Greener Energy Means More Green in the Economy

How the argument around climate change investment needs an economic reframe

The Biden administration's new Bipartisan Infrastructure Bill is a $550 billion initiative to address climate change by focusing on improving current infrastructure. Although critics argue that the bill costs are unfeasible and necessary, what would happen if we truly considered renewable energy in our initiatives to mitigate climate change?

Last year, the Biden administration passed the Bipartisan Infrastructure Bill—landmark legislation to mitigate the climate crisis. The $550 billion price tag is set to address crumbling infrastructure, increase access to broadband internet and clean water, develop a network of electric vehicle charging stations, and invest in the energy transition. The legislation intends to spur innovation in renewable energy and clean technology, harden our infrastructure, and improve our climate resiliency against increasingly severe weather conditions. Subsidies, tax benefits, and investment in solar, wind, hydro, and nuclear power are also included to increase our energy access, efficiency, and production output through lower consumer costs.

Climate change deniers and proponents of the oil and gas industry argue that the costs of this legislation are neither feasible nor necessary. Unsound rhetoric like that is pervasive and dangerous because it delays the implementation of renewables and magnifies the harms of a wetter, warmer climate.

Research supports the idea that anthropogenic warming— or, the heating of our climate driven by human activity— exists and is a critical component to understanding the climate crisis. However, even when pushing aside that socially contentious— but scientifically sound— notion, moving towards renewable energy would still be the right choice to make. As technology continues to develop in this sector, the payoffs are undeniable. Clean energy is proving itself to be more efficient and less expensive to maintain and operate— the short story: it is fiscally advantageous to go green. Showing that renewables can boost people's finances and lifestyles might make them feel more inclined to support renewables. Instead of viewing the costs of renewables and climate resilience as flat costs, people should view them as investments. While investments always come with risks, science and data are on the side of action and disruption of our current systems rather than complacency with them. Our current global trajectory of energy usage and overall consumption patterns lead us to an inhospitable, hazardous world. So, action

really is our only option. Increased capital allocated towards changing the systems in place will lead to greater renewable generation capacity, better energy storage systems, increased grid resiliency, and improved energy efficiency, especially compared to fossil fuels.

But what is energy efficiency? Our world is supplied with a nearly infinite amount of primary energy from the sun's radiation, and this energy is converted into a variety of forms. Through photosynthesis, solar radiation feeds plant life and biomass, which break down and eventually form coal and oil. Heat from the sun warms our air causing currents to flow throughout the atmosphere. Inflows of primary energy must be converted into useful energy, which is the energy that can actually be put to work, like electricity. A portion of useful energy is lost with each conversion which leads to decreased energy efficiency for resources with more conversions required.

Fossil fuels have a lengthier process of becoming usable energy. For example, plant and animal matter must undergo centuries of heat and pressure before turning into crude oil. It is extracted in its natural form, transported for refinement, and then transported again, likely to a consumer location like a gas station. People pump that gas into their car where it is combusted and the byproduct of CO2 is released. This process takes multiple steps of energy conversion, meaning that overall usable energy is lost, requiring extensive transportation capacity. Ultimately, it leaves us with CO2 saturating our atmosphere and our oceans, and reliant on a fixed and diminishing resource. In contrast, solar panels are made of highly abundant silicon wafers, primary energy is absorbed directly, and a single conversion to usable electricity occurs. The energy lost is better described as "surplus energy." It is excess solar energy that our current technological capacity cannot harness to the full extent. As investments such as the infrastructure bill fund the development of renewable energy systems, the U.S. can harness and deploy more of this energy and increase the capacity of our energy capture systems. Renewable energy resources are often more energy efficient from the start, and these further investments in renewable development and infrastructure will help consumers see an even bigger bang for their buck when compared to fossil fuels.

This is monumental: by updating and improving our renewable systems, U.S. citizens can save money on our energy use. Solar, although an initial investment, tends to pay off in six to ten years. This estimate is most likely lower when considering that fossil fuel prices are trending upward and renewable costs are falling. Over the last decade alone, prices for solar installations have dropped 50%. Another way consumers can maximize energy savings through utilizing renewables is by switching to electric vehicles. While electric vehicles are still broadly more expensive, tax incentives can help reduce the cost to consumers and continual development and competition in the sector continues to drive the market price downward. The Michigan Transportation Institute conducted research that showed the average annual cost of an electric vehicle is roughly $485 versus $1,117 for a traditional combustion engine. Additionally, electric vehicle maintenance costs are often cheaper since the engine system is simpler and usually operates with higher energy efficiency.

