Assessing Climate Change Accountability: A Comparative Study of High and Low Income Groups in a Middle-Income City- Dublin

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ABSTRACT

Climate change is one of the global problems caused by the rise of carbon dioxide levels in the atmosphere. Climate change leads to more social problems that need to be solved by people, thus causing social problems. This study investigates the distribution of responsibility for climate change across income groups and ethnicities in the city of Dublin, California region, using a combination of survey approach and secondary data. The paper reveals significant disparities in CO2 emissions between different income groups. The economic status of different groups of people leads to different abilities of different groups of people to address climate change. In addition to examining the economic dimension of the different abilities of the residents of the Dublin area to address climate change, this paper also examines the impact on carbon emissions at the cultural level. This paper focuses on carbon emissions in terms of both lifestyle and renewable energy. The results of the study show that higher income groups have higher levels of income but higher levels of CO2 emissions and a greater ability to address climate change. The opposite is true for low-income groups. The findings of this paper emphasize the need for the U.S. to develop environmental policies that target people of different races, income groups, and cultural backgrounds to ensure equitable mitigation of climate change. The study emphasizes the integration of social equity and justice into climate action and calls for the participation of all groups in society to reduce the impacts of climate warming.

KEYWORDS

responsibility, equity, policies, carbon emissions, society

INTRODUCTION

Climate change has become a profound and urgent global challenge and affects the present and future of humankind. Climate change refers to the gradual alteration of typical weather conditions that we associate with specific areas of the planet, whether on a local, regional or global scale (Shaftel 2023.). The primary cause of climate change is human activity; the IPCC's Sixth Report states that human emissions of greenhouse gases have led to an increase in temperature of about 1.1 degrees Celsius since 1850-1900 and finds that global temperatures will average 1.5 degrees Celsius or more over the next 20 years (IPCC 2021). The main factor contributing to climate change is the burning of fossil fuels. Fossil fuels refer to coal, oil and gas. The burning of these three fossil fuels is by far the leading cause of global climate change, accounting for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions (Nations 2023). NOAA's data show that climate change will have significant impacts on water resources, food security, human health, and ecosystems and infrastructure (Allen 2003). These factors also affect the institutional equity of human society, the economy and the living environment.

In the context of the current climate change agenda, institutional equity and economic challenges play a fundamental role. These challenges are deeply embedded in how human societies distribute resources and assign responsibility for climate change. A fair solution would involve allocating responsibility based on the levels of emissions, but this presents significant practical obstacles, particularly in accurately tracking and pinpointing the sources of carbon dioxide emissions(Allen 2003).The question of responsibility can be viewed from different angles: whether it is the beneficiaries of emissions, such as consumers and nations that have prospered from industrialization, or the direct producers, like corporations and specific industries, who should be held accountable. This determination is critical in formulating an effective response to climate change. However, it involves navigating a complex web of historical, economic, and social factors (Peder et al. 2006). Extending this issue to the individual level, a new layer of complexity emerges. It raises the question of which demographic groups or sectors of society should bear a greater burden in policymaking and climate action. Should the focus be on high-income individuals who typically have a larger carbon footprint, or should it encompass broader groups, including those indirectly contributing to emissions? These considerations of responsibility are not just theoretical but have tangible socio-economic

implications. Climate change disproportionately impacts the economically disadvantaged and marginalized communities, who often have the least capacity to adapt or mitigate its effects. Therefore, any approach to addressing climate change must be sensitive to these inequities. It necessitates policies that are not only environmentally sound but also socially just, ensuring that the burden of climate action does not exacerbate existing inequalities.

Addressing the institutional equity and economic challenges of the climate change agenda requires an integrated strategy that takes into account the different income levels of consumers and their daily emissions. While much of the research has focused on international responsibility and emissions, there is a clear gap in addressing individual responsibility in climate action, especially given the polarization of responsibility between different socioeconomic groups (Bel and Rosell 2017). Higher-income people who adopt energy-intensive lifestyles tend to have larger carbon footprints but they are also more willing to sacrifice some income for the environment (Hailemariam et al. 2020). However, low-income people are more focused on their basic livelihoods, and although some low-income people are willing to contribute to environmental causes, they lack the resources to do so. This disparity calls for targeted and relatively equitable policies, financial incentives, and support programs to encourage sustainable practices across all income levels. All income groups should cooperate to reduce the impacts of climate change and the global climate change process.

