

Analysis of Renewable Energy's Impact on the Fossil Fuel Industry and Life in the United States

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By

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

As the effects of climate change become an increasing issue in the United States, the importance of renewable energy grows as part of the ongoing effort to reach zero carbon emission. Renewable energy is defined as coming from a source that can replenish itself, such as the sun, wind, water, or geothermal heat (Beck, Gordon 2019). As a result of the increase in climate change, the US Energy Information Administration predicts a significant increase in renewable energy consumption over the next several decades (EIA, 2021), as shown in Figure 1.

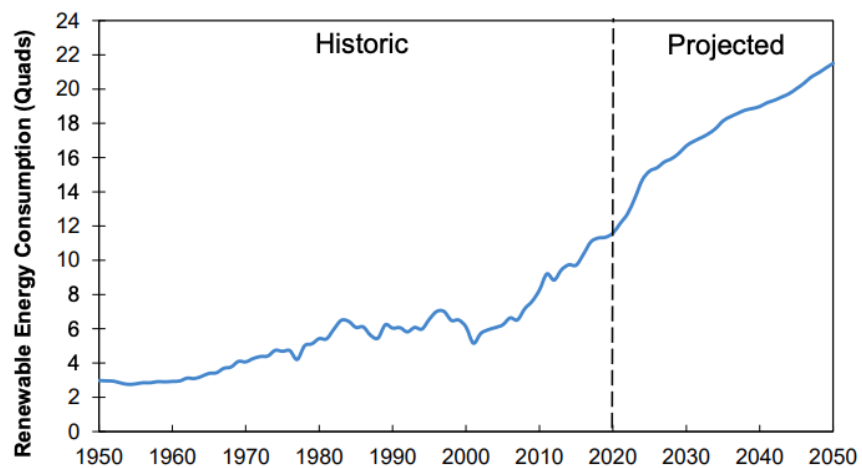


Figure 1: US Consumption of Renewable Energy, Historic and Projected (EIA, 2021)

The projection of increased use of renewable energy in the US shows that it is important to understand why this growth will occur and the resulting consequences of the change in energy sources. Over the past century, fossil fuels have dominated energy production in the United States, but the climate change crisis and the inevitable exhausting of the available nonrenewable resources has led to a turning point in the fossil fuel industry. According to Sönnichsen, energy consumption has already seen a decrease in fossil fuels (petroleum, natural gas, coal) from 2019

to 2020 and increases in renewable resources (wind, solar, geothermal), an indication that the US is already beginning to shift to cleaner energy consumption, as shown in Figure 2 (Sönnichsen, 2021).

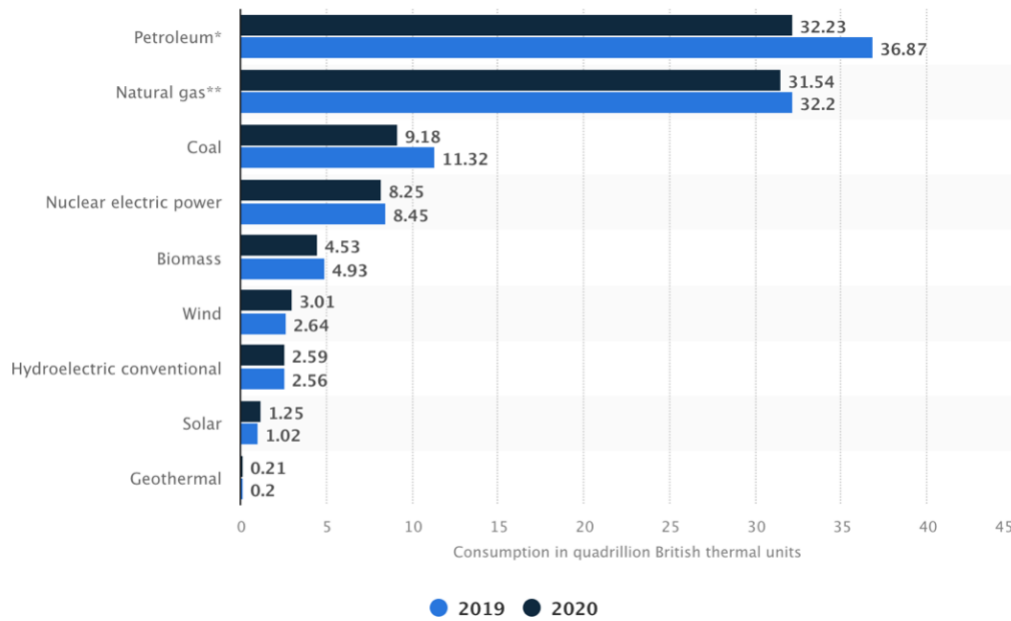


Figure 2: Primary Energy Consumption in the US, by energy source (Sönnichsen, 2021)