Moreover, making the switch to renewables is increasingly cost-effective as costs to operate fossil fuel power plants rise. It is cheaper to expand solar and wind power capacity in the U.S. than to reinvest in most of our coal-powered plants, as coal becomes an increasingly stranded resource— a resource whose economic viability or extraction capacity grows limited. The New York Independent Systems Operator conducted a study that "showed that adding 8 GW of wind capacity in New York State would save $1.3 billion in power plant operation costs per year, roughly $65 per person served."Energy costs constitute some of the biggest expenses to American consumers, so any cost reduction is a welcome one to lessen their energy burden.

Climate resiliency is another opportunity for savings. Damages from severe weather events have cost the U.S. approximately $2.6 trillion since 1980. In 2022, the U.S. had 18 weather events that cost at least $1 billion. Hardening our infrastructure can prevent such extensive damage and save money, as well as lives. It is estimated that every dollar invested in climate resiliency saves six—clearly a great return on investment by any standard. Renewable grids are also considered more reliable in the face of severe weather, especially when coupled with

energy storage technology and microgrid systems. As rising temperatures lead to more severe storms and weather events—both in severity and frequency—the U.S. economy can save big by investing in climate resiliency and energy grid upgrades.

Energy independence is another advantage to developing renewable production and capacity since our economy currently relies on Middle Eastern oil. That has left us vulnerable to energy price spikes caused by Russia's invasion of Ukraine and the Organization of the Petroleum Exporting Countries' (OPEC) slash in production. If the U.S. energy sector can produce at scale domestically, this would limit the chokehold from foreign oil while expanding our job market. A self-reliant energy sector would help the U.S. avoid another oil price war with Saudi Arabia like the one in 2014 where a competitive spike in production levels caused oil prices to plummet. While this was welcomed by consumers, it ultimately harmed our oil and gas industry and exposed our vulnerability to exploitation by Middle Eastern oil powers. With many dominant actors, like China, working to develop and scale their renewable capacity and evolve their clean technology, the U.S. would be strategic to be a leader and pioneer in the field. Increasing our energy capacity would help secure our position as an industry leader and help solidify independence from foreign powers wealthy in oil.

By growing our energy capacity and implementing new technologies, a collaboration of industries will be critical; vocational demands will span a broad variety of sectors and require unique skill sets and innovative thinking. Renewables can help the U.S. economy diversify, grow, and compete. Implementing new clean technology can act as a growth catalyst in many forms. As manufacturing for new products increases alongside investments in research and development teams, so will the need for technical experts in the fields of wind, solar, electrification, and more. According to a report by the Department of Energy, the energy sector had a larger growth rate than the overall employment rate. Job loss will occur in the fossil fuel sector— something that government institutions will need to prepare for by providing support to individuals and communities to minimize damage. The complexity of shifting away from fossil fuels will require a holistic approach to ensure we have a just energy transition. If there is adequate support and investment, the U.S. can construct a solid foundation of renewable energy resources, systems, and infrastructure which can help its economy flourish and eventually dominate in the sector, achieving energy independence, thereby supporting Americans through domestic job growth by bringing back jobs from overseas.

The green transition will not be costless or easy because revamping our energy systems and infrastructure will take time and effort, but the payout is there. Implementation of new systems that will take time to streamline and require support and retraining as the job market shifts to reflect our changing market. If taxpayers begin to view funding like the Bipartisan Infrastructure Bill as investments rather than flat costs, then there is a more visible opportunity for profit, savings, and growth. The national economy can benefit as a whole, and individuals can see the rewards on their level too. As prices for energy drop, and resources themself become more reliable, the energy burden that strains many U.S. households can start to ease, and health benefits can be gained from a cleaner society. This notion needs to be pushed more broadly and aggressively to the public to help gain momentum for the transition. Those who view renewables as unsavory and simply a means to push the "green agenda" are unlikely to be motivated to join in the energy transition by showing them another picture of a malnourished polar bear. They might, however, be convinced to hop on board if there is a chance to put more money in their pockets. Increased GDP and employment, energy independence, and health benefits would be icing on the cake. By reframing the argument from an economic standpoint, the green movement stands to gain momentum and would benefit from collaboration and diversified innovation as more people support the transition. After all, a greener energy system means a greener economy.