This research paper aims to address the question of the key responsibilities for addressing climate change, looking in particular at the role of rich people and poor communities. The study aims to explore the extent to which wealthy individuals can reduce their carbon footprint compared to poor communities through changes in lifestyle and consumption patterns (SQ1). Furthermore, it intends to explore how economic disparities and income inequality affect the ability of these groups to engage in effective mitigation efforts (SQ2). In addition, the study aims to identify strategies to promote cooperation and collaboration between wealthy individuals and poor communities to maximize the overall effectiveness of mitigation efforts (SQ3). The underlying hypothesis of this study is that wealthy individuals bear significant moral and practical responsibility due to their historical contribution to GHG emissions and their greater capacity to initiate meaningful changes in consumption and lifestyles. The study aims to contribute to a valuable understanding of the roles and responsibilities of different segments of society in the fight against climate change, while taking into account the principles of equity and justice.

BACKGROUND

Study site

The city of Dublin, California is a great place as a research site for assessing consumer responsibility for climate change. Dublin, California is a middle-income city, and according to the United States Census Bureau, the average income in California in 2020 will be $33,719, while the average income in the city of Dublin in 2020 will be $72,946 (U.S. Census Bureau 2022). Dublin's average annual income is higher than the U.S. average suggests that there is a certain amount of support available in the city for addressing the environmental issues. The City of Dublin has adopted a Climate Action Plan 2030 and Beyond (CAP 2030), marking an important stage in its long-term commitment to climate action and sustainable urban development. The CAP 2030 outlines Dublin's opportunities and transformational strategies to address the challenges of climate change. These strategies include a 100% transition from fossil fuels to renewable energy, improving the efficiency of buildings, promoting sustainable transport and land use, enhancing waste use and management, and leading governance measures in environmental management(CAP 2030). The plan's holistic approach aims to reduce negative environmental impacts, promote community improvement, economic growth and reduce risks from natural disasters. The comprehensive climate measures implemented in Dublin, coupled with its varied income levels, make it an ideal area to study climate policy effectiveness and explore the polarization of responsibilities among different socioeconomic groups.

History of carbon emissions

Carbon emissions have a detailed history and are closely linked to human industrial and economic development. Carbon emissions were relatively low prior to the industrial era, and the primary source was nature (Allen 2003). The situation changed dramatically with the onset of the Industrial Revolution in the late 18th century, when the invention of the steam engine and the use of coal weaved the way for humans to begin emitting large amounts of carbon dioxide (Pearson and Foxon 2012). During the 19th and 20th centuries, not only coal, but natural gas also began to increasingly power the industrial boom, leading to a sharp rise in emissions (Azam et al. 2021). Urbanization has contributed to CO2 emissions to some extent.The development of technology caused a rise in productivity, and because of this rise in productivity the industrial revolution increased carbon dioxide emissions. After the Second World War, unprecedented economic and

industrial development led to an increase in carbon dioxide emissions. The widespread use of automobiles and the rise of consumerism have played an important role in CO2 emissions. At the end of the 20th century, mankind established the first Earth Day to emphasize the necessity of energy conservation and emission reduction (Rome 2003). The 1997 Kyoto Protocol and the 2015 Paris Agreement have brought energy conservation and emission reduction to an international level, aiming at mitigating climate change through the reduction of greenhouse gases. Since entering the 21st century, people have been improving energy utilization and the development of new energy sources (Caineng Zou 2020). However, despite these efforts in the 21st century, global carbon emissions continue to rise, posing a continuing challenge to the transition to a low-carbon economy.

