

## Your Leadership to Make the Net Zero 2050 Vision a Reality

As we witness forests and grasslands stretching from Australia to the Amazon burned to the ground, it is increasingly obvious that we are at a make or break point in human stewardship of the planet and its environment. Net Zero 2050 is the international scientific consensus for preventing the worst climate damage which severely impacts people's life, where the goal is to drop greenhouse gas emissions by 45 percent from 2010 to 2030 and to reach the state called "Net Zero" by 2050 to prevent the worst climate changes. Net Zero is the state where the greenhouse gases going into the atmosphere are balanced by removal out of the atmosphere, which stops the global warming and climate changes. In this essay, I discuss how the largest sources of pollution and emissions- various industries- can find ways to be more efficient and less wasteful to protect and roll back the harm we've done to the environment.

Why are all the countries so enthusiastic to achieve Net Zero 2050, and why is stopping global warming so important yet difficult? Stopping climate change is a major problem that all of us must work together to solve because climate change is getting increasingly worse, while plans and solutions grow ever more limited. Moreover, climate change is extremely harmful to us because temperature increases and variations cause various chain effects such as animal extinction, worse natural disasters, and rising sea levels. According to some estimates, animal extinction events are directly correlated to more infectious diseases, which creates additional dangers and headaches for global societies as new pandemics, many which could be zoological in origin like the past two SARS/COVID epidemics, break out. Moreover, both worsening natural disasters and rising sea levels cause many casualties and economic problems over increasingly large areas, including areas historically considered more immune to natural disasters- Hurricane Sandy's impact in New York was a wake-up call for us all, for example. Due to the stronger storms and hurricanes, more deaths will occur and more damage to buildings or critical infrastructure will happen, particularly along coasts or in island communities. In addition, rising sea levels may "sink" or cover area in several of the world's largest or most important cities like Amsterdam, New Orleans, Venice, and Savannah, by 2030. Since climate change results in all these terrible consequences, it is necessary for people to keep their attention to accomplish Net Zero 2050 for the better future. While Net Zero itself is not the primary solution, it is an important beginning: only once we stop digging can we attempt to climb out of the hole we as a species has created.

Despite all the doom and gloom rhetoric or phenomena surrounding climate change and its impact on human activity, there is reason for hope. After decades of coaxing, negotiation, public relations, and public diplomacy, the UN, its member states and its organs' efforts culminated in the Paris Climate Agreement, which built a framework and advisory guidelines to attempt to curb and eventually roll back our contributions to a warming planet. To cap global warming, all countries commit to reduce their emissions so that global temperature increases in this century are no greater than 2 degrees Celsius. However, even though we have this helpful guideline, the commitments from governments are far shorter than what is required: it remains that there is a great deal of global inequality in both emissions and countermeasures to emissions, and though various solutions have been proposed, none yet have passed the difficult test of being applicable equitably across the globe. Additionally, the largest polluters within the largest polluting states are those in industry, manufacturing, and transportation, which means that we would need to rethink our entire economic way of life in order to reduce emissions effectively.

In the meantime, as we pressure industries and governments to do better, what can average people practically do to achieve net zero by 2050? To reach Net Zero, we, in unison, have to work together to cut the emissions from energy sector of greenhouse gas emissions such as energy usage in buildings, transportation, industry, and construction. There are two major types of energy usage in building: residential energy consumption and commercial energy consumption. Residential energy consumptions accounts for about a third of greenhouse gas emissions, consumption which comes from heating and cooling gadgets in house, electronics usage, and much more; residential energy use increases in response to higher needs for

climate controlled environments and the increasing number of gadgets and tech in houses. This energy usually comes from burning fossil fuels, which causes many emissions. To reduce the emissions of homes, researchers recommend starting with small and simple steps which can save energy such as using natural ventilation like wind instead of artificial cooling elements to save energy; additionally we can take a close look at the biggest energy taking items in the house and try to replace them with other items that uses less energy or try not to use it. For example, older, less energy-efficient models of electronics like computers, televisions or refrigerators can be surprising vampire appliances, and making the investment to less energy-intensive items can make a difference both on our wallets and the environment. After doing all these small but effective methods, it is even better if we get some help from the experts. They can give better advice which can save energy significantly and can give people the best option, including discussions of adding natural, renewable energy additions like solar panels or better energy-efficiency.

To reduce commercial energy consumption, we must improve the equipment so that it uses less energy. Most well-known example is installing motion sensitive light switch, which is both easy option that requires little work, and can reduce the energy use of light significantly. Also, some cities like Seoul have attempted to curb energy waste by mandating smaller and more efficient sources of lighting or neon signs. Typically, in the office for commercial buildings, the lights are on for whole day, even if the lights are not being used in the specific space. However, if the light switch be swapped with motion sensitive light switches, then the time the lights would be on will decrease, which leads to less energy waste. Additionally, the usage of more natural light and cooling or heating can be game changers as well. It is necessary for people to step into these problems and try to solve it instead of leaving the problems to get worse by thinking “one doesn’t matter.” To our climate crisis, all of us matter.

