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**Clean Energy, Dirty Prices: The Disconnect Between Low-Income Communities and Renewable Energy in Western North Carolina**

**Abstract:** Since the introduction of state- and nationwide renewable energy sources in the early 1990s, renewable energy, and its implementation into society has been an issue filled with hardship and conflict. Facing pushback from politicians and fluctuation of prices by manufacturers, Americans are struggling to smoothly make the switch to clean energy. Low-income Americans are finding it the hardest among those in the nation struggling to switch to clean energy solutions. High prices and a lack of easily accessible government solutions have made it challenging for those living in poverty to make the switch, leading to a common phenomenon known as energy poverty. In western North Carolina, specifically Asheville, these hardships hold just as true. The lack of state government funding for residential renewable energy solutions and high prices for personal renewable energy producers have created a disconnect between those living in energy poverty and renewable energy solutions. I take a deeper look into this lack of government assistance and the high prices relating to clean energy, how this combination has caused severe energy poverty in the U.S. and specifically western North Carolina and will propose possible solutions to be implemented in WNC so that renewable energy disconnect in low-income communities will slowly disappear.

**Essay:**

Growing up in Asheville, North Carolina, I have seen many inefficient energy solutions being used in the region. Since I was a kid, I remember being able to see smoke from the Duke Energy coal plant and being warned not to go on areas of the French Broad River because of the plant's pollution. I remember hearing stories of rural communities being left only to fireplaces when power lines fall and listening to my parents discuss the increasing prices of their energy bills. With so many people experiencing these issues, it leads to a large group of WNCs experiencing the "energy poverty" phenomenon. Anyone affected by failures in energy services and those who cannot pay their energy bills is living in this type of poverty. Stemming from a variety of different causes, but mostly due to the high prices of renewable energy solutions and the lack of easily accessible renewable energy solutions, energy poverty has negative effects on those living in it, with most of these people being low-income communities. Energy poverty can lead to health issues, limit access to education and employment, and even lead to malnourishment. According to a study by the Converge of Climate-Health-Vulnerabilities at UNC, 30% of North Carolinians live in energy poverty (Energy 1), meaning that 1 almost 3 people in NC are struggling to pay their energy bills. Of the 800,000 people living in WNC, almost 200,000 of them are sacrificing their health and well-being in a failed attempt to pay their power bills. As for the bills themselves, over the last year, WNC residents have seen a 9% increase in their energy bill, meaning that the average energy bill in WNC has grown to over 160 dollars a month (Duke 1). Although this may not seem like a lot, this average bill can add up to almost \$2000 a year, which for a low-income WNC citizen, they are losing almost 10% of their yearly paycheck to pay in full for energy alone. These prices and estimates do not consider renewable energy solutions, with residential solar installations costing thousands of dollars. Even

with the claim of government help, WNC residents, especially those living in Asheville, are living in energy poverty and are still separated from renewable energy solutions. These residents are left to decide between forfeiting a hefty part of their paychecks to pay for energy per month or attempting to fix their long-term energy situation by spending massive amounts of money in the present. Faced with a tough decision, the fact that those living in energy poverty are also living in overall poverty causes them to select non-renewable solutions due to them being the cheapest option present. Fossil fuels are cheaper and easier to access compared to residential renewable solutions, meaning that when living from paycheck to paycheck these low-income communities are choosing more pollution and less effective long-term energy. Overall, low-income communities are shying away from renewable solutions due to these high prices and lack of accessibility to renewable energy, with devastating consequences for both those living in poverty and the environment around them. With these consequences from non-renewable solutions, renewable energy is the better option, posing a better long-term for the people of WNC. Switching to renewable energy in these communities could help reduce the impacts of poverty and the effects of climate change.

