



**University of Pennsylvania
Penn Sustainability Office
Air Travel Carbon Offsets FAQs
November 1, 2022**

Benjamin Pierce, Professor of Computer and Information Science and a member of the Air Travel Offset Selection committee, responds to some frequently asked questions about carbon offsets and Penn's selection process.

What are carbon offsets and carbon offset credits?

From the Stockholm Environmental Institute's [Carbon Offset Guide](#):

A carbon offset broadly refers to a reduction in GHG emissions – or an increase in carbon storage (e.g., through land restoration or the planting of trees) – that is used to compensate for emissions that occur elsewhere. A carbon offset credit is a transferable instrument certified by governments or independent certification bodies to represent an emission reduction of one metric ton of CO₂, or an equivalent amount of other GHGs.... The purchaser of an offset credit can “retire” it to claim the underlying reduction towards their own GHG reduction goals.

What's special about air travel?

Air travel currently accounts for about 5-10% of Penn's main campus carbon emissions. And in contrast to ground transportation, heating, etc., which are rapidly transitioning to clean electricity, the aviation sector will take longer to decarbonize because viable replacements for jet fuel are not yet available at scale. Penn launched the [Commitment to Travel Sustainability Policy](#) in July 2021 to encourage more sustainable travel decisions and establish the Climate Impact Offset Charge. This policy encourages the Penn community to reduce unnecessary travel and choose more sustainable transportation methods when possible, but air travel will clearly play a significant role in Penn's academic mission for some time to come. To address these emissions responsibly and stay on track for Penn's goal of achieving carbon neutrality by 2042, an Air Travel Working Group decided to pursue purchasing offsets for Penn's air travel emissions.

How does the air travel offset charge work?

These offsets are funded through a Travel Sustainability Fund that is supported by a Climate Impact Offset (CLIO) charge to the schools and centers for their travel. Each quarter, Penn Procurement records the number of flights taken on Penn's behalf by faculty and staff from each school or center. Schools are charged \$11/flight for domestic flights and \$25/flight for international flights. (These fees reflect current prices for good quality offsets; they will be updated periodically to reflect market changes. Using the simple domestic / international distinction instead of tracking actual air miles greatly simplifies bookkeeping.) The collected fees are gathered into a central Air Travel Sustainability Fund, which is used to purchase offsets.

How does Penn choose offsets?

The Air Travel Sustainability Policy and program are governed by a collaboration between Penn Sustainability, Penn Procurement Services, and participating staff and faculty oversee the program and the purchase of carbon offsets. This Air Travel Offset Selection committee is composed of Penn staff and faculty with experience in the area, and is responsible for vetting high-quality offset projects. All projects must, at a minimum, meet Second Nature's [Carbon Markets and Offset guidance](#), must address environmental justice impacts, and, where relevant, must follow the [UN Declaration on the Rights of Indigenous Peoples](#). Where possible, preference is given to projects that are regional to Penn.

What project is Penn using to offset emissions from air travel?

This year, Penn is investing in a nitrous oxide abatement project—i.e., the “compensating action” in this case is destruction of an appropriate amount of nitrous oxide to compensate for the jet fuel burned when Penn faculty and staff fly on planes..

A company called [Ascend Performance Materials](#) makes a chemical compound called adipic acid, which in turn gets used to make Nylon 6,6—a lightweight performance plastic that is used in cars, aircraft, electric vehicles, and elsewhere. This process releases nitrous oxide into the atmosphere—emissions that the company is not legally required to abate. The offset credits for this project are purchased through an offset provider—[ClimeCo](#), of Boyertown, PA—and verified by an independent accredited greenhouse gas verifier, [Ruby Canyon Environmental](#). They are issued on the voluntary carbon market and tracked by the Climate Action Reserve (a carbon offset registry that serves the California cap-and-trade program as well as the voluntary carbon market)

Penn's offsets will help pay for equipment that will expand and upgrade nitrous oxide destruction capabilities at this facility, allowing 98% of nitrous oxide to be destroyed before it enters the atmosphere. According to Ruby Canyon Environmental's report, "The Project activity consists of the installation and operation of a new absorption column at Ascend's adipic acid plant in Cantonment, FL. The column converts NOx to nitric acid via a high pressure water absorption process. This absorption column allows the plant's Thermal Reduction Unit (TRU) to accept a higher percentage of the adipic off gas flow from the adipic acid plant... Longer TRU operating times result in more N2O destroyed."

What is nitrous oxide?

Nitrous oxide (N₂O) is a potent greenhouse gas, nearly 300 times as powerful as carbon dioxide. Global emissions of nitrous oxide are increasing due to human activities, contributing significantly to climate change.

How are carbon offsets for nitrous oxide calculated?

According to the EPA, one metric ton of N₂O emissions equals 298 metric tons of “carbon dioxide equivalents.” The total N₂O emissions reductions are calculated by measuring the actual emissions prior to abatement (Baseline Emissions) and subtracting the measured emissions post abatement, as well as any emissions from the abatement process.

Has Penn purchased offsets before?

Penn has purchased offsets in the past, most recently for emissions from Vicinity Energy’s steam generation plant. Penn prioritizes *reducing* emissions—e.g., through regular, cyclical recommissioning of its campus buildings—then works to use energy from *renewable* sources for remaining needs, such as will be generated through Penn’s recent solar power purchase agreement (PPA). Offsetting is used only in situations where these options are not viable. This is the first time that Penn has purchased offsets for air travel.

For more information, please contact sustainability@upenn.edu.