Research Framework

Economic distribution

When analyzing the distribution of California's economy again, we see that the state's wealth and resources are unevenly distributed across its vast geography. Northern California, especially the Bay Area and specifically San Francisco, is known for its booming industrial technology. The technology industry contributes significantly to the state's gross domestic product (Dorfman 1983). In 2019 the GDP per capita in the Bay Area region was $128,308, which exceeds the GDP per capita of almost all countries (Pulkkinen 2019). In contrast the Central Valley, although it is a major agricultural center, has higher poverty rates at lower income levels. Southern California is centered around Los Angeles, a diverse city famous for its entertainment and manufacturing industries. Geographic differences in economic activity result in varying income levels and standards of living across the state. In addition, according to Bill Emmerson and Gil Garcetti's article Coastal Cities Have Higher Incomes and Better Job Opportunities in California's Coastal Cities Compared to Inland Cities.(Bill Emmerson 2023).This disparity highlights the challenge of achieving equitable economic development and environmental justice, and the need for policy interventions to minimize the impacts of climate change everywhere (Lahsen et al. 2010).

Ambitious liability

Anthropogenic climate change is a cumulative crisis, with historical and current greenhouse gas emissions creating an unprecedented environmental crisis situation worldwide. The responsibility for these GHG emissions extends beyond current activities and can be traced back to historical contributions (Heidari and Pearce 2016). In this context, current society bears the burden of not only its own emissions, but also those of the past, as humankind now benefits from previous industrial and economic progress. This complex intergenerational responsibility can be divided into three distinct categories, consumer responsibility, beneficiary responsibility and producer responsibility (Lenzen et al. 2007). Consumer responsibility relates to emissions associated with individual consumption patterns. As consumers, the choices we make in our daily lives, from energy use to product purchases, have a direct impact on greenhouse gas emissions. Beneficiary responsibility, on the other hand, recognizes that the present generation benefits from the intensive emissions of the past. This benefit means that we need to address the environmental issues associated with these historical emissions (Levin et al. 2023). Finally, producer responsibility focuses on those who directly generate GHG emissions, usually companies and industries. This aspect entails responsibility as a major source of emissions and requires them to adopt cleaner, more sustainable practices. In this paper, we specifically concentrate on exploring the aspect of consumer responsibility in the broader context of climate change accountability.

Current Policies

Although California is recognized as a world leader in climate change initiatives there is a growing perception that the state's current policies may not be comprehensive and effective enough. California has spent the last decade refining existing policies and developing new ones to address climate change. (Bedsworth and Hanak 2013).Despite these efforts, California still faces significant challenges in exaggerating the scale of these initiatives to meet the escalating demands of climate change. In 2006 the California government passed the California Assembly Bill (AB) 32 (Greenblatt 2015). Essentially addressing global warming, this bill requires California to reduce greenhouse gas emissions to 1990 levels by 2020. On May 22, 2014 the government approved 431 MMT CO2 as the 2020 emissions limit based on the recommendations of the IPCC's Fourth Report (California Air Resources Board 2020) In 2023, the U.S. will emit around 4,807 million metric tons of carbon, which means the U.S. will need to

cut 91% of its carbon emissions. California's energy CO2 emissions have been reduced each year. Although the initial goal was not met, by 2020 we have achieved the goal that was changed in 2014. The bill plays a significant role in California , as it demonstrates that technological advances, economic development, population growth and global climate change contradict each other. California has also enacted new standards for energy efficiency. Approximately 40% of carbon emissions in the U.S. come from power plants (Yin and Powers 2010), and RPS policies are federally mandated, but each state has developed its own specifics. The RPS is a set of policies that determine a certain percentage of energy to come from renewable sources such as wind, solar, and biomass (Huang et al. 2007). California's RPS goal is to increase renewable energy generation to 33 percent and to achieve an energy efficiency goal of at least 32,000 GWh by 2020 (Mahone et al. 2009). Although the State of California's progress toward the goal has been delayed, California remains in the process of meeting the goal. The existing imperfections and efficiency issues in California's policy framework have contributed to the shortcomings in achieving various environmental policy objectives. Despite the state's leadership in climate change initiatives, these challenges highlight the need for continuous evaluation and improvement of policy mechanisms to effectively address the complex and evolving nature of environmental issues.