Most energy suppliers in WNC are claiming a drive towards completely renewable energy production, but that promise is much farther away than these corporations attempt to make residents believe. The fact of the matter is that renewable energy solutions are expensive and that any kind of large-scale switch to renewable energy is even more expensive. City and county governments don't want to raise taxes or go deeper into debt because of the positive long-term benefits of renewable energy when they have cheap, easily accessible fossil fuels readily available. Along with this financial motivation, those in power in city government are not willing to take a chance and invest large sums of taxpayer money into a long-term energy plan. They

fear that if the plan is unsuccessful, or if voters don't see big change fast, they will lose their position. This means that not only is it hard for residents to attain renewable energy solutions due to the high residential prices, but the government is not striving to provide more accessibility because it would, in turn, cost them just as much if not more money to make these solutions easily accessible to the public. With the lack of accessible clean energy solutions provided by local and state governments and the high prices of residential solutions, many WNC residents are suffering, but those living in low-income communities are being hit the hardest.

In North Carolina right now, the average residential customer's energy bill is predicted to rise by 9% by the end of 2022 (Duke 1). Covid-19 had a lasting effect on energy suppliers, causing an increase in the cost to harvest and transport fossil fuels, meaning that consumer prices have to be raised for energy companies to achieve their financial goals. Not only do these non-renewable energy solutions hurt the environment, but they are now hurting the consumer's financial security at an even higher rate due to the continually climbing prices. In this situation, renewable energy would be a much more effective means of providing energy because its harvest and transportation costs would remain steady regardless of what's happening around the globe. Not only can a price increase on non-renewable energy solutions affect whole communities, but a rise like this can be devastating for low-income customers individually, meaning that they will have to forfeit even more of their small paychecks to pay their monthly energy bills.

One would think that these rising energy prices would cause local governments to work tirelessly to find alternative ways to provide energy, such as clean energy solutions, but they would be mistaken. A suffering community in WNC, faced with the struggle of paying even more money for an energy bill, would surely cause an uproar drawing immediate attention and extensive action from the Asheville city government but one would be wrong once again.

Although the city of Asheville has pledged to make drastic changes in the way they treat energy, little headway has truly been made. According to the city government, Asheville's energy will be completely renewable by 2030. This is an incredibly bold prediction, because as of now Asheville only has one major solar power producer, accounting for about 103,100 kilowatt hours per year, which is about the power needed to power 12 average homes for a year. Asheville has over 90,000 residents, making 12 homes an incredibly small fraction of what is needed to turn Asheville 100% renewable in 10 years. The Asheville city government has also claimed to be partnered with the Buncombe county government to install a variety of solar panels in areas throughout the county, yet this plan to be completely renewable by 2030 has been in place since 2018 and there has yet to be any true strides in creating solar farms throughout the county, not to mention any other type of renewable energy that would be necessary for this proposed plan to be completed. This lack of effort given by the Asheville city government in driving renewable solutions forward is a perfect example of the lack of accessibility that residents in WNC, especially lower-income residents cannot seek clean energy solutions elsewhere.

Because of rising energy prices stemming from the pandemic and disinterest from local leaders, local governments are failing to provide low-cost renewable energy solutions, driving low-income residents to seek renewable energy solutions residentially from the private sector. This path of action would almost be ideal, except for the fact that private renewable energy solutions are expensive compared to the paychecks of people living in these low-income communities. According to a study on the price of solar energy systems done by the Center for Sustainable Energy, "The average cost for a residential system is currently \$3-5 per watt. That means the average 5-kW residential system will cost \$15,000-\$25,000" (Center 1). The average low-income household in WNC makes less than 50,000 dollars a year, meaning these

communities cannot afford to forfeit almost half of their yearly salary for this relatively cheap renewable energy solution, even if it has more long-term benefits. To make matters worse, solar energy is considered the easiest renewable energy solution to access as a residential consumer, outside of any renewable energy created and supplied by major energy providers. This means that any other renewable energy solutions, such as wind energy, are practically impossible to implement because of both price and practicality. No consumer is willing to pay upwards of \$25,000 for a solar installation, especially when this accounts for over half of the yearly income of a low-income consumer. These high prices for private, residential solutions are forcing those who cannot pay to look back to non-renewable energy, forcing them to choose the option that is detrimental to both the environment and in some cases the consumer to supply energy to their households.

