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Is supersonic flying sustainable?

A Boeing 737 flies more than 40,000 feet at Mach .789 or 530 miles per hour. This fact is the standard flight demographic for a narrow and wide-body jet traveling domestically and internationally. These speeds and altitudes are well within the aircraft's safety standards. The Concorde, which was a supersonic airliner in the late ’70s flew at Mach 2.04 or 1,354 mph at 60,000 feet. The Concorde flew twice the speed and altitude of the transonic planes we fly today (CNN). Supersonic flights aren’t sustainable compared to transonic flights because of the sound barrier, worsening greenhouse gas emissions, and operating costs.

First, supersonic flights break the sound barrier, resulting in a sonic boom. A sonic boom is a loud explosive noise caused by a shock wave from an aircraft traveling faster than the speed of sound. “Despite its name, it is not a one-off bang, but rather it is continuous, trailing the aircraft.” (SimpleFlying) Sonic booms can cause shattered home windows, disrupt building structures, and disturb humans and wildlife (ResearchGate). An aircraft begins to exceed the sound barrier and create a sonic boom around 770 miles per hour, or roughly Mach 1.06 (Af.mil) Owing to this phenomenon, supersonic flights would be limited in destination and route options because flights would only be granted clearance to fly over the oceans.

Moreover, the way jetliners contribute to climate change alongside the low carbon emissions they produce are key components of a sustainable jetliner. “Supersonic jets generate three times more NOx and CO2 than today’s subsonic planes and contribute five times more to global warming, due to the high altitudes at which they release their emissions” (Climate change news). Flying hundreds of these environmentally unfriendly aircraft around the world would wreak havoc on our already suffering atmosphere. Environmentalists all around the world are working urgently to regulate the amount of carbon dioxide and nitrogen gas jetliners can produce to be certifiable to operate. (ResearchGate)

Furthermore, for a jetliner to be sustainable, it must be profitable for the producer and the airports that will be servicing the aircraft. Using Concorde as a reference, it burned most of its fuel during takeoff. This issue required an excessive amount of fuel to be loaded onto the aircraft to have enough for the remainder of the flight, and reserve fuel in the case of an emergency. The Concorde accelerated past the sound barrier of Mach 2 where it would activate its afterburner and become exceptionally more fuel efficient. The Concorde guzzled roughly 5,638 gallons of fuel per hour (SimpleFlying). A subsonic jet used today consumes roughly 750 gallons per hour (SimpleFlying). With only about 130 pilots trained to fly the Concorde and requiring strict training procedures, the jet wasn’t cheap to operate or to train pilots. A lack of jetliners and trained pilots made the market for supersonic airliners sparsely profitable. There is also an extraordinarily high consumer cost to make supersonic flights worth it. When Concorde was still in operation, a plane ticket would cost between $10,000-$20,000 one way (SimpleFlying). This isn’t a practical cost at all for most consumers, which limits it to only the rich.

On the other hand, there are claims that flight engineers and experts are in the developmental stages of creating quieter supersonic jets that don’t make as much noise. Hence, they argue that the sound boom will no longer be a problem. Opponents also note that funded research companies have begun looking at sustainable aviation fuels. They contend that this idea would be better for the environment and decrease concerns environmentalists have about the emissions supersonic flying would produce.

However, these claims can easily be refuted. Creating a refined turbojet or turbofan aircraft engine will not eliminate the sonic boom that is caused by a fast-moving plane. It also can’t legally happen due to the United States banning supersonic planes from flying overland in 1973 (SimpleFlying). Sustainable aviation fuels aren’t an environmentally friendly source of fuel due to the amount of fuel supersonic jets require for flight. Having a fleet of supersonic jets requiring this would be extremely difficult to maintain and produce at the rate that would be feasible.

In conclusion, supersonic planes will not be sustainable because of the sonic boom the jet produces, what supersonic traveling does to our environment, and the cost to operate these jetliners. As for the unhealthy emissions that the plane will emit into the environment and the cost of operating and training its pilots. Supersonic flying is too resource-dependent and will not be able to meet the demand standards of the world aviation economy. It would cost a lot more to fly to the same destinations as transonic planes. These planes are possible to fly, but they are not a sustainable mode of transportation.

**Annotated Bibliography**

Brussels, Arthur Neslen in. “Supersonic, Super-Rich, Super-Polluting: The next Generation of Business Jets.” *Climate Home News*, Climate Home, 1 Nov. 2017, https://www.climatechangenews.com/2017/10/27/supersonic-super-rich-super-polluting-next-generation-business-jets/.

This article from climate home news provides environmental reinforcement for the argument that supersonic jetliners wreak havoc on our global climate change problem. This is a valuable source because it provides specific reasoning and numerical support for how much carbon and nitrogen emissions are distributed by ultrasonic airplane engines. This was helpful to my argument because it gave direct ways supersonic jetliners will be a pollutant to our earth.

Hayward, Justin. “How Much Fuel Did Concorde Consume?” *Simple Flying*, 16 Feb. 2022, https://simpleflying.com/concorde-fuel-consumption/.

This article from Simpleflying provides a precise estimate of what it would take to fuel a supersonic jetliner such as Concorde. It is an essential component of the credibility of my argumentative argument. This is a valuable source because it gives a range of operating costs that would be required for the jetliner. It also takes into account inflation to make it more credible in today's economy. This was helpful to my research because it provided a useful representation of what it takes to operate such an inefficient aircraft.

Rylander , Ragnar. “Sonic Boom Exposure Effects—a Field Study on Humans and Animals.” *ResearchGate*, https://www.researchgate.net/publication/223415386\_Sonic\_boom\_exposure\_effects-A\_field\_study\_on\_humans\_and\_animals.

This article from ResearchGate details the effects of the sonic boom on humans, the environment, and animals. Using the Concorde and Military jets as references for what problems the sonic boom can initiate. This is a valuable source because it provides information and knowledge about a scientific phenomenon that not a lot of people are aware of, or knowledgeable about. This was helpful to my research because it exemplifies why jetliners that produce sonic booms are limited to flying over the ocean due to their sonic booms. This directly affects the profits of supersonic planes by limiting the routes and destinations consumers need to get to.

Slutsken, Howard. “What It Was Really like to Fly on Concorde.” *CNN*, Cable News Network, 1 Mar. 2018, https://www.cnn.com/travel/article/concorde-flying-what-was-it-like/index.html.

This article from CNN details what the typical flight parameters were for a supersonic airliner in the late 90s. It gives insight into the speed and altitude capabilities of the airplane. This is a valuable source because it includes key information regarding the standard operating procedures of the Concorde. In addition, it has credible pilots and engineers of the Concorde providing insightful information on what it takes to run such a complex jetliner. This was helpful to my research because it provided detailed information that strengthened my overall argument.

“Sonic Boom.” *Air Force*, https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104540/sonic-boom/.

This website from the Air Force gives in-depth details regarding sonic booms. It delves into scientific details and reasoning as to why the phenomenon occurs. This is a valuable source because it provides mathematical support regarding sonic booms and explains them intellectually. This was helpful to my research because it provided numerical numbers to use as references and key points in my argumentative essay.