

Kettering University

Climate Change - Personal Essay

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Introduction

Most people when they hear “engineer” the first thing that comes to mind is an image of a guy wearing a hard-hat and carrying pencils, paper, ruler, and possibly some tools. This traditional portrayal - often perpetuated in popular culture such as emoticons - represents the common perception of engineers as individuals involved in the design and manufacturing of physical things. What people do not know is that the role and purpose of engineers extends far beyond this restricted stereotype. The purpose of this essay is to expand on the current knowledge of what an engineer is, why they are important, how they use the concepts of fluid mechanics to help them, and what their end goal is- more specifically their impact on global climate change.

Background

Before we dive deeper on this topic, we must start at the beginning - what is an engineer and what is global climate change? An engineer is a person whose job is to design or build machines, engines, or electrical equipment, or things such as roads, railroads, or bridges, using scientific principles (Cambridge English Dictionary, 2023). In other words, engineers are highly skilled individuals that are equipped with high level thinking and problem-solving, knowledge of scientific and mathematical concepts to invent and solve complex problems.

Engineers have the amazing ability to develop new concepts, processes, and things that have never been created before. An engineer's job is to use these skills to help improve the world right now and in the future. Without engineers, there would be nothing in the world and the world would not progress. Do not believe me? Consider: Without engineers, the computer you are currently using, the phone grasped in the palm of your hand, the car that helps transport you and your friends to school, or even the house you call home would not exist. Engineers are responsible for the future - to be more specific, maintaining a sustainable and livable planet.

This leads us to our next crucial step: developing a deeper understanding of climate change. Climate change is changes in the world's weather, in particular the fact that it is believed to be getting warmer as a result of human activity increasing the level of carbon dioxide in the atmosphere (Cambridge English Dictionary, 2023). According to the *National Oceanic and Atmospheric Administration* (NOAA), climate change is more than just temperature shifts, it can affect the water you drink day-to-day to the weather outside your door. Climate change manifests in multiple

ways, including - but not limited to - rising global temperatures of the Earth's atmosphere, changes in sea-levels, and disruptions in ecosystems (National Oceanic and Atmospheric Administration).

Carbon dioxide is the leading cause of climate change, and the main contributor to the carbon dioxide emissions is the burning of fossil fuel. The burning of fossil fuels heightens the greenhouse effect, which leads to the warming of the atmosphere. Fossil fuels are the most common type of energy source that is being used globally, nearly 65% of global greenhouse gas emissions is carbon dioxide. Fossil fuel is reliable, plentiful, and easy to get - which is why a lot of people use and rely on fossil fuels (United States Environmental Protection Agency). Fossil fuels are also used as fuel for vehicles, such as the car you drive every day. Everytime you turn on the car and use it, the car is emitting a ton of carbon dioxide. The industrial sector is aiming to reduce carbon emissions by improving and changing the energy supplies that are required to keep the economy running (like transportation and infrastructures). According to *The United States Government*, the industrial sector is pivotal to "tackling" the climate change "crisis".

Engineer's Key Role

Now that some foundation has been laid and some fundamental understanding has been established, we can focus on the role of the engineer in improving and sustaining the future of this planet we call home. In regards to climate change, engineers provide extremely helpful insight with their skills. Engineers can help predict patterns of weather: temperature, participation, ecosystem patterns, and much more. Being able to have these patterns and theoretical simulations of the future can help the world to better prepare to minimize the impact of global climate change and to prevent it from the sources. An engineer's perseverance is unquantifiable because they challenge the odds and find a way to make something work. Though there is no clear solution to climate change, an engineer's goal is to find it, and make it effective and efficient.

A way to make a change in global climate change is to switch over to renewable energy. An engineer will use what we currently know about renewable energy and will find a way to make it more effective on a larger scale and make it efficient as well. They will also find a way to generate a new way of creating energy with their problem-solving skills and their knowledge of the laws of physics. Many companies,

such as General Motors, Ford Motor Company, and Stellantis are banding together to have an all-electric future - which is a step in the fight against climate change. The goal for an all-electric future will decrease the burning of fossil fuels which will lead to a decrease in carbon dioxide emissions. Many other companies outside of automotive are also following suit, such as the medical field. A lot of hospitals have some sort of renewable source of energy used to power the facilities such as solar power and hydropower (dams).