While the rise of renewable energy in the United States shows clear signs of a step in the right direction towards tackling climate change and having a society with zero carbon emissions, there are some concerns to examine. This energy sector is in direct competition with the fossil fuel industry, which has been the leading source of energy in the United States for decades, and still accounts for about 80% of energy production in the US (EIA, 2020). Therefore, a switch to renewable energy will have negative consequences on the American economy if the country is not prepared to make the change in energy sources. It is important to examine how the fossil fuel industry is being impacted by the rise of renewables today.

This research paper will argue that the rise of renewable energy is crucial to ensure that the United States heads in a direction of having zero carbon emission to slow down and eventual curb the influence of climate change around the world. However, because the country has been reliant on fossil fuels for energy consumption for so long, the switch to renewable energy as a new source could have some unprecedented consequences on both the economy and American citizens. As a result, this paper will investigate the rise of renewable energy and the fall of the fossil fuel industry, as well as the implications of the inevitable switch of primary energy sources in the United States. However, this paper will prove that while there can be some negative consequences to the shift to renewable energy, ultimately the US will set to prosper from being the first nation to successfully function from this energy source and tackling the climate change crisis.

Part I: The Rise of Renewable Energy

In 2016, over 190 parties signed off on the Paris Agreement, an international treaty set to reach zero carbon emission by 2050 and limit the rise of global temperature to 1.5 degrees Celsius above pre-industrial times (UNFCCC, n.d.). This treatise solidified the existing dangers of global warming and climate change, setting the stage for nations to find a solution to the crisis. One of the current solutions to reducing carbon emissions is the use of renewable energy, which uses self-replenishing sources without harmful byproducts to create energy. This form of energy production is surely to continue increasing in availability and prevalence, especially in the United States, as the country continues its fight against climate change. Analyzing which factors contribute to the rise of renewables is important to understand why the US will eventually make the switch to clean energy sources.

Economic Benefits of Renewable Energy

One of the main ways that renewable energy benefits the United States has been the economic growth that it provides. According to IRENA, the International Renewable Energy Agency, one way to understand the benefits of renewable energy is to examine the impact of the sector's growth on GDP, jobs, welfare, and trade. With the United States leading the charge in renewable energy production, IRENA predicts a 1.1% increase in global GDP production, 24 million jobs, 3% increase in global welfare, and many new trading markets to open by 2030 as a result of continued investment in the renewable energy sector (IRENA, 2016). This agency champions the development of renewable energy on a global scale, as it predicts a notable boost in the quality of any nations that would fund the technology.

In the United States, investments in renewable energy, even in locations that have traditionally been dependent on the use of fossil fuels, has become extremely beneficial towards local economies. The National Renewable Energy Laboratory (NREL) attributes two main reasons as to why this technology is so advantageous to economies – renewable energy is extremely labor-intensive, creating many more jobs than typical electricity generation technology, and the use of naturally reoccurring technologies allows energy dollars to stay at home (NREL, n.d.). With multiple sources becoming significant energy producers in the US- wind, solar through both light and heat, geothermal, and biomass, the opportunity for success in the sector is extremely promising due to the diverse geographic and environmental profile of the country (NREL, n.d.). As the current world leader in renewable energy, the US has a clear advantage over a lot of other nations with the availability of natural resources for energy production.

In addition to the potential local economic benefits that would occur from increased investments in these technologies, the potential gains to the US economy are glaring as well. With IRENA's predictions of a 1.1% increase in global GDP with continued investment in renewable energy technologies, which equates to 1.3 trillion USD (IRENA, 2016), the US stands to have the most to gain from such a boost. By continuing to be the leader in this sector, the manufacturing of all products related to renewables in the US and distributed to the rest of the world will establish the United States as a new manufacturing leader in a newly growing industry.

