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TASK FORCE

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Establishing the Department of Climate Change:
In Defense of a Consolidated Federal Climate Effort

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Establishing the Department of Climate Change: In Defense of a Consolidated Federal Climate Effort

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To Professor Scott L. Montgomery:

"Your students will forever cherish your patience, instruction, and commitment to the cause. Thank you for making this possible."

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Glossary

Biodiversity:

Biodiversity (biological diversity) is the variety of life on earth, encompassing genes to entire ecosystems, as well as the evolutionary, ecological, and cultural processes that sustain life.

Cabinet of the United States:

A group comprised of the secretaries of 15 Executive Departments with the role of advising the President on any subject he may require relating to the duties of each member's respective office.

Carbon Sink:

A natural environment capable of absorbing carbon dioxide from the atmosphere.

Carbon Tax:

A fee imposed on the burning of carbon-based fuels (coal, oil, gas).

Capacity Factor (CF):

The maximum energy output possible that can be achieved by an energy generator or fuel source.

Carbon Capture and Storage (CCS):

The process of capturing waste carbon dioxide from large point sources, such as biomass or fossil fuel power plants, transporting it to a storage site, and depositing it where it will not enter the atmosphere, normally an underground geological formation.

Carbon Pricing:

An instrument that captures the external costs of greenhouse gas (GHG) emissions and ties them to their sources through a price, usually in the form of a price on the carbon dioxide (CO₂) emitted.

Clean Air Act (CAA):

A federal law that regulates air emissions from stationary and mobile sources. The Act was passed in 1963, but important and major amendments were added to the original Act in 1970 and 1990.

Clean Power Plan (CPP):

Enacted policy by the Obama Administration in 2014, aimed to combat anthropogenic climate change by lowering the carbon dioxide emitted by power generators.

Clean Water Act (CWA):

The Clean Water Act is a U.S. federal law that regulates the discharge of pollutants into the nation's surface waters, including lakes, rivers, streams, wetlands, and coastal areas. Passed in 1972 and amended in 1977 and 1987.

Climate Adaption:

Adequately preparing for climate-change related effects such as floods and excess rainfall through changes in infrastructure, business practices, and culture.

Climate Resilience:

The capacity of a community to recover from climate related natural disasters or changes.

Common But Differentiated Responsibilities and Respective Capabilities (CBDRRC)

A principle within the United Nations Framework Convention on Climate Change that acknowledges the different capabilities and differing responsibilities of individual countries in addressing climate change.

Conference of Parties (COP):

The governing body of the United Nations Framework Convention on Climate Change. States that are Party to the Convention are represented at the COP and review the national communications and emission inventories submitted by Parties.

Department of Energy (DOE):

A cabinet-level department of the United States government founded in 1977 under the Carter administration. Its mission is to ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions.

Department of Environmental Protection Affairs Act of 2001 (S.159):

A bill during the 107th Congress of the United States intended to elevate the EPA to a cabinet level department, entitled the Department of Environmental Protection Affairs.

Electrical Grid (Grid):

The electrical grid is the electrical power system network that connects generating plants, transmission lines, substations, transformers, and distribution lines with the consumer.

Energy Efficiency Resource Standards (EERS):

Establishes specific, long-term targets for energy savings that utilities or non-utility program administrators must meet through customer energy efficiency programs.

Energy Independence:

The idea of becoming completely independent from foreign petroleum imports by boosting domestic production.

Energy Policy and Conservation Act (EPCA):

This 1975 law created a comprehensive approach to federal energy policy after the 1973 oil crisis. One major component of the law banned most crude oil exports, a provision repealed by the Obama administration in 2015.

Energy Star:

The government backed symbol for energy efficiency. It provides simple, credible, and unbiased information that makes it easy for consumers and businesses to buy products that save them money and protect the environment.

Environmental Protection Agency (EPA):

An independent agency of the United States federal government for environmental protection. It was established by the president Richard Nixon on July 9, 1970. Its mission is to protect human health and the environment.

Extreme Weather:

Extreme Weather is a meteorological event that falls outside the realm of normal patterns in the Earth's atmosphere.

Federal Emergency Management Agency (FEMA):

The Federal Management Agency is an Agency of the United States of Homeland Security which oversees disaster preparedness and relief.

Fossil Fuels:

Fossil fuels, or mineral fuels, are hydrocarbons, primarily coal, fuel oil or natural gas, formed from the remains of dead plants and animals or hydrocarbon-containing natural resources. The burning of fossil fuels by humans is the largest source of emissions of carbon dioxide.

Global Climate Change Initiative (GCCCI):

A series of foreign climate assistance programs under Obama Administration in developing countries. GCCCI aims to promote sustainable and climate-resilient societies, foster low-carbon economic growth, and reduce greenhouse gas emissions from deforestation and land degradation.

Government Accountability Office (GAO):

A legislative branch agency that investigates, monitors, and audits the federal government to evaluate its efficiency regarding the use of taxpayer dollars.

Greenhouse Gas Emissions (GHG):

A gas that absorbs and emits radiant energy within the thermal infrared range, causing greenhouse effects on the planet.

Grid Reliability:

Reliability is the ability of a power system to deliver electricity in the quantity and with the quality demanded by users.

Grid Resilience:

Resilience is the ability of a power system to reduce the magnitude and/or duration of disruptive events. The effectiveness of a resilient grid system depends upon its ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event.

Intergovernmental Panel on Climate Change (IPCC):

An intergovernmental body of the United Nations assigned with providing an objective and scientific view of climate change and its impacts to the world.

Market Based Policies (MBI):

Policy instruments that use markets, price, and other economic variables to provide incentives for polluters to reduce or eliminate negative environmental externalities.

Massachusetts v. Environmental Protection Agency:

The 2007 Supreme Court decision that found that carbon dioxide and other greenhouse gasses are air pollutants under the Clean Air Act, and thus can be regulated by the Environmental Protection Agency.

National Climate Assessment (NCA):

A report summarizing the effects of climate change on the US created by the US Global Change Research Program, a US government interagency.

National Disaster Recovery Framework (NDRF):

The NDRF is the interagency operational plan led by FEMA which enables effective recovery support to disaster-impacted states, tribes, territorial and local jurisdiction.

National Oceanic and Atmospheric Administration (NOAA):

Under the Department of Commerce, NOAA focuses on the conditions of the oceans, major waterways, and the atmosphere.

National Science Fund (NSF):

An independent federal agency created by congress in 1950 to promote the progress and basic research of science, advance the national health, prosperity and welfare, and to secure national defence to drive the US economy, enhance national security, and advance knowledge to sustain global leadership.

Representative Concentration Pathway (RCP):

RCPs are tools used by the Intergovernmental Panel on Climate Change that predicts GHG concentration trajectories based on emission scenarios. The scenarios are used to advise policy decisions.

Sequestration:

Describes the long-term storage of carbon dioxide or other forms of carbon to mitigate the effects of global warming.

Stabilization Triangle:

The 175 billion tons of carbon that needs to be prevented from entering the atmosphere by 2054. The “Stabilization Triangle” consists of 7 smaller “wedges” that each represent at least 1 billion tons of carbon to be cut per year.

Stakeholder:

A group or body which has economic and/or social ties to local, state, or federal interests such as a city, town, state, or business.

United Nations Framework Convention on Climate Change (UNFCC):

The first international environmental treaty that addresses climate change, adopted by 197 countries across the globe in 1994. It aims to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

U.S. Department of Education:

A cabinet-level department of the United States government founded in 1980 to establish policy for, administer, and coordinate most federal assistance to education, collect data on US schools, and to enforce federal educational laws regarding privacy and civil rights.

U.S. Department of Energy (DOE):

A cabinet-level department of the United States government founded in 1977 under the Carter Administration. Its mission is to ensure America’s security and prosperity by addressing its energy, environmental, and nuclear challenges through transformative science and technology solutions.

U.S. Department of Health and Human Services (HHS):

HHS is the U.S. Government’s principal agency for protecting the health of all Americans and providing essential human services, especially for those who are least able to help themselves.

U.S. Department of the Interior (DOI):

A federal executive department of the U.S. government, responsible for the management and conservation of most federal lands and natural resources, and the administration of programs

relating to Native Americans, Alaska Natives, Native Hawaiians, territorial affairs, and insular areas of the United States.

U.S. Global Change Research Program (USGCRP):

A federal program within the Executive Office of the President that coordinates federal research and investments regarding the global environment and climate change through promoting the collaboration and cooperation of its 13 member agencies.

Zero-Emission Credits:

Monetary incentives that are funded by the government in order to compensate consumers for decreased carbon emissions.

Executive Summary

Claire Bacon

Climate change is the defining crisis of the Anthropocene, and the threat it poses cannot be overstated. The impacts of climate change, both direct and as a result of its capacity for threat amplification, will be felt across all facets of human and non-human life. At stake are hundreds of millions of lives, international political stability, the health and viability of the economy, and the future habitability of this planet.

The extent and severity of the climate crisis necessitates a sea change in the priorities and conduct of the government, the private sector, and the public. Current government efforts are disjointed and limited in their authority, enforcement capability, and influence. Private sector attempts at technological redemption will ultimately be insufficient to enact the comprehensive changes necessary to limit the magnitude of climate change and adapt to its impacts. Establishing a concerted and immediate federal effort is therefore imperative to achieving significant, long-term emissions reduction and strengthening climate resilience globally.

The title of this Task force, *Establishing the Department of Climate Change: In Defense of a Consolidated Federal Climate Effort*, makes the purpose of our capstone project evident. This Task Force argues that the most effective way to counter the climate threat would be with the creation of a Cabinet-level department on Climate Change, and lays out a broad proposal for its formation.

We have divided our report into six major sections in service of this goal. The first section demonstrates the extent of the threats posed by climate change across a variety of sectors. The second assesses current U.S. government efforts to address climate change, both on the domestic and international level. The third section contends that a Cabinet-level department is the organizational level necessary to achieve the requisite federal climate response. The fourth section outlines the functions and authority of the new department. The fifth section responds to some of the major possible objections and barriers to the creation of the new department. Finally, the sixth section projects some of the positive impacts of establishing the Department of Climate Change and its associated policies.

The Mission Statement of the proposed Department of Climate Change is as follows:

The Department of Climate Change (DCC) will identify, monitor, and seek to address all significant current and future threats to the United States stemming from the impacts of climate change. The DCC will work with other federal entities, local governments, companies, and communities to ensure the long-term vitality of the nation in the key areas of U.S. national security, economic prosperity, and public well-being. This will be achieved through the pursuit of 8 (eight) core missions:

1. Identify, closely monitor, and inventory impacts of climate change on U.S. states and territories.
2. Conduct and fund research that furthers knowledge of climate change and its effects, making this knowledge accessible internationally.
3. Streamline climate change operations and facilitate greater intergovernmental cooperation on climate related programs. Support the U.S. foreign policy agenda in environmental negotiations through consultation with the Secretary of State.
4. Strengthen options to reduce greenhouse gas emissions, including public-private partnerships with the industrial, corporate, and commercial sectors.
5. Advance methods that help cities, towns, military installations, and other communities prepare for and adapt to climate impacts.
6. Establish minimum national standards for new infrastructure and buildings that are better able to resist or withstand climate impacts.
7. Create and administer effective regulations that support the above missions without imposing an undue burden on industry.
8. Advance public understanding of climate change and DCC efforts by producing regular communications available to citizens, media personnel, schools, and academic institutions.

The climate crisis poses an unprecedented threat to humanity, and incremental change is no longer enough to prevent or mitigate the devastating effects of a changing climate. Establishing a Cabinet-level department of climate change will allow the U.S. government to exact the rapid and transformational action that this threat demands.

Thank you for taking the time to read this report. We hope you carefully consider and evaluate our position and reasoning for establishing the Department of Climate Change.

Climate Change: Areas of Threat

Abigail Shaw, Ireland Scheer

Climate change is a clear and present crisis for the United States, and its significance is much more extensive than deterioration of the environment. The threats it poses will impact national security, the economy, and public well-being— all areas of major responsibility for the federal government. Each year the effects of climate change are weakening critical infrastructure, compromising key military bases, costing the nation billions of dollars, and causing disease, death, and impoverishment among American citizens. Were any of these effects attributed to a foreign power, they would be met with drastic action. Combined, they would merit a declaration of war. The United States has historically reacted to major threats with strength and resilience, and the climate crisis is no different. While the country cannot declare war on nature, it can, in a sense, declare war on climate change by pursuing solutions to the climate issue. The decisions the U.S. makes as a nation must be better informed in order to mitigate the further exacerbation of climate threats and to combat their impact on our collective future.

Responsibility for the Mitigation of Climate-Induced Threats

When addressing the threats associated with climate change, it is clear that there are two major players with strong mitigation potential. Both the private sector and the government have the ability and the motivation to address the problem of climate change. Businesses are being pressured by investors, consumers and employees who demand greater accountability and higher green standards (Polman 2019). The government is being faced with the looming reality of the high material and political costs of ignoring climate change. Mitigating threats posed by the climate crisis will require the work of both corporations and legislators. Some of the largest obstacles to pursuing more comprehensive standards for carbon reduction can be solved from within the private sector. For example, the development of new technologies that lower production costs for environmentally-friendly products or allow the use of renewable energy in production to be more cost-effective. However, it is imperative that the government also create mitigation policies that regulate the private sector evenly and ensure they are working in the nation's best interest. A move towards more sustainable corporate practice would be faster, easier, and more impactful with government support. In order to stimulate mobilization against climate change by the private sector, the government must give additional incentives to environmentally-responsible companies, eliminate subsidies for industries that are substantially worsening climate change, and enact policies that ensure the market is regulated to create a fair system for environmentally-friendly competition and innovation to thrive. Paul Polman, CEO of Unilever, calls on governments to implement "clear emissions targets... as well as credible plans to meet them. Ending fossil fuel subsidies — still around \$400 billion a year — and implementing effective carbon-pricing are key" (Polman 2019). It is easy to assume that the private sector can unilaterally solve the climate crisis with technology and innovation, but the role of the government in addressing climate change and growing climate threats through concerted legislative action is of equal, if not greater, importance.

Chapter 1

Climate Change: Areas of Threat

National Security

Abigail Shaw

“Critical infrastructure describes the physical and cyber systems and assets that are so vital to the United States that their incapacity or destruction would have a debilitating impact on our physical or economic security or public health or safety. The nation's critical infrastructure provides the essential services that underpin American society.” (DHS)

Background

It is no secret that national security and defense are highly prioritized sectors for the United States. Their importance to the country is demonstrated not only by their significant funding but also through deliberate military action. In 2019, defense spending accounted for 21% of total government spending in the United States and accounted for over half of discretionary spending at \$997.9 billion (Chantrill 2020). The annual budget of the Department of Defense for 2020 alone is \$718.3 billion (DOD Releases Fiscal Year 2019). If a sector's funding is indicative of its importance, it is clear that the United States places considerable value on national defense and security. Moreover, not only is considerable funding appropriated for defense and security purposes, but two Cabinet-level departments exist to service this mission: the Department of Defense and the Department of Homeland Security. However, as successful as these departments are in protecting the U.S. from a myriad of threats, they do not address the threats to national security posed by climate change. While it may not be an outright attack on U.S. soil, climate change threatens U.S. defense and security more comprehensively than any of our previous adversaries. Yet, as demonstrated by the General Accountability Office (GAO) Report in 2019, it is not a current national priority (High Risk Series 2019).¹ The risks that climate change poses to national security are outstanding and worthy of combatting.

Climate Change Effects Overview

The most relevant effects that climate change poses to national security can be attributed to warmer temperatures, which increase the intensity of floods, fires, and storms. The 2020 report on climate change from NASA and NOAA demonstrates the recent trend of increasing temperatures in

¹ The GAO High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk

Areas of 2019 reports that substantial efforts by the executive branch are needed in order to make progress in high risk areas such as climate change. The report states that adaptation efforts currently do not approach the scale that is necessary to avoid substantial damage to the U.S. economy, environment, and human health in the coming decades. The GAO advocates for government-wide action to improve resilience and reduce federal fiscal exposure in the face of these threats posed by climate change.

comparison to a common baseline of temperature averages between 1951 and 1980. According to the report, 2019 was 1.9 degrees Fahrenheit warmer than the 1951 to 1980 mean, making it the second warmest year since modern record keeping began in 1880 (Fig. 1.1) (NASA, NOAA Analyses 2020). In addition to the more direct issues caused by higher temperatures, warmer weather also increases water evaporation and retention in the atmosphere, which leads to heavier rainfall, flooding, and more intense storm surge. Additionally, increased temperatures result in rain, as opposed to snow, in the winter months. This increase in rainfall causes flooding as well as a rise in ocean levels, thus heightening the effects of coastal storms. Moreover, there is an increased risk of fire during dry periods of the year, as heavy rainfall during the wet season augments plant growth which in turn acts as kindling during the dry season (Global Warming 2019).

