Economic Recovery from Coronavirus

as a Response to the Climate Change Crisis

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ABSTRACT

The climate change crisis is earth's most pressing long-term threat. It will have far reaching and disastrous effects on our environment and tangential effects throughout society for decades to come. Simultaneously, the COVID-19 (or Coronavirus) pandemic is the most urgent threat, one that has put much of the world effectively under quarantine. In addition to the significant health risk to U.S. citizens across the country, it threatens to send a U.S. economy that had seen record highs earlier this year into a recession. Congress has passed short-term stimulus measures, and continues to debate future legislation to further support America as it battles the Coronavirus. However, these efforts will not be enough to fully restart the economy – and they do nothing to minimize the dangers of the long-term changes to earth's climate. Instead, I propose a stimulus package dedicated to incentivizing research and production of renewable energy sources, as well as continuing efforts to encourage consumers to transition to renewable energies. These proposals would encourage investment in the nascent energy sector, mitigate our reliance on fossil fuels and their effects on climate change, and kickstart the economy in the wake of Coronavirus.

INTRODUCTION

The climate change crisis is earth's most urgent long-term threat. It will have far reaching and disastrous effects on our environment and tangential effects throughout society for decades to come. Simultaneously, the COVID-19 pandemic has become the most immediate threat, one that has put much of the world effectively under quarantine. In addition, it threatens to send the U.S. economy, which only two months ago had reached record highs, into a recession.

There has been much debate in the U.S. about the best ways to stimulate the stalled economy. We have already seen efforts such as The Coronavirus Aid, Relief, and Economic Security (CARES) Act, which among other things established refundable tax credits to much of the population and grants to small businesses to keep the lights on and employees paid.

These efforts will not be enough to fully restart the economy – and they do nothing to minimize the economic dangers resulting from the long-term changes to earth's climate. For instance, the National Oceanic and Atmospheric Administration has tracked more than 275 climate-related disasters that have each exceeded $1 billion (inflation adjusted) in damage costs.[1] That same analysis has found that in the last five years the average annual number of Billion dollar climate-disaster events has nearly doubled from the average of 6.6/year from 1980-2019 to 13.8 over the most recent five years. Already in 2020, we have seen 16 such climate-related disaster events through October 2020. These staggering costs are expected to rise as natural disasters continue to become both more severe and more frequent. To combat this, Congress should prioritize a stimulus package dedicated to incentivizing the research and production of renewable energy sources, as well as continuing efforts to encourage consumers to transition to renewable energies. This would encourage investment in the nascent energy sector, mitigate our reliance on fossil fuels and their effects on climate change, and kickstart the economy in the wake of COVID-19.

CLIMATE CHANGE

In 1988, concerns about man-made climate change made front page news following congressional testimony made by NASA scientist Dr. James Hansen making the connection – with 99 percent certainty - between global warming and pollutants in the atmosphere. Over the last several decades, there has been little legislative or regulatory action despite numerous scientific studies that illustrate the consequences of fossil fuel emissions on nearly every aspect of life. Fossil fuels still remain the primary source of energy in the United States, responsible for more than 60 percent of all U.S. electricity generation in 2019.[2]

RENEWABLE ENERGY

A fundamental change to energy production is necessary to stymie the continued effects of climate change. The International Renewable Energy Agency, for example, predicts that in order to have a two-thirds likelihood of keeping global temperature rise below an annual rate of 2 degrees Celsius by 2050, CO_2 emissions would need to fall by more than 70 percent from today's levels. To accomplish this, they suggest among other things that nearly 95

percent of electricity generation would need to be low-carbon. Another study, which analyzed the necessary steps to meet Paris Agreement temperate targets, found that "avoiding 1.5 degrees of warming altogether, even with immediate action, would require considerably greater effort—at least a 25 percent cut in effective global CO_2 emissions from present-day levels by 2030."[3] In short, drastic and immediate action should be undertaken to mitigate the effects of climate change.

Though costs vary due to regional differences (such as ease of harnessing solar energy in the Southwest as opposed to other regions of the country) and incentive structures (such as tax credits), a leading reason for the lack of adoption is the current renewable energy costs on the whole being higher than fossil fuel costs. However, renewable energy offers a number of benefits in addition to a decreased reliance on fossil fuels and thus cleaner emissions.