Those living in these low-income communities are forced to choose non-renewable energy solutions, often leading to both environmental and health consequences. The best example of a non-renewable energy source affecting both the environment and consumer health comes from one of the most commonly used non-renewable solutions in the greater U.S. and especially WNC; coal. Coal is not only harvested in the mountains of Appalachia but is also used as one of the major energy producers for the whole region. First exploring the environmental effects of non-renewable energy solutions begins at harvesting. Since coal and many other renewable solutions are located below the Earth's surface, those looking to harvest it must engage in a variety of different mining techniques to retrieve this energy source. In WNC and greater Appalachia, the most common harvesting method for coal is strip mining. Strip mining is a process in which mountaintop removal occurs to produce an easy access point to the inner section of a mountain, then making it possible to harvest the coal located inside the mountain

itself. This mountaintop removal process involves decimating the top of a mountain, destroying the habitats of local wildlife species, and wiping out any indigenous plant life living at the top. In her book discussing the environmental injustice performed by the harvesters of coal and other non-renewable energy solutions across Appalachia, Michelle Morrone writes “To damage a system which allows an infinite number of life forms to coexist, to destroy what we cannot possibly replace, would not only be irresponsible, but it would also threaten our survival” (Morrone 43). Writing about the local ecosystem of Appalachia, Morrone is direct and stern in her truthful assessment of what happens when mountaintop removal occurs. It damages not only the environment of the mountain itself, but its destructive consequences could reach as far as our own lives, especially those put at risk for flash floods and mudslides due to mass amounts of rock being disturbed near their homes. The environmental damage continues after its production, resulting in air pollution that has a multitude of negative consequences including but not limited to global warming, acid rain, and a wide range of human health problems including asthma, lung cancer, and in some cases even death. According to a separate study done by the same Harvard Center for Climate, Health, and the Global Environment, there are over 350,000 deaths a year in the U.S. attributed to the effects of fossil fuels, with NC being one of the leaders amongst the highest deaths per capita (Vohra 1). This number, although not extremely high compared to the overall population of the U.S., is still absurd because the ability to reduce these deaths can be stopped through a switch to renewable energy. It is frightening to think that all that is necessary to develop these issues is to live in a community that harvests fossil fuels, These health problems, these incredibly devastating environmental issues, are caused because of people choosing non-renewable energy solutions over renewable energy solutions, a decision that

people living in low-income communities in WNC have no other choice to make, all because of their disconnect from renewable energy solutions.

Another major issue that arises from this disconnect between low-income communities in WNC and renewable energy solutions is energy poverty. According to the Convergence of Climate-Health-Vulnerabilities at UNC, energy poverty is defined as “when a person spends a disproportionate percentage of their household income on utilities” (Convergence 1). Anyone who has to compromise their normal spending to pay their energy bills falls under this defined category, with that percentage of residents in NC being more than 16% of people paying energy bills (Scheier 5). This means that over 3.5 million people are facing some sort of energy poverty when the communities in WNC taking no exception. Seen mostly in low-income communities, those living in energy poverty, although struggling, do not seem to be receiving the help they so desperately. In their journal article documenting energy poverty in the U.S., Eric Scheier, and Noah Kittner state that “Energy inequity is an issue of increasing urgency. Few policy-relevant datasets evaluate the energy burden of typical American households” (Scheier 1). This issue of energy poverty is receiving far less recognition and far less assistance than what is truly needed for those living in this situation. Due to the lack of assistance for those living in this manner, those facing energy poverty are placed in a dangerous situation, and the effects can be anything from facing the elements of mother nature with limited resources to sacrificing personal health to secure safety and energy security in their own homes.

