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Combating Climate Change

Climate change is an ever present and growing concern in today's society. The methods which are currently being used to produce energy are the greatest contributor to climate change. Many human activities such as the burning of fossil fuels and deforestation have allowed excess greenhouse gasses (e.g. carbon dioxide and methane) to reach the atmosphere without decomposing; this allows thermal radiation from the sun to be trapped in the Earth's atmosphere (The National Academies Press, 2022).

Many people wonder if this complicated problem can be subdued without making major sacrifices in how modern society currently operates. Having worldwide commitment towards improving clean energy production is the best method to counteract climate change (The National Academies Press, 2022). Engineers are the core group responsible for developing feasible methods of clean energy production. Engineers must follow strict ethical guidelines while making decisions in order to consider long term environmental and business effects.

Automobiles of the Future

It is nearly impossible to consider new methods to reduce climate change without also considering how transportation plays a role. Electric vehicles are currently hitting the automotive industry with increasing popularity as gas prices have increased countless times thus far in the year 2022. According to the Environmental Protection Agency, about 27 percent of total U.S. greenhouse gas emissions currently come from transportation (EPA, 2022). There are many developing technologies that look to reduce this number by allowing people to depend less heavily on traditional fossil fuels. Biodiesel, electricity, ethanol, hydrogen, natural gas and propane are all examples of alternative fuels because they can have reduced greenhouse gas emissions in certain applications (Alternative Fuels Data Center, 2022). Engineers spend tremendous amounts of time and energy experimenting with alternative fuels in order to develop what they believe is the best alternative for both the consumer and the environment. Today, there is not one holy grail energy source that is expected to completely replace fossil fuels, but the alternatives can pose specific benefits depending on what type of application the vehicle is being used for.

Although there are many forms of alternative fuels for transportation, the battery electric vehicle (BEV) appears to be the most rapidly developing technology in the world of automotive transportation. Like all energy sources, the BEV has some downsides that prevent it from being the perfect long term solution for all transportation needs. On the other hand, the BEV is responsible for producing less greenhouse gasses than an average gasoline car, even when considering the fact that electricity is dominantly produced with fossil fuels (EPA, 2022). Taking into consideration the manufacturing of BEV's and the recycling/disposal of them (at the end of their usable life), the greenhouse gas emissions emitted throughout the lifecycle still outperforms the fossil fuel counterpart.

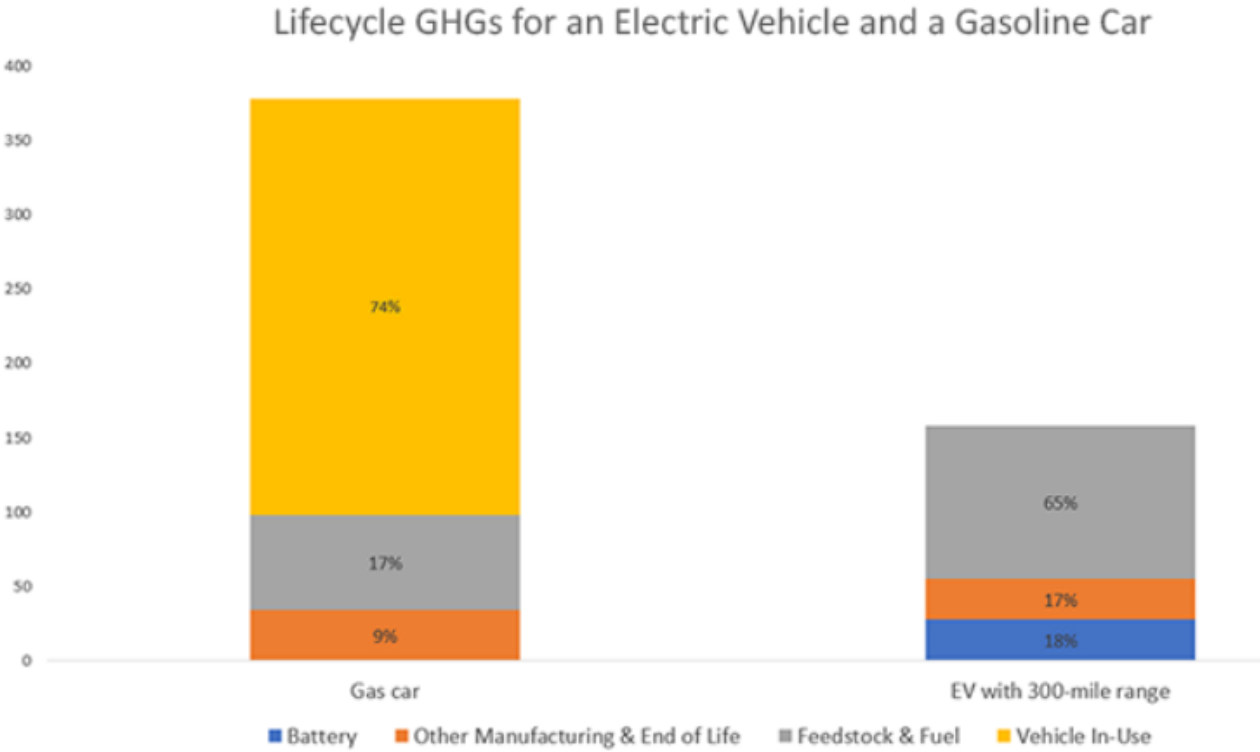


Figure 1: Life Cycle GHG Emissions of BEV Vs. Gas Car: <https://www.epa.gov/greenvehicles/electric-vehicle-myths>

Updating The Power Grid

According to the Environmental Protection Agency, about 25 percent of the total U.S. greenhouse gas emissions come from electricity generation (EPA, 2022). Within this sector of energy generation, 60% of all energy in the United states came from fossil fuels in 2021 (EIA, 2022). 18.9% was generated through nuclear energy, and 20.1% was generated through renewable sources (wind, hydropower, solar, biomass etc.) (EIA, 2022). It is important to promote the further development of renewable or cleaner energy sources such as nuclear

power, as well as improving efficiency of current systems. Sources such as solar and wind power can be highly effective when implemented properly. When placed in appropriate locations, solar panels generally capture energy throughout daylight hours and, while wind is typically less consistent than sunshine, turbines are able to capture energy at any time of day that the wind may blow (Team, V, 2021).

When talking about clean energy, it is impossible to ignore the potential of nuclear energy. According to Energy.gov (2022), "Nuclear is the largest source of clean power in the United States." With its high output and clean generation, nuclear has lots of potential to be an alternative to fossil fuels. New technologies such as fusion energy will only add to the immense potential of nuclear energy. Nuclear fusion harnesses the same type of reactions that burn within our Sun and other stars in order to create a sustainable source of clean power. Fusion also has the benefit of being safer than current methods of fission. According to the IAEA (2022), "the fusion process is difficult to start and maintain, [so] there is no risk of a runaway reaction and meltdown." As new methods of power generation are developed, there will be greater potential and more options to choose from in order to fit each unique situation.

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