Defining the Problem:

Currently, most states in the United States rely on non-renewable energy sources, which negatively impact the climate, due to the large stake in their economies. Although there is a shift toward renewable energy, frequently it doesn't create long-term jobs that can sustain and transition these economies. One exception is nuclear power, which shows promise though it is thought to be more dangerous than other sources of energy. This poses difficult questions: how do we shift away from a non-renewable energy-based economy towards a more sustainable energy economy while mitigating public fears around nuclear power? What are other alternatives which would help us meet our energy goals?

The US currently has 94 nuclear power reactors, generating 18.6% of all US electricity in 2023. Despite its historically bad reputation, a majority of Americans now support more nuclear power, with 56% of adults favoring it to generate electricity - especially due to their abilities to create hundreds of jobs[1]. With a newfound momentum growing, in every state two-thirds of energy policies introduced declare that nuclear energy will help replace fossil fuels[2].

Despite the new positive outlook, with difficulty in the technical and engineering aspects, building new nuclear reactors ranges from $3,000/kilowatt (kW) to $6,200/kW, which includes neither the long-term costs of planning and maintenance nor the cost of safeguarding nuclear waste, which the US has spent $500 million on for 100 plants in the past year. Nuclear waste will need to be safeguarded over the long term even after the material cannot produce any energy. Nuclear energy is also a long-term investment that cannot replace short-term non-renewable energy. Although individuals are researching and innovating modernized solutions and designs for more efficient nuclear plants, this process will not be completed in the short term. Additionally, uranium mining's unethical processes negatively impact indigenous peoples' health and exposure to cancerous materials and use of non-renewable fuel manufacturing.[3]

Politicians and states have faced rising concerns from both citizens and the energy industry about the feasibility of using nuclear energy. With concerns sourcing from events such as Chernobyl and Three Mile Island, 11 plants are now set to retire by 2025; and within the past 20 years, we have only successfully constructed one new reactor. Citizens are slowly coming around to the support of more plants, with a 25% increase in support from citizens who live near power plants; seeing firsthand the effects nuclear energy can provide.

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[1] Leppert, Rebecca. "Majority of Americans Support More Nuclear Power in the Country." *Pew Research Center*, Pew Research Center, 5 Aug. 2024, www.pewresearch.org/short-reads/2024/08/05/majority-of-americans-support-more-nuclear-power-in-the-country/.

[2] The Associated Press. "The U.S. Is Divided over Whether Nuclear Power Is Part of the Green Energy Future." *NPR*, NPR, 18 Jan. 2022, www.npr.org/2022/01/18/1073726137/the-us-is-divided-over-whether-nuclear-power-is-part-of-the-green-energy-future.

[3] Bowen, Matt, et al. "The Uncertain Costs of New Nuclear Reactors: What Study Estimates Reveal about the Potential for Nuclear in a Decarbonizing World." *Center on Global Energy Policy*, Columbia University SIPA , 7 Dec. 2023, www.energypolicy.columbia.edu/the-uncertain-costs-of-new-nuclear-reactors-what-study-estimates-reveal-about-the-potential-for-nuclear-in-a-decarbonizing-world/.

Government intervention in nuclear energy development as a part of the Green New Deal is crucial to address climate change, foster economic security, and promote energy independence. While it may have high upfront costs and long-term liabilities, it is a great opportunity for green energy in the United States.[4] As a result, we hope to provide a policy solution which outlines objectives for pursuing nuclear energy through taking steps to promote the green energy source throughout the nation. We strive to do so in this policy memo through developing a national energy policy prioritizing nuclear power, investing in development of technologies, offering incentives for new reactor construction, addressing public concerns, and developing a sustainable waste management strategy. In doing this, we believe that the government can create an environment for a strong and sustainable nuclear energy sector, contributing to a cleaner and greener future.

While nuclear energy is just one example of a possible renewable energy source for our nation, throughout this memo we will examine different policy alternatives which could be taken to help achieve the goals delineated in the Green New Deal.