The economic predictions made by agencies such as IRENA and the NREL on the future benefits related to the renewable energy sector displays why so much attention has been given to the quickly growing industry. The US would clearly profit greatly by continued investments in this technology and leading the way for renewable energy production in the world.

A Resource with an Endless Supply

A dominating benefit that has contributed to the exponential growth of renewable energy in the US has been the limitless availability of the resources that are used by the technology. Due to the size of the country and the vast variety of geographic features that the American landscape has to offer, there is a large amount of land that permits to produce energy through different natural resources. Figure 3 below shows different maps of the United States and the availability for four different resources, wind, photovoltaic solar, geothermal, and biomass, to depict where the industry can take advantage of resources (NREL, n.d.).

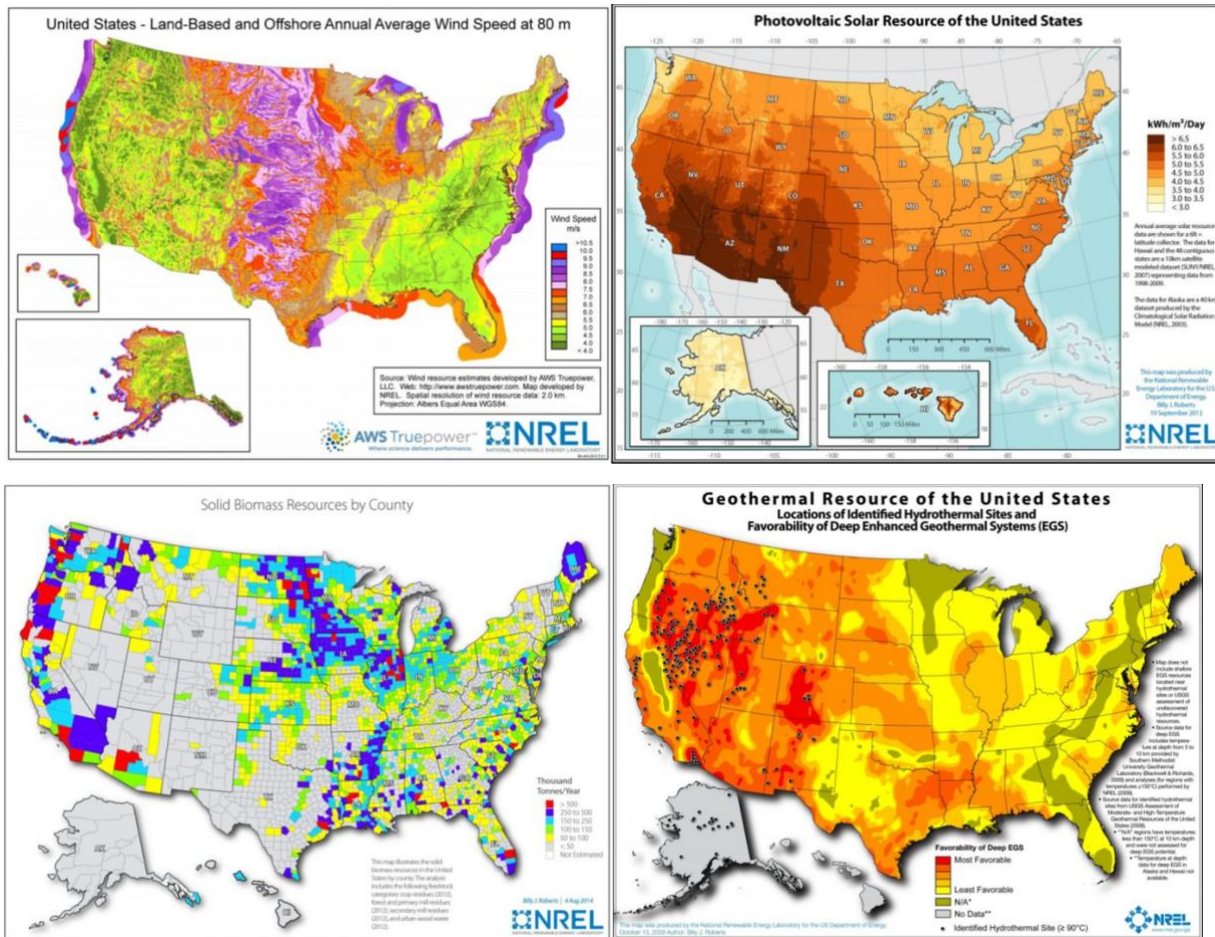


Figure 3: US Maps of wind (a), photovoltaic solar (b), biomass (c), and geothermal (d) resources available for energy production (NREL, n.d.).