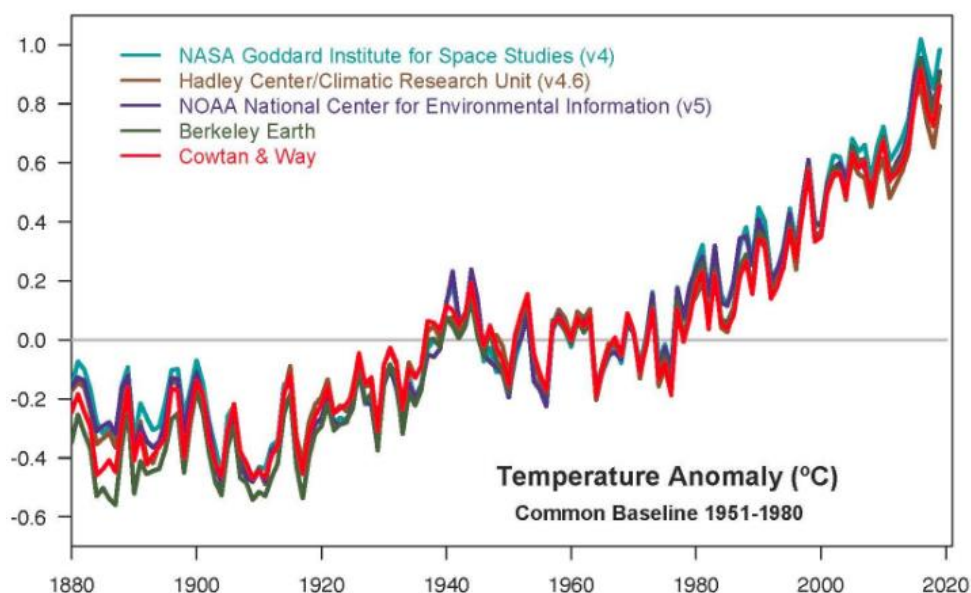


Fig. 1.1 Temperature Anomaly 1880-2019. "NASA, NOAA Analyses Reveal 2019 Second Warmest Year on Record," NASA, 2020, <https://climate.nasa.gov/news/2945/nasa-noaa-analyses-reveal-2019-second-warmest-year-on-record/>

Military Infrastructure and Operations

One of the most immediate manners in which climate change affects U.S. national security is through the damage it causes to military infrastructure and operations. Not only does extreme weather restrict the training of military personnel, it also causes substantial and costly damage to training facilities and mission routes within and outside of the U.S.

Increased temperatures have led to more frequent heat-related suspensions of training. In 2018, roughly 2,800 U.S. troops suffered from heat related illnesses, which was 50% higher than just 5 years previous. The problem is especially felt in bases such as those located in Arizona and Florida where the heat index surpasses 100 degrees Fahrenheit for more than one month out of the year. North Carolina, Kentucky, and New Orleans are also at risk. This not only compromises troop health, but also

mission readiness. As temperatures continue to rise, summers become increasingly difficult to work around (Myers 2019). The military status of the United States is in part portrayed by the breadth of its defense operations. With 800 military bases abroad, the global climate also has a significant influence on U.S. military performance (Vine 2015).

Moreover, the Department of Defense has stated that the institution's "operational readiness hinges on continued access to land, air, and sea training and test space" (Climate Change and U.S. Military Bases). However, these spaces are currently threatened by fluctuations in the climate in and outside of the United States. A survey done in 2018 by the Department of Defense found that around 50% of military facilities in the U.S. reported at least one impact of climate change on their assets, with airfield operations being the most commonly affected asset category (Melton 2018). As warmer temperatures cause flooding and more substantial storm surge from hurricanes, operations are disrupted and military infrastructure and mission critical transport routes are subject to costly water and erosion damage.

One example of this is the Tyndall and Offutt Air Force Bases, which were announced by the U.S. Air Force to have incurred \$5 billion worth of repairs following recent extreme weather events. Officials say that these bases were completely unprepared for the severe impacts of October's Hurricane Michael and floods that occurred in the Midwest in 2018— events which were exacerbated by climate change (Taft 2019). Unusually warm waters garnered strength for Hurricane Michael while heavier late winter storms and warm weather water retention caused flooding in the Midwest. The unpreparedness of these bases is a flaw shared by multiple bases around the country and is indicative of the need for a Cabinet-level department of climate change.

Political Instability

United States national security is greatly dependent on not only U.S. stability but on global stability as well. Climate change threatens regional security both by rendering certain areas uninhabitable and by reducing natural resource availability, creating opportunities for conflict. As environmental conditions worsen, competition over land and resources becomes more pressing, and the displacement of people and consequent overcrowding becomes more widespread, resilience in the face of even routine hardships will become more difficult.

"Security planners in the DoD, Intelligence community, and around the world call climate change an 'accelerant of instability'." (Climate Change and U.S. Military Bases)

Threats to natural resources and the heightening intensity of extreme weather weaken states. These conditions reduce the availability of food and water and create unfavorable living conditions, thus displacing populations in newly uninhabitable areas. Weak states have often proven to be breeding grounds for terrorist networks and organizations (Holland 2019). Afghanistan in 2001 and Syria today are both examples of this effect. Extreme weather patterns and consequential disasters "can damage

economies, lower farming and livestock production and intensify inequality among social groups” which, in turn, creates conflict that can lead to violence (Ryan 2019). One major contributor to the Syrian conflict in the Middle East was the period of extreme drought experienced by the country. This drought lasted years and contributed to agricultural failures, economic dislocations, and population displacement (Sellers et. al. 2019; Gleick 2014). The ongoing situation in the Middle East has proven that these issues are not contained to their areas of origin. The U.S. is inexorably affected by the violence and displacement caused by climate change across the globe.

Transportation Infrastructure

Transportation systems are not only vital to the function of everyday life in the United States but are also crucial to the security of the country, the uninterrupted flow of resources and people, disaster response, and the ability to deploy troops. Typically, most transportation infrastructure in the process of construction today is expected to last for at least 50 years or more. Thus, it is imperative to understand how climate change will affect infrastructure, especially in the coming decades, in order to ensure that U.S. infrastructure will withstand future challenges (Climate Impacts on Transportation 2016).

Extreme heat due to climate change can limit construction activities by creating unsuitable working conditions. Additionally, increased temperatures cause the softening and expansion of pavement, leading to weakened roads with ruts and potholes. This also places stress on bridge joints. Not only do these effects decrease safety, they make it more costly to maintain roads and highways (Climate Impacts on Transportation 2016). While warmer winters may decrease cold weather damage and maintenance, the effects that heavier rainfall incurs are much more detrimental than present levels of snowfall. Especially in Alaskan regions which rely on ice roads and permafrost support, increased heat is a substantial threat to infrastructure integrity. Increased rainfall and intense storms that accompany higher temperatures create flooding which disrupts traffic, delays construction, and washes out roadways, railways, airstrips, tunnels, and bridge supports (Climate Impacts on Transportation 2016). Many of these roadways double as evacuation routes, making this damage even more dangerous to the American public who could lose their ability to evacuate in an emergency. It is critical that transportation systems allow disaster response and recovery efforts to reach their destinations, especially as the risk of environmental disaster is heightened (National Security 2017). Increased intensity of storms and extreme heat affect aircraft performance, therefore obstructing both commercial and cargo air travel (Climate Impacts on Transportation 2016). This will have a devastating effect on the flow of goods and people, both of which are crucial to national security and public safety (National Security 2017). Competition and internal conflict are magnified when resources are unable to reach their expected locations. The ability to deploy troops will become increasingly difficult with a lack of strong transportation infrastructure in the U.S. and around the globe, putting security at further risk (National Security 2017). If the U.S. wants to protect its assets around the world, it will need to prevent further damage to the infrastructure that allows it to maintain its global presence.

Energy and Communication

“The U.S. military is the single largest user of the electrical grid, and the grid’s resilience [is] critical to national security. The military depends on electricity to power electronics critical to military readiness and disaster response.” (Cropper 2020)

The integrity of U.S. energy related critical infrastructure is extremely significant to the function of U.S. national security. The climate crisis will cause extensive damage to these systems, particularly by compromising military technology, security systems, and grid access. Between 2003 and 2014, weather-related power outages in the U.S. doubled and comprised 80% of all outages between 2003-2012. Weather conditions addressed in this data set include storms and severe weather, hurricanes and tropical storms, and heat events and wildfires (Kenward and Raja 2014). If the grid is down, bases rely on backup power sources that are only equipped to last for a few days (Cropper 2020). Just as extreme weather damages infrastructure, it also damages the systems that power the country and its defense programs. U.S. systems are especially vulnerable as a large portion of energy infrastructure is located in coastal areas. This means that rising sea levels and increased storm surges will affect them first (Climate Impacts on Energy 2016). Systems at risk include fuel ports, electricity lines, oil refineries, and pipeline energy sources. Even solar and wind installations that are connected to the grid will not work during an outage. This leaves the U.S. with limited options to power security and defense technology.

Conclusion

The Department of Defense, the National Intelligence Council, and the National Security Council have all identified climate change as an important and immediate national security threat. U.S. allies, including France, Japan, South Korea, and many others have also identified climate change as a direct threat to their national security. In order to maintain and improve its security and defense capability status in the world, the United States needs to start taking significant steps towards combating climate-related impacts on both domestic and international U.S. assets. Efforts to strengthen national security will be futile if climate change continues to create roadblocks to effective defense efforts. Strategies for preventing the negative effects of climate change are needed now to preserve national security in the future. It is crucial for the U.S. to know when, where, and how to adjust to climate threats, and to respond accordingly. Taking national security seriously means responding to the climate crisis in suit.

References

- Chantrill, Christopher. "Federal Budget." *U.S. Government Spending*, 2020. https://www.usgovernmentspending.com/federal_budget_estimated.
- "Climate Change and U.S. Military Bases." *American Security Project*, n.d. <https://www.americansecurityproject.org/climate-energy-and-security/climate-change/climate-change-and-u-s-military-basing/>.
- U.S. Environmental Protection Agency. "Climate Impacts on Transportation." 2016. https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-transportation_.html.
- U.S. Environmental Protection Agency. "Climate Impacts on Energy." 2016. https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-energy_.html.
- U.S. Department of Homeland Security. "Critical Infrastructure Security." n.d. <https://www.dhs.gov/topic/critical-infrastructure-security>.
- Cropper, Nicholas. "Climate Change Threatens the Power Grid. Can It Take the Heat?" *American Security Project*, 2020. https://www.americansecurityproject.org/climate-change-threatens-the-power-grid-can-it-take-the-heat/?utm_source=General+Interest&utm_campaign=b030152ba0-EMAIL_CAMPAIGN_2020_02_26_04_16&utm_medium=email&utm_term=0_d4ef008de8-b030152ba0-242968729&mc_cid=b030152ba0&mc_eid=e7460292db.
- U.S. Department of Defense. "DOD Releases Fiscal Year 2020 Budget Proposal." 2019. <https://www.defense.gov/Newsroom/Releases/Release/Article/1782623/dod-releases-fiscal-year-2020-budget-proposal/>.
- Gleick, Peter H. "Water, Drought, Climate Change, and Conflict in Syria." *Weather, Climate, and Society* 6, no. 3. 2014. <https://doi.org/10.1175/wcas-d-13-00059.1>.
- "Global warming is contributing to extreme weather events," *The National Academies of Science Engineering Medicine*, 2019. <https://sites.nationalacademies.org/BasedOnScience/climate-change-global-warming-is-contributing-to-extreme-weather-events/index.htm>.
- U.S. Government Accountability Office. *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas*. 2019. <https://www.gao.gov/products/GAO-19-157sp>.

- Holland, Andrew. "Climate change, Paris, the rise of ISIS, and What "Causes" Terrorism." *American Security Project*, 2015. <https://www.americansecurityproject.org/climate-change-paris-the-rise-of-isis-and-what-causes-terrorism/>.
- Kenward, Alyson and Raja, Urooj. "Blackout: Extreme Weather, Climate Change and Power Outages." *Climate Central*, 2014. <https://assets.climatecentral.org/pdfs/PowerOutages.pdf>.
- Melton, Michelle. "Climate Change and National Security, Part I: What is the Threat, When's It Coming, and How Bad Will It Be?" *Lawfare*, 2018. <https://www.lawfareblog.com/climate-change-and-national-security-part-i-what-threat-whens-it-coming-and-how-bad-will-it-be>.
- Myers, Meghann. "How rising temps could cause even more heat casualties at military bases," *Military Times*, 2019. <https://www.militarytimes.com/news/your-military/2019/11/12/how-rising-temps-could-cause-even-more-heat-casualties-at-military-bases/>.
- U.S. National Oceanographic and Atmospheric Administration. *NASA, NOAA Analyses Reveal 2019 Second Warmest Year on Record*. 2020. <https://climate.nasa.gov/news/2945/nasa-noaa-analyses-reveal-2019-second-warmest-year-on-record/>.
- U.S. Department of Transportation. *National Security*. 2017. <https://open.spotify.com/track/6jXrIEipTpnPbvbRi56iJV?si=LEtIF2IGQvWqnRbQQBjOmg>.
- "Nuclear power plants in U.S. vulnerable to power outages, study shows," *Patriot News*, 2019 https://www.pennlive.com/midstate/2011/03/nuclear_power_plants_in_us_vul.html.
- Ryan, Devon. "Stanford-led study investigates how much climate change affects the risk of armed conflict." *Stanford News*, 2019. <https://news.stanford.edu/2019/06/12/climate-change-cause-armed-conflict/>.
- Sellers, Samuel et al. "Climate Change, Human Health, and Social Stability: Addressing Interlinkages." *Environmental Health Perspectives*, 2019. <https://ehp.niehs.nih.gov/doi/10.1289/EHP4534>.
- Taft, Molly. "U.S. Air Force bases caught off guard by climate change." *Think Progress*, 2019. <https://thinkprogress.org/climate-change-is-costing-the-air-force-billions-6059ea179316/>.
- "The Cabinet." *The White House*. <https://obamawhitehouse.archives.gov/administration/cabinet>.

Vine, David. "Where in the World Is the U.S. Military?" *Politico*, 2015.

<https://www.politico.com/magazine/story/2015/06/us-military-bases-around-the-world-119321>.

Chapter 2

Climate Change: Areas of Threat

The U.S. Economy

Abigail Shaw, Ireland Scheer

“Climate disasters have cost North America \$415 billion in the last three years, much of that due to wildfires and hurricanes.” (Columbia University 2019)

Background

The extreme weather events caused by climate change create extensive damage every year, costing the United States billions of dollars. This is damage for which the federal government and taxpayers are financially responsible. For instance, in 2012, Hurricane Sandy incurred an estimated \$65 billion in damages in New York, New Jersey, and Connecticut. Much of this damage was related to intensified coastal flooding due to climate-augmented storm surge (Hurricanes and Climate Change). Federal reports are predicting climate-related economic damage in the U.S. could equal 10% of the nation’s GDP by the end of the century (World Economic Forum 2020). Increased temperatures and storm intensity brought on by climate change directly contribute to the deterioration of transportation, energy, and residential and commercial infrastructures. These effects are only the beginning of the economic costs that climate change has on the United States, as climate-related disruption to vital economic sectors also results in major financial losses.

General Infrastructure

As touched on in the National Security chapter, climate change will have vast repercussions for infrastructure throughout the U.S. Extensive and long-term infrastructural damage will be expensive to repair and will have additional implications for other sectors. In the National Security chapter, we established the main reasoning behind the need for strong and sustainable infrastructure. Damage to it cannot be ignored, and of course it falls to the government to repair it when damage is incurred.

Heat damage to roads and bridges leads to the need for repair more frequently (Climate Impacts on Transportation 2016). As a result, any economic sectors that rely on ground transportation are debilitated. Furthermore, the inability of repair crews to work outside or use their equipment due to heat and their equipment threatens jobs within the construction sector and incurs equipment damage costs. Damages caused by increased rainfall, storms, storm surge, sea level rise, and flooding will be costly fixes for the United States government. It is estimated that sea level rise alone will cause the loss of asset value accumulating to between \$2 trillion and \$5 trillion in the U.S. by the end of the century. Housing, airports, docks and ports, coastal railway lines, and major coastal highways are all at risk domestically, as well as globally (Cho 2019). The costs incurred by communication system damage is just as high. Data centers, traffic exchanges, termination points, and over 4,000 miles of fiber optic cable are all at risk from sea level rise. NOAA predicts that this water damage vulnerable cable could be

underwater by 2033 due to its proximity to coastlines. Hubs like New York, Miami, and Seattle and providers such as CenturyLink and AT&T are most at risk (Cho 2019).

Jobs and the Financial Market

Another side effect of climate change is employment loss across all sectors. Extreme weather in the U.S. and abroad contributes to factory damage, supply chain disruption, and transport obstruction. Furthermore, the economy will shift in response to alterations in supply and demand. For example, more intense droughts decrease water supply which in turn makes water more expensive. Thus, the processing of raw materials, which often requires large amounts of water, will consequently become more costly (Cho 2019). As sea level rise continues, communications infrastructure will be threatened. With the interconnection between major hubs at risk, companies who rely on communications cables for their markets will suffer substantial economic impacts. Disabled communication networks will impact the fundamental ability of firms to remain operational, crippling U.S. businesses.

The investment sector is encountering new risks as a result of climate change. Large amounts of money have been funneled into industries that will be diminished due to the climate crisis, such as the fossil fuel industry. Property investments will be threatened by natural disasters and insurance companies will not be able to handle the enormous number of claims derived from the destruction of property. The stock market will be compromised as foundational aspects of our society are rocked by biodiversity loss, extreme weather events, mass migrations, and political instability.

Agriculture

Agriculture is perhaps the most vulnerable economic sector to climate change. Threats to agricultural production already have the potential to devastate the U.S. economy. Agricultural jobs are also at stake. As of 2017, 11% of total U.S. employment was comprised of jobs related to agricultural and food sectors and direct on-farm employment accounted for about 1.3% of U.S. employment (Ag and Food Sectors and the Economy 2019). These are just the raw materials of an industry that relies largely on manufacturing. In 2016, “the U.S. food and beverage manufacturing sector employed more than 1.5 million people, or just over 1% of all U.S. non-farm employment” (Ag and Food Sectors and the Economy 2019). The industry creates significant revenue for the U.S. In 2017, agriculture, food, and related industries contributed \$1.053 trillion to U.S. gross domestic product, or 5.4% of overall GDP (Ag and Food Sectors and the Economy 2019). Intense storms cause costly damage to fencing, barns, greenhouses, and other agricultural structures. Additionally, not only does agriculture produce essential resources for the U.S. population, the loss of crops and livestock greatly affects U.S. economic prosperity.