[4] Duncan, Jeff. "U.S. Can and Should Dominate World's Nuclear Power Resurgence." *Congressman Jeff Duncan*, 12 Mar. 2024, jeffduncan.house.gov/media/in-the-news/us-can-and-should-dominate-worlds-nuclear-power-resurgence.

Policy Alternatives:

I. Letting Present Trends Continue

The status quo when it comes to energy policy is to let states—including Pennsylvania, West Virginia, and Texas—continue to rely on non-renewable energy sources. Renewable energy currently only accounts for 18% of U.S. energy consumption, and electric nuclear power makes up half of this.[5] Petroleum and natural gas make up 38% and 36% of U.S. energy consumption, respectively.[1] In particular, Texas consumes the most natural gas at 15.1% of the U.S. total, partially due to its large production capacity of oil drilling.[6] The non-renewable energy industry also provides economic benefits; in Texas, gas extraction and coal mining activities support 187,269 jobs.[7] Moving away from the status quo challenges the economic stability and access to energy that supports systems and households across the country.

II. Cap-and-Trade

Other policy recommendations include instituting a cap-and-trade tax in these states. Cap-and-trade limits carbon output in a certain industry or sector.[8] Under this system, a business or industry is granted a license for a certain amount of emissions that it can output. These businesses can then sell or trade their licenses to other companies. This total carbon allowance becomes gradually more restricted, eventually preventing new emitters from entering the market and achieving lower carbon emissions year after year. Cap-and-trade taxes do not exist at a federal level—though some states have joined a cap-and-trade compact.[9] Instituting a federal program would lessen carbon emissions, and could reduce the production of coal by 20% or petroleum refining by 12%.[10] The downside, however, is that prices for other goods, such as home utilities, are projected to increase by 11%.[6]

III. Carbon Neutral Infrastructure

One potential solution is for federal programs to focus on restructuring public infrastructure to decrease or omit carbon emissions that can bring economic and ecological benefits. Green infrastructure designs can alleviate the impacts of flooding, cooling systems, and congestion within densely populated areas. The usage of public transportation limits the per capita emission of CO2 by 45%[11], saving a total of 37 million metric tons of carbon dioxide in the United States. By incentivizing transit systems and designing cities to be less car-reliant, there will not only be reduced carbon emissions but also more efficient commute systems.

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[5] "U.S. Energy Facts Explained - Consumption and Production - U.S. Energy Information Administration (EIA)"

[6] "Frequently Asked Questions (FAQs) - U.S. Energy Information Administration (EIA)"

[7] Texas Comptroller Energy Tour. "Good for Texas - Energy." Texas.gov, 2023

[8] "How Cap and Trade Works." Environmental Defense Fund

[9] "Cap and Trade Basics." Center for Climate and Energy Solutions

[10] Goettle, Richard J, and Allen A Fawcett. "The Structural Effects of Cap and Trade Climate Policy." Energy Economics, vol. 31, 4 July 2009, pp. S244–S253.

[11] "5 Environmental Benefits of Sustainable Transportation." Transportation, 2021, transportation.ucla.edu

Additionally, urban implementations of vegetation, such as forest trees can provide a natural form of cooling that can reduce energy costs by 25%[12], while sequestering CO2 emissions and smog. Vegetation can also play a large role in lessening the impacts of floods, absorbing rainwater, and reducing surface flow [13]. Revamping public infrastructure can decrease unemployment, with green infrastructure projects creating jobs at a pace of 10% in the state of Pennsylvania alone. Jobs in green infrastructure provide work opportunities to all people, regardless of education level, who have reliable and sufficient wages.

III. Alternative Renewables

Of course, alternative sources of renewable energy to nuclear energy include, for example, solar power, an inexhaustible source. Solar panels convert sunlight into electricity which can be utilized directly. Solar gasification, a related technology, heats biomass with concentrated solar power to create a gas that is converted into gasoline and diesel fuel for transportation purposes[14]. Wind turbines, another form of renewable electricity generation, offer power through wind[15]. Similarly, underwater turbines turn water into hydropower at dams and the mouths of large bodies of water [11]. The burning of organic matter also creates bioenergy, which, despite emitting carbon dioxide, remains renewable as the organic matter used, including plants and timber, can be regrown[11].