Analyzing the different graphs, there are certain areas in the United States that have a larger abundance of natural resources over others. Two of the states with the most resources available, Texas and California, accounted for nearly 84% of total renewable energy purchased by cities from 2015 to 2020, but many other areas in the United States started to grow in clean energy purchases as well (Gonçalves, Liu, 2020).

The advantages that the United States has for growth in renewable energy as opposed to other countries include the diverse geographic landscape, as well as the proximity of majorly populated areas readily using natural resources for energy production.

Part II: The Fall of the Fossil Fuel Industry

The primary source for energy production in the United States is by far fossil fuels, including coal, natural gas, crude oil, etc. Since the beginning of the industrial era, these nonrenewable energies have dominated the process in which humans produce energy. However, as recent times have shown, people in the US have begun to understand the impact of climate change on the environment and the need to switch to a sustainable energy source that is more reliable for the future of the planet. As shown in Figure 3, the total amount of energy produced in the United States by fossil fuels continues to decrease on a yearly basis (EIA, 2020).

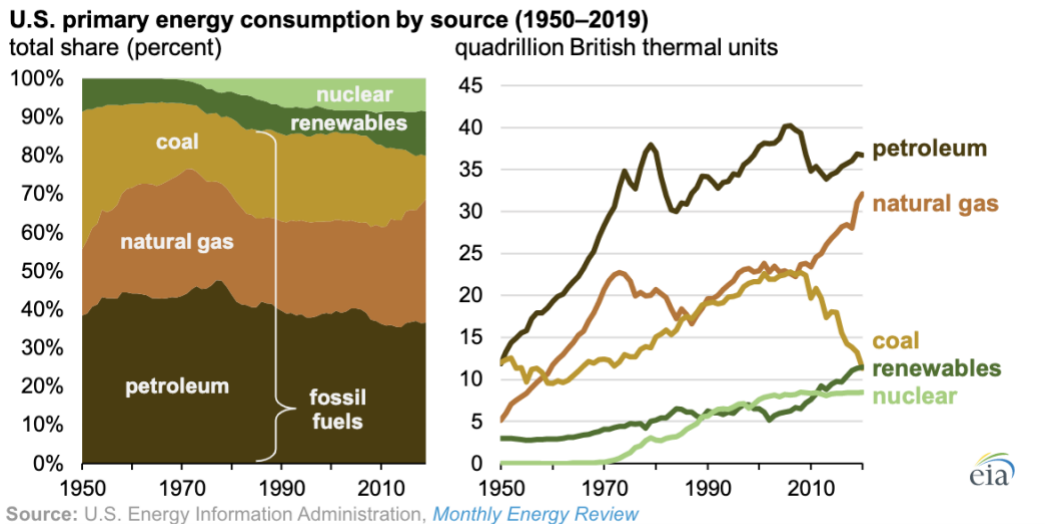


Figure 4: Energy Production Distribution in the US by source (EIA, 2020).

The two charts developed by the EIA display the gradual decline of fossil fuels out of total energy production in the US because of the increase in renewable energy production, as well as a drop of total energy produced in thermal units of nonrenewable energy since its peak in 2008 (EIA,2020). The trends shown clearly indicate that the fossil fuel industry has started its decline as it makes way for the rise of renewable energies.

The impact of this industry’s decline must be investigated, as the economic size of the business produced over 28 billion USD in net income in 2018 (EIA, 2019), an amount that would surely hurt the nation’s economy if nonrenewables were completely removed as being a source for energy.

What if the Fossil Fuel Industry Disappeared?

While it is easy to say that fossil fuels need to be dissipated for the damages caused to the planet, there is a lot more to the billion-dollar industry than being the most common form of CO₂ production in the United States. While the production of carbon fuel has decreased as a percentage of the total amount of energy available in the US, there is still a lot of success by working for these oil companies.