Renewable energy can contribute to "social and economic development, energy access, [and] a secure energy supply," if implemented properly.[4] Proper implementation in essence necessitates buy-in from relevant state and local governments (and in some cases regional coordination) in both investment in R&D and construction of the energy generation facilities, and proper policies to ensure successful deployment and conversion to use the energy. Renewable energies can have a positive impact on job creation and can also provide energy to rural areas of the country where adequate access to non-renewable energies may not be readily available. For instance, both climate and geography may create barriers to safe, efficient, and sufficient transport of certain energies to certain remote areas, while renewable energy generation techniques (such as wind turbines or solar panels) may not have those barriers. Crucially, it should also be noted that costs in recent years have declined and are expected to continue to do so with innovations in the renewable energy sector. Barring significant setbacks, the reductions in cost may help propel renewable energy forward in the coming years. However, depending on how the global economy reacts to the pandemic, COVID-19 may significantly impact continued investment in and adoption of these energies which may impede continued reductions in cost.

POTENTIAL IMPACTS OF COVID-19

The COVID-19 pandemic is likely to have a significant and damaging impact on the adoption of renewable energy. Initial reports of the pandemic trickled out of China in late 2019, and just a few short months later the disease had impacted much of the world. Since the end of March, the United States has effectively been under various degrees of quarantine due to strict stay-at-home orders issued by many states. In response, Congress has taken unprecedented steps such as the $2 trillion CARES Act to protect the country against the

potential of an economic recession.

Peer-reviewed academic studies have not yet been done on the economic ramifications associated with COVID-19. However, available literature on predicted 2020 market trends, energy sector analyses, and previous economic recessions can help us recognize the negative impacts to adoption of clean energy stemming from the pandemic.

In October 2019, the International Energy Agency (IEA) predicted a "rapid rise in the ability of consumers to generate their own electricity" due to a predicted growth of distributed solar energy systems in homes, commercial buildings, and industry.[5] In early April, Heymi Bahar, a Senior Analyst of Renewable Energy Markets and Policy at IEA, expressed serious concerns for the renewable energy sector in the wake of the pandemic. A number of factors play a role in the concerns.

One such factor includes the effects of reduced production of solar panels in China – which manufactures nearly three-quarters of the total global supply– in early 2020.[6] While the wind energy supply chain is not as dependent on China for manufacturing as solar due to Europe's role as a major hub for wind energy manufacturing (Behar, April 2020), Europe similarly suffered manufacturing shutdowns and delays due to the pandemic.[7] Manufacturing in Spain and Italy – two primary countries in the manufacturing supply chain – shut down for a period of time along with the countries as they battled rising COVID-19 cases, though as of October 2020 all of Europe's wind turbine and component factories are now open again.[8]

Compounding the issues due to delays in manufacturing and construction, the IEA notes that solar and wind energy production in the United States have additional concerns to grapple with moving forward as a result of the pandemic. In the U.S., "wind developers…are required to ensure projects are operational by 2020 to receive production tax credits. Any delay in components or construction puts companies at risk of missing these deadlines and thus important financial incentives."[9]

Concerns over decreased adoption rates have been echoed by renewable energy advocates across the country in response to the pandemic. The American Wind Energy Association (AWEA) released a report in mid-March detailing the industry's outlook in the wake of COVID-19. "According to AWEA analysis, COVID-19 is putting an estimated 25 gigawatts (GW) of wind projects at risk, representing $35 billion in investment. More than $8 billion in wind energy projects in rural communities and over 35,000 jobs, including wind turbine technicians, construction workers, and factory workers."[10]

The solar industry is also preparing for significant impact due to COVID-19. Prior to the pandemic, an annual report on the industry was released in mid-March by the Solar Energy Industries Association, which projected 47 percent annual growth and nearly 20 GW of installation expected

in 2020. The report included an addendum, however, that these projections did not take into account the effects of COVID-19 and they would likely be reduced following a full assessment of the effects at a later time.[11]

Taking a look at investment trends, investment in the renewable energy sector is lagging by a significant amount compared to previous years, a trend many analysts believe to be a result of COVID-19. For example, per a Q1 report on solar industry financing, "funding levels dropped in Q1 as the pandemic brought the global economy to a halt. Most large economies are shut down and there is minimal activity in solar markets…The worst maybe yet to come, but hope is that activity picks up in the second half of the year."[12] The actual numbers included a decline of nearly 1 billion dollars in venture capital, public market, and debt financing for the solar industry – more than 30 percent lower than Q1 2019. To date, the hope for an increase in activity has not come to fruition. Most recent analysis reports just 3 GW of solar installations capacity in Q2 2020 and a loss of nearly 40 percent of related jobs.[13]

Statements from concerned solar and wind energy industry representatives and a measured decrease in investment imply more than just a temporary impact, but rather an industry-wide slump that may last well after 2020. To combat this however, we can study past financial crises to gain a better understanding of how the renewable energy industry fared and develop policy options that may better protect the industry moving forward.

PAST FINANCIAL CRISES

The 2007-2008 global financial crisis that began with the subprime mortgage markets in the United States had far reaching effects, including in the renewable energy sector.