Transitioning states are cautious about the cost and support for quotidian nuclear power integration, but governments can ease concerns via subsidies. Nuclear plants have high upfront but low operational costs over time, making subsidization essential to offset financial barriers[16]. By reducing the individual state's financial risks, private investors are encouraged to divest, making nuclear power a competitive energy compared to fossil fuels, which also receive subsidies. Today the government has committed 46%[17] of energy subsidies to renewable sources; now there is a need for a shift of importance to nuclear as there has been yet a significant quantity attributed to nuclear. One of the first steps in increasing nuclear usage can be accredited with the Zero-emissions Nuclear Power Production Credit (PTC), which provides a tax credit of up to $15 per MWh for nuclear plants, reducing the capital cost on investors[18].

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[12] Akbari, H. “Shade Trees Reduce Building Energy Use and CO2 Emissions from Power Plants.” Environmental Pollution, vol. 116, 1 Mar. 2002, pp. S119–S126

[13] “Economic Benefits of Green Infrastructure | US EPA.” US EPA, 17 July 2024,

[14] Banton, Caroline. “4 Clean Energy Alternatives to Uranium.” Investopedia, 2022,

[15] “What Are the Different Types of Renewable Energy? | National Grid Group.” Nationalgrid.com, 2020

[16] “Economic Aspects - World Nuclear Association.” World-Nuclear.org, 2016

[17] “U.S. Energy Information Administration - EIA - Independent Statistics and Analysis.” Eia.gov, 2024

[18] “Zero-Emission Nuclear Power Production Credit | Internal Revenue Service.” Irs.gov, 2024

Defining our Criteria:

1. **Efficacy:**

Efficacy is the measuring ability of policy implementation and achievement of the policy's goals. For the Green New Deal, efficacy would measure the ability to move non-renewable energy to nuclear power and the subsequent decrease in non-renewable energy emissions. Efficacy in moving towards nuclear power should also measure energy collection efficiency and the ability of new energy sources to sustain current energy levels. A policy's efficacy will dictate the possibility of reducing long-term climate impacts.

2. **Replicability:**

It is important to analyze the Green New Deal's replicability worldwide. Replicability is the difficulty of copying or reproducing effects. In this context, it applies to our policy being passed in other countries. The Green New Deal's replicability will measure the ability to attain low-carbon or carbon-zero emissions through the use of renewable energies and other clean energy technologies. These technologies and practices must be implemented and sustained similarly to ensure their positive impact on the environment.

3. **Equity:**

The Green New Deal seeks not only environmental justice but also economic and social equity amongst the working class. With the introduction of 100% clean energy, new infrastructure can help rid of unclear air and lead poisoning, which historically have impacted communities of color as a consequence of redlining practices[19]. Revitalizing green infrastructure also creates a more accessible environment for disabled citizens who make up 41% of public housing units[20]. The Green New Deal is designed to incorporate the needs of stakeholders while not elevating the social capital of an interest group to a point of wide economic or social disparity.

4. **Political Feasibility:**

Political feasibility is a metric that seeks to measure the likely outcome of a proposed policy by predicting how policymakers and the public will approve of it. A large change such as transitioning to renewable energy on a national scale, especially regarding nuclear power, would require high levels of support to be implemented. Thus, it is very important to measure and examine the political feasibility of the Green New Deal to determine pathways for these policies to work.

	Efficacy	Replicability	Equity	Political Feasibility

[19] Whitehead, LaToria S., and Sharunda D. Buchanan. "Childhood Lead Poisoning: A Perpetual Environmental Justice Issue?" Journal of Public Health Management and Practice, vol. 25, no. 1, Jan. 2019, pp. S115–S120,

[20] Ross, Tracey, et al. Creating Safe and Healthy Living Environments for Low-Income Families. 2016.