It is not only the coastal regions that are at risk, as agricultural centers of the United States will face the effects of the climate crisis as well. In 2019, increased rainfall and snowmelt caused historic flooding in the Midwest, an area which comprises a huge portion of U.S. agricultural production. Nebraska alone lost \$440 million worth of cattle in the flooding, and Iowa suffered at least \$1.6 billion in losses (Agriculture in the Midwest 2017). This area contains over 127 million acres of agricultural land—which comprises about 12% of all U.S. agricultural land (Agriculture in the Midwest 2017). States in this

region are home to both livestock and crops including corn, soybean, vegetables, fruits, tree nuts, berries, and nursery/greenhouse plants. Increased climate variability is affecting even inland areas where imperative pillars of the US agricultural economy will face the consequences. Moreover, high temperatures will also decrease crop yield especially for commodity crops, due to their sensitivity to these conditions. Simultaneously, livestock are more likely to experience heat stress, leading to less dairy production, and are more susceptible to diseases that warm temperatures proliferate. Increased temperatures also lead to more extreme drought as well as wildfires devastating crops and livestock alike. It is significant to note the weight of US industry's heavy reliance on raw material provided by the agricultural sector to contribute added value to the economy—such as tobacco products, textiles, apparel, leather products, food and beverage stores, and restaurants. (Ag and Food Sectors and the Economy 2019). A decrease in crop production will disrupt the marketplace at home and abroad. Decreased yield can create an increase of prices on the market as supply decreases. Furthermore, the repercussions faced by US exporters contribute to the economic threats. For example, more than 70% of U.S. tree nut production volume and cotton was exported between 2011 and 2013. More than 50% of wheat and rice production was also exported (Ag and Food Sectors and the Economy 2019). Crops such as these have a substantial place in the U.S. economy. If the agricultural market is compromised at this scale, the US will face extreme economic destabilization.

Tourism

Travel and tourism is the largest employer both globally and within the U.S., with one of every 10 Americans employed in the field. However, the jobs that comprise the travel and tourism sector are at risk. As climate threats increase, air travel will become more discouraged due to its high contribution to carbon emissions. Popular tourist destinations will face sea level rise and progressively common natural disasters, precipitating the further crippling of the travel industry. Much of tourism depends on snow and beach regions which are the most affected by climate change. Snow based sports businesses like mountain resorts and equipment shops will experience financial losses if a lack of snow lowers demand for their products and services. Since the early 1980s, the amount of snow in the western United States has dropped by an average of 41%, and the snow season has shrunk by 34 days as a result. Shareholders are already becoming apprehensive about investing in U.S. ski resorts because of the variability and unpredictability of snowfall. This would constitute a significant loss for the U.S. economy as snow sport tourism contributes about \$20 billion each year (Olick 2019). Moreover, “the home values in mountain towns like Vail and Aspen are some of the highest in the nation”, but it is predicted that by 2050, their value has the potential to drop by at least 15% due to warmer winters. At lower elevation ski areas, like those in Utah, Idaho, Nevada, and parts of California, this drop is closer to 55% (Olick 2019). Biodiversity decline also has a negative effect on tourism, making destinations less attractive (Cho 2019). In warmer climates, rising temperatures have detrimental impacts on air and water quality, altering the environmental state of tourist locations that rely on their natural surroundings to attract visitors. Algal blooms caused by warming water make it dangerous for tourists to swim, boat, and fish in freshwater, costing the tourism industry close to \$1 billion each year (The Effects: Economy 2019). At the same time, more extensive wildfires are destroying property such as hotels, forests, and vineyards vital for tourism while the smoke creates hazardous air and breathing conditions, further discouraging travel to certain regions.

Beaches, which are the leading tourist destination in the U.S., are under threat from flooding, increased storm surge, and rising sea levels. “Coastal states receive about 85% of the tourist-related revenues in the U.S.” and “it is estimated that U.S. beaches contribute more than \$320 billion annually to the national economy” (ASBPA). Although beaches often fluctuate over time, the rate of sea level rise and the shrinkage of beaches has accelerated over the past 25 years. In the 1990s, the rate of sea level rise was about 0.1 inches per year, while today it is about 0.13 inches per year (NASA 2018). Coastal storms are destroying businesses and creating large amounts of debris. Higher temperatures cause the water quality to suffer due to more frequent and intense algae blooms. Toxic algae blooms curtail recreational water activities and recreational fishing, the latter of which generates “nearly \$50 billion in retail sales with a \$125 billion impact on the nation’s economy”. The recreational fishing industry encompasses manufacturing and sale of fishing gear and equipment as well as boating services, hotels, restaurants, and more (Sportfishing Industry 2019). As of 2018, the tourism sector was contributing almost \$1.6 trillion to U.S. GDP, comprising 7.8% of GDP in the country (US Travel Sector 2019). The loss of capital attributed to the potential decline of tourist activities poses a substantial threat to the U.S. economy, especially since numerous areas of tourism will be affected.

Energy

As discussed in the previous chapter, political instability is one of the many negative consequences of climate change deriving from damages incurred to the energy sector. Although the U.S. has increased its domestic oil production, international oil shortages still have the ability to hurt the American economy (Linking Energy). Shortages in the U.S. would cause gas prices to rise and disrupt oil-powered production. At the same time, extreme weather will cause higher numbers of weather-related power outages in the U.S. (Kenward and Raja 2014). Loss of grid power is a threat to oil and gas fields, oil refineries, pipelines, oil and gas storage centers, export and import terminals, and any solar or wind installations connected to the grid including rooftop solar panels. The size of the energy sector within the U.S. economy is massive. Total investment within the sector is valued at \$350 billion, making it the second largest in the world (Energy Industry Spotlight 2020). For this reason, detrimental impacts from climate change on the viability of certain energy sources, or the ability of energy sources to function would deal a tremendous blow to the U.S. economy.

Conclusion

The evolving threats of climate variability will continue to contribute to the exacerbation of extreme weather, biodiversity loss, and natural disasters. These are threats to entire economic sectors, the job market, investments, and the general infrastructure of our nation. Climate change has already proven to be extremely costly to the United States. It is necessary that the government identify and mitigate both current and future climate risks to the economy in order to minimize future costs to the American government, private sector, and the public.

References

- U.S. Department of Agriculture. *Ag and Food Sectors and the Economy*. 2019.
<https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/ag-and-food-sectors-and-the-economy/>.
- U.S. Department of Agriculture. "Agriculture in the Midwest." 2017.
<https://www.climatehubs.usda.gov/hubs/midwest/topic/agriculture-midwest>.
- U.S. Department of Agriculture. "Agricultural Trade." 2019.
<https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/agricultural-trade.aspx>.
- Cho, Renee. "How Climate Change Impacts the Economy." *Columbia University*, 2019.
<https://blogs.ei.columbia.edu/2019/06/20/climate-change-economy-impacts/>.
- U.S. Environmental Protection Agency. *Climate Impacts on Transportation*, 2016.
https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-transportation_.html.
- "Energy Industry Spotlight." *Select USA*, 2020. <https://www.selectusa.gov/energy-industry-united-states>.
- "Hurricanes and Climate Change." *C2ES*, n.d. <https://www.c2es.org/content/hurricanes-and-climate-change/>.
- "Linking Energy and U.S. National Security." *UT Austin*, n.d. <https://www.strausscenter.org/energy-and-security/energy-and-national-security.html>.
- National Aeronautics and Space Administration. "New study finds that sea level rise is accelerating." 2018. <https://climate.nasa.gov/news/2680/new-study-finds-sea-level-rise-accelerating/>.
- "New study shows beaches are a key driver of U.S. economy." *ASBPA*, n.d.
<http://www.sandsaver.com/downloads/beacheconomy.pdf>.
- Olick, Diana. "Climate change is taking a toll on the \$20 billion winter sports industry — and swanky ski homes could lose value." *CNBC*, 2019. <https://www.cnbc.com/2019/03/20/climate-change-is-taking-a-toll-on-the-20-billion-ski-industry.html>.
- "Sportfishing Industry Releases Updated Economic Contributions of Recreational Fishing by U.S. Congressional Districts." *ASA*, 2019. <https://asafishing.org/industry/1226/>.

U.S. Environmental Protection Agency. *The Effects: Economy*. 2019.
<https://www.epa.gov/nutrientpollution/effects-economy>.

“United States - Agricultural Land.” *Trading Economics*, 2020. <https://tradingeconomics.com/united-states/agricultural-land-percent-of-land-area-wb-data.html>

“US travel sector retains #1 status and grows despite trade tensions.” *World Travel & Tourism Council*, 2019. <https://www.wttc.org/about/media-centre/press-releases/press-releases/2019/us-travel-sector-retains-no-1-status-and-grows-despite-trade-tensions/>.

World Economic Forum. *The Global Risks Report 2020*, 2020. http://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf

Chapter 3

Climate Change: Areas of Threat

Public Health and Safety

Ireland Scheer

Background

Public health and safety are key priorities of the U.S. government. This is institutionally embodied by the U.S. Department of Health and Human Services (HHS), whose stated mission is “to enhance and protect the health and well-being of all Americans. We fulfill that mission by providing for effective health and human services and fostering advances in medicine, public health, and social services” (Public Affairs 2016) HHS includes agencies such as the Centers for Disease Control and Prevention (CDC), the Agency for Toxic Substances and Disease Registry (ATSDR), and the Office of the Assistant Secretary for Preparedness and Response (ASPR). Important as they are, none of these agencies are able to deal adequately, or at all, with the range of threats to well-being posed by the climate crisis.

Impactful weather patterns will change, mass migration will increase, and access to many resources will be reduced. As these threats and others materialize, they will be extremely expensive in terms of the government funding and response, detrimental to American livelihoods, and cost the lives of many Americans. These effects span all facets of life and have proven to be deleterious to public safety and health at all levels of society. While they can be particularly damaging to minorities and lower income communities who live in areas highly vulnerable to extreme weather, the nature of climate-related impacts ensures that safety and health risks will not discriminate on the basis of race, wealth, or political affiliation. Major floods, extreme storms, drought, air pollution from wildfires, the spread of infectious disease, and eroding mental health are just a few factors that have the potential to impact the entire population. A coordinated, efficient government response will be necessary to minimize their impact. Both restorative and preventative action needs to be taken in order to minimize the dire consequences of climate change on the health and safety of the American public.

Changes in the Natural World

Humans rely on the environment for natural resources and functions that play a critical role in our public health and safety, and climate change threatens the delicate balance upon which these resources and functions rely.

Biodiversity Loss

Biodiversity is imperative to human life as we know it. The dramatic loss of biodiversity brings serious risks for societies, economies and the health of the planet. Sir Robert Watson, chair of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), observes that “biodiversity and nature’s contributions to people sound, to many people, academic and far

removed from our daily lives. . . Nothing could be further from the truth—they are the bedrock of our food, clean water and energy” (World Economic Forum 2020). Many natural substances are used to create life-saving drugs and find cures to diseases. Diverse ecosystems contain organisms and processes that naturally clean our air and water. Natural resources are the source of our energy supply. Insects pollinate plants to provide us with food. Disruptions in pollination would be catastrophic to the food chain, impacting both the livelihoods of agricultural workers and the the necessary nutrients and overall amount of food available to citizens. The loss of biodiversity and other natural resources will result in a complete upheaval of the way our country currently functions.

There are multiple natural systems being altered by climate change, which will have massive impacts on biodiversity. As the preeminent global carbon sink, the oceans have been absorbing some of the worst warming effects of anthropogenic actions. This absorption may have offset some atmospheric warming, but there are other effects taking place underwater. By 2100, ocean acidity had “increased by 30% since the industrial revolution, and by 2100, if we continue emitting CO₂ at the same rate, ocean acidity would have increased by as much as 150%” (Richardson 2011). This acidification of the ocean has dire consequences for species that depend on calcification, a process disrupted by increased acidification. One specific species being impacted is coral. The death of coral reefs is a global problem, as they provide habitats for many other species, as well as ecological services such as food, income, and coastal protection to over 500 million people in tropical coastal areas (Richardson 2011). Coral reefs are just one example of how the threats of climate change create a ripple effect along species webs, impacting the availability of other species of plants and animals that humans rely on for food, building materials, and medicine. In fact, 50% of modern drugs were derived from natural sources (World Economic Forum 2020) This figure is just one way to exemplify how these species provide the foundation for entire economic sectors such as fishing, plant and animal agriculture, and the pharmaceutical industry. The impacts of biodiversity loss will impact human health by limiting access to food, leading to potential shortages, malnutrition, and increases in food-related illnesses such as diabetes and heart disease. Maintaining healthy biodiversity within well-maintained ecosystems is necessary to maintaining life as we know it.

Availability of Clean Water and Air

Climate change is altering natural patterns of drought and precipitation, threatening our access to clean water. As droughts occur, evaporation increases and precipitation levels decrease, effectively eradicating many sources of freshwater. Furthermore, droughts and rising temperatures cause an increase in toxic algal blooms, which pollute freshwater and render it unsuitable for humans to touch or drink (Climate Central 2017). The North American pan-continental drought of 2012 is an example of the effects of climate change. A study on this particular drought concluded that “this spatially extensive warming, and the accompanying increase in evaporative demand, represents a broad forcing that may increase the spatial coherence of droughts across regions, increasing the likelihood that multiple regions will experience drought simultaneously” (Cook 2016). This prediction demonstrates how climate change is facilitating larger droughts, which has potential to create crises at a national scale over a lack of water for agriculture, animals, and human use.

Air pollution is a driver of climate change, and climate disasters such as wildfires are also detrimental to air quality. Wildfires have ravaged the western United States in the past few decades, specifically in Washington, Oregon, and California. This increase in wildfire frequency is caused by climate change-driven drought and rising temperatures. The fire smoke releases toxic air pollutants such as particulate matter and carbon monoxide. Health problems such as heart attacks, asthma, and COPD are worsened by smoke, and as a result of those 2012 fires, 226 people died prematurely. In fact, “the health damages linked to 2012 wildfire smoke in Oregon totaled \$2.1 billion” in 2018 dollars (Limaye 2019). Air pollution resulting from climate change travels, therefore effecting the entire American public, regardless of factors such as wealth, race, or geographical location. These impacts will only worsen and spread as temperatures continue to rise.

Spread of Disease and Illness

As climate patterns change and regional temperatures shift, the spread of disease is imminent. The WEF Global Risk Report states that “warming temperatures are expanding mosquito-friendly habitats beyond the tropics, spreading diseases such as malaria, dengue, yellow fever, West Nile virus and Zika into new regions” (World Economic Forum 2020). These regions, including those in the U.S., are not equipped to deal with these unfamiliar diseases. This could result in massive disease outbreak. Furthermore, biodiversity loss will reduce the ability to develop new drugs, making outbreaks far more dangerous. As international refugees and internally displaced persons shift migration patterns, health services and resource systems will be stretched to the limit. This will mean that not everyone who needs treatment for various ailments will be treated properly, increasing poor health outcomes. Aside from communicable diseases, non-communicable diseases will also present a bigger problem as a result of climate change. Low quality diets from a lack of proper nutrition lead to chronic and degenerative conditions, which already account for 41 million deaths each year (World Economic Forum 2020). As pollution spreads and the quality of water and air worsen, more people are at risk of developing fatal cancers and other illnesses. The threats of a changing climate will be directly responsible for increasing levels of disease, illness, and death. It is imperative that the U.S. health system work to mitigate the threats of climate change to protect the health of the American public.

Natural Disasters

Natural disasters have always been a threat to the health and safety of the American public. As climate change worsens, natural disasters and extreme weather events are becoming more frequent and larger in scale. The death and destruction associated with these disasters is increasing commensurately. Floods, droughts, hurricanes, wildfires, and heat waves are all intensified by the changing climate. The costs associated with these events on public health and safety are numerous. Property is destroyed, public services are rendered inoperable, agricultural systems are interrupted, availability of resources such as food, water, medicine, and energy are all decreased, and many people die as a result. The economic and human costs of natural disasters are exceptional. There was approximately \$161 billion in damage from Hurricane Katrina, 1,883 people were killed, and over one million people were displaced (CNN Library 2019). This hurricane occurred in 2005, which means the impacts of future climate disasters are expected to be even more extreme.

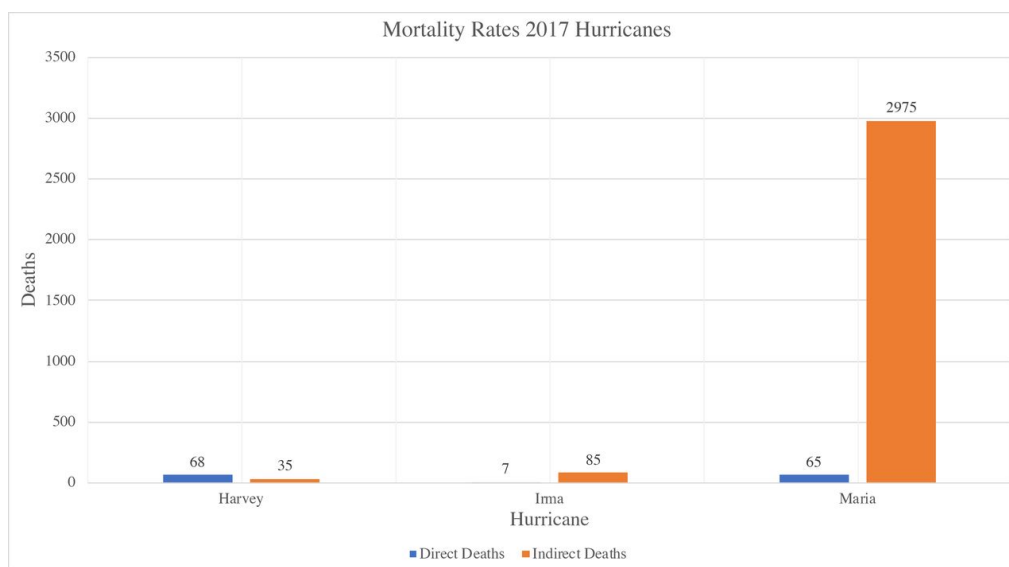


Figure 3.1. Mortality Rates 2017 Hurricanes. “Quantifying Inequities in U.S. Federal Response to Hurricane Disaster in Texas and Florida Compared with Puerto Rico.” *BMJ Global Health* 4, January 18, 2019, <https://doi.org/10.1136/bmjgh-2018-001191>.