The National Renewable Energy Laboratory, under the U.S. Department of Energy, issued a report in 2009 which studied the effects of the financial crisis on renewable energy projects.[14] Their analysis found that "The pace and structure of renewable energy project finance has been reshaped by a combination of forces, including the financial crisis, global economic recession, and major changes in federal legislation affecting renewable energy finance."[15] Another study, by the Paris Innovation Review, found that "total global annual investment in clean energy dropped by 6 percent in 2009 compared to 2008."[16]

Following the economic downturn a decade ago, scholars have conducted studies to analyze the impacts of the recession. For example, in 2012 Dan Hofman and Ronald Huisman re-examined the work of a study done a few years prior which looked at the policy preferences of more than fifty venture capital and private equity investors.[17] The original study, which was conducted in 2007, offered an opportunity for Hofman and Huisman to compare investors' appetites for renewable energy investment in a pre-recession and post-recession

economy. The investors were asked to rate twelve separate policy mechanisms on a scale of 1 (least preferred) to 5 (most preferred). The policy mechanisms included: (1) Feed-in tariffs (e.g. subsidies in the form of long-term energy contracts paid to renewable energy market producers); (2) Reduction of fossil fuel subsidies; (3) CO_2 emissions trading; (4) Renewable portfolio standards; (5) Renewable fuel standards or targets; (6) Green (renewable energy) quotas and certificate trading; (7) General CO_2 tax or energy tax; (8) Residential and commercial tax credits for renewable energy; (9) Kyoto mechanisms; (10) Government procurement of renewable energy; (11) Production tax credits; and (12) Technology performance standards.

The results of Hofman and Huisman's study found that all policies scored lower overall in their study than in 2007, except for technology performance standards which saw a modest increase from a 3.5 rating in 2007 to a 3.66 rating in 2011. Little discussion was made by the authors for why this was the case, though part of it may be due to a reduced risk of investment. Governments setting strict pollution regulations (such as vehicle emission standards) would ensure guaranteed market-wide purchases and would be among the "safest" bets of the twelve policy mechanisms discussed. The National Emissions Standards Act, which established pollution reduction standards in personal automobiles, showcases this; the automobile industry may incrementally move to cleaner standards with advances in technology, but the timeline can speed up when it is compelled to do so. Conversely, CO_2 trading, green quotas, and Kyoto mechanisms all scored among the lowest, which the authors explained may be due to "these policies imply[ing] more risk for investors since market prices for CO_2 and green certificates fluctuate."[18] Feed-in tariffs, which was the highest rated policy mechanism in 2007, saw declines in preference in 2011 but still remained as the highest rated mechanism.

Interestingly, more than twice as many survey respondents focused their renewable energy investments in Europe than North America. This suggests that clean-energy investment has a stronger focus in Europe. This provides a potential impetus to enact policies to spur investment in the United States. Doing so would attract domestic investment in adoption of renewable energy. With that in mind, it is worthwhile to take a deeper look at the North American investment preferences for policies.

In both 2007 and 2011, feed-in tariffs ranked the highest among North American investors. Technology performance standards unsurprisingly saw a boost in popularity in 2011 considering the discussion above. CO^2 taxation was the only other policy mechanism to rise in popularity in 2011. In comparison to Europe in 2011, North American investors showed a greater preference for production tax credits. These four preferences (feed-in tariffs, technology performance standards, CO^2 taxation, and production tax credits) may serve to provide a starting point for United States policies to combat the economic

impact of COVID-19.

Additionally, the United Nations' Environment Program's Division of Technology, Industry and Economics conducted a similar study in 2009 on the impact of the financial crisis on renewable energy finance.[19] Their findings suggested that small-scale project developers found it more difficult to find appropriate amounts of financing throughout the financial crisis, leading to a strong trend of mergers and acquisitions as the smaller companies are bought out by the larger, more established firms. Economist Joseph Schumpeter famously hypothesized that large firms are more than proportionately more innovative than small firms. Economists who follow this position may argue that this is a positive – large firms buying up small firms (and their associated IP, technologies, and workforce) should ultimately lead to more innovation.

