We Are Not Ready: A Look at The Current State of Renewable Energy

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Abstract

The concern regarding global warming has prompted numerous discussions from activists, political figures, and even the everyday individual. As renewable sources of energy—including nuclear, solar, and wind, among others—grow in prominence, the effectiveness of these sources warrants consideration, especially when considering the hefty reliance on traditional fossil fuels and other non-renewable energy sources. Many are unaware of the extent of humankind's reliance on coal, oil, and other fossil fuels for energy sources, which makes the rapid shift to renewable energy concerning for its potential to greatly disrupt currently established ecological or economic systems. Due to humanity's dependence on energy, transitioning from nonrenewable to renewable energy sources can result in unforeseen ramifications due to the specific areas in which further development or research is necessary. The economic costs of producing electrical-powered products and clean energy-producing devices may be too significant to warrant their application over traditional coal- and oil-based products. Ecologically, renewable energy is exponentially cleaner than nonrenewable energy; the same cannot be said about its production. Furthermore, while the renewable energy job sector is steadily growing, nonrenewable energy employs a much more significant proportion whose occupations would be at stake should renewable energy sufficiently replace nonrenewable energy. It must be stated how, despite its benefits for the environment and the individual, implementing renewable energy too quickly and haphazardly can have economic, infrastructural, and some unintended ecological ramifications.

My world's on fire, how 'bout yours?

—Smash Mouth's "All-Star"

Over the past few centuries, the entire world has been steadily growing hotter and hotter, with some pointing to the Industrial Revolution as the first domino in the chain, leading to the concerns of global warming facing people today. For many, this can be attributed to the consistent and excessive use of fossil fuels, including coal, oil, and natural gas, that has steadily increased with time, leading many to support the notion of cutting off fossil fuel use for the sake of the environment and the planet. While it would be nigh impossible to terminate all fossil fuel consumption in one, fell swoop, the detrimental environmental and long-term financial costs would outweigh the genuine concerns and logistical problems that would be faced. However, as things currently stand, we cannot yet transition to purely renewable energy due to the economic, sociological, and ecological costs of renewable energy, which have not yet been reduced to a degree by which they outweigh the benefits brought by "clean" energy and the benefits of the already established nonrenewable energy industry.

Before examining the current state of renewable and nonrenewable energy, it should be established what degree of energy consumption could be expected, looking at the United States of America as an example. The U.S. Energy Information Administration reported that the United States consumed 72.9 quadrillion British Thermal Units, or BTUs, of fossil fuels in 2020 alone, looking at the combined use of petroleum, natural gas, and coal ("U.S. Fossil Fuel Consumption"). To put that into a more tangible manner, that equates to over 351 million tons of

coal, more than 228 trillion gallons of natural gas, and over 5 trillion barrels of crude oil, using measurements and conversions from the Independent Petroleum Association of America ("Reference Tools"). Of the 72.9 quadrillion BTUs of energy generated from fossil fuels, the two largest sectors in which they are used are transportation and generating electric power, with 31% and 28% of fossil fuels used for each sector, respectively ("U.S. Fossil Fuel Consumption"). These two fields of application are, for obvious reasons, the most thought about when fossil fuels are discussed, with the transportation sector being the most applicable to individuals' daily routines.

According to the Federal Highway Administration, as of 2020, over 100 million cars are registered in the United States ("Highway Statistics 2020"). While this statistic only represents a single country, it clearly shows how prevalent automobile use — and, more specifically, fossil fuel use — can be. Now, let us compare the number of cars to their electric counterparts, which, according to Leonardo Paoli and Timur Gül, who wrote on behalf of the International Energy Agency (IEA), represents 16 million cars driven worldwide, taken from an estimate based on annual electric car sales. In short, transportation has shown itself to be the field where individuals most closely consume fossil fuels, even if electric cars have become more prominent. While a single individual may never see 5 trillion barrels of crude oil, their involvement in using fossil fuels perpetuates a system in which fossil fuels will continue to be consumed, and the transition to renewable energy is stunted.