These extreme impacts are felt most acutely by front-line communities. Natural disasters are much more detrimental to minority groups and low-income communities. Figure 3.1 depicts the inequalities between death tolls of Hurricanes Harvey, Irma, and Maria. The steep mortality rate of indirect deaths from Hurricane Maria exemplifies how minority communities are more likely to be negatively impacted by natural disasters on a greater scale.

Energy sources are often cut off as a result of climate disasters. For example, during Hurricane Maria, 1.4 million Puerto Ricans experienced blackouts. The effects of these disasters are long-lasting. Eight months later, 10,000 Puerto Ricans were still without power, and it was not fully restored for 11 months after the initial hurricane (Campisi 2018). This lack of access to power after natural disasters is dangerous and can pose a large threat to public health and safety. Light and electricity are necessary for the functioning of essentially every public service, including schools, grocery stores, and hospitals. When energy sources are comprised, so are the operations of these facilities. This can result in reduced food supplies and the inability to retrieve necessary medications or receive medical services, and can at times prove fatal as a result. It is important to note that the threat posed by losing power after natural disasters is disproportionately dangerous for minorities and low-income communities that don’t have the political power or disposable income to safely mitigate a loss of power.

Political Instability

As climate disasters continue to increase in scale and frequency, populations in and outside of the United States will be increasingly affected by these disasters. As homes are destroyed in hurricanes, livelihoods are eradicated by biodiversity loss, and resources are depleted due to droughts and famines,

more people will begin to migrate in search of safety and the ability to fulfill their basic needs. Changing population sizes becomes a problem as public health resources are depleted and public safety is threatened. These migrations may be domestic or cross international borders. In 2017, “18.8 million new disaster-related internal displacements” were recorded (UNHCR 2020). Though these statistics only count domestic displacement, these patterns can and will expand to international migration. The displacement of both U.S. citizens within national borders and the influx of international migrants seeking refuge will cause increasing conflict over matters such as resource allocation, housing, and migration and resettlement. These conflicts will increase the likelihood of violence, as well as make it difficult for the public to access adequate food, water, and public services. The reduction of these resources is inherently a threat to public health, and the increased likelihood of violence is a threat to public safety. The number of persons displaced in the context of climate-related disasters will only continue to increase, exacerbating national and global conflict and creating widespread political instability.

Mental Health

It is more difficult to directly observe the direct and indirect impacts of climate change on mental health, however all of the aforementioned climate threats have serious ramifications for rates of mental and emotional stability, mental illness, and even suicide. Infectious diseases, chronic diseases (asthma and allergies), nutritional deficiencies, and injuries resulting from natural disasters can result in chronic stress (APHA 2016). Natural disasters can also cause PTSD, anxiety, depression, and outbursts of violence (APHA 2016). Job loss, the threatening of economic livelihoods, and decreased access to basic resources can result in stress, depression, and suicide. In fact, following a record drought in the 1980s, the suicide rate doubled, and suicide and suicidal ideation more than doubled after Hurricane Katrina (APHA 2016). The threats of climate change will result in radical changes to the functioning of our society, which will make it extremely difficult for the American public to feel safe and stable. Climate change is a threat to not only American bodies, but Americans minds as well.

Conclusion

The climate crisis will only continue to worsen if left unchecked by the government. The costs associated with climate change and its associated threats are already immense and will eventually become practically impossible to combat. Climate change impacts all facets of human life and existence, and public health and safety are no exception. In order to protect the public from the daunting threats posed by the climate crisis, it is necessary that the government evaluate both the current and future effects of climate change, and begin to implement policies to mitigate these effects, while minimizing the cost to U.S. citizens.

References

- “Algae Blooms and Climate Change.” *Climate Central*, 2017.
<https://www.climatecentral.org/gallery/graphics/algae-blooms-and-climate-change>.
- Campisi, Jessica, and White, Jaquetta. “Finally, 11 Months after Maria, Power Is Restored in Puerto Rico - except for 25 Customers.” *CNN*, 2018. <https://www.cnn.com/2018/08/07/us/puerto-rico-maria-power-restored-wxc-trnd/index.html>.
- “Climate Changes Mental Health.” *APHA*, 2016.
https://www.apha.org/~media/files/pdf/topics/climate/climate_changes_mental_health.ashx
- Cook, Benjamin I. et al. “Pan-Continental Droughts in North America over the Last Millennium.” *Journal of Climate* 27, no. 1, 2014. <https://doi.org/10.1175/jcli-d-13-00100.1>.
- Cooney, Catherine M. “Preparing a People: Climate Change and Public Health.” *Environmental Health Perspectives* 119, no. 4, 2011. www.jstor.org/stable/41203242.
- Florido, Adrian. “Hurricane Maria Caused 2,975 Deaths In Puerto Rico, Independent Study Estimates.” *NPR*, 2018. <https://www.npr.org/2018/08/28/642615337/hurricane-maria-caused-2-975-deaths-in-puerto-rico-independent-study-estimates>.
- “Hurricane Katrina Statistics Fast Facts.” *CNN*, 2019. <https://www.cnn.com/2013/08/23/us/hurricane-katrina-statistics-fast-facts/index.html>.
- Kopp, R.E. et al. “New Jersey’s Rising Seas and Changing Coastal Storms: Report of the 2019 Science and Technical Advisory Panel.” Trenton, New Jersey: *Rutgers University*, 2019.
https://climatechange.rutgers.edu/images/STAP_FINAL_FINAL_12-4-19.pdf
- Limaye, Vijay, and Juanita Constible. “Up In Smoke: Oregon Wildfires Cost Billions In Health Harms.” *NRDC*, 2020. <https://www.nrdc.org/experts/vijay-limaye/smoke-oregon-wildfires-cost-billions-health-harms>.
- Polman, Paul. “Why Business Cannot Tackle Climate Change on Its Own.” *Financial Times*, 2019.
<https://www.ft.com/content/318eabe2-1132-11ea-a7e6-62bf4f9e548a>.
- Public Affairs. “About HHS.” *U.S. Department of Health and Human Services*, 2016.
<https://www.hhs.gov/about/index.html>.
- Richardson, Katherine, Steffen, Will, and Liverman, Diana, eds. *Climate Change: Global Risks, Challenges and Decisions*. Cambridge: *Cambridge University Press*, 2011. Accessed February 11, 2020. ProQuest Ebook Central.

United Nations. "Climate Change and Disaster Displacement." *UNHCR*, 2020. <https://www.unhcr.org/en-us/climate-change-and-disasters.html>.

Willison, Charley E, Phillip M Singer, Melissa S Creary, and Scott L. Greer. "Quantifying Inequities in U.S. Federal Response to Hurricane Disaster in Texas and Florida Compared with Puerto Rico." *BMJ Global Health* 4, no. 1, 2019. <https://doi.org/10.1136/bmjgh-2018-001191>.

World Economic Forum, "False Positive". *The Global Risks Report 2020*, 2020. http://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf

World Economic Forum, "Save the Axolotl". *The Global Risks Report 2020*, 2020. http://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf

Chapter 4

United States Government Response to Climate Change

Domestic Efforts

Zhuohang (Ash) Zhou

Background

Despite the known and unknown threats of climate change, the United States federal government has lacked any standardized form of domestic response addressing the crisis. The current hub for federal response to climate change is the responsibility of the United States Global Change Research Program (USGCRP). The United States Global Change Research Program was initiated in 1989 during the George H. W. Bush administration. With 13 agencies collaborating under the USGCRP, the program serves as a climate information hub that helps both the U.S. and foreign communities plan appropriate actions to address climate change (USGCRP n.d.). The USGCRP facilitates collaboration across federal member agencies to gain a better understand of how the climate changes. These agencies are as follows: the Department of Agriculture, the Department of Commerce, the Department of Defense, the Department of Energy, the Department of Health and Human Service, the Department of Interior, the Department of State, the Department of Transportation, the National Aeronautics & Space Administration (NASA), the National Science Foundation, the Smithsonian Institution, the U.S. Agency for International Development, and the Environmental Protection Agency (which will be introduced in this chapter and thoroughly examined in the following).

The USGCRP member agencies are set up to accomplish several tasks. First, the USGCRP gathers data and use different models to advance knowledge in global change science. Second, the USGCRP uses the knowledge about global change to assess the impact of future shifts. Third, the USGCRP is required to publish a Nation Climate Assessment (NCA) every four years, which includes synthesis of climate impacts and trends across U.S. regions and sectors. Forth, the USGCRP provides data and tools to the general public. The following section will discuss the purpose of member agencies of the USGCRP, and their past domestic efforts.

USGCRP Member Agencies and Purposes

NASA

National Aeronautics and Space Administration (NASA) is established in 1958 focusing on space observation and exploration. One of NASA's mission is to advance scientific knowledge and understanding of the Earth. Given the existing satellite and monitoring instruments, NASA plays a unique role in the USGCRP. From the point of view of space, NASA's satellites provide routine data on the atmosphere, ocean, land, sea ice, and ecosystem.

In the early 1980s, as more attention is placed on climate change, NASA starts to work on the Earth science program called the Global Habitability. After the establishment of the Global Change Research Program, NASA became more involved in data collection from space. In 1991, the Earth Observing System implemented, and it is significant to American climate science. By the time of 2007, NASA has 17 space missions to collect climate data from space. Decades of atmospheric data provided by NASA build the foundation of the U.S. climate change study.

Department of Agriculture

The U.S. Department of Agriculture's Climate Change Research Program is created to focus on the implication of climate change on agriculture, forests, grazing lands, and rural communities. It aims to assist land managers, policymakers, and various agencies with science-based knowledge to manage risk related to climate change. The USDA's Climate Change Research Program includes multiple sub-program to address a more specific field including the Agricultural Research Service (ARS), Forest Service (FS), Economic Research Service (ERS), and more.

The USDA also develops systems to prepare for the negative impacts of climate change other than providing information. USDA develops cultivars, cropping systems, and management practices to improve tolerance and build resilience to climate variability. USDA conducts research and integrates USGCRP's research findings into farming and natural resource management to help prepare for climate change with advanced technologies.

Department of Commerce

The Department of Commerce created the National Oceanic and Atmospheric Administration (NOAA) and National Institute of Standard and Technology (NIST) to respond to the climate change crisis. NOAA's main tasks are to provide scientific information about climate change and its impact on the general public and to provide a predictive understanding of climate change to policymakers. NOAA aims to help the nation to prepare for the current impacts of climate change and assess the future states of the climate system.

The National Institute of Standard Technology works with other agencies to develop standards, methodologies, and technologies to measure greenhouse gas emissions and further climate science research. NIST also helps to generate more accurate and reliable climate observation by providing measurements and calibrations.

Department of Defense

Originally, the Department of Defense plays no role in global change research. However, as the impact of climate change on military bases intensify, DOD starts to sponsor basic research activities. Systems and platforms of DOD can be influenced by environmental conditions. Based on DOD's report on the effects of climate change in 2019, there is a total of 79 military installations at risk within the 20-year timeframe from recurrent flooding, drought, desertification, wildfires and thawing permafrost caused by climate change (Report on Effects 2019).

Department of Defense responds to climate change mainly with three programs: Strategic Environmental Research and Development Program (SERDP), Navy Task Force Climate Change (TFCC), and U.S. Army Corps of Engineers (USACE). SERDP is the joint effort of DOD, Department of Energy, and EPA aiming to develop climate-change assessment tools and to identify important environmental variables. TFCC assists in providing recommendations, plans and actions to the military to adapt to climate change. USACE actively investigates the impacts of climate trends for DOD. USACE also responds to the needs of the military to set up research programs.

Department of Energy

Department of Energy Office of Science supports research to understand the Energy-Environment-Earth system connection and their implications related to energy. The goal of the DOE Office of Science is to predict the impact of climate variability on the nation's energy and environmental issues. DOE invests much in researches on atmospheric sciences and terrestrial science. In detail, atmospheric science focuses on the interdependence of clouds, precipitation, and radioactive transfer; terrestrial science emphasizes the interactions of carbon, water, and their impact on the biosphere. In response, DOE invests much in the Energy-Exascale Earth System Model (E3SM) and Atmospheric Radiation Measurement (ARM) research facility. E3SM combines various information that can affect trends and extremes on scales from local to global. ARM obtains simulation measurements of a broad range of parameters relative to clouds and their impact on the radiative energy balance.

DOE also conducts applied energy research. Office of Energy Efficiency and Renewable Energy (EERE), Fossil Energy (FE), and Office of Electricity (OE) are created to address the potential energy challenges. They are responsible for designing and deploying future energy technologies for the future.

Department of Transportation

Department of Transportation (DOT) focuses on examining potential climate-change impacts on transportation, methods for increasing transportation efficiency, and methods for reducing emissions. DOT's Center for Climate Change and Environmental Forecasting is responsible for coordinating researches to promote comprehensive approaches to reduce emission, address climate-change impacts, and develop adaptation strategies. DOT also contributes directly to USGCRP through funding research such as the Center's Gulf Coast Studies.

There are multiple agencies within DOT that work on climate change issues. The involvement of DOT's Federal Aviation Administration (FAA) is to identify and address key scientific gaps regarding aviation climate impact and to inform mitigation solutions. FAA also manages Continuous Lower Energy, Emissions, and Noise Program (CLEEN). CLEEN focuses on developing technologies for energy efficiency, noise and emissions reduction, and sustainable alternative jet fuel. The Federal Highway Administration (FHWA) continuously develops regional climate data, conducts methodological research, and aids transportation stakeholders. The Federal Transit Administration (FTA) advances the nation in adapting transit assets and operations to the impacts of climate change by completing seven Climate Change Adaptation Pilot studies.

Department of Health and Human Services

US Department of Health and Human Services mainly conducts research related to environmental health and the health effects of global climate change. The roles of DHHS in terms of climate change includes finding linkage between climate change and health, to conduct surveillance of climate-related health outcomes, and to engage the communities in communication about climate change. The National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC) are actively involved in research programs. Researches mostly focus on understanding the vulnerabilities of individuals and communities to climate-related change, changes in transmission of infectious disease, and impacts in the aftermath of severe weather events. Researches are aimed to reduce climate vulnerability and provide adaptation strategies to the public.

Department of the Interior

Under the Department of the Interior (DOI), U.S. Geological Survey (USGS) is mainly responsible for conducts global change researches. USGS's main goal is to help the nation understand, adapt, and mitigate global change by providing scientifically valid information and predictive understanding of global change and its effects. USGS Climate and Land Use Change Research and Development Program support researches on earth system and land-cover change and provide data used in accessing changes in land use, land cover, ecosystem, and water resources. Moreover, DOI Climate Science Centers (CSCs) provide scientific and technical support to other agencies and regional organizations dealing with climate change.

Department of State

The Department of State (DOS) distributes funding to the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC). Funding to UNFCCC and IPCC enhances global climate observation and assessment activities mainly in developing countries. The DOS coordinates other departments and agencies to promote international cooperation.

National Science Foundation

The National Science Foundation (NSF) focuses on advocating the knowledge of climate change and developing educational resources. Researches emphasize the impact of the Earth System on human beings and the improvement of predictive capability. NSF provides necessary technical support to programs in the USGCRP.

Smithsonian Institution

The Smithsonian Institution is the world's largest museum, education, and research complex. Global-change researches related to atmosphere, ecosystem, and environmental change are done in numerous museums. Numerous types of museums enable Smithsonian Institution to carry many different types of researches related to global change. Smithsonian Institution also reaches out to communities to exhibit the challenges of climate change and the progress of related science.

US Agency for International Development

The U.S. Agency for International Development (USAID) calls for international cooperation to achieve climate resilience and low emission sustainable economic development. Using research results from other agencies, USAID can provide other countries with comprehensive strategies to solve the climate change problem. USAID is responsible to maintain relationships with other nations in cooperation to act on climate change.

The Environmental Protection Agency

The Environmental Protection Agency is a unique case among other USGCRP members as it is the most frequently turned to when the United States government is demanded to create a climate change response. However, the creation of the EPA was not intended for addressing climate change as a global threat. As concern about the impact of pollutants on human health increased, President Nixon signed the National Environmental Policy Law (NEPA) to form the Council on Environmental Quality (CEQ) in January of 1970, which advises the president on environmental related issues. In December of the same year, the Environmental Protection Agency (EPA) was officially formed as an independent agency. At the time of its establishment, climate change was not the focus of the EPA. The EPA was mainly concerned about air and water pollution. The book *Silent Spring* written by Rachel Spring brought attention to air and water pollution in the 1960s. By describing how birds were killed by pesticide, she hinted that humans could suffer the same as birds if no further actions were taken. The heightened worry was confirmed by the fire on the Cuyahoga River in 1969. Oil spilled on the Cuyahoga River in Cleveland, which caught on fire and caused about \$100,000 in damages (Rotman n.d.). This series of disasters directly led to the creation of EPA. The EPA's mission is to protect human health by protecting clean air, land, and water through research and by enforcing statutes.