Transportation is one of the most important technologies to people these days, allowing people to travel anywhere, anytime, quickly and efficiently. However, as the transportation technology improves, more people started to use fossil-fuel transportation due to its convenience and cheapness. This led to much more emissions because most of the transportations in our life uses fossil fuels as an energy source. Transportation accounts for 16.2% of greenhouse gas emission, and 11.9% being road transportation; in other words, a very significant portion of global emissions is attributable to our addiction to cars, buses, and burning carbon to go faster. A solution for reducing emissions for road transportation is easier than the other transportation because it can be reduced by using fully decarbonized electricity as a main fuel for most of the cars, so that the cars do not use fossil fuels either directly or from the electricity grid which generates power. Experts believe that if road transportation can be fully electrified, the emission for transportations will significantly decrease overall. However, even though we know the clear solution to lower the emission, we still do not use enough electric transportation, such as electric cars, because of the relative infancy of the technology, despite its leaps and bounds in progress over the past few decades, and limiting factors like range anxiety, or fearing the battery might run out of charge before reaching their destination, few charging stations, comparatively long charging time, and price. The most direct way to encourage both innovation and broader usage is through government subsidies or monetary incentives, much like other energy efficient policies. Moreover, giving benefits to people who uses electric cars or giving penalties to people not using electric cars would induce more people to buy the product. If the government pay more attention to greenhouse emission and use more money to solve these transportation emissions, the goal line to Net Zero 2050 would be much closer. Additionally, there is a large space for governments and private enterprise to try and electrify larger, more gas-guzzling and less efficient carbon burners like cargo trains, trucks, and airplanes.

Energy use in industry is the most energy consuming sector in our world. In the current society, iron and steel are core pillars, as one of the most important engineering and construction materials, and the process of manufacturing these important materials gave challenges to many countries, since it emits an average 1.85 tons, which is about 7% of global greenhouse gas emission. To solve the emission that iron and steel manufacturing causes, there are some solutions which are changing customer requirements and

research about carbon-friendly steel products, tightening the carbon emission regulations for iron and steel, and raising public interest in sustainable iron and steel. If the government requires many companies to cut down carbon emission for the manufacturing process and tighten the regulations, the companies will have decarbonization as their top priorities, which then, can resolve greenhouse gas emissions. There are many technologies, such as basic oxygen furnace efficiency programs, which are programs that improve efficiency and/or decrease production losses for steel, generally enhancing the efficiency of the steelmaking process and thus resulting in lower emissions. The other way of decarbonizing technique is called carbon capture and usage, which is a technique that uses emissions to create new products for the chemical industry, such as ammoniac or bioethanol. This technology is premature and needs to be proven economically; however, if enough research and works are done, it can be very useful technique to reduce emissions made by steel and iron industry. Carbon capture has proven especially interesting to industries which have little want of reducing fossil fuel use; in other words, instead of reducing to reach net zero, they have elected to bet on increasing the ability to filter out and remove greenhouse gases.

Yet another general industry, the chemical industry, has been constantly evolving and creating new technologies to improve on efficiency and cost reduction. Now, it's focus is on how to reduce its carbon footprint. Greenhouse gas emission for this sector is about 18% of industrial emission, and a significant quantity of these emissions originate from syngas, which is made by using steam methane reformer technology that convert natural gas into a mixture of predominantly hydrogen and carbon monoxide. The production of syngas is crucial because it is used as a building block for the synthesis of other important chemicals, such as ammonia fertilizers, cleaner burning fuels for transport, ethylene, propylene and butadiene for plastic production, and commodity chemicals such as methanol. However, this production accounts for most of the chemical industry's emission, since steam reforming is an endothermic process, which requires high level of heat, that is acquired by burning methane, resulting in a high carbon intensity. Even though carbon capture and storage technology can capture and store the carbon dioxide that is being produced, the carbon dioxide that is produced by steam reforming technique is dilute, which makes it tricky and relatively expensive to capture. Some suggestions for reducing emissions are using different efficient way of generating syngas at scale in which all the carbon dioxide comes out in a single stream at high pressure, making it easy and economical to capture with very high efficiency. These methods include Gas Heated Reforming and Autothermal Reforming, which can eliminate the problematic dilute, low pressure outlet stream containing carbon dioxide. It is true that making carbon-free chemical industry is impossible, but it is possible to use the carbon more efficiently, reducing carbon intensity, and greenhouse gas emissions.