The EIA conducted a study from 2013 to 2018 on the profits in this industry and found that in 2018 the net income for all 43 US oil producers amounted to over 28 billion USD, a profit that was calculated to be the high of the five year study, as shown in figure 5 (EIA, 2019). However, one piece of information not shown in the graph is that the number of companies decreased from 46 to 43 moving from 2017 to 2018, a removal of non-profitable companies, which may have led to the increase in profit.

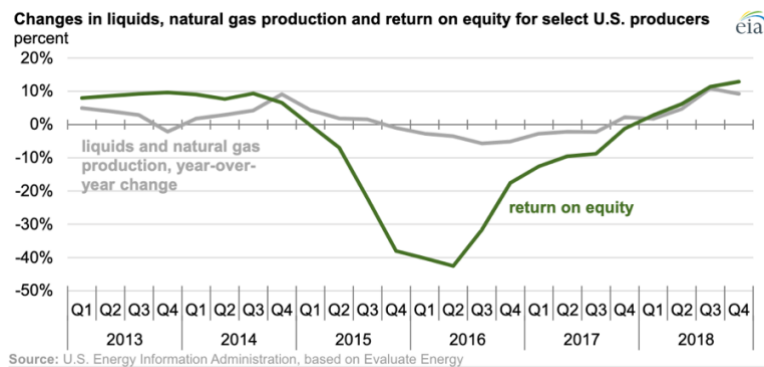


Figure 5: Profit for US oil producers from 2013-2018 (EIA, 2019).

What effect could the continued loss of fossil fuel companies have on American life? One of the major examples of this occurring can be found in the decline of Pacific Gas & Electric Company, PG&E, a company that serves over 16 million people utilities in the state of California. Due to extreme weather in 2019 because of climate change, the company faced over 30 billion USD in liability damages connected to wildfires and a possible call for bankruptcy, which would've caused a severe detriment to millions of people in the state (Roth, 2019). Figure 6 displays how much financial trouble PG&E faced after the wildfires, and how many people stood to suffer from a possible bankruptcy (Roth, 2019).

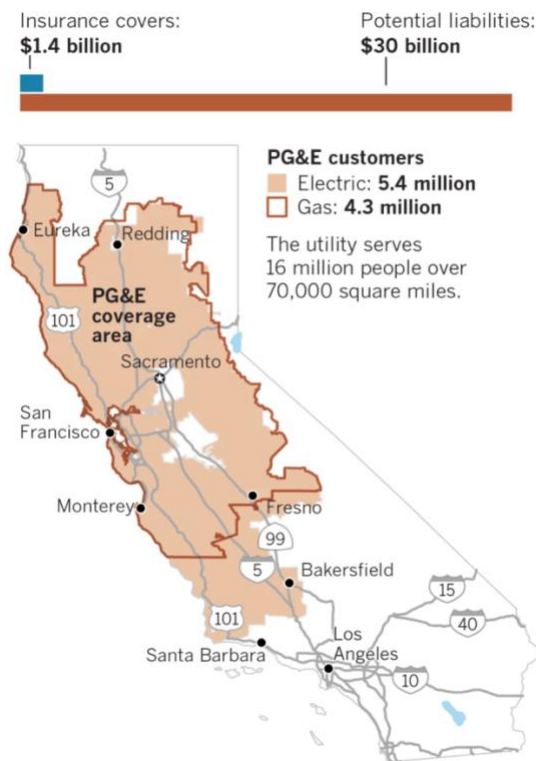


Figure 6: Graphic of PG&E's service coverage and liability costs (Roth, 2019).

PG&E is just one of many difficult scenarios that fossil fuel companies face today. Other companies, such as Chesapeake Energy and California Resources, have seen significant drops in their stock price (over 75% to both) as they have struggled to stay afloat during the coronavirus

pandemic and the uncertainties with oil prices, with hundreds of companies possibly having to go bankrupt by the end of 2021 (Egan, 2020). As renewable energy usage continues to rise and the liabilities associated with companies like PG&E skyrocket, corporations have already started to go out of business and make way for cleaner energy.