The Environmental Protection Agency successfully accomplished its original goals, to clean the air and land of pollution. The new challenge of addressing climate change is faced by the EPA, despite its original intent being separate of the global crisis. Prior to the Earth Summit in 1992, efforts such as the Clean Air Act and Clean Water act responded to the issue of pollution. After the Earth Summit, statutes were to be passed regarding climate change by the Environmental Protection Agency (despite contradicting its founding purpose).

The Clean Water Act

The Clean Water Act (CWA) of 1972 is based on the Federal Water Pollution Control Act in 1948, which aimed to maintain clean bodies of water and restore polluted water. The CWA established the basic structure for containing water pollutants in the water. There are several regulations that the CWA has made to achieve its goal. First, the CWA implements quality standards of wastewater for different industries. Corporations must process their wastewater before dumping, which prevents large toxic material causing irreversible damage to the water. Second, the CWA implements a permit system. It makes any discharging without permit unlawful. These measures help the EPA to keep track of the amount of wastewater. Third, the CWA also set out plans to clean up polluted waters. Enforcing the CWA has led to significant decreases in water pollution (EPA 2019).

The Pollution Prevention Act of 1990 has implemented a different approach to pollution reduction. While the Clean Air Act and the Clean Water Act focus on reducing the pollutant after production by process the leftovers, the Pollution Prevention Act focus on reducing the amount of pollutants through changes in production and raw material use. In order to reduce the pollutants from production, equipment and technology modifications are necessary. Eventually, the Pollution Prevention Act can help organizations to increase efficiency in the use of energy and reduce the cost in recycling and disposal.

Environmental Protection Agency Efforts Following the Earth Summit

Before the Earth Summit in 1992, the main focuses of EPA were to reduce hazardous material emitted from production and clean up polluted area. The priority has shifted slowly in the 1990s when concern about climate change became elevated. Entering the 1990s, hazardous pollutants emission has been significantly reduced after 20 years of EPA regulation. The focus of the EPA shifted from reduction of hazardous matters to reduction of carbon emission to address climate change.

Less than a month after the Earth Summit in 1992, the EPA started the Energy Star Program (ESP) in conjunction with the U.S. Department of Energy. The Energy Start Program is a voluntary program that incentivizes businesses to create product that consumes less energy without hampering its performance. This program applies to appliance companies, car companies, home builder, and more. In order to be Energy Star qualified, the product or the building needs to have energy performance among the top 25% products of same type. A blue square Energy Star label will be placed on any appliance or building that fits the requirement. This program benefits both businesses and consumers. For business, Energy Star certified products enjoy a tax credit up to 30%, which makes the product more competitive in comparison to products without Energy Star label (ENERGY STAR n.d.). For the consumers, the Energy Star label can help consumers better and spot energy efficient products which reduce costs and benefit the environment in the long run. In 2009, researchers estimated that the Energy Star Program has helped to save nearly \$17 billion on utility bills (???, ???) and reduce greenhouse gas emission significantly (Ryan 2018).

Environmentally Preferable Purchasing (EPP) program is created by President Clinton. This program allocated \$200 billion from the federal budget to purchase recycle and environmentally preferable products (Goldel 1999). The purpose of the program is to encourage business source reduction. There are three positive effects of this policy. First, purchasing environmentally preferable products prevents pollution significantly and reduces greenhouse emission. Second, businesses were incentivized to become environmentally friendly to use these products, which make them also more competitive in the global market. Third, climate change was being addressed by the federal government as a priority to the private sector. The Environmentally Preferable Purchasing and the Energy Star Program provide many incentives for business to reduce carbon emission.

In the 1990s EPA rolled out stricter regulations regarding air quality. In 1995, EPA announced the first comprehensive regulation on petroleum refineries. The first refinery regulation rule that 192 refineries and any newly built refineries are required to cut the emission of 11 types of air toxins by

53,000 tons annually, which is 59% reduction from the current level (Petroleum Refineries 2019). The reason for the program is to benefit the health of 4.5 million people living near refineries. In 1999, President Clinton announces to adopt a tougher Sulphur tailpipe emission standard on civil vehicles. Tier 2 Gasoline Sulfur program development by EPA is adopted. The new Sulfur program reduces the sulfur content in gasoline by up to 90% (Gasoline Sulfur 2017).

From 2004 to 2009, the EPA has rolled out multiple programs that reduce carbon emission from ground transportation. In January 2004, the Clean School Bus program is created by EPA to reduce children's exposure to toxic emissions from buses. Most school buses are operated using diesel; while diesel exhaust has a particularly negative impact on children whose respiratory system is not fully developed. School buses travel about four billion miles and provide transportation service to 25 million American children every day (Clean School Bus 2019). Not only does this national program equip buses with better emission-control technology with upgrades for a new fueling system, this program provides funding to school districts and fleet owners to replace old buses. The Clean School Bus program also offers rebates to those who replaced buses run on diesel. In May 2004, Clean Air Nonroad Diesel Rule is finalized to reduce harmful diesel emission from off-road vehicles. The higher standard imposed requires vehicles to be more efficient. It aims to cut 90% emission from construction, agricultural, and industrial diesel-powered equipment and it plans to remove 99% of the sulfur in diesel fuels by 2010 (Emission Reduction 2005). Nonroad diesel-powered vehicles account for 47% of diesel particulate matter (PM) and 25% of nitrogen oxides (NO) (Bishop 2006). The goal of 90% of emission reduction can prevent estimated 12,000 premature deaths and 15,000 heart attacks annually. In 2006, the National Clean Diesel Campaign requires refiners and fuel importers to start to produce Ultra Low Sulfur Diesel. The new diesel standard requires diesel produced to reduce sulfur content by 97% which can reduce air pollution from diesel fuel by more than 90 percent (Diesel Fuel 2019).

In the 2010s, the EPA has done much more in addressing the issues of carbon emissions. In October 2010, together with the Department of Transportation, the EPA announced the first national standards for trucks and buses to reduce greenhouse gases. This comprehensive national program aims to reduce greenhouse gas (GHG) emission by 250 million metric tons and save 500 million barrels of oil (Carbon Pollution 2019). This act targets manufacturers to demand more efficient production.

In August 2012, under the Obama Administration, the EPA issued a standard that fuel efficiency standards will be set to 54.5 miles per gallon (mpg) by Model Year 2025. This act sets new efficiency standards almost double the fuel efficiency of vehicles running on those roads at the time. The new standard can reduce gas emissions significantly, which can also save consumers more than \$1.7 trillion on gas spending and reduce U.S. oil consumption by 12 billion barrels (Obama Administration 2008).

Conclusion

While the EPA is regarded for its work in reducing pollution and toxins impacting the livelihood of citizens, the shift demanding its attention to climate change was limited in capabilities. A domestic federal response to the climate crisis seems divided among the member agencies of the USGCRP. It is

being more and more evident that these agencies efforts are simply not enough to handle the mass concern of climate change within the United States. The lack of fundamental interest of the federal U.S. government on a domestic level transcends the country's behavior internationally as well.

References

- “About USGCRP.” *Global change*. Accessed March 5, 2020.
<https://www.globalchange.gov/about/mission-vision-strategic-plan>
- Bishop, John. “Progress Report on EPA’s Nonroad Mobile Source Emissions Reduction Strategies.” Office of Inspector General, September 27, 2006. <https://www.epa.gov/sites/production/files/2015-11/documents/20060927-2006-p-00039.pdf>.
- “Carbon Pollution from Transportation.” EPA. Environmental Protection Agency, June 10, 2019.
<https://www.epa.gov/transportation-air-pollution-and-climate-change/carbon-pollution-transportation>.
- “Clean School Bus.” EPA. Environmental Protection Agency, April 30, 2019.
<https://www.epa.gov/cleandiesel/clean-school-bus>.
- “Diesel Fuel Standards and Rulemakings.” EPA. Environmental Protection Agency, August 5, 2019.
<https://www.epa.gov/diesel-fuel-standards/diesel-fuel-standards-and-rulemakings>.
- “Emission Reduction Incentives for Off-Road Diesel Equipment Used in the Port and Construction Sectors.” ICF Consulting, May 19, 2005.
https://archive.epa.gov/sectors/web/pdf/emission_20050519.pdf.
- “ENERGY STAR for Small Business.” ENERGY STAR Buildings and Plants | ENERGY STAR. Accessed March 5, 2020. <https://www.energystar.gov/buildings/facility-owners-and-managers/small-biz>.
- “EPA History.” EPA. Environmental Protection Agency, December 19, 2019.
<https://www.epa.gov/history>.
- “Fact Sheet: President Obama to Announce Historic Carbon Pollution Standards for Power Plants.” National Archives and Records Administration. National Archives and Records Administration. Accessed March 5, 2020. <https://obamawhitehouse.archives.gov/the-press-office/2015/08/03/fact-sheet-president-obama-announce-historic-carbon-pollution-standards>.
- “Gasoline Sulfur.” EPA. Environmental Protection Agency, June 6, 2017. <https://www.epa.gov/gasoline-standards/gasoline-sulfur>.
- Goldel, Eun-Sook. “Defending the Environment At the Department of Defense.” EPA, July 1999.
<https://www.epa.gov/sites/production/files/2015-05/documents/envdod.pdf>.

- “Obama Administration Finalizes Historic 54.5 Mpg Fuel Efficiency Standards/ Consumer Savings Comparable to Lowering Price of Gasoline by \$1 Per Gallon by 2025.” EPA. Environmental Protection Agency, May 15, 2008. https://archive.epa.gov/epapages/newsroom_archive/newsreleases/13f44fb4e2c2d39d85257a68005d0154.html.
- “Petroleum Refineries: National Emission Standards for Hazardous Air Pollutants (NESHAP).” EPA. Environmental Protection Agency, February 13, 2019. <https://www.epa.gov/stationary-sources-air-pollution/petroleum-refineries-national-emission-standards-hazardous-air>.
- “Progress Cleaning the Air and Improving People's Health.” EPA. Environmental Protection Agency, August 14, 2019. <https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health>.
- Rotman, Michael. n.d. “Cuyahoga River Fire.” *Cleveland Historical*. accessed March 5, 2020, <https://clevelandhistorical.org/items/show/63>.
- “Report on Effects of a Changing Climate to the Department of Defense.” Office of the Under Secretary of Defense for Acquisition and Sustainment, January 2019. <https://media.defense.gov/2019/Jan/29/2002084200/-1/-1/1/CLIMATE-CHANGE-REPORT-2019.PDF>.
- Ryan, Julie. “What Is ENERGY STAR Anyway?” Energy Alabama, May 14, 2018. https://alcse.org/what-is-energy-star-anyway/?gclid=Cj0KCQiA7aPyBRChARIsAJfWCgJjoG7wjjZmCLe2SgHB8KIOlqpspzV63-cK-GgxYoe57E_TDWDeOEoaArOgEALw_wcB.

Chapter 5

United States Government Response to Climate Change

International Efforts

Sabrina Mohd Nordin

Background

As a preeminent global power and major greenhouse gas emitter, the United States is destined to have a principal role in international climate change mitigation efforts. Such a role requires consistent and committed policy efforts on both the domestic and international level. The federal government has engaged in a number of internationally oriented climate programs and policies, but to a relatively limited extent. Conversely, China, a burgeoning threat to American global preeminence, has been at the helm of climate innovation in this key domain for well over a decade. Evaluating the U.S. government's past and present climate change response is necessary to identify how U.S. competence and influence can be elevated in climate governance in the future.

The following will examine the history of U.S. climate change related policies and programs in the international sphere since 1989. This timeframe is chosen because it aligns with the founding of the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC), which marked the dawn of international political response to climate change. The primary focus of this chapter is on programs administered by the Department of States (DOS) and the U.S. Agency for International Development (USAID), as these are the main governmental bodies dealing with foreign climate affairs.

The United States and International Climate Action

The USGCRP and NCA

The establishment of the USGCRP is significant as it was the impetus for Congress to mandate the Global Change Research Act of 1990 (GCRA), which then started the National Climate Assessment (NCA) (USGCRP n.d.). To date, four NCA reports have been published, with the GCRA commissioning their publication every four years by the USGCRP (USGCRP n.d.). These assessments provide a comprehensive look at the current state of the U.S. government climate change effort. While the NCAs are made available for everyone to peruse, they are especially intended to inform the President and Congress on the impacts of climate change on the United States (NOAA n.d.). On the international level, the USGCRP aligns the U.S. research effort with that of the global community, with the aim of fostering international scientific cooperation and assisting developing countries in expanding their adaptation capacity (USGCRP n.d.). In addition to the NCA, the USGCRP, under the DOS direction, also contributes to international climate assessment, such as the IPCC.

The United States Role in UNFCCC and The Berlin Mandate

The Bush administration's foremost climate contribution on the international level was ratifying the UNFCCC in 1992 at the Rio Earth Summit. The UNFCCC is governed by the Conference of Parties (COP)

and it laid the foundation for future international climate treaties, including the Kyoto Protocol and the Paris Climate Agreement (UNFCCC n.d.). The objective of the UNFCCC is to stabilize the concentration of greenhouse gases in the atmosphere “at a level that would prevent dangerous anthropogenic interference with the climate system” (United Nations 1992). This Convention is the earliest international treaty to address climate change and went into force on March 21, 1994. The UNFCCC recognized the principle of “common but differentiated responsibilities and respective capabilities” (CBDRRC) (Center for Climate and Energy Solutions n.d.). To implement the principle, the UNFCCC stated that developed countries, as listed in Annex I of the agreement, should lead the way as they have the major share of GHG emissions (UNFCCC n.d.). There was no specific binding target for signatory countries, but the Annex I countries are expected to reduce their GHG emission by 2000 to 1990 level while financially assisting developing countries to mitigate and adapt to climate change.

The Clinton administration played a significant role in the UNFCCC negotiations beginning in 1995 at the first COP meeting in Berlin. This meeting set a binding target and timeline for developed countries to reduce their GHG emissions. The Berlin Mandate, the agreement resulting from this negotiation, upheld the notion that developed countries should lead in climate action. Therefore, no new commitments were added to developing countries (Royden 2002). The latter part of the agreement became a point of contention between President Clinton and Congress because the U.S. Senate voted 95-0 on the Byrd-Hagel Resolution on July 25, 1997. The resolution asserted that “the United States should not be a signatory to any protocol that excludes developing countries from legally binding commitments or that causes serious harm to the U.S. economy” (Phillipson 2001). It was driven by intense lobbying from the energy industry and Congressional concern over the status of U.S. trade when more stringent emission reduction is implemented, particularly as developing competitors, namely China and India, are not obligated to reduce their emissions in turn (Royden 2002). The Clinton administration faced challenges from the opposite direction. Should the U.S. find a way to encourage developing countries to reduce their emissions, Congress would be more likely to ratify the agreement. In addition, the administration needed to set its own binding target to a level that would satisfy other participating nations (Royden 2002).

The United States Involvement in Kyoto Protocol

The Kyoto Protocol was adopted in 1997 during COP 3 and entered into force on February 16, 2005. The objective of the treaty was to provide signatory parties with ways to reduce the level of six GHGs emission between 2008 and 2012 (Phillipson 2001). Congress originally resisted signing the Kyoto protocol due to their concerns about the economic impact of reducing GHG and the lack of contribution by developing countries. Vice President Al Gore, on behalf of the Clinton administration, eventually signed the agreement in 1998 during COP 4 in Buenos Aires. With regards to the Byrd-Hagel Resolution, Senator Chuck Hagel claimed that Clinton “blatantly contradicted the will of the U.S. Senate” for signing the agreement (Royden 2002). Despite its rigorous efforts during the negotiation process, from reaching out to other countries to express the U.S. stance and form allies to creating a task force for U.S. Kyoto Strategy, the U.S. however never officially ratified the Kyoto Protocol (Royden 2002).

The U.S. fully exited the Kyoto Protocol during George W. Bush’s presidency. The Bush administration announced on April 27, 2001 that the terms agreed in the Protocol would not be implemented for three main reasons: 1) it would affect the U.S. economy negatively, 2) it has inadequate

commitment from developing countries, and 3) it was based on flawed scientific findings (Phillipson 2001). The Protocol was subsequently weakened without U.S. ratification. Since the U.S. contributed approximately 20-30% of total global greenhouse gas emissions, the Protocol could not take effect as it required more than 55 countries to ratify it and 55% of the total 1990 GHG emission should come from countries in Annex I (U.S. Rejection of Kyoto Protocol Process 2001). Without the U.S., the Protocol demanded other large emitters such as Russia and Japan to ratify the agreement for it to go into effect and targets were thus lowered to encourage the participation of other countries in the Protocol, further weakening the objective (Phillipson 2001).

The Major Economies Meeting on Energy Security and Climate Change

Bush introduced the Major Economies Meeting on Energy Security and Climate Change (MEM) on May 31, 2007 to address the defects of the Kyoto Protocol and plan a long-term goal of reducing GHG emission after the expiration of the Protocol in 2012. The Meeting first convened on September 27 and 28, 2007 involving representatives from Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, South Korea, South Africa, United Kingdom, the EU, the EC, and the UN. One of the focus for MEM is to expand research and development of clean energy technologies (The White House 2007). Aside from the MEM, the Bush administration did The Obama administration adopted Bush's MEM and launched it on March 28, 2009 by renaming it Major Economies Forum.

The Executive Order on Climate Resilient International Development

In 2014, Obama announced his international climate initiative through the Executive Order on Climate Resilient International Development. To achieve the program's goal of reducing the U.S. domestic and global GHG emission, all the U.S. department and agencies administering international development projects must incorporate "climate-resilience considerations into policies and procedures" under this executive order (Obama 2014). A working group co-chaired by the secretary of Department of Treasury and administrator of the USAID was established to achieve the goal. This working group also involved the participation of representatives from federal agencies responsible for direct international development programs and investments, science and security, and agencies participating in multilateral entities (Obama 2014).

