



BALANCING PROGRESS AND SUSTAINABILITY: THE PATH TO NET-ZERO EMISSIONS BY 2050

News / Business aviation



Pilot, president, and founder of Icarus Jet, a global trip support and aircraft management company, Kevin Singh has flown globally as a chief pilot and captain on private jets like the Hawker 800-A and 850 XP, and the Challenger 600 series and Global 6000. We're sharing his latest opinion piece on sustainability.?

It is no secret that our society is based on hydrocarbons, a wild, cheap source of energy that powers everything from electric grids to agriculture to transportation: gasoline, natural gas, and coal are the three main hydrocarbons. At the same time, the energy released by hydrocarbons is CO₂, a greenhouse gas that has this traumatic weather effect. Total emissions globally are 50 billion tons annually (a mind-numbing number).

Climate change is the most brutal challenge humanity has ever faced, and there is no reason for it to happen. Wait, do you know if that is true by chance? The highest temperature ever recorded, rising sea level, change in weather patterns, wildfires, floods, hurricanes, and melting glaciers.

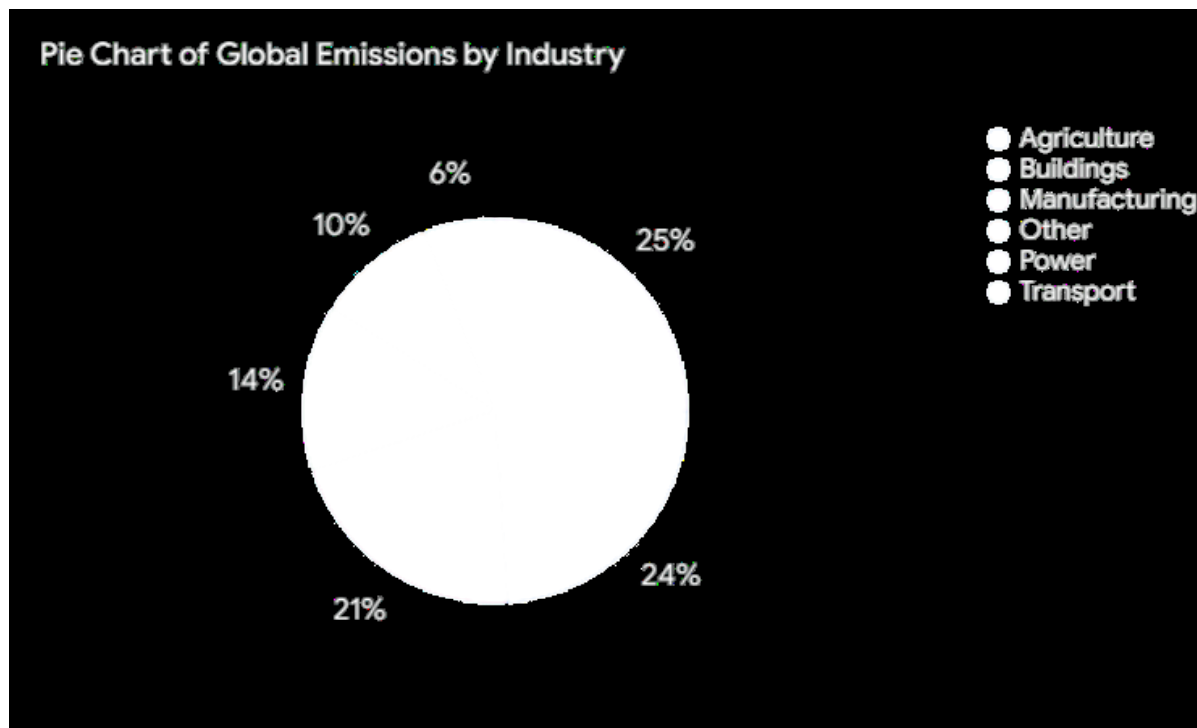
We are addicted to fossil fuels, so will going cold turkey work? What if the electric grids were no

longer powered, and we could not produce fertilizers? You could not drive to work, and we wouldn't be able to build infrastructure or roads. We could freeze to death and won't be able to cook food. So, what is our carbon footprint, how do we measure it, and can you buy carbon credits to offset your carbon footprint?

Yes, you can, and it is expensive. Here is a link to [calculate your carbon footprint](#) and here is another to [buy your carbon offsets](#).

Innovation to the rescue: a systems approach

Before moving any further in the discussion, let's examine a pie chart showing the total global emissions by industry.



- Manufacturing: Mining, Chemicals, Cement, Steel, Oil/Gas.
- Electricity: Buring Coal, Natural Gas, Oil.
- Agriculture: Livestock, Crops, Waste, Land use.
- Transportation: Cars, trucks, Boats, Aircraft.
- Buildings: Heat and cooling of the buildings.

So, to achieve zero emissions, we have to zero the emissions of the five categories above in every single country. And we have until 2050 to achieve this.

Having climate activists is important, and they will help us deal with the daunting task of achieving zero emissions. I empathize with their cause and staunch belief in climate change. We can learn from them just like scientists come up with breakthroughs. From the climate activist perspective, as we are now, it could be better for the future, and they have a bleaker view of the world.

Innovating our way out of the climate crisis

Can we expose these activists to some innovations to calm them down? Before we do that, let's educate ourselves about hydrocarbons. They're cheaper than a bottle of water and do some miraculous things except for producing CO₂.

We are now inventing batteries that are tenth the density of gasoline, so we are getting there, but zero-emission is a number that gives us very little option. It is very hard to make people today understand the effects of climate change on the people most affected by climate change. Those who live in the poorest nations and unborn children are the two stakeholders of climate change (the generations living today will have to make sacrifices for the generations yet to come). This is where the profit motive comes in, where there is an objective way of doing things. Climate change is a scale problem. If you don't have a scale, you can't change climate as a hobby; therefore, we need a scale to solve this crisis.