Unfortunately, a primary factor in individual gasoline consumption comes from the price of an electric vehicle versus a traditional gasoline engine. Renee Valdes writes in an article for Kelley Blue Book, a reputable company in automobile research and fiduciary understanding, how, as of July 2023, new electric cars cost approximately $5,000 more than new gasoline vehicles. However, the federal government can offer up to $7,500 to qualified buyers as an incentive to purchase an electric vehicle (Valdes). While that should negate the $5,000 price difference, it fails to consider how the average American, when shopping for a new vehicle, will likely not opt for the latest possible model, instead purchasing an older model for cheaper. Since efficient, consumer-friendly electric cars have only gained prominence within the last decade or so, options for newer cars will be inherently pricier due to their newness, which is further raised if the vehicle happens to be electric. The gap caused by the cost of electric-vehicle technology can already inhibit how many individuals transition to this cleaner alternative. Though the price may be hefty presently, there should be a more significant cultural and infrastructural shift to electric vehicles, especially considering the rise in the cost of nonrenewable energy.

Fossil fuel prices, as consumption grows and conflicts regarding the extraction and possession of fossil fuels continue to escalate, have jumped drastically in recent memory. In his 2008 article, professor of anthropology Thomas Love makes some astounding claims for the time but proves correct with time. He states, "With oil prices doubling in 2007 to now surpass an all-time high of US$100 a barrel, the stresses and strains of inelastic are beginning to show… We are in the last days of cheap oil" (Love 3). With the peak in gasoline prices in mid-2022, seeing many locations across the United States selling gas for over $5 per gallon, this sentiment of 2008 containing the last days of "cheap oil" has never been more evident. While rising oil prices do not correlate with the prices seen in the outrageous gasoline prices from just a few years ago, they reflect an overall trend that the prices of different fossil fuels appear to be following. In this situation, renewable energy resources should hold the solution to these rising costs. However, Love also suggests a consequence of these rising prices: "Escalating oil prices are already encouraging development of alternative energy…" (3). As fewer and fewer people can

sustainably afford to use fossil fuels, it makes sense for renewable energy to step in and replace nonrenewable energy. But, as incredible as that may sound, developing alternative energy can bring its own handful of issues.

The value of renewable energy as a cleaner and, of course, renewable energy carries many unforeseen costs. In her presentation "Benefits and Costs of Conventional and Renewable Power Sector in Siberia," Natalia Gorbachev shares the benefits and costs of both traditional, nonrenewable fuel, and renewable energy concerning five "dimensions," those being availability, affordability, sustainability, innovation, and governing. For the sake of brevity, understand that Gorbachev shares a plethora of benefits to both renewable and nonrenewable energy. However, she raises a few select concerns, the most notable of which pertain to renewable energy; renewable energy can result in severely reduced wages for workers (roughly half of what those who work in the sector of traditional fuel earn), a cost for electricity approximately six times higher than that of fossil fuel-made energy, an easily monopolized industry, and the possibility of "crony capitalism and risks of corruption" (Gorbachev). From an economic perspective, transitioning to renewable energy at this point would be an unwise decision due to the uncertainty in the business of "clean energy" and when the economic benefits of fossil fuels can still be utilized. Renewable energy has not developed to the point where it economically justifies implementing and replacing nonrenewable energy.

In addition to economic concerns, many sociological and infrastructural issues arise when dealing with the issue of energy. Too many industries, external factors, and functioning systems within society are currently set in stone to allow for a swift transition to fossil fuels. The simple matter of "where we get our energy from" has significance outside the sphere of energy, such as the production of job opportunities. According to the IEA, "energy," which refers to fossil fuel from production to use, employs 65 million individuals worldwide, which makes up 2% of the world's total employment (*World Energy Employment*). When considering decreasing fossil fuel production, use, or consumption, a significant portion of the world depends on these jobs for their livelihoods, to make a living wage to sustain themselves and maybe even their families.

However, some may point out that the growing renewable resource business will bring its fair share of job opportunities, and those people would be correct. Scholars from the International Renewable Energy Agency reveal that 12.7 million jobs exist globally in the renewable energy sector, with 700,000 new jobs created in a year despite the industry still recovering from the COVID-19 pandemic. IRENA's Director-General, Francesco La Camera, is cited as saying that "renewable energy jobs remain resilient and have been proven to be a reliable job creation machine" ("Renewable Energy"). It is undeniable how rapidly renewable energy grows, and with it comes necessary jobs. If — once again, despite the COVID-19 pandemic — 700,000 jobs can be created in a single year, how much greater can these job opportunities grow by 2025 or even later, like 2030 or 2040?