Moreover, Obama pledged to contribute \$3 billion to the Green Climate Fund (GCF) on November 15, 2014. The GCF was established by the UNFCCC in 2010 to generate funding for least developed countries (LDCs), small island developing states (SIDs), and African states to mitigate and adapt to climate change. The fund aimed to mobilize USD 100 billion per year by 2020 from various sources, including UNFCCC parties and private entities (Green Climate Fund n.d.). In comparison with other contributors such as Japan and Germany that pledge \$1.5 billion and \$1 billion respectively, Obama had pledged the highest amount of contribution to the GCF (Green Climate Fund 2020). The United States, however, have only contributed \$1 billion to the fund and it is unlikely that the remaining \$2 billion pledge will be fulfilled under the Trump administration because of their views on climate action (Green Climate Fund n.d.).

The Global Climate Change Initiative

The Obama administration established the Global Climate Change Initiative (GCCII) to incorporate climate considerations in U.S. foreign development projects. Through bilateral, multilateral, and private

sector mechanisms, U.S. foreign aid projects under the GCCI aims “to promote sustainable and climate-resilient societies, foster low-carbon economic growth, and reduce greenhouse gas emissions from deforestation and land degradation” (Lattanzio 2015). Funding considerations for these programs were made based on the GCCI’s three main objectives: clean energy, sustainable landscape, and adaptation (USAID 2016). The programs were funded primarily through the Department of Treasury and the DOS budgets, along with USAID, thus illustrating the interagency effort of addressing climate issue abroad (USAID 2016). Figure 5.1 below summarizes the working framework of the program. Examples of the programs spearheaded by this initiative include Reducing Emissions from Deforestation and Degradation (REDD+) and Enhancing Capacity for Low Emission Development Strategies (EC-LEDS).

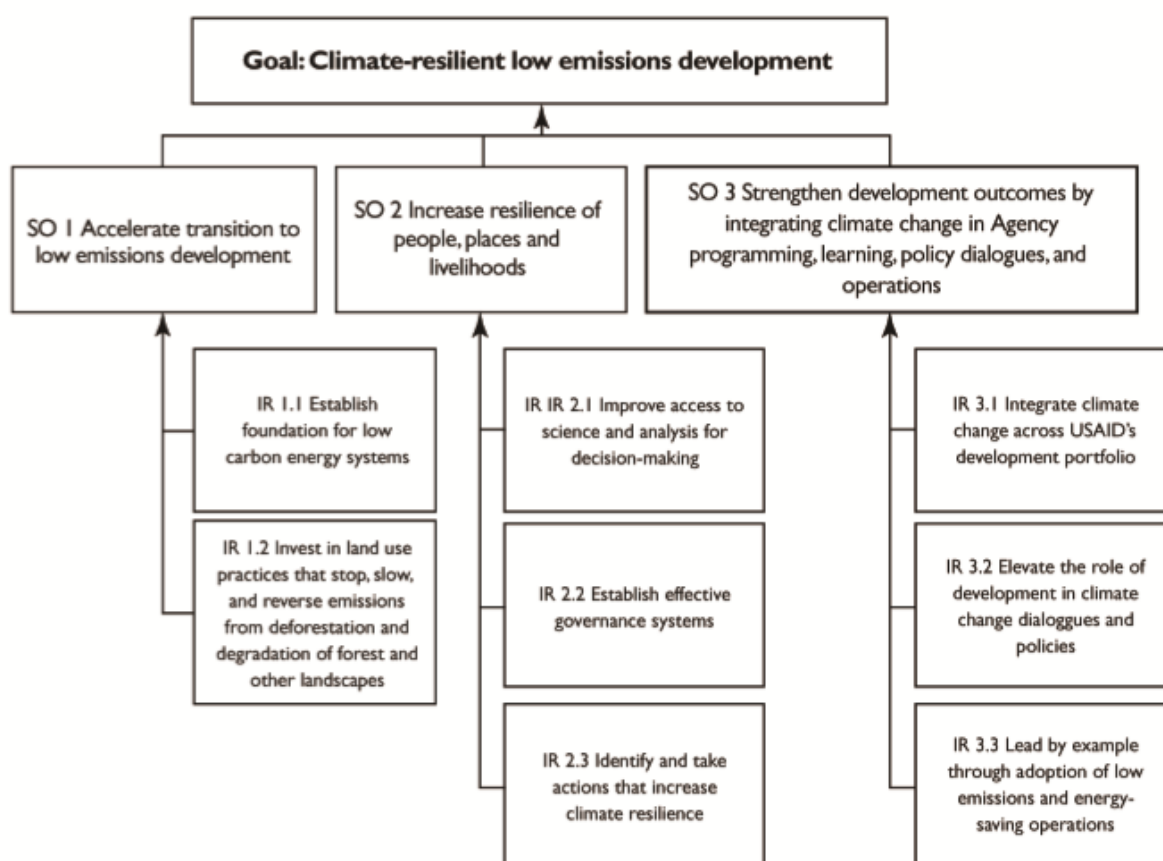


Fig. 5.1: USAID Climate Change and Development Results Framework

Source: USAID. 2016. *USAID CLIMATE CHANGE AND DEVELOPMENT STRATEGY 2012-2016*. Washington D.C.: U.S. Agency for International Development.

Considering that deforestation and forest degradation contributed 15% of global GHG emissions, the second largest source after fossil fuel consumption (USAID 2016), the REDD+ program was introduced as a cost-effective countermeasure to address the issue in key tropical forest landscapes such as the Amazon and Indonesia (Department of State 2010-2015). USAID’s work scope in REDD+ include supporting the Forest, Climate, and Community Alliance (FCCA) to assist communities in partnering

countries in managing forest landscape and responding to the market demand for forest-based carbon offsets. In Indonesia and Colombia, the REDD+ projects are expected to sequester at least 5 Mt CO₂e and 3 Mt CO₂e respectively per year over the next several years (Department of State 2010-2015).

Comparatively, the EC-LEDS is an initiative led by USAID and DOS with the help of other U.S. agencies aiming to assist partnering countries to “create, or improve their own long-term, economy-wide LEDS” through technical assistance and capacity building (USAID 2016). Unlike REDD+, EC-LEDS planned to cut GHG emission by reinforcing the countries’ ability to utilize their regional or indigenous clean energy resources such as solar and wind and improving their infrastructure to increase efficiencies (USAID 2016). The list of countries partnering with the U.S. on the EC-LEDS programs are as follows:

- Africa: Ethiopia, Gabon, Kenya, Malawi, South Africa, and Zambia
- Asia: Bangladesh, Cambodia, Indonesia, Kazakhstan, Philippines, Thailand, and Vietnam
- Latin America: Colombia, Costa Rica, Guatemala, Jamaica, Mexico, and Peru

The program benefitted partnering countries’ national GHG inventory system as can be seen in the passing of the “INFOCARBONO” law in Peru which establishes a national GHG inventory system and the improvement in accuracy of the system in the Philippines (Department of State 2010-2015). The program also helped Gabon developed a forest-monitoring system and gathered forest-cover data which resulted it to become the second developing country and the first in Africa to submit its Intended Nationally Determined Contribution (INDC) to the UNFCC (Department of State 2010-2015).

Bilateral Climate Agreements under the Obama Administration

Several bilateral climate agreements were made with other countries during Obama’s administration as part of its international climate initiative. These countries include China, India, and Brazil. Within the bounds of these agreements, the U.S. agreed to reduce their GHG emissions 26-28% by 2025 and China agreed to cap their emissions by 2030. The U.S. and India established a five-year memorandum of understanding energy security, clean energy and climate change. Brazil consented to replant 12 million hectares of rainforest by 2030 as well (Gutin and Ingargiola 2015). The agreements set a precedent to strengthen international cooperation before the UNFCC COP21 meeting in Paris in December 2015. As a result of these bilateral agreements, Obama submitted the U.S. INDC to UNFCC, reiterating the deal of 26-28% GHG reduction by 2025.

The Paris Climate Agreement

The Paris Climate Agreement set a more defined goal than the Kyoto Protocol, to “limit the global temperature increase in this century to 2 degrees Celsius above preindustrial levels, while pursuing means to limit the increase to 1.5 degrees” (UNFCC n.d.). It was adopted on December 12, 2015 after 195 world leaders agreed to its terms for combatting climate change, and officially went into effect on November 4, 2016. The principle of CBDRRRC formerly included in the UNFCC and Kyoto Protocol was maintained with the creation of the Paris Agreement. In addition, it obliged developed countries to assist with the commitment to climate action made by developing nations. The U.S. official participation in the Paris Agreement took place on September 2016, in which President Obama signed onto the accord through

executive action (Denchak 2018). The U.S. participation in the Paris Agreement is important because it signifies the U.S. serious commitment in tackling climate change, maintains good diplomatic relations with other countries, secures jobs as transition to renewable energy began, and ensures other countries committed to their NDCs (Waskow and Light 2017).

However, once President Trump entered office, he kept his campaign promise to withdraw the U.S. from the Paris Agreement. The withdrawal was announced on June 1, 2017 but will officially become operative on November 4, 2020. Trump also revoked Obama's executive order on Climate Resilient International Development, replacing it with an executive order on Promoting Energy Independence and Economic Growth. His decision resembled the positioning of George W. Bush administration's international climate policies, similarly, withdrawing from an international climate agreement and repealing the previous administration's policies on the environment and climate. Believing that the Paris Agreement would impose "draconian financial and economic burdens" to the U.S., President Trump described the Agreement as "less about the climate and more about other countries gaining a financial advantage over the United States" (The White House 2017). However, he stated that the U.S. would consider re-entering the Agreement should a fairer consensus are achieved through future negotiations (The White House 2017).

Without U.S. participation, other countries, may be discouraged to achieve their Nationally Determined Contributions (NDCs) as per the Paris Agreement (Zhang, et al. 2017). This may jeopardize the success of the agreement, as can be seen in the case of Kyoto Protocol, where the lack of countries consensus led to the failure of the climate treaty. On the one hand, countries who emit way less GHG than the U.S. may feel dissuaded as they are not accountable for much of the emission. On the other hand, other major emitter such as China may also dismiss its NDC because if a country that hold a fair share of emission resolve to inaction for economic gain, why should they suppress their economic growth by slowing down their operation? In either situation, the United States withdrawal have set a bad precedent to the global community as an international role model in global climate affairs.

The Trump Administration's International Climate Action

Under President Trump, internationally focused climate contributions from the Obama era have diminished or ceased. Financial contributions to Obama's Global Climate Change Initiative and the Green Climate Fund have been entirely abandoned. Similar to the EPA, the DOS and USAID also suffered a massive budget cut (Thwaites 2019). In 2018, the funding used for climate development projects abroad was cut by 28.7% from the previous year (Zhang, et al. 2017). Figure 5.2 presents the trend in U.S. international spending on climate change programs between 2016 and 2020.

The reduction of funding for U.S. climate-related programs is detrimental to the world as it limits the extent of climate research and capacity for foreign climate assistance projects to be executed (Zhang, et al. 2017). The U.S. is the frontrunner in global climate research, from producing more than a third of the world's climate change papers between 2010 and 2016 to housing the top 10 organizations, all of which are U.S. government agencies, that contribute the most to climate literature (Zhang, et al. 2017). Without substantial budget, these agencies will not be able to conduct extensive climate research, which

may put the U.S. behind the rest of the world as they are quickly catching up. Similarly, Trump's decision to put a halt on most foreign climate projects will hinder the developing countries' ability to mitigate and adapt to climate threats (Zhang, et al. 2017). This will not only affect the communities in the affected regions, but also the world as a whole because the lack of infrastructures will delay the effort to reduce the global GHG emission.

U.S. Climate-Related International Spending, FY2016-2020



 WORLD RESOURCES INSTITUTE

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Fig. 5.2: U.S. International Spending on Climate Change Programs

Source: Thwaites, Joe. "2020 Budget Shows Progress on Climate Finance, But U.S. Continues to Fall Behind Peers." World Resources Institute, January 30, 2020.

<https://www.wri.org/blog/2020/01/2020-budget-shows-progress-climate-finance-us-continues-fall-behind-peers>.

Conclusion

While effective climate governance begins domestically, the status of the U.S. as a principal carbon emitter, as well as its breadth of influence and resources, make involvement in international climate affairs equally essential for the U.S. government. The United States international response to the climate crisis has fluctuated over the years and throughout the course of varying administrations. At time where other countries are making climate change their main priority in policy making, the United States is failing to adequately address this exigency. For the U.S. to maintain its influence in the international system, it needs to create and fully commit to comprehensive international climate action.

References

- Center for Climate and Energy Solutions. n.d. History of UN Climate Talks. Accessed January 15, 2020. <https://www.c2es.org/content/history-of-un-climate-talks/>.
- Denchak, Melissa. 2018. Paris Climate Agreement: Everything You Need to Know. December 12. Accessed February 9, 2020. <https://www.nrdc.org/stories/paris-climate-agreement-everything-you-need-know>.
- Department of State. 2010-2015. "Overview of the Global Climate Change Initiative." Washington D.C. <https://2009-2017.state.gov/documents/organization/250737.pdf>.
- Green Climate Fund. n.d. How We Work: Resource Mobilization. Accessed January 25, 2020. <https://www.greenclimate.fund/how-we-work/resource-mobilization>.
- "Status of Pledges and Contributions (Initial Resource Mobilization)." 2020. Green Climate Fund. February 3. Accessed February 12, 2020. <https://www.greenclimate.fund/sites/default/files/document/5-status-pledges-all-cycles-website-03feb20-rev1.pdf>.
- Gutin, Ori, and Brendan Ingargiola. 2015. Fact Sheet - Timeline of Progress Made in President Obama's Climate Action Plan. August 5. Accessed February 9, 2020. <https://www.eesi.org/papers/view/fact-sheet-timeline-progress-of-president-obama-climate-action-plan>.
- Lattanzio, Richard K. 2015. The Global Climate Change Initiative (GCCI): Budget Authority and Request, FY2010-FY2016. Congressional Research Service. <https://fas.org/sgp/crs/misc/R41845.pdf>.
- NOAA. n.d. What is the National Climate Assessment (NCA)? Accessed February 12, 2020. <https://www.climate.gov/teaching/what-national-climate-assessment-nca.4>
- Obama, Barack. 2014. Executive Order -- Climate-Resilient International Development. September 23. Accessed February 5, 2020. <https://obamawhitehouse.archives.gov/the-press-office/2014/09/23/executive-order-climate-resilient-international-development>.
- Phillipson, Martin. 2001. "The United States Withdrawal from the Kyoto Protocol." *Irish Jurist* 288-304.
- Royden, Amy. 2002. "U.S. Climate Change Policy Under President Clinton: A Look Back." *Golden Gate University Law Review*. <http://digitalcommons.law.ggu.edu/ggulrev/vol32/iss4/3>.

- The White House. 2007. "Fact Sheet: Major Economies Meeting on Energy Security and Climate Change." The White House. September 27. Accessed February 10, 2020. <https://georgewbush-whitehouse.archives.gov/news/releases/2007/09/20070927.html>.
- What is the United Nations Framework Convention on Climate Change? 2015. March 31. Accessed February 9, 2020. <https://obamawhitehouse.archives.gov/the-press-office/2015/03/31/fact-sheet-us-reports-its-2025-emissions-target-unfccc>.
- Statement by President Trump on the Paris Climate Accord. 2017. June 1. Accessed February 9, 2020. <https://www.whitehouse.gov/briefings-statements/statement-president-trump-paris-climate-accord/>.
- Thwaites, Joe. 2019. US Climate Finance Improves with 2019 Budget, But There's Still a Long Way to Go. February 20. Accessed January 25, 2020. <https://www.wri.org/blog/2019/02/us-climate-finance-improves-2019-budget-theres-still-long-way-go>.
- UNFCC. n.d. About the Secretariat. Accessed February 12, 2020. <https://unfccc.int/about-us/about-the-secretariat>.
- The Paris Agreement. n.d. Accessed February 10, 2020. <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>.
- What is the United Nations Framework Convention on Climate Change? n.d. Accessed February 12, 2020. <https://unfccc.int/process-and-meetings/the-convention/what-is-the-united-nations-framework-convention-on-climate-change>.
- United Nations. 1992. United Nations Framework Convention on Climate Change. New York: United Nations.
2001. "U.S. Rejection of Kyoto Protocol Process." *The American Journal of International Law* (Cambridge University Press) 95 (3): 647-650.
- USAID. 2016. USAID CLIMATE CHANGE AND DEVELOPMENT STRATEGY 2012-2016. Washington D.C.: U.S. Agency for International Development.
- USGCRP. n.d. About USGCRP. Accessed January 25, 2020. <https://www.globalchange.gov/about>.
- n.d. Fourth National Climate Assessment. Accessed February 12, 2020. <https://www.globalchange.gov/nca4>.
- Waskow, David, and Andrew Light. 2017. The Paris Agreement: Should the U.S. Stay or Should It Go? April 17. Accessed February 22, 2020. <https://www.wri.org/blog/2017/04/paris-agreement-should-us-stay-or-should-it-go>.

Zhang, Yong-Xiang, Qing-Chen Chao, Qiu-Hong Zheng, and Lei Huang. 2017. "The Withdrawal of the US from the Paris Agreement and its Impact on global climate change governance." *Advances in Climate Research* 213-219.