People living in energy poverty are realistically presented with one of two options, live with limited energy resources and face the consequences or sacrifice health to secure enough money to pay the energy bill. If these people facing energy poverty in low-income WNC communities choose to not pay all of their energy bills, they risk losing everything from



communication with others outside of the home to their household's safety due to WNC experiencing all four seasons in full and regularly seeing sub-freezing temperatures during the winter and early spring seasons. If the residents living in energy poverty choose to attempt to pay their growing energy bill, they sacrifice their health by working an absurd number of hours to attempt to scrape together the funds to pay their energy bill, most likely compromising their health or forfeiting the payment of other bills to provide themselves with the necessities of electricity and heat.

This separation between renewable energy and low-income communities may have negative consequences for both the communities and the environment, but it also means that switching these low-income communities in WNC to renewable energy will help reduce both poverty and the destruction of the WNC environment. If these issues can be addressed by the city of Asheville government and other governing bodies in the area, one can easily see the positive effects of switching to clean energy solutions being woven into everyday society in WNC. Although WNC is a unique region with its low-income communities facing their unique challenges, several possible solutions could lead to a relatively painless switch to renewable energy.

On a global scale, WNC could take a lesson from Poland. One of the best possible solutions to break down the disconnect between renewable energy and low-income communities in WNC comes from an academic journal article written on energy poverty in Poland, and it involves receiving a vast amount of government assistance to change the way energy poverty is addressed, to change how energy is produced, and how that energy production can be best utilized at the residential level (Biernat-Jarka 17). Although this plan may be based on the energy poverty levels in Poland, statistically WNC has similar poverty rates to that of Poland, therefore

making their proposed plan comparable and easily accessible to communities in WNC. The vital first part of the plan is to redefine what it means to be living in energy poverty. Instead of just considering people who are unable to pay their energy bills in full, the government must start identifying all people who could have leaks or insulation problems that could lead to inefficient energy use. This would provide a better estimate of how drastic renewable energy solutions need to be because, without this redefined idea of energy, energy production to true usage could be inaccurately represented when projecting mandatory energy production of renewable resources. The next major step in this plan is to move to eliminate the non-renewable sources that are most detrimental to our environment first. In WNC's case, this would mean striving to eliminate all coal power plants as soon as possible. This could be done by having the City of Asheville's government use its governmental platform to push all coal-power power plants to close once renewable solutions are in place. Although it truly moves in tandem with the elimination of coal power plants, the next step of this plan is to work to place more government funding into solar and hydroelectric energy, two of the most prevalent renewable energy sources in both Poland and WNC. With the solar energy solutions, the plan emphasizes the use of photo-voltaic solar cell farms, known for their ability to retain high amounts of solar energy compared to basic panels. These farms would be used primarily in the city's main infrastructure. As for hydroelectric power solutions, in Poland, they use the Baltic Sea, but in WNC the government could utilize the French Broad river and appropriate more funding into upgrading the already created man-made dams in place. By pushing more funds into the creation and utilization of these renewable energy platforms, Asheville's government would make renewable energy more easily accessible to those living in low-income communities with a greater overall volume of

renewable energy options and help decrease the amount of air pollution/environment destruction through the closure of coal-powered power plants.

Although this proposed plan could directly benefit low-income communities in WNC facing the divide between themselves and renewable energy solutions, the question then arises of how the City of Asheville and other local governments could cover the funding for all of these renewable energy solutions. One of the best proposed financial solutions comes from Canada, with applications still directly relevant to the low-income and greater communities of WNC. This solution, outlined in the academic journal article addressing innovative financial solutions for renewable energy, the authors look to propose several different methods for financing renewable energy solutions, with the most successful being hybrid bonds and renewable energy credits (Miller 11). Hybrid bonds are a great way to create and provide an added form of income to make renewable solutions more available and help strengthen the value these solutions can have on the economy. These bonds would allow more everyday consumers to invest in renewable energy, making it more available to the public and more easily accessible financially from a residential standpoint. Renewable energy credits are like hybrid bonds as in they will help create more opportunities for renewable energy solutions, but instead of being handled mostly by the public, these credits would be passed out directly from the local government. In some capacity, the local governments would match the amount of consumer money spent on installing residential renewable solutions, therefore making any renewable solutions more readily available to the public and specifically those in low-income communities who could not afford residential renewable energy solutions previously.

