor John Kasarda, who consulted in the design of airports in Detroit, Bangkok, Brazil and the Philippines, says a new approach to airport design could reduce emissions.

He said he sees merit in an untried design by Illinois inventor Jim Starry, who conceived the design while flying back to the USA from England in the early 1980s.

Starry envisions parallel runways -- on an upward slant for landing and a downward slant for takeoff -- leading jets directly onto, or off, the roof of a circular passenger terminal and parking garage. The design, which was first proposed by Starry to the FAA in the mid-1980s, reduces a jet's taxi time, cutting emissions and saving fuel.

"I see brilliance in the ideas," says Kasarda, who plans to work with Starry to refine his design and make it commercially viable.

*Individual action. Some European environmentalists are pushing programs that enable passengers to pay a fee to mitigate their share of the damage from the carbon dioxide emitted during each flight. A Welsh company, Treeflights.com, uses the money to plant trees, which remove carbon dioxide from the air. British Airways has an "emissions calculator" on its website that determines how much carbon dioxide is emitted and how much each passenger can pay to another company, Climate Care, to offset it.

But Forster, the professor from Leeds, says there is one foolproof way to reduce aircraft emissions.

"The best answer, of course, is to fly around less," he says.



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