Status Quo				
Cap and Trade				
Carbon-neutral infrastructure				
Alternative Renewables				
Subsidies				

Examining our Alternatives with Criteria:

Status Quo

Projected Outcomes

- *Efficacy:* Letting present trends continue will allow U.S. carbon emissions to increase, particularly in oil-mining and high oil-consuming states like Texas. This alternative will not address the problem of climate change effectively, and it will not introduce any new changes.
- *Replicability:* Doing nothing to implement a Green New Deal is extremely replicable.
- *Equity:* The status quo of increasing carbon emissions disproportionately harms minorities and is not an equitable alternative. For example, Black Americans will encounter higher impacts of climate change, and Latine Americans have high rates of participation in industries that are particularly vulnerable to the effects of extreme temperatures.[21]
- *Political feasibility:* The status quo is already in place, so the political feasibility is 100%.

Cap and Trade

Projected Outcomes

- *Efficacy:* Cap-and-trade can be a cost-efficient and environmentally effective solution to limiting carbon emissions and reducing climate change.
- *Replicability:* They are not easily replicable since there isn't a set standard for the system. In poorer countries, there isn't a way to implement it without disproportionately affecting local industries. Oppositely, it is easier to implement in wealthier countries.[22]
- *Equity:* This program can increase wealth equity through revenue collected by the government eventually lowering tax burdens and increasing government revenue.
- *Political feasibility:* This system is much more politically feasible than compared to carbon taxes, as it is much more bipartisanly favored with serious discussion of implementing such a mechanism in 32 different countries from 1997-2011.[23]

Carbon-neutral infrastructure

Projected Outcomes

- *Efficacy:* Carbon-neutral infrastructure aims to mitigate greenhouse emissions produced in buildings and the long-term use of it.
- *Replicability:* This is replicable as any infrastructure being built can be done with a focus on clean energy and smart technology. However, carbon-neutral infrastructure may not be

[21]EPA, Environmental Protection Agency, "EPA report shows disproportionate impacts climate change socially vulnerable"

[22] Coiffard, Adrien; Deperrois, Rose; Sauquet, Alexandre; Subervie, Julie (2024) : Replication Study of "Coase and cap-and-trade" (Zaklan 2023), I4R Discussion Paper Series, No. 112, Institute for Replication (I4R), s.l.

[23] Chang, Alice H. (2014) "The Politics and Future of Carbon Cap-and-Trade: Lessons from the European Union," Claremont-UC Undergraduate Research Conference on the European Union: Vol. 2014, Article 7. DOI: 10.5642/urceu.201401.07

as viable and replicable in developing countries that cannot focus their infrastructure on climate change and may rather have to prioritize economic advantages.

- *Equity:* Carbon-neutral infrastructure is very equitable and creates community spaces and public goods that are environmentally friendly. Investing in infrastructure that mitigates pollution and decreases energy costs supports low-income individuals and communities that are disproportionately affected by climate change.
- *Political feasibility:* Few federal legislation focuses directly on investment as climate-focused legislation revolves around tax cuts and subsidies. Carbon-neutral public goods are not as easy to invest in on a federal level and each local government would have to implement its own investment.[24]

Alternative Renewables

Projected Outcomes

- *Efficacy*: Alternative renewable energy sources would be both economical and beneficial. A report from the International Renewable Energy Agency in 2022 found that renewable energy is the cheapest type of energy, with investing in this energy source saving the United States $55 billion in 2022 alone.[25] Nuclear energy is one of the cleanest sources of energy, and its use omits millions of tonnes of carbon in the atmosphere, saves space, and is long-lasting.[26]
- *Replicability*: Wide-scale implementation of nuclear power is difficult because of the costs - both the costs of uranium mines and nuclear power plants can cost billions of dollars.[27] It is also a lengthy process, taking up to 15 years to find suitable conditions.
- *Equity*: Efficient renewable energy can save cities money and reform the way we utilize commodities, such as transportation, agriculture, and electricity.
- *Political feasibility:* Lobbying from fossil fuel companies deters concrete action from occurring as political candidates advocate for different alternatives instead. Another barrier to implementation is climate change denialism which creates an obstacle as those who don't see it as a threat will be less likely to support candidates who advocate for green energy.