Chapter 6

Departmental Necessity

The Limitations of the EPA and Establishing a New Federal Response

Mary Cho

Background

While the federal government has made strides in addressing the environmental issue of pollution, such a response to address climate change is still lacking. Intended to “make a coordinated attack on the pollutants which debase the air we breathe, the water we drink, and the land that grows our food”, the Environmental Protection Agency was established in 1970 as the U.S. federal government’s response to the environmental threats of pollution in the air and water (Reorganization Plan No.3 of 1970 2016). Under the initial jurisdiction of the Clean Air Act (CAA), the Environmental Protection Agency specifically regulated six common pollutants that have been found to harm human health and the environment, and cause property damage, not greenhouse gasses that primarily drive climate change (Criteria Air Pollutants 2018). This initial mandate to address pollutants acts as the foundation for the EPA’s mission to “protect human health and the environment”. However, despite the 2007 Supreme Court case ruling that determined greenhouse gasses to be a pollutant under the Clean Air Act, the initial mandate limits the agency’s ability to regulate greenhouse gasses, and subsequently address climate change. (Our Mission and What We Do 2018). The climate change crisis continues to evolve requiring an effective, comprehensive, and streamlined response at the highest level of the federal government. For such a response, the federal government must create a new cabinet level department, entitled the Department of Climate Change (DCC).

As the EPA appears to be the primary government entity responsible for enforcing legislation to curb greenhouse gas emissions, this chapter will make the case that climate change is a pressing global crisis that is inadequately addressed by the EPA, requiring the establishment of the DCC in the Executive Branch. In the first section of the chapter, the EPA’s successes in addressing pollution and limitations in addressing greenhouse gasses will be examined. In doing so, the CAA will be examined to analyze the EPA’s current approach to greenhouse gasses. Further, it will analyze the implications of *Massachusetts v. Environmental Protection Agency*, the Supreme Court case ruling that deemed Carbon Dioxide as a pollutant under the regulatory authority of the EPA. In the second section, past intergovernmental issues and previous attempts to elevate the EPA to a Cabinet department will be examined to support the notion that a cabinet level department best serves the mission of addressing climate change at the federal level. The rationale used in such efforts will be used to justify the need for the DCC.

Successes and Limitations of the EPA



Figure 6.1 Smog in New York City: 1973 vs. 2013. Source: Environmental Protection Agency. 2020. "History of Reducing Air Pollution from Transportation in the United States." Last modified January 23. <https://www.epa.gov/transportation-air-pollution-and-climate-change/accomplishments-and-success-air-pollution-transportation>

Acting as one of the foundational laws that gives the EPA regulatory authority, the Clean Air Act required the EPA to control six common pollutants which, at the time of the 1970 amendments, formed dense, visible smog in many of the nation's cities and industrial centers -- particulate matter (also known as particle pollution), ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, and lead (See Figure 6.1). By setting and enforcing National Ambient Air Quality Standards (NAAQS), the EPA mitigated the negative effects that these "criteria pollutants" have on the public health, land, and cause property damage. The Act also contained key provisions that aimed to minimize increases in pollution from mobile and stationary sources (Clean Air Act Requirements and History 2017). Other provisions were added to the law in the CAA Amendments of 1977 and 1990 in order to address the new environmental threats of toxic air pollutants, acid rain, emissions that deplete the stratospheric ozone layer, and regional haze (1990 Clean Air Act Amendment Summary 2017).

Since enactment the CAA has saved many lives and reduced levels of pollution-related illness and injury nationwide (Benefit and Costs of the Clean Air Act 2017). Millions of Americans face lower risks of premature death and other adverse health effects, such as skin cancer and cataracts. Despite such success, the EPA was not mandated nor set up to address the greenhouse gasses that primarily fuel climate change, such as Carbon Dioxide and Methane (Air Pollution: Current and Future Challenges 2019). Whether greenhouse gases were under the jurisdiction of the EPA at all was a controversy up until 2007. Following the Supreme Court Case decision, *Massachusetts v. Environmental Protection Agency*, that deemed greenhouse gasses as pollutants under the regulatory jurisdiction of the EPA set out in the CAA, the EPA took its first steps to address pollution in 2009 with the publishing of a scientific determinant that greenhouse gases driving climate change do in fact endanger the health and welfare of the public. By doing so, the EPA initiated its meager first steps into addressing greenhouse gasses and subsequently, climate change. In addressing the climate change crisis today, the EPA regulates greenhouse gas emissions from mobile sources, including cars, trucks, and busses. Additionally, they control greenhouse gasses from large stationary sources, such as power plants. The Agency also partners with the private sector through

voluntary partnerships (What EPA Is Doing about Climate Change 2017). Despite such efforts, studies have found that the greenhouse gas emissions have continued to significantly increase (Global Greenhouse Gas Emissions Data 2019).

Today, science shows that the U.S. federal government cannot afford to address climate change by tacking on greenhouse gas provisions as a mere afterthought to the EPA's original mandate. Greenhouse gases from human activities are the most significant driver of observed climate change since the mid-20th century. Carbon Dioxide is the primary greenhouse gas emitted through human activities (see Figure 6.2). Studies have found that the increase in the atmospheric concentration of Carbon Dioxide since the 1750s has played the largest role in driving climate change (Alexander et al. 2013). Additionally, in 2010 global energy-related carbon-dioxide (CO₂) emissions reached an all-time high of 30.6 gigatonnes, and global greenhouse gas emissions are predicted to increase. The OECD predicts that without more ambitious policies than those in force today, GHG emissions will increase by another 50% by 2050, resulting in detrimental effects on the national security, public health, and economic prosperity of the United States (see Figure 6.3) (OECD Environmental Outlook to 2050 2011). It is clear that a response at the highest level of government is needed to address the pressing crisis of climate change. Such a response should entail the establishment of the DCC.

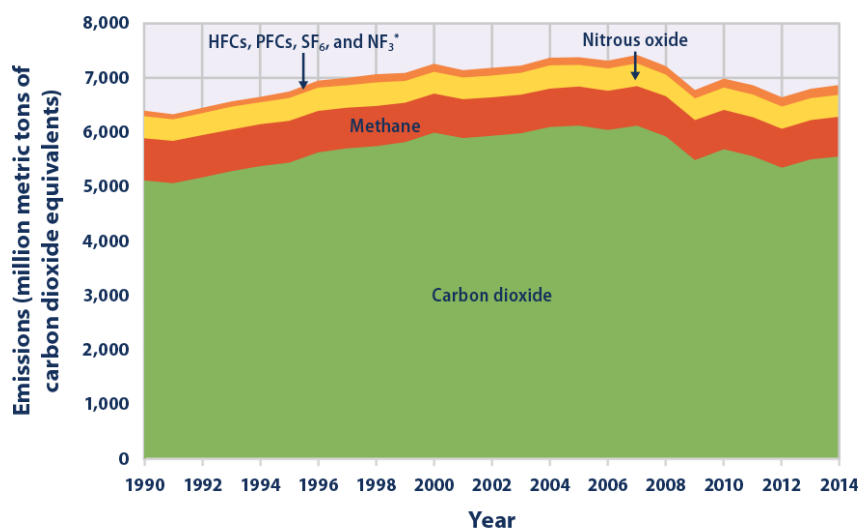
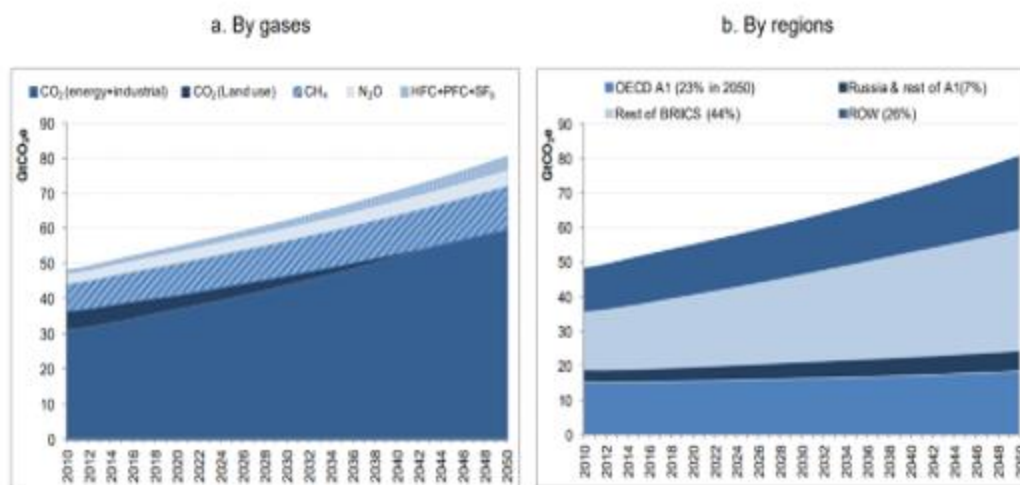


Figure 6.2 U.S. Greenhouse Gas Emissions by Gas, 1990–2014 *Source:* Environmental Protection Agency. 2016. "Climate Change Indicators: U.S. Greenhouse Gas Emissions." Last modified December 17. <https://www.epa.gov/climate-indicators/climate-change-indicators-us-greenhouse-gas-emissions>

Emissions: Baseline by Gas, 2010-2050

Figure 3.5. GHG emissions: Baseline, 2010-2050



Source: OECD Environmental Outlook Baseline; output from IMAGE/ENV Linkages.

Figure 6.3 Emission: Baseline by gas, 2010-2050 Source: OECD. 2011. "OECD Environmental Outlook to 2050 Climate Change Chapter." November 11. <https://www.oecd.org/env/cc/49082173.pdf>

Significance of Establishing a Cabinet Department

National priorities of the United States can be seen in the responsibilities of each Cabinet department. For example, the national fight against the threat of terrorism following the 9/11 attacks can be reflected in the creation of the Department of Homeland Security (Creation of the Department of Homeland Security 2015). In a similar manner, climate change is a global threat that will most effectively be addressed through the establishment of a Cabinet level department. Establishing the DCC will have symbolic and practical implications, allowing for greater intergovernmental coordination in enforcing climate change legislation.

Intergovernmental Coordination

Establishing the DCC as a Cabinet Department will allow the Department to effectively enforce legislation aimed to control climate change by allowing the new department to establish healthy working relationships with relevant government departments. Establishing the Department at the highest level of government will elevate the issue of climate change as a national priority, signaling to relevant government entities that the DCC warrants respect. As an example, the EPA has previously faced significant difficulties in enforcing greenhouse gas legislation with a Cabinet level department, the Department of Justice (DOJ), due to the organizational power imbalances between a Cabinet department and a federal agency (see Figure 6.3). While pursuing federal environmental judicial enforcement, EPA bureaucrats have previously claimed that DOJ attorneys can be viewed as "high handed", "arbitrary", and "nitpicking" in their dealings with the EPA's regional enforcement staff, highlighting the power imbalance between a department and an agency (Mintz 2012). In the words of former EPA Administrator Christine Todd Whitman, "Unfortunately, there are some within bureaucracies in Washington who will kind of look down their nose at an agency -- 'You're an agency, not a department. So you don't get quite the same

respect from time to time.” (Another Earth Day 2014). This power imbalance is further highlighted in the President’s Cabinet. The Administrator of the EPA customarily has a Cabin rank seat within the Cabinet, but not a Cabinet seat, a position that heads of Cabinet departments along with the Vice President enjoy (The Cabinet n.d.). Establishing a separate DCC as a Cabinet department will allow the Department to work collaboratively with relevant government entities to effectively address climate change.

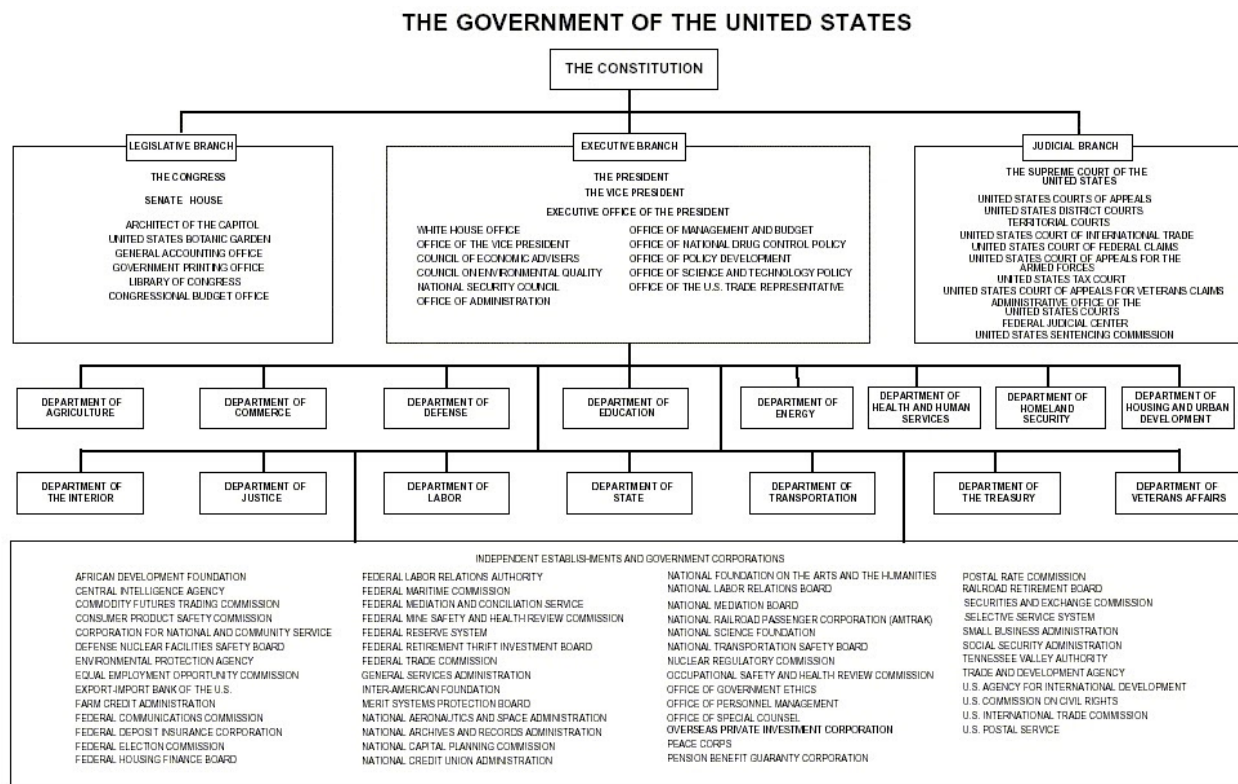


Figure 6.3 Federal Government Chart

Source: U.S. Government Manual. 2017. “Organizational Chart of the U.S. Government.

<https://www.usgovernmentmanual.gov/ReadLibraryItem.ashx?SFN=Myz95sTyO4rJRM/nhIRwSw==&SF=VHhnrOeEAnGaa/rtk/JOg=>

Internationally, the creation of DCC would enable an environment official of ministerial status under the federal government infrastructure to collaborate with the Secretary of State in negotiations with equal counterparts in the governments of other nations. Congress has already recognized the increasing need for international cooperation to effectively combat environmental issues in the initial attempts to reestablish the EPA to a Cabinet department, entitled the Department of Environmental Protection Affairs. They also recognized the federal government’s failure to appoint an equal environmental official with ministerial status like those of other highly industrialized nations (Department of Environmental Protection Affairs Act 2001). Creating a DCC will not only allow for greater intergovernmental coordination domestically, but it will also produce an environmental official with the authority to address climate change in the necessary multilateral matter.

Previous Efforts to Establish a Cabinet Department

Government officials previously saw the significance of establishing a Cabinet department to address environmental concerns when they attempted to elevate the EPA to a Cabinet level department, entitled the Department of Environmental Protection Affairs. Congress found that based on the findings that the “protection of public health and the environment is a mission of at least equal importance to the duties carried out by cabinet-level departments” (Department of Environmental Protection Affairs Act 2001). This further highlights the relatively higher ranking that Cabinet Departments have within the executive branch. Attempts to reestablish the EPA as a Cabinet department recognized the increasingly complex nature of environmental issues and the dangers they pose and that elevating the environmental issues to the highest level of government was required in order to address these issues. Today, these environmental issues would include climate change. Therefore, the same rationale used to justify the creation of the Department of Environmental Protection Affairs can be applied regarding the establishment of the DCC.

Conclusion

While the federal government of the United States has made strides in addressing environmental issues such as pollution through the creation of the EPA, such a response at the federal level is still lacking to address the climate change crisis. Despite the incorporation of greenhouse gas mitigation provisions into the Clean Air Act in the early 2000s, the EPA is still in the early stages of tackling climate change, while greenhouse gas concentrations in the atmosphere worsen and are projected to have continued adverse effects on the national security, public health and economic prosperity of the United States and the world. To address such a threat, the United States must establish the Department of Climate Change as a Cabinet department in order to increase government coordination in the enforcement of climate change policies.

- The EPA was not initially mandated nor set up to address climate change.
- The rate at which the climate is changing cannot be addressed by the EPA’s current response to climate change.
- A response at the highest level of government is necessary to address climate change. Such a response should entail the establishment of the Department of Climate Change.
- Such an establishment would elevate the issue of climate change as a national priority and increase governmental coordination domestically through the establishment of healthy working relationships between relevant government agencies.
- Further, such an establishment will create an environmental official of ministerial status who can work with the Secretary of State and other global officials in addressing climate change internationally.