METHODS

Study Design

This study uses a mixed-methods approach to assess the distribution of climate change responsibilities across income groups in Dublin, California. This paper focuses on understanding individual (household) CO2 footprints using survey and analysis of secondary data which are the data from City Council of Dublin. The carbon footprints of the households' daily lives and consumption are used to assess the responsibility of reducing carbon footprint in different income groups. This study aims to explore the relationship between socio-economic and environmental change responsibilities, and the combination of survey and secondary data ensures the accuracy of the data and provides insights into the perceptions of economic individuals and households in mitigating climate change. The study seeks to reveal the potential contribution of different income groups to climate change, as well as the nuances of individual environmental responsibility and action.

Study Instrument

To examine the distribution of responsibility for climate change across income groups in Dublin, California, the collection of quantitative data using a questionnaire played a key role. This structured approach allowed for the collection of data on two main aspects, based on consumption and CO2 footprint, and the daily CO2 footprint of households. Designed to be both comprehensive and user-friendly, the survey's platform is provided by the Cool Climate Network, a prominent entity dedicated to providing advanced yet user-friendly carbon footprint calculators. The carbon footprint calculator was divided into four main sections: Travel Carbon Footprint, Daily Life Carbon Footprint, Consumption Carbon Footprint and Food Carbon Footprint. All questions in the questionnaire can be skipped. I sent out the surveys to 66 people of different races and everyone who participated in the survey got a sticker about the environment and a chance to win an eco-friendly shopping bag. The surveys were passed to participants through QR code inside of Safeway in Dublin. Participants scanned the QR code to answer 2 surveys, one was from Cool Climate platform and the other was a short survey about renewable energy equipment. Once the data had been collected I entered all the data into R studio and analyzed it qualitatively according to the different segments. Entered the data into the r studio to analyze the carbon footprint between different income groups in the form of a bar chart. Use the data collected before to find mean carbon footprints in each segment of different income groups. Then use multiple regression analysis to see how variables affect carbon footprint.

RESULTS

All respondents lived in the Dublin area, with 55% of respondents earning more than 228,282 dollars per year which is the average income per household in the City of Dublin. and 45% of respondents earning less than 228,282 dollars per year . Of these respondents 15% were Black, 35.7%were Asian, and 49.3% were White. There was a very small percentage of people in

the questionnaire who were not of any ethnicity, and since the number was small I have ignored the minority in the results.

Income level analysis

Income-based analysis highlights significant differences in carbon footprints. Households with annual incomes of more than 228,282 million dollars have a significantly higher carbon footprint which is 22.8% higher than low income groups. representing 55% percent of the survey population, while households with annual incomes of less than 228,282 dollars have a smaller carbon footprint, representing 45% percent of the survey population. The increase in carbon footprint is due to greater reliance on personal vehicles, higher rates of consumption of goods and services, and more space in the home, which in itself requires more energy for heating and cooling. Comparatively, lower annual income groups have a smaller carbon footprint due to less living space, greater reliance on public transportation and lower overall consumption levels.

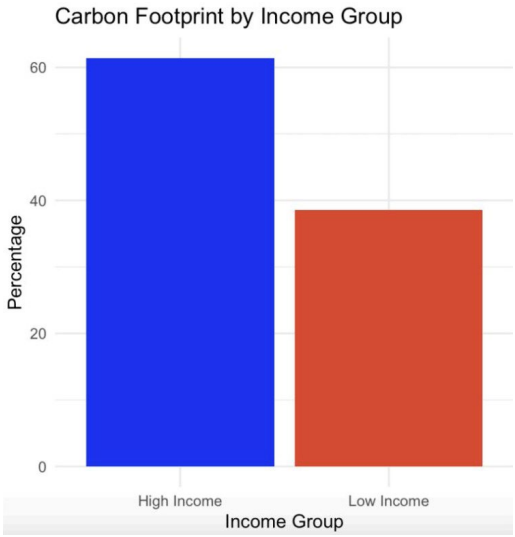

Figure 1. Carbon footprint by income group in percentage. The carbon footprint of high income groups is 22.8% higher than low income groups.