Another direct impact that an engineer has on global climate change is overall waste management. Waste management means the action of monitoring and assessing the amount of waste being produced. Engineers will find what can be done to reduce the waste produced and reuse the waste for another purpose (recycling). This will save the company money but it will also minimize the amount of waste in landfills and not wasting “goods” that could be repurposed. In which it will ultimately reduce the amount of fossil fuels burned to produce the energy needed to produce a “good”. An example of this would be in manufacturing, whether that be automotive or even the food sector, a company could produce item “z” from item “x” and “y” and the process of item “z” would lead to a lot of excess used item “y”. An engineer would assess the process and find a way to either a) reduce excess item “y”, b) reuse item “y” for something else”, or c) do both a and b.

Engineers and Fluid Mechanics

Overall, the goal of an engineer is to solve a problem, think of a solution, execute the solution, improve the solution, and optimize the solution. A driving factor for these solutions is the knowledge of fluid mechanics. Fluid mechanics can be defined as the study of how fluid is at static or dynamic motion and the forces it exerts. Using this definition and the laws of physics, engineers can apply this information in real-life scenarios to find solutions to a problem or to develop something new completely. Fluid mechanics allows engineers to create solutions for cooling and heating systems, turbine efficiency, hydropower efficiency, and general engine efficiency just to name a few.

When it comes to cooling and heating systems, engineers use their knowledge of how fluids behave to come up with smart solutions that save energy and work better. They study how fluids like air or refrigerants move around and use this information to design heat exchangers, ventilation systems, and air conditioners that work well and

use less energy. By using the science of how fluids flow, engineers make these systems transfer heat more effectively, which saves energy and helps protect the environment.

Along with heating and cooling systems, engineers use their knowledge of fluid mechanics to improve turbine efficiency. They study how fluids move and use this knowledge to design turbines that convert fluid energy into mechanical or electrical energy more efficiently. By doing this, engineers can make the turbines work better, waste less energy, and generate more power. This helps us produce energy in a more sustainable and efficient way.

Another way engineers use their knowledge of fluid mechanics to help climate change is to improve hydropower. When it comes to hydropower, engineers use their knowledge of how fluids work to make hydroelectric power plants work better. They understand how water flows through turbines and use this understanding to design and run hydropower systems that get the most energy out of flowing water. They consider things like the design of the turbines, how much water is flowing, and the pressure of the water to make sure they generate the most power possible while causing the least harm to the environment.

One more way engineers use their knowledge of fluid mechanics to help with decreasing the causes for climate change is general engine efficiency. In the case of regular engines like the ones in cars, knowing how fluids work is really important. Engineers use this knowledge to make the engines work better. They use fluid dynamics principles to improve how the fuel burns inside the engine, make sure the right amount of fuel and air mix together, and reduce energy wasted because of things like fluid rubbing and turbulence. By making the engine work better with fluid mechanics, engineers can make it use less fuel, produce fewer harmful emissions, and overall, make it more efficient.

Conclusion

All in all engineers have an important role in fighting climate change. They use their skills and knowledge to come up with solutions that make the world a better place. One way they do this is analyzing a process or scenario, predict a future outcome, and look at where improvement can be made. For example they look for alternatives to replace something that is not as efficient or desirable; in the case of climate change, an alternative to fossil fuels can be a renewable energy source. They

also do waste management to make sure the usage of materials is optimized to create less pollution and waste, as well as saving material and labor costs.

Engineers also are vital in the movement towards fighting climate change in the sense that they look at understanding how fluids, like air and water, move and behave. For example, they design cooling and heating systems that save energy by making fluids transfer heat more effectively. They also improve turbines used for power generation by making them convert fluid energy into electricity more efficiently. Engineers even work on hydropower, where they design systems to get the most energy from flowing water while causing less harm to the environment. When it comes to engines, they use their understanding of fluids to make them work better and use less fuel, which helps reduce emissions.

In conclusion, engineers have a crucial role in the battle against climate change. They can make a difference by advocating for change and educating the public about the reality of climate change. With their expertise, engineers have the ability to think critically and come up with effective solutions. Engineers know that the end goal will never be accomplished correctly if they do not follow the process from beginning to end properly. They know that tackling a big problem requires breaking it down into manageable parts as well as understanding the importance of each part. They start by identifying specific issues related to climate change and understanding their root causes. Then, they use their critical thinking skills to develop smart solutions for those problems. Engineers work hard to put those solutions into action, constantly improving and optimizing them along the way. By raising awareness and starting conversations, engineers can inspire significant changes and improvements. In short, engineers are essential in creating a greener and more sustainable world for everyone.

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