Father greed is the only thing more powerful than Mother Nature, so we need to ask our capitalists to offer innovative solutions. Let's start with cement manufacturing. The CO₂ emission from producing cement is a chemical problem, but we will have a solution in the near future. Using silicon rocks that have no calcium can help reduce carbon emissions, but chemistry is still in progress. The problem lies with the fact that India alone has so many cement plants that use limestone that simply using silicon rocks with the new chemistry won't be adopted easily in India, and that brings us the same problem of scalability.

Yes, cement manufacturing is a significant contributor to global carbon emissions, making it a major environmental concern. Here's a breakdown of why:

- **CO₂ emissions from chemical reactions:** The core process of cement production, where limestone is heated to create clinker, releases substantial amounts of carbon dioxide (CO₂). This chemical process alone accounts for many of the industry's emissions.
- **Energy consumption:** Cement manufacturing requires exceptionally high temperatures, leading to a large energy demand. The reliance on fossil fuels like coal and natural gas to power these processes further increases CO₂ emissions.
- **Transportation:** The transportation of raw materials (like limestone) and the final cement product also contributes to the industry's carbon footprint.

Electricity: a renewable future

Electricity is the only power system that we know how to produce with clean, renewable sources like wind, solar, and hydropower. However, renewable sources have only become affordable recently, and solar energy has issues at night and under certain weather conditions. Also, the storage of renewable energy is complicated and ineffective.

Nuclear has issues with nuclear disasters and storage of nuclear waste, but there is a new technology that is different than nuclear fusion; it is called nuclear fission. Instead of using water to cool the reactors, TerraPower, for instance, a Bill Gates-funded nuclear plant still under construction in Wyoming, will use liquid sodium (natrium), which remains liquid at a wider range of temperatures and causes less pressure build-up, which can cause disasters like Fukushima and Chernobyl.

According to climate activists, their main concern is that the fossil fuel industry is making record profits, and it is getting harder for people to wean off fossil fuel products. What climate activists need to understand is that they can only denigrate the current way of doing things with a proper replacement for fossil fuels. There will be no food, no transportation, no jobs, no way to charge their smartphones to share their selfies stored on servers that require immense amounts of electricity to keep them running and to keep these servers cooled. We shouldn't be under blind optimism and climate denial.

Feeding the world sustainably

We have been farmers long before we were modern civilizations. Today's biggest necessity is that we grow enough food and nutrition to feed all. Farming, however, produces 24% of all greenhouse gases. From the combines to the fertilizers to the methane produced by animals (enteric fermentation) and trapped gases in the soil released due to tilling and manure management leads to methane emission.

The saddest part of it all is that 40% of the food produced is wasted, and when in the landfill, it produces more methane. For poultry farmers, 60% of the emission is the feed they buy. One of the most interesting breakthroughs has been in feed additives and food decomposition machines for homes, which can reduce greenhouse gases but are very expensive to buy and use electricity to operate.

The green highway

In the transportation realm, aviation accounts for 3% of all emissions. Biofuels are being invented to reduce carbon footprints by using feedstock and advancement conversion technology. We are also developing blended technology and sustainable aviation fuel and reducing sulfur content using alternative fuels and desulfurization technologies. Recent studies on contrail formations and how sulfur particles contribute to the formation of contrail [are being researched](#).

The downside is that the cost of sustainable aviation fuels (SAF) is nowhere closer to the cost of jet fuel, and SAF production is so minuscule that we will need to produce more by 2030 to dent carbon emissions. But again, science is on its way to the rescue. Battery electric trucks today can go about 250 miles, and EVs can do the same, but the infrastructure needs the EV charging stations, and EV prices are only slowly coming down for it to be affordable enough for everyone to own one. This alone would solve the 8% emission problem. We need a vehicle that can go a thousand miles, which is what a diesel truck does.

Breakthroughs in carbon capture

At the forefront of carbon capture is Iceland, with its game-changing process of drawing CO₂ out of the atmosphere, filtering it, and then jacking it underground, where it solidifies into rock. Using Direct Air Capture (DAC) technology that captures carbon dioxide from ambient air, this method starts with DAC. The CO₂ is then transported to volcanic basalt rock formations, where it reacts with the minerals in the rock, turning the gas into solid carbonates. This process of mineralization makes carbon safe and stable, preventing it from re-entering the atmosphere.

That is the unique geology in Iceland, with the good supply of volcanic basalt, speaking. Though promising, this method is considered one of the ways to reduce atmospheric CO₂; scaling it up to a global level is yet an overtaking challenge. However, with technological advancement and as it gets cost-effective, this could play a vital role in combating climate change through permanent storage of carbon in solid form.

In a nutshell

Addressing climate change requires finding a balance between urgency and pragmatism. Climate activists, whose fears about the environmental impact of fossil fuels are understandable, rarely present anything like a vision for scalable, reliable replacements. The pragmatic approach conjoins the idealism of activism with an innovative mindset from the private sector. Profit, long demonized

in environmentalist rhetoric, proves a powerful motivator. Where businesses spot lucrative climate solutions, progress accelerates.

Climate change requires a global response that innovates, collaborates, and adapts. From rethinking the production of cement to scaling up renewable energy, each sector must make a needed contribution to a collective solution. Technology will certainly be all-important, but so will our readiness to make the sacrifices that are required today for the benefit of future generations.

The clock is ticking, the challenge is huge. But this is a challenge that can be raised with a systems approach and appropriate incentives. Let's innovate our way out of the crisis.



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