Ethical background analysis

An in-depth look at carbon footprints through the lens of ethnic background reveals the role of complex socioeconomic and cultural dynamics on environmental impacts. In this study,

we find that carbon footprints are strongly correlated with racial background and income level. 45.6% of whites, 75.2% of Asians, and 57.8% blacks belong to high-income groups. Meanwhile, 54.4% of Whites, 24.8% of Asians, and 42.2% Blacks are categorized as low-income groups. Further analysis revealed that among all racial groups, 39.437% respondents preferred to use public transportation. 30.5% whites, 28.2% Blacks and 56.5% Asians are willing to take public transportation to commute. Compared to White and Black, Asian respondents more frequently chose public transportation as their primary mode of travel. Asian energy consumption is lower than the other two races. 46% of people in Dublin have renewable energy systems in order to reduce carbon emissions and save some money. (Consumption emissions are lower for Asians, and these may be due to different cultures and different ethnic understandings of consumption.

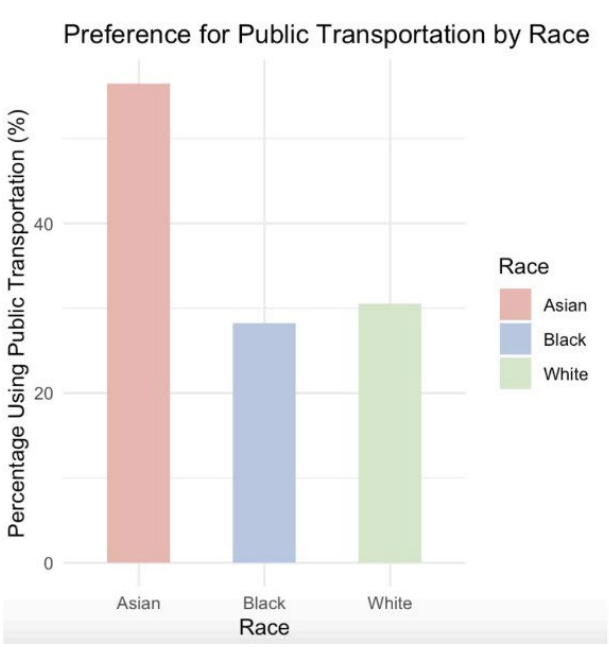

Figure 2. The percentage using public transportation by race in Dublin. 39.437% respondents preferred to use public transportation. 30.5% whites, 28.2% Blacks and 56.5% Asians are willing to take public transportation to commute. The percentage of Asian people who want to take public transportation is higher than other races.

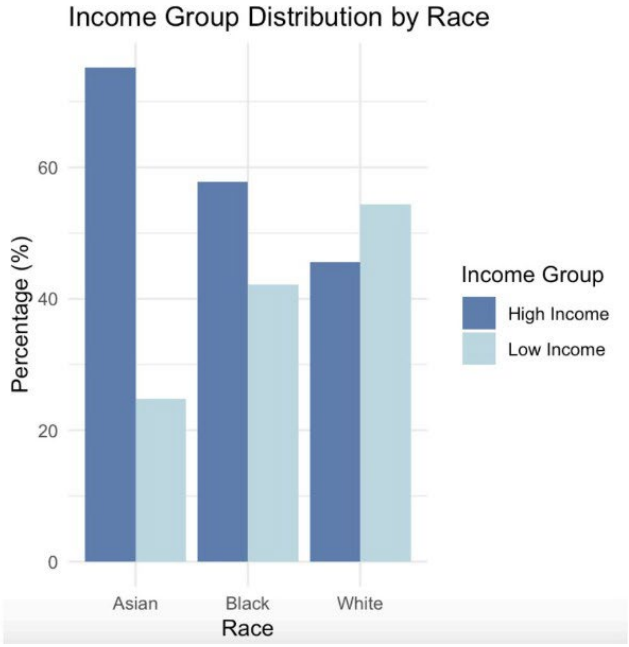

Figure 3. Income group distribution by race. 45.6% of whites, 75.2% of Asians, and 57.8% blacks belong to high-income groups. 54.4% of Whites, 24.8% of Asians, and 42.2% Blacks are categorized as low-income groups. Asians tend to have more people belonging to the high income groups in Dublin.