Efforts to Save the Industry

An understanding of what companies in the industry are doing to prevent complete disaster is crucial to ensure that fossil fuel corporations still have a future in the United States. Two of the most heavily affected companies also happen to be the biggest, Exxon and Chevron. To survive, the companies may have to either merge or begin to invest in clean energy by purchasing small renewable energy companies to boost their business and not get lost in the dying fossil fuel industry (Patton, 2021).

There are efforts being made to shift from fossil fuel production in the US and around the world, as policies have been made to discourage carbon powered energy. One of the strongest driving forces for these companies to make changes have been exponentially increasing pressure from investors, as previously shown trends clearly depict the inevitable global switch to clean energy and the complete transition to a net zero carbon emission society. Different strategies have been proposed to the industry, such as decarbonization of oil and gas, fuel switching (powered by renewables sources), support of electrification, and more (Bell, Blakemore, Johnston, 2020).

The fossil fuel industry has certainly moved far past its glory days and entered the final stages of its dominance over energy production in the US. With surmounting pressure to make drastic changes to fight against climate change, corporations will have to find how to stabilize

the damages fossil fuels have caused to the environment over the past century and work hard to ensure a net zero carbon emission country by 2050. With companies going bankrupt at an alarming rate, working together with the renewable energy industry will become the clear path forward to prevent further economic disasters.

Part III: Completing the Clean Energy Transformation

The renewable energy has shown great potential to becoming the next major source of energy production in the United States and the world. Led by a monstrous 90% rise in global wind capacity additions, renewable energy capacity saw a 45% jump during the pandemic in 2020, which the International Energy Agency states was the only fuel source to see an increase last year (Chappell, 2021). However, to have continued success in the US, there needs to be clear promotion by the policymakers and acceptance by the public for the new technology to fully assimilate into American society. Even with reservations over new renewable energy sources by a lot of people in the country, the future of clean energy has already started its fully transition with the help of governments on all levels. With this support, citizens will have no option but to see the benefits of renewable energy and adapt to the energy transition to finally achieve a society of no carbon emissions within the next couple of decades.

Public Skepticism

Public fear of new ideas and technologies is very common, especially in the US within the past year. Fossil fuel companies that are unwilling to join the fight against climate change instead choose to spread fear in the public to act against the establishment of renewable energy technologies in their local communities. The American Petroleum Institute (API) claims that natural gases will reduce carbon dioxide emissions and are extremely beneficial to the nation but

have also donated over 98 million USD in disinformation ads and spending since 1998 (Fortuna, 2020).

Disinformation is characterized as news that is deliberately misleading to manipulate consumers of the information (UW, n.d.), which groups in support of fossil fuels such as the API have done to a certain measure of success when trying to convince people against supporting renewables. A primary example of a group trying to spread disinformation to American citizens are the efforts of the Heartland Institute, a libertarian think tank that is extremely skeptical of climate change. James Taylor, the institute's senior fellow for environmental policy, claims that 'renewable power mandates are very costly to consumer throughout the 50 states,' and that 'renewable energy is more expensive than conventional energy' as part of the effort to make backwards progress on mandates for cleaner energy sources in the US (Eilperin, 2012).

When large groups like the Heartland Institute make bold claims about cost, it is easy for uneducated consumers of such information to believe what they're told and end up standing against renewable energy. However, renewables now have already started to get cheaper than fossil fuels: some solar panel projects can generate power at half the cost of coal (Stevens, n.d.). Also, as the technology of clean energy continues to improve, costs will continue to decrease, which further disproves claims on cost. While skepticism from groups like the Heartland Institute have caused questions from the public about the practicality of renewable energy as a sufficient power source, the benefits to clean energy are glaring in reducing carbon emissions.

Policy on Renewable Energy

Local, state, and federal governments in the United States have all been in great support of renewable energy, as seen by recently enacted policies all over the country. States have

implemented renewable portfolio standards (RPS) or goals to reduce carbon emissions and begin the transition of energy usage from fossil fuels to cleaner fuels. A 2015 report from DSIRE on RPS on a state level shows that 29 states already had policies in place to combat carbon emissions, a number which is increased by states and amount of policies since, as depicted in figure 7 (DSIRE, 2015).