If these plans, both governmental and financial, were to be integrated into low-income communities in WNC in their full capacity, the effects would be a drastic improvement from the

current state of both these people living in energy and general poverty and an improvement in the overall state of the WNC environment. Following the proposed governmental and financial plans, WNC would be able to greatly diminish the effects of poverty. Renewable energy is more efficient than non-renewable in the long term, therefore making it a more cost-effective energy solution. A cheaper cost for energy bills could help pull thousands of low-income WNC residents out of energy poverty and help reduce the overall effects of general poverty with a decrease in the amount of money put towards energy bills, making energy and other bills easier to pay. For example, in a study done in partnership with the National Conference of State Legislatures, rural South Carolinians found that when switching to renewable energy solutions their energy usage decreased by 34%, and the average household saved around 288 dollars per year on their energy bill (Durkay). Due to the cost and energy-efficient characteristics of renewable energy solutions, citizens in rural areas can save hundreds both by having cheaper long-term energy bills and by using less overall efficient energy.

Another way that renewable energy solutions greatly benefit the low-income communities of WNC is through their effects on the health of the residents and the health of the overall environment of the area. Non-renewable energy solutions create a variety of health risks for those living in the vicinity, including asthma, lung cancer, and several different types of chemical poisoning due to pollution. According to a study done by the Harvard Center for Climate, Health, and the Global Environment, the implementation of an 80x30 clean electric solution by 2030 could save over 317,500 lives and stop over 9,200 premature baby deaths due to reduced exposure to particulate matter from the ozone layer (Harvard 5). Renewable energy can not decrease the amount of money paid towards energy, which can provide more money for health-related expenditures, but also through a lack of destruction of the environment caused by

the implementation of renewable solutions, one can indirectly increase the state of a community's health and wellbeing.

Although the proposed 80x30 plan from the study would be extremely challenging to implement into WNC, the financial tools outlined earlier would be a perfect way to make this plan possible. As renewable energy can benefit the health of the people living in those areas, it can also help the ecosystems of that area itself. The integration of renewable solutions helps decrease the number of dangerous chemical contaminants being released into the air and water, meaning that these solutions can save the lives of countless organisms living in these habitats. Not only that but due to a lack of chemical pollutants being released into the air and hurting the ozone layer, the effects of global warming and climate change can be limited as well, therefore indirectly helping any organisms living in areas that are greatly affected by the negative characteristics of this said phenomenon.

The current divide between renewable energy and low-income communities is causing a multitude of problems for those living in the area, including poor health, energy poverty, and the destruction of local ecosystems. A change from non-renewable energy solutions to renewable energy solutions in the low-income communities of WNC would help reduce the effects of poverty in the region and help improve the overall health of the residents and the environment. Although there is no perfect plan for the implementation of renewable energy solutions currently, the urgency of steps that need to be taken is growing by the day. Non-renewable energy is causing irreversible damage to those living near its production plants and the surrounding environment. Every day is another day in which damage is done to the land and people of WNC, damage that could be limited if not completely stopped with renewable energy solutions.

With all this being said, there is still so much to be done. City governments need to stop putting political standing and fear of removal over the welfare of WNC citizens. Local renewable energy providers need to reanalyze the cost-benefit ratio of supplying cheaper renewable energy solutions, considering that their greed is detrimental to the WNC environment. Whether it be local, state, or national government, someone needs to take a stand and solve this disconnect before more people die. Consumers who can afford renewable solutions need to take advantage and choose to go clean, forcing the hand of non-renewable energy producers and hopefully settling the market eventually to a point where those living in poverty in WNC can engage with these renewable energy solutions. No matter what the next step is, this divide needs to be solved as soon as possible.

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