DISCUSSION

Findings

Research conducted in Dublin, California, provides a nuanced understanding of the distribution of climate change responsibility across income groups and ethnicities. The data

collected in Dublin shows that income level, lifestyle choices, and sources of energy use all influence the carbon footprint and have significant disparities. The study confirms that higher income groups with a higher standard of living emit more carbon dioxide and thus have a greater impact on the environment than lower income groups. This leads to a different division of responsibility for carbon emissions among different income groups. The study also highlights the willingness of different ethnic groups to engage in sustainable development practices, such as the use of public transportation and the installation of renewable energy systems in their homes.

Income level and carbon footprint

The study found that households with annual incomes above the average annual income for the City of Dublin have a 22.8% higher carbon footprint emissions than households with below average annual incomes. The results of this study show a relationship between income levels and carbon emissions in Dublin. This difference stems from differences in consumption rates, vehicle emissions, living space, and standard of living. The higher the economic status of the population, the more carbon emissions they produce and the more damage they do to the environment. Therefore, more targeted environmental protection measures should be developed for high-income groups based on their carbon emissions. Conversely low-income people have lower household carbon emissions, but they have higher carbon emissions from household appliances. Based on the data we collected before shows that low-income people cannot afford to upgrade the efficiency of their appliances due to financial constraints. However, there are some ways in which low-income people can improve the efficiency of their energy use due to financial constraints, such as the size of their homes and their choice of car. The energy efficiency of low-income and high-income groups introduces the importance of climate responsibility, as low-income people are willing to contribute to environmental protection but lack the ability to address climate change due to financial constraints.

Ethical and carbon footprint

The impact of racial aspects on carbon emissions was broken down in the study. In the study we found that Asian groups are more likely to travel by public transportation. Traveling by public transportation is also a viable way to reduce carbon footprints, and enhancing the transportation infrastructure in Dublin or middle-income cities in the U.S. may be a good way to reduce carbon

footprints (U.S. Department of Transportation 2010). This study addresses the importance of different cultures in reducing carbon dioxide emissions and suggests that environmental policies need to take into account different cultures in order to develop climate change mitigation policies.

Renewable energy sources

46% of the population in the study had renewable energy systems in their homes, demonstrating that the Dublin City population is taking a proactive approach to reducing fossil fuel burning. This positive signal suggests that the City of Dublin can increase its commitment to clean energy through economic incentives that make clean energy information, resources, and equipment more easily and conveniently available to all income groups. Economic incentives include subsidies for renewable energy equipment and subsidies for high power appliances (Abdmouleh et al. 2015). All of these strategies can make people more inclined to choose clean energy and efficient appliances.

Cultural and carbon footprint

This study's insights into the various factors affecting the carbon footprints of different income groups can inform the development of more nuanced and equitable climate policies for middle-income U.S. cities. On an economic level, governments need to enact stricter emissions measures and increase carbon taxes for higher income groups. At the economic level, the government also needs to create incentives to reduce carbon emissions. For the low-income group, the government should increase the amount of money invested in the economy so that the low-income group can also join the road to reduce carbon emissions. This includes subsidizing renewable energy equipment and high power appliances (Starr et al. 2023). In addition, considering the impact of culture on the environment opens up new avenues for community engagement strategies. This can allow for the resonance of values and practices of different ethnic groups. This approach can go a long way towards reducing carbon emissions, but ensuring cultural inclusiveness and sensitivity.

Next steps and limitations

Findings suggest that effective environmental policy in the Dublin, California area requires a deeper understanding of the relationship between socioeconomic status, cultural

context, and environmental responsibility. By taking these factors into account, policymakers can develop better and more equitable environmental policies to reduce social inequalities. In this study, several limitations should be acknowledged. Sample size is not large enough and also the sample does not include the minority race. The result may have bias because of these factors.

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REFERENCES

Abdmouleh, Z., R. A. M. Alammari, and A. Gastli. 2015. Review of policies encouraging renewable energy integration & best practices. Renewable and Sustainable Energy Reviews 45:249–262.

Allen, M. 2003. Liability for climate change. Nature 421:891–892.
Climate change impacts | National Oceanic and Atmospheric Administration. (n.d.). .

Azam, A., M. Rafiq, M. Shafique, H. Zhang, and J. Yuan. 2021. Analyzing the effect of natural gas, nuclear energy and renewable energy on GDP and carbon emissions: A multi-variate panel data analysis. Energy 219:119592.