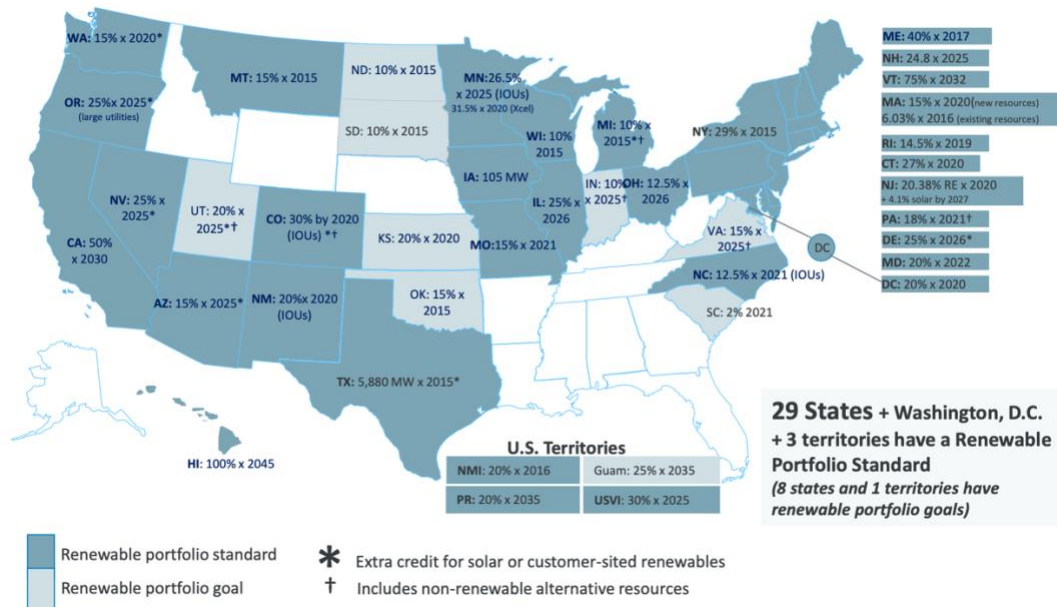


Figure 7: RPS Policies in the US, 2015 (DSIRE, 2015).

A common benefit provided by state governments is a tax credit, which allows people to save money on taxes by using qualified clean energy resources. These credits will not only make the use of renewable energy more popular, but further prove that financially traditional energy is not beneficial to either the American taxpayer or the environment. This all contributes to the Clean Power Plan (CPP), a plan developed by the federal government as part of the overall goal to reach zero carbon emissions by 2050, which sets target emission rates for each state to lower by over 30% by 2030 from 2005 levels (Zhou, 2015). US government officials have seen the warning signs of climate change and already taken steps to promote the use of renewable energy

by their actions in policy making, which has greatly helped the American public understand the legitimacy of the issue and the challenges that will have to be faced if the masses don't work together to make drastic changes in US energy usage.

Conclusion

This paper has analyzed the growth of clean energy in the United States, its impact on the fossil fuel industry, and how clean energy must be assimilated in American society. The rise of renewable energy in the US and the world has been inevitable ever since the effects of climate change have been increasingly alarming. Over the past decade, the technology in clean energy has seen some fantastic advances, and the diverse landscape and geography of the United States has proven to be the perfect location for the main fight against climate change to take place. With these technologies in place all over the country and more projects being put up at an exponentially increasing rate, the environment and American economy will see great benefits.

Like any other industry, the competing industry of one on the rise has begun to see its decline. The fossil fuel industry has had a great impact in the United States for decades, but the demand for clean energy has taken its toll. Oil and gas companies are going bankrupt at the highest rate in history, but some corporations understand the environmental situation at hand and have joined the effort to decrease carbon emission to save themselves and the environment.

Unfortunately, before renewable energy can be fully adopted into American society, most people must be on board with the switch to the new source for energy usage. There have been reservations by some people, especially about the cost of renewables, even if the information may not be correct. However, the US government understands the urgency of implementing renewable energy in everyday life and having most citizens on board with the switch to reach net

zero carbon emissions by 2050 is crucial. This ethical dilemma of having renewable energy as the main energy source in the US is already well on its way, and with the help of the government and cooperation of the people, the United States will hopefully lead the world to cleaning up the planet so that the environment can survive.

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