The other component which emits much greenhouse gas is the construction industry, yet even though construction plays a significant role in improving our life, it has one fatal downside, which is carbon emission. There are many types of building materials we use for the construction, and some of the materials are sustainable such as wood or biobricks, but most of the materials are the opposite. The examples of these not sustainable materials are aluminum, steel, glass, and reinforced concrete, which is most common building materials we use; as discussed earlier, the process of mining, smelting and forming steel or other metal products are high emissions creators, while reinforced concrete has an average of 635kg embodied carbon per m<sup>3</sup> due to its production process. During this process, carbon dioxide is emitted from the energy used to fire the material, and the chemical reaction produced from the mixture. Similarly, the glass emits greenhouse gases because of the process of melting the raw materials, such as sand, soda ash, and limestone. Steel and aluminum are also very unsustainable building material because of the producer's high reliance on captive coal-fired powers. These materials' incredible level of carbon footprints makes the construction industry harmful to our environment. However, we cannot stop using them because of their high strength to weight ratio, low cost, low maintenance, and flexibility in design. Fortunately, there are some solutions and suggestions that is made for construction companies to lower the carbon emission of construction, which can help us to step forward towards Net Zero 2050. The simplest, and effective way of lowering carbon emission is to implement efficiency in material design: in other words, just use less! Research

suggests that eliminating material waste at the design stage can reduce 18% of greenhouse gas emission between 2017 and 2050, which is a significant amount accounting for roughly all the world's road traffic. Research also highlights the importance of reducing steel and cement use in construction, since these materials have excessive amount of carbon footprint, and in finding alternative, more sustainable material such as timber. Currently, timber construction has been gaining popularity to reduce materials emissions and utilize local and sustainably managed forests, and it is predicted to cut down the emission by 6% between 2017 and 2050. Moreover, there is research happening to reduce the carbon intensity when making cement, by adding sustainable concrete materials, such as calcined clays, fly ash, and blast-furnace slag. Depending on the dosage of these additions, the carbon footprint of concrete is expected to be reduced by up to nearly 70%.

Despite all the possible solutions that can be used, climate emissions for energy usage in buildings, transportation, industry, and constructions are still a major problem to accomplish Net Zero 2050. However, if everyone takes closer look, care our environment by heart, and apply these solutions to our real life, accomplishing Net Zero 2050 is not a fantasy.

## Works Cited

- “What Is Net Zero? - Net Zero Climate.” *Net Zero Climate*, 2 Mar. 2022, [netzeroclimate.org/what-is-net-zero/](https://netzeroclimate.org/what-is-net-zero/).
- Nationalacademies.org*, 2022, [www.nationalacademies.org/based-on-science/is-it-possible-to-achieve-net-zero-emissions](https://www.nationalacademies.org/based-on-science/is-it-possible-to-achieve-net-zero-emissions).
- Nations, United. “Net Zero Coalition | United Nations.” *United Nations*, United Nations, 2022, [www.un.org/en/climatechange/net-zero-coalition](https://www.un.org/en/climatechange/net-zero-coalition).
- “Sources of Greenhouse Gas Emissions | US EPA.” *US EPA*, 29 Dec. 2015, [www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions](https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions).
- “Global Greenhouse Gas Emissions Data | US EPA.” *US EPA*, 12 Jan. 2016, [www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data](https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data).
- “9 Building Materials and Their Shocking Carbon Footprints That Will Surprise You. — Pliteq Inc.” *Pliteq Inc*, Pliteq Inc, 7 Jan. 2022, [pliteq.com/news/building-vs-carbon-footprint/](https://pliteq.com/news/building-vs-carbon-footprint/).
- Musulin, Kristin. “5 Key Ways to Reduce GHG Emissions in Building Construction.” *Smart Cities Dive*, 11 Oct. 2019, [www.smartcitiesdive.com/news/5-key-ways-to-reduce-ghg-emissions-in-building-construction/564707/](https://www.smartcitiesdive.com/news/5-key-ways-to-reduce-ghg-emissions-in-building-construction/564707/).
- “Carbon Pollution from Transportation | US EPA.” *US EPA*, 10 Sept. 2015, [www.epa.gov/transportation-air-pollution-and-climate-change/carbon-pollution-transportation](https://www.epa.gov/transportation-air-pollution-and-climate-change/carbon-pollution-transportation).
- “The Paris Agreement | UNFCCC.” *Unfccc.int*, 2020, [unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement](https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement).
- Chemicals – Analysis - IEA. “Chemicals – Analysis - IEA.” *IEA*, 2021, [www.iea.org/reports/chemicals](https://www.iea.org/reports/chemicals).
- Transport – Topics - IEA. “Transport – Topics - IEA.” *IEA*, 2020, [www.iea.org/topics/transport](https://www.iea.org/topics/transport).
- “C40 Knowledge Community.” *C40knowledgehub.org*, 2022, [www.c40knowledgehub.org/s/article/How-to-drive-electric-vehicle-uptake-in-your-city?language=en\\_US](https://www.c40knowledgehub.org/s/article/How-to-drive-electric-vehicle-uptake-in-your-city?language=en_US).

“Decarbonizing U.S. Buildings - Center for Climate and Energy Solutions.” *Center for Climate and Energy Solutions*, 4 Feb. 2020, [www.c2es.org/document/decarbonizing-u-s-buildings/](http://www.c2es.org/document/decarbonizing-u-s-buildings/).