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[24] Costa, Kristina, and Kevin DeGood. "Reducing Carbon Pollution Through Infrastructure." Center for American Progress, 1 Oct. 2024

[25] United Nations. "Renewables: Cheapest Form of Power | United Nations." *United Nations*, www.un.org/en/climatechange/renewables-cheapest-form-power.

[26] Conca, James. "Is Nuclear Power A Renewable Or A Sustainable Energy Source?" Forbes, Forbes Magazine, 12 Oct. 2022,

[27] International Atomic Energy Agency (IAEA). "Official Web Site of the IAEA." International Atomic Energy Agency (IAEA), 11 Nov. 2024, www.iaea.org/. Accessed 20 Nov. 2024.

Tradeoffs and Matrix:

Status Quo: Allowing the status quo to continue is the most replicable and most politically feasible because no further action needs to be taken for this option. It is the least effective alternative, as the current non-renewable energy production in the United States releases a significant amount of greenhouse gasses and contributes to global warming. The status quo scored a 1.5 in equity; although climate change disproportionately affects minorities and women, continuing with present trends allows workers in the nonrenewable sector to keep their jobs and enjoy financial stability. We would not recommend letting present trends continue because of its very low scores in efficacy and equity.

Cap and Trade: By placing emission limitations into the market field, the likelihood of manipulation is most likely to occur. Companies are now able to offset emissions rather than invest in nuclear-specific infrastructure, ultimately undermining the broader goal of the Green New Deal. While it is true this system would create a financial incentive for low-carbon energy, factors such as market regulation and social accessibility are under scrutiny, as there is less concern about the means to switch to such a system and more about the end goals. Ultimately, a system of checks upon companies would be needed to ensure progression to fulfilling the Green New Deal through technological developments or new emissions reduction strategies.

Carbon Neutral Infrastructure: Restructuring infrastructure to omit carbon emissions as much carbon emissions as possible can be greatly beneficial in connecting communities and revitalizing marginalized areas in urban settings due to its focus on concise transportation and green architecture. Yet adopting a carbon-free model comes at the cost of greatly or completely overhauling pre-existing frameworks to fit carbon neutral standards. There are very few cities with metropolitan populations exceeding 1 million that can effectively maintain carbon neutrality, making mass replicability difficult. The transition process of carbon neutrality can also be met with public discontent over inconveniences that impede on daily living. A carbon neutral city would also meet pushback from interest groups who benefit from current emission standards, such as car corporations and big oil.

Alternative Renewables: Alternative renewables, especially nuclear energy, are highly effective and equitable as they offer a clean yet affordable way to obtain energy. However, actually implementing nuclear energy is very difficult in terms of replicability and political feasibility as nuclear power plants are highly expensive and time-consuming to build. Additionally, the power of the fossil fuels industry in the political sphere poses a challenge to obtaining political support for renewable energy. Overall, it is important to weigh these two trade offs against the benefits of renewable energy to determine the scale at which renewable energy can be implemented.

Recommendation:

With the impending crisis of climate change, it is imperative that the status quo does not continue due to its harmful effects, regardless of its ease and political feasibility. In an ideal world, we would recommend a combination of all of these policy alternatives with regards to the Green New Deal due to their abilities to address global warming in effective and equitable ways. However, when picking the singular most effective policy option we recommend implementing Cap and Trade programs due to its feasibility, efficacy, and replicability.

Criteria Table	Efficacy	Replicability	Equity	Political Feasibility	Total
Status Quo	1	5	1.5	4.5	12
Cap and Trade	4	3.5	3	3	13.5
Carbon-neutral infrastructure	3	2	5	2	12
Alternative Renewables	5	1	4	2	12

Conclusion:

In an ideal world, we would recommend a combination of all of these policy alternatives with regards to the Green New Deal due to their abilities to address global warming in effective and equitable ways. However, when picking the singular most effective policy option we recommend implementing Cap and Trade programs due to its feasibility, efficacy, and replicability.