It cannot be denied that job opportunities in the renewable energy sector grow at an incredible rate as more and more countries and businesses develop this technology further. However, the logistical problem remains and stands out quite evidently, that the number of people currently employed due to fossil fuel production extensively outweighs the job opportunities presented. 12.7 million (*World Energy Employment*), while an impressive number of jobs, is still a far cry from the 65 million employed by fossil fuels worldwide ("Renewable Energy"). If individuals left fossil fuel positions prematurely, it would result in a demand for energy that could not be met. Since nearly 78% of all energy production comes from the burning and consumption of fossil fuels ("U.S. Energy Flow, 2021"), renewable energy would need to

produce a comparable percentage of power to allow for decreased fossil fuel production and consumption without causing a gap in the demand for energy. In other words, while some jobs exist, there are not enough for a seamless transition to renewable energy.

However, sociological concerns exist outside of job opportunities, and nonrenewable energy has its own issues. As an anthropologist, Love outlines in his article factors that can be damaged through conflicts involving fossil fuels and likewise fossil fuel scarcity, such as labor conditions, access to food, and geopolitical alignment (Love 3-4). Fossil fuels can start the fire of domestic and international conflict, spreading far beyond personal and individual experience and reaching the height of global matters. Examining these issues, most notably the possibility of food shortages and shifts in the geopolitical landscape, it is evident that fossil fuels create their share of sociological problems. As renewable energy is relatively newer, it does not appear to have these same anthropological influences as nonrenewable energy. Yet, time will tell how that may shift and develop in their global impact and sociological relations. If fossil fuels have an anthropological reach of that magnitude, as indicated by Love, what manner of influence, good or bad, could renewable energy have? Nonrenewable energy has firmly established itself as the predominant energy source and shifting away from that — as much as energy corporations and society should — could significantly disrupt the current social and societal infrastructure. Once these concerns have been met, such as creating enough of a job market, then a more appropriate and successful move to renewable energy can be made.

The last important aspect of fossil fuels and renewable energy that should be considered revolves around their environmental impact. Examining fossil fuels, many scholars have thoroughly documented the detrimental environmental effects of fossil fuel consumption. Savannah Bertrand, an author for the Environmental and Energy Study Institute and former worker at the Environmental Protection Agency, outlines in her article "Climate, Environmental, and Health Impacts of Fossil Fuels" specific acute effects of fossil fuel consumption. Rising sea levels due to melting ice, increased acidity in ocean water as it absorbs carbon dioxide, and a high likelihood of increased extreme weather events all represent the future of the climate should fossil fuel use be continued (Bertrand). It is worth noting that all these consequences come from the same root: increased global temperature. Bertrand describes the underlying cause for these extreme consequences: "When fossil fuels are burned, they emit greenhouse gases like carbon dioxide that trap heat in the earth's atmosphere and contribute to climate change." When heat is trapped, the earth's overall temperature begins to increase. This trapping of heat has garnered the attention of renowned institutions, such as NASA.

NASA has kept thorough records of the earth's average temperature on their website, noting any annual "anomalies." In other words, whenever the temperature fluctuates too far beyond natural variation, it is regarded as abnormal and recorded as an anomaly. The most recent anomaly occurred in 2021, with NASA saying this event will "[continue] a long-term warming trend due to human activities" ("Global Temperature"). These "human activities" encompass a range of actions and decisions with ramifications on the climate, but burning fossil fuels is the most prominent. As such, our use and abuse of fossil fuels have set the stage for alternative energy to take over as the dominant energy source.

In their article "Renewable Resources – Energy Generation," authors Deo Prasad and Elizabeth Fox outline various methods of obtaining renewable resources, from solar to wind to organic systems. Nevertheless, they share a staggering statistic by telling the story of Australia's first "wind farm," or collection of windmills made to generate electricity. They say that "[i]t is estimated that 1.9 million litres [500 thousand U.S. gallons] of diesel fuel will be saved per