Dorfman, N. S. 1983. Route 128: The development of a regional high technology economy. Research Policy 12:299–316.

Greenblatt, J. B. 2015. Modeling California policy impacts on greenhouse gas emissions. Energy Policy 78:158–172.

Hailemariam, A., R. Dzhumashev, and M. Shahbaz. 2020. Carbon emissions, income inequality and economic development. Empirical Economics 59:1139–1159.

Heidari, N., and J. M. Pearce. 2016. A review of greenhouse gas emission liabilities as the value of renewable energy for mitigating lawsuits for climate change related damages. Renewable and Sustainable Energy Reviews 55:899–908.

https://climate.nasa.gov/what-is-climate-change. Hailemariam, A., R. Dzhumashev, and M. Shahbaz. 2020. Carbon emissions, income inequality and economic development. Empirical Economics 59:1139–1159.

https://www.noaa.gov/education/resource-collections/climate/climate-change-impacts. Climate change widespread, rapid, and intensifying – IPCC — IPCC. (n.d.).

https://www.un.org/en/climatechange/science/causes-effects-climate-change. Shaftel, H. (n.d.). What Is Climate Change?

Huang, M.-Y., J. R. R. Alavalapati, D. R. Carter, and M. H. Langholtz. 2007. Is the choice of renewable portfolio standards random? Energy Policy 35:5571–5575.

Lahsen, M., R. Sanchez-Rodriguez, P. R. Lankao, P. Dube, R. Leemans, O. Gaffney, M. Mirza, P. Pinho, B. Osman-Elasha, and M. S. Smith. 2010. Impacts, adaptation and vulnerability to global environmental change: challenges and pathways for an action-oriented research agenda for middle-income and low-income countries. Current Opinion in Environmental Sustainability 2:364–374.

Lenzen, M., J. Murray, F. Sack, and T. Wiedmann. 2007. Shared producer and consumer responsibility — Theory and practice. Ecological Economics 61:27–42.

Levin, K., T. Fransen, C. Schumer, C. Davis, and S. Boehm. 2023. What Does "Net-Zero Emissions" Mean? 8 Common Questions, Answered.

Mahone, A., C. K. Woo, J. Williams, and I. Horowitz. 2009. Renewable portfolio standards and cost-effective energy-efficiency investment. Energy Policy 37:774–777.

Nations, U. (n.d.). Causes and Effects of Climate Change. United Nations. https://www.un.org/en/climatechange/science/causes-effects-climate-change.

Pearson, P. J. G., and T. J. Foxon. 2012. A low carbon industrial revolution? Insights and challenges from past technological and economic transformations. Energy Policy 50:117–127.

Peder Hjorth. (n.d.). Navigating towards sustainable development: A system dynamics approach - ScienceDirect. https://www.sciencedirect.com/science/article/pii/S0016328705000753?casa_token=jeNhO9cC_N8AAAAA:DHguQi3fo5fbQNxjW7ArRpzumnElgtCQpcxXeWv6ePbTL-_5mT3ww Tt3qLqNK609pZyX6zYnKsou.

PublicTransportationsRoleInRespondingToClimateChange2010.pdf. (n.d.). .

Pulkkinen, L. 2019, April 30. If Silicon Valley were a country, it would be among the richest on Earth. The Guardian.

Rome, A. 2003. "Give Earth a Chance": The Environmental Movement and the Sixties. Journal of American History 90:525–554.

Starr, J., C. Nicolson, M. Ash, E. M. Markowitz, and D. Moran. 2023. Income-based U.S. household carbon footprints (1990–2019) offer new insights on emissions inequality and climate finance. PLOS Climate 2:e0000190.

U.S. Census Bureau QuickFacts: Dublin city, California. (n.d.). . https://www.census.gov/quickfacts/fact/table/dublincitycalifornia/PST040222.

Yin, H., and N. Powers. 2010. Do state renewable portfolio standards promote in-state renewable generation?. Energy Policy 38:1140–1149.

Zou, C. (2020). New Energy. The section on revolutionary new energy technology may provide insights into the ecological benefits of transitioning from fossil fuels to renewable energy sources, such as solar, wind, and hydroelectric power, which have significantly lower environmental impacts.