Economists in recent years, however, have suggested that there may actually be a disadvantage in the correlation between firm size and innovation – that is to say, that large firms may actually be no more innovative than small firms.[20] The reasons for this argument are numerous, but primarily rest in the diversion of focus on a specific project or goal into many, which leads to wastes in resources, talent, and ultimately innovation. Some studies have also come to this conclusion, including one conducted by the Information Technology & Innovation Foundation (ITIF) in 2017, which found a proportionally outsized impact from smaller high-tech companies in comparison to large companies in terms of patents filed, employment, and wages due in part to their "seeking to develop innovations that have a clear competitive advantage in the global market."[21]

POLICY OPTIONS

In addition to the environmental concerns posed by declines in clean energy adoption, there may also be a significant economic impact. A 2013 study, for example, found that while investment in fossil fuel-based energy had no impact on employment, there was demonstrated proof of increased output (GDP) and employment growth stemming from renewable energy investment.[22] Policymakers should recognize the impact of legislation to combat past financial crises, as well as concerns expressed in the early stages of the COVID-19financial crisis, in order to develop successful policies moving forward.

As discussed above, feed-in tariffs are popular in Europe though widespread adoption of the incentive has not quite taken off in the U.S. to date, with just four states (New York, Indiana, Hawaii, and California) and the Virgin Islands offering the program as of October 2020.[23] Despite that, investors still prefer them over other surveyed incentives primarily because of the long-term stability they bring via the guaranteed rates over a long-term contract. That being said, there is uncertainty regarding the economic impact feed-in tariffs

may have, especially in times of recession. For example, a 2017 study found that "the recession shows that traditional renewable energy support schemes such as feed-in tariffs are ineffective in the long-term."[24] However, other studies have concluded that when included among other incentives in a market reform package, feed-in tariffs may actually be a viable option.[25] Therefore, while the feed-in tariff option may be tempting to legislators looking to spur investment in future stimulus package, it should be regarded as just one tool of many in a toolbox of policy options.

Providing an extension of the Production Tax Credit, for example, should be a priority for legislators moving forward. In particular the wind energy industry would stand to benefit most, as the industry is suffering from unprecedented manufacturing and construction delays and may not be fully able to take advantage of the current Production Tax Credit by the time it expires at the end of 2020. In addition, renewing the credit would also recognize the preferences of investors, who scored production tax credits as one of the most preferred policies in Hofman et al's 2012 study.[26] Further, renewing the credit would mirror actions taken by Congress in 2009. , The American Recovery and Reinvestment Act of 2009 extended the Production Tax Credit for 3 years part of the largest single investment in clean energy in history.[27]

In addition, the Solar Investment Tax Credit, which incentivizes residential consumers as well as small- and medium-sized businesses to transition to solar, should be increased to its previous level of 30 percent of the cost of the system, and the sunsetting provision for residents, which was set to take place in 2022, should be removed. Doing so would again ensure stability and encourage further solar energy adoption in the burgeoning market.

Policymakers should also recognize the vital role the Federal Government plays in energy research and development (R&D). A recent analysis of the Federal Fiscal Year 2021 budget, for example, recognized the relationship between federal government and private sector in the transition between basic and applied research. The federal government is better equipped to finance fundamental research, while the private sector can apply that research into the development of marketable products.[28] However, the FY 2021 budget request would cut wind energy R&D within the Department of Energy by 74 percent and solar energy R&D by 76 percent These drastic cuts amount to more than $300 million lost in clean energy R&D, and could lead to a long-lasting drought in innovation, not to mention the environmental impact that it may cause.

Finally, no matter what efforts Congress undertakes, it is imperative that the incentives offer stability over a multi-year period and are not beholden to annual reauthorizations. Doing so would encourage long-term investments and adoption of renewable energy, and provide investors and the market with much needed certainty. As discussed above, uncertainty is among the single most important factors for why investments slow down in times of economic stress.

CONCLUSION

Climate change has steadily grown as the foremost global threat as a result of the continued reliance on fossil fuels. The pandemic may pose a risk to clean energy adoption due to fears of an economic slowdown leading to decreases in investment and decisions to continue to rely on fossil fuels due to their low current costs.

This decline may actually pose additional economic troubles for the United States as it battles a potential recession in the coming months and potentially years. It is therefore of paramount importance to implement policies that can encourage growth and adoption of renewable energy sources to mitigate further damage to the environment and protect the economy.

The policy options discussed above provide a broad suite of options policymakers can enact that would lead to immediate economic stimulus to protect against the economic effects of COVID-19. The options would further support an innovative, high-tech industry that provides high wages and employment opportunities across the country. They would also offer protection against future environmental harm caused by climate change. The options build on the lessons learned from past financial crises and recognize the concerns of the renewable energy industry in the early stages of the current pandemic.

As Ragnheiður Elín Árnadóttir, senior fellow of the Atlantic Council Global Energy Center said, "…as history demonstrates, innovation will thrive at this time of crisis, and this time may provide an opportunity to explore the use of renewable energy and take the leap into the next generation of technologies."[29] America, and the world, are in the grips of multiple crises at the same time – environmental, health, and economic. It is vital that policymakers let innovation thrive in order to navigate us through them.

ENDNOTES

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