annum, which will reduce CO_2 emissions by 5,000 tonnes" (Prasad and Fox 4). For context as to how extraordinary this figure is, this was from *one* farm for *one* source of renewable energy, which was built in March of 1994. When other renewable energy methods are factored in, such as solar, hydroelectric, geothermal, biomass, or nuclear energy, the substantiality of renewable resources is abundantly clear. Other scholars support this notion as well. In the article "The Effects of Renewable and Nonrenewable Energy Consumption on the Ecological Footprint: the Role of Environmental Policy in BRICS Countries," Nattapan Kongbuamai and his co-authors reveal how much cleaner renewable energy sources are when compared to fossil fuels and their relation to other factors, such as their environmental and economic footprint. The authors write, "in the case of CO_2, renewable energy consumption has mitigated CO_2 emissions in OECD countries… in 16 EU countries… in the BRICS countries (Russia, India, and China, excluding South Africa), etc." (Kongbuamai et al., 27892). With a significant international sample size, collecting data from several countries worldwide, the data reveals the simple truth that using renewable resources, when compared to using fossil fuels, reduces carbon dioxide emissions by a significant degree. The environmental cost of using renewable energy has been shown to be much cleaner than traditional nonrenewable energy.

Bertrand provided information regarding the adverse environmental effects of fossil fuel use, such as air and water pollution, worsened weather severity, and increased global temperature. Obverse to that, Kongbuamai has already outlined the beneficial changes in temperature resulting from renewable energy consumption. So, how can fossil fuel production, regarding environmental impact, be considered superior to cleaner, renewable energy? Well, the answer lies in the *process* of creating those alternative means.

Rachael Nealer et al., in their article "Global Warming Emissions from Manufacturing Electric Vehicles," detail several inferior aspects of electric vehicle (EV) production compared to traditional gasoline vehicles. "Manufacturing emissions," they reveal, "are approximately 15 percent, or 1 ton of CO_2e higher than those of a comparable conventional gasoline vehicle" (Nealer et al., 21). They elaborate on this, explaining how battery production contributes to this staggering difference. While utilizing and using renewable forms of energy have shown to be more environmentally friendly by reducing carbon dioxide emissions, creating, developing, and producing ways to harness or implement these forms of power is not beneficial to the environment. While the energy itself is much cleaner than fossil fuels and other nonrenewable energies, devices to create, harness, and utilize renewable energy have not progressed to the point in which their benefit outweighs their multifaceted costs. Once again, the harmful side effects of fossil fuel use have been thoroughly documented, yet — while admittedly better — the environmental cost of renewable energy technologies has not caught up to our growing need for a truly clean alternative. For this reason, we must, unfortunately, depend on fossil fuels for a little longer.

Society today stands at a nexus point in the development of energy technology. Our need for renewable energy has never been greater, yet our ability to implement it has not progressed to meet our needs. The truth regarding climate change, fossil fuel use, and renewable energy cannot be denied: alternative, renewable, sustainable energy has not been developed to where it needs to be to take appropriate steps toward positive change. As much as we, as a collective society, may desire a swift transition to an environmentally friendly lifestyle through the abandonment of fossil fuels, moving too quickly can have ramifications on people's livelihoods, the economy, and even the environment if the transition is done haphazardly. Furthermore, countless facets of the ongoing change have not been discussed here, such as the disposal of current fossil fuel-

consuming products, the creation of alternatives to products made with fossil fuels, distributing technology developed that utilizes renewable energy, and figuring out what to do with the current reserve of fossil fuels. These subjects warrant respect, attention, and research in the discussion of renewable energy.

If we desire positive changes in the current climate, environment, and economy, proper steps to transition to all-renewable energy need to start now. For individuals, it necessitates sacrificing electricity use whenever fossil fuels are at the source, such as turning off unnecessary lights, carpooling to save on gas, and recycling plastic materials at every opportunity given. Regarding more significant, broader issues, employers, or those with the power to establish new job positions, must have openings available for employees to migrate from working for nonrenewable energy to renewable energy. Suppose renewable forms of energy are to be implemented; in that case, development, construction, and access costs need to be drastically reduced regarding the widescale industry, environmental aspects, and the consumer perspective. Furthermore, the construction and implementation of renewable resources must improve their environmental impact to become widespread.

Essentially, the decision to continue fossil fuel production, consumption, and use stems from the current underdevelopment and limited implementation of renewable alternatives, along with the vacuum of energy production, economic revenue, and environmental conditions created. For as much as I want to see the earth heal through more gentle and respectful care of the planet and its resources, it cannot be denied that to do so, we, as a society, must walk a tight balancing act of decreasing fossil fuels as renewables are proportionally increased. The goal should not be to continue to rely on fossil fuels but to strive for innovations and developments in manufacturing technology and the implementation of renewable energy to become sustainable enough that these concerns are rendered obsolete.

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