References

- Department of Homeland Security. 2015. "Creation of the Department of Homeland Security. Last modified September 24, 2015. <https://www.dhs.gov/creation-department-homeland-security>
- E&E News. 2014. "Another Earth Day, and still no Cabinet status for leading U.S. enviro agency" Published April 22. <https://www.eenews.net/stories/1059998242>
- Environmental Protection Agency. 2016. "Climate Change Indicators: U.S. Greenhouse Gas Emissions." Last modified December 17. <https://www.epa.gov/climate-indicators/climate-change-indicators-us-greenhouse-gas-emissions>
- Environmental Protection Agency. 2016. "Reorganization Plan No. 3 of 1970." Last Updated November 16. <https://archive.epa.gov/epa/aboutepa/reorganization-plan-no-3-1970.html>
- Environmental Protection Agency. 2017. "1990 Clean Air Act Amendment Summary." Last modified January 3. <https://www.epa.gov/clean-air-act-overview/1990-clean-air-act-amendment-summary>
- Environmental Protection Agency. 2017. "Benefit and Costs of the Clean Air Act." Last modified January 4. <https://www.epa.gov/clean-air-act-overview/benefits-and-costs-clean-air-act-1990-2020-second-prospective-study>
- Environmental Protection Agency. 2017. "Clean Air Act Requirements and History." Last modified January 13. <https://www.epa.gov/clean-air-act-overview/clean-air-act-requirements-and-history>
- Environmental Protection Agency. 2017. "What EPA Is Doing about Climate Change". Last modified May 9. <https://archive.epa.gov/epa//climatechange/what-epa-doing-about-climate-change.html>
- Environmental Protection Agency. 2018. "*Criteria Air Pollutants*." Last modified March 8. <https://www.epa.gov/criteria-air-pollutants>
- Environmental Protection Agency. 2018. "*Our Mission and What We Do*." Last modified February 7. <https://www.epa.gov/aboutepa/our-mission-and-what-we-do>
- Environmental Protection Agency. 2019. "Air Pollution: Current and Future Challenges." Last modified September 17. <https://www.epa.gov/clean-air-act-overview/air-pollution-current-and-future-challenges>
- Environmental Protection Agency. 2019. "Global Greenhouse Gas Emissions Data". Last modified September 13. <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>

Environmental Protection Agency. 2020. "History of Reducing Air Pollution from Transportation in the United States." Last modified January 23. <https://www.epa.gov/transportation-air-pollution-and-climate-change/accomplishments-and-success-air-pollution-transportation>

IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_SPM_FINAL.pdf

Mintz, Joel. 2012. "EPA And The Challenges Of Enforcing Future Greenhouse Gas Legislation". *US-China Law Review*. 9(2), pp.73-92. https://heinonline-org.offcampus.lib.washington.edu/HOL/Page?collection=journals&handle=hein.journals/uschinalrw9&id=84&men_tab=srchresults

OECD. 2011. "OECD Environmental Outlook to 2050 Climate Change Chapter." November 11. <https://www.oecd.org/env/cc/49082173.pdf>

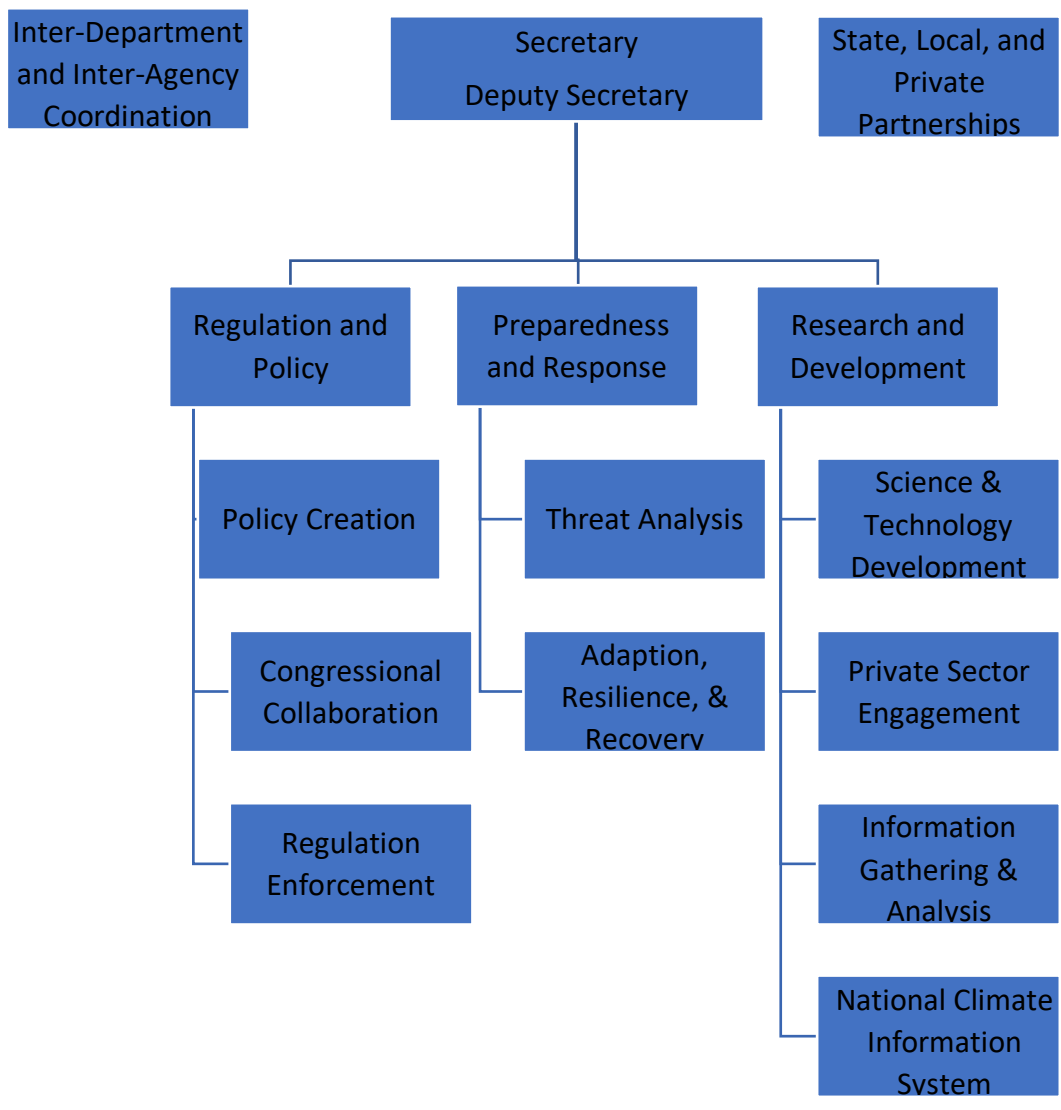
The White House Archive. "The Cabinet". <https://obamawhitehouse.archives.gov/administration/cabinet>

U.S. Congress, Senate, *Department of Environmental Protection Affairs Act of 2001*, S.159, 107th Congress. . Introduced in Senate January 23, 2001. <https://www.congress.gov/bill/107th-congress/senate-bill/159>

U.S. Government Manual. 2017. "*Organizational Chart of the U.S. Government*". <https://www.usgovernmentmanual.gov/ReadLibraryItem.ashx?SFN=Myz95sTyO4rJRM/nhIRwSw==&SF=VHhnJrOeEAnGaa/rtk/JOg=>

Department of Climate Change Overview

Department of Climate Change Organizational Chart
Gabriel Collins



Research and Development

The R&D branch of the Department of Climate Change will support and develop countermeasures to climate threats in a manner that supports national interests while minimizing economic costs. It will do this by consolidating and collaborating on the creation and distribution of existing research and development efforts both intergovernmentally and with the private sector. The DCC will further encourage climate-related technological innovation in the private sector by utilizing

congressionally appropriated and/or externally acquired funds to distribute grants. Department research will involve advancement in the following areas:

- Research on the state of the climate crisis and its impacts on natural and human-built systems
- GHG capture, reduction, and storage
- Renewable energy (hydroelectric, solar, wind, geothermal, tidal, nuclear, biofuels) proliferation
- Technological and infrastructural resilience and adaptation efforts

Policy and Regulation

Proper regulation enforcement and policy guidance will be necessary to ensure climate change-related goals are enforced. The Department will create regulations governing GHG emissions, waste disposal, and business practices across the local, state, and federal levels. The Department will also issue policies and incentives to assist public and regulated entities engage in environmentally conscious practices and further U.S. ambitions of carbon neutrality. The DCC will aim to issue regulations which pose a minimal economic and social burden on U.S. industry and the public.

Emergency Preparedness and Response

Adaption, Resilience, and Recovery

The Department will oversee domestic government assistance in conjunction with FEMA and other federal entities to develop emergency preparedness and response measures in preparation for emergency multiplication and exacerbation due to climate change. The Department will guide local, state, and national authorities in adaptive and resilience measures, along with recovery planning. Domestic stakeholders will also receive direction on critical response measures after catastrophic events such as hurricanes and floods. Lastly, the Department will coordinate with the Department of Homeland National Response Plan considering wide-scale natural disasters.

Threat Analysis

The Department of Climate Change will assess, monitor, and consolidate threat information concerning industry, state, and local authorities, providing warnings and recommendations for adaptive and mitigating actions by key stakeholders. Furthermore, the Department will create a publicly available threat assessment database in order to ensure the dissemination of information crucial for climate change adaptation and risk reduction.

The DCC would be responsible for evaluating risks critical to domestic stability, such as food supply chains, water systems, agriculture, healthcare, transportation, and financial markets. By coordinating across industries, federal entities, and state and local authorities, the Department will ensure the proper steps are taken to protect U.S. national interests against threats posed by climate change.

Chapter 7

Departmental Overview

Research and Development

Sarah Smiley

Background

A robust research and development (R&D) division will be central to achieving the mission of the DCC. Research that advances scientific understanding of climate change and its impacts on the U.S. is essential for the development of technological and policy-based countermeasures. These countermeasures are designed to effectively and economically facilitate emissions reduction and counter climate impacts with minimum economic costs and maximum benefits. To make this possible, R&D must have consistent support in funding, facilities, programs, and personnel. It has been proven time and again that such consistency is essential to the success of any large-scale, knowledge-based effort. At the same time, such an effort is heavily penalized when broken up and scattered amongst a variety of authorities, each with its own mission and priorities.

For these reasons, R&D regarding climate change must be centralized under one government entity, as will be provided by the DCC. Currently, federal research related to climate change and its impacts is divided between the 13 agencies under the United States Global Research Program (USGCRP), each with a different mission and specific applications. This division of research is inefficient and hinders the government's ability to develop and enact efficient responses to the climate crisis. Consolidating climate-related research under the Department of Climate Change is needed in order to maximize benefits to national security, the U.S. economy, and the public. The R&D branch of the DCC will maximize these benefits in several ways: by improving the flow and translation of scientific findings between researchers to policymakers; engaging in public-private partnerships; and using scientific findings to inform adaptation, resilience, and mitigation efforts at all levels of government.

Consolidating Research

While the USGCRP facilitates coordination between varying climate research programs, it is not a research body in and of itself. Research is still directly led by their respective agencies and departments, which means that they are operating under different objectives (U.S. Government Accountability Office 2015, 15). The USGCRP is responsible for consolidating the findings of each of its member agencies and making this collected information accessible to both policymakers and the public. However, the existing distribution of climate-related research programs throughout different government agencies leaves these programs vulnerable to the biases of their respective agencies. This means that climate change resilience, adaptation, and prevention are not necessarily prioritized in the respective departments' pursuits of their missions. There are a number of existing climate research programs, all of which are connected through the USGCRP, that are better suited to operate directly

under the proposed department. One such example of this is the National Oceanic and Atmospheric Administration (NOAA), which is housed under the Department of Commerce.

The creation of the Department of Climate Change would transfer these programs to the DCC to facilitate improved coordination between operations covering different topics and regions. Centralizing research into a single department would allow for a well-rounded, unbiased understanding of what actions should be taken to minimize the harmful effects of climate change. The process of consolidation would then dissolve the need for the USGCRP, as both direct climate R&D efforts and intergovernmental communication and exchange on these efforts would be absorbed by the new department.

Currently, the USGCRP structure is such that “member agencies feed their stakeholders’ interests and needs into the USGCRP strategic planning process, including [the triennial updates] and the development of annual interagency priorities, which involve the production of actionable science and informing stakeholders” (U.S. Global Change Research Program 2017, 81). The DCC will operate under a different structure to reduce departmental and agency bias; it will conduct research on climate change and its effects and use these findings to advise departments and agencies on addressing climate change in their missions. To maintain intergovernmental cooperation, each research program will have representatives acting as intermediaries between that working group and other entities to whom the working group is relevant. For example, a body that researches renewable energy sources will coordinate with the Department of Energy to reduce redundancy in research pursuits, share resources and findings. Interagency coordination will allow departments and agencies to communicate with the DCC to suggest research projects that they deem necessary. This structure will serve to centralize the objectives of climate research while still allowing other departments and agencies to maintain some influence regarding research areas.

Research consolidation under the DCC would also allow scientific findings regarding climate change to be in contact with a departmental policy office. This would create a more direct line between researchers and policymakers and ensure that findings regarding the impacts of climate change will be considered in future legislation. One of the current issues for decision makers regarding climate change is the lack of a national information system to translate scientific findings into an accessible format. Beyond policymakers, this national climate change information database would be accessible to all levels of government. This will improve the nation’s ability to keep policy up to date with developments in the understanding of climate-related threats.

One exception of research programs not to be transferred are those within the Department of Energy (DOE), since this department has extensive resources and funding that it directs toward the research of renewable energies and innovative energy technologies. The National Energy Technology Laboratory is already well-established under the DOE and will not be transferred to the DCC. Because of the overlap between energy and climate research, there will be extensive interagency coordination between the DOE and DCC in the form of collaborative research, information sharing, and policy advising.

Focus Areas for Research and Development

The Department of Climate Change will perform research to advance the nation's understanding of climate change and its effects, and to develop solutions for mitigation. The Department's research will build upon that of the USGCRP and will adopt the responsibility of publishing National Climate Assessments. National Climate Assessments report the findings of the USGCRP's research and provide a comprehensive list of the highest risks of climate change. The DCC will continue to evaluate these risks and further research to respond to these vulnerabilities through mitigation and adaptation efforts. More specifically, the DCC's research will prioritize the following actions:

- Detecting patterns and changes in atmospheric and oceanic temperatures
- Monitoring and predicting sea level rise
- Observing changes in weather patterns (i.e. precipitation, droughts, wildfires, and hurricanes)
- Measuring the level of GHGs in the atmosphere
- Identifying impacts of climate change on society (i.e. food security, human health, agriculture, water supply, transportation, energy, and ecosystems (USGCRP 2018))
- Identifying impacts of climate change on the economy and industry
- Understanding the interconnected impacts of climate change and the threat multiplication effect of climate change
- Comprehending how climate change impacts worldwide will further affect the U.S.
- Advancing and developing infrastructure to be resilient in the face of natural disasters

The Department will use this research to develop technologies and systems for climate change adaptation, mitigation, and resilience to better prepare the nation for the effects of climate change. This includes advancing renewable energies, improving emergency preparedness measures, and developing technologies to reduce the amount of GHGs in the atmosphere.

It is important to note that because the effects of climate change vary by region, intensity, and duration, the Department must be comprehensive in its research and coordinate with all levels of government. Some impacts of climate change, like sea level rise, are gradual and wide-reaching and will need to be continually monitored, while others, such as California's 2018 wildfires, may be short term and localized but extremely destructive. Therefore, collaboration with all levels of government is needed to ensure that regional and local concerns are understood and addressed. Further, due to the variation in longevity and level of severity of climate change impacts, it is important that the Department's research focuses on both immediate and long-term threats.

This research will inform technological development regarding climate change prevention and adaptation. This development will heavily focus on reducing the nation's dependence on fossil fuels. For example, in collaboration with the Department of Energy, the DCC will advance renewable energy technology. In particular, the DCC would develop technology to advance the ability to store and

distribute renewable energies to reach the ultimate goal of supporting the entire electrical grid using sustainable sources. Electrification in the transportation sector will also be a primary focus as the number of electric cars continues to increase and the demand for charging stations rises. It is not only important that the nation's infrastructure keeps up with this increasing demand, but also that technological development prioritizes electric vehicles. This would ensure that electric vehicles would become the preferred option for consumers compared to gasoline-fueled vehicles. Further development efforts will include resilience infrastructure as increasing temperatures, increasing frequency of storms, and rising sea levels threaten cities and shorelines in all regions of the U.S. Additionally, as the amount of carbon in the atmosphere will continue to reach unprecedented levels before major energy changes can be made, it is also important that the DCC explore the geo-engineering options of carbon dioxide removal and storage as well as solar radiation management.

Advising Decision Makers

The R&D branch will also play a role in helping decision makers from all levels of government adequately deal with the repercussions of climate change as they increase in frequency and cost. To do so, the R&D branch will not only house climate scientists, but also social scientists who will identify vulnerable communities and sectors in the economy. Climate scientists and social scientists will also work together to translate findings into informational materials for policymakers and the public, thereby ensuring that decision-makers have access to relevant reports on climate change and its effects.

Currently, information accessibility for stakeholders and decision makers is a challenge. In a 2015 report, the United States Government Accountability Office (GAO) noted that the "federal government's own climate data—composed of observational records from satellites and weather stations and projections from climate models—are fragmented across individual agencies that use the information in different ways to meet their missions" (U.S. Government Accountability Office 2015, 16). The GAO report found that this fragmentation inhibited the ability of decision makers involved in federal, state, local, and private sector planning processes to easily access the climate information necessary for risk management (Ibid, 6).

The 2015 GAO report was released while the President's June 2013 Climate Action Plan and November 2013 Executive Order (EO) 13653 were active. EO 13653, enacted under President Barack Obama, "drew attention to the need for improved technical assistance" and directed "numerous federal agencies, supported by USGCRP, to work together to develop and provide authoritative, easily accessible, usable, and timely data, information, and decision-support tools on climate preparedness and resilience" (U.S. Government Accountability Office 2015, 6). The GAO recommended the creation of a federal entity under the Executive Office of the President that would develop official climate change science and establish an official national climate information system to direct federal and nonfederal entities (Ibid, 47).

The GAO report named several options for this federal entity, one of which was strengthening the USGCRP. The stated benefits of strengthening the USGCRP included employment of existing relationships and utilization of already established coordination, however, one of the two main

limitations of this option was listed as “few links to on-the-ground decision makers” (Ibid, 33). The USGCRP, which names “informing decisions” as one of its main objectives, also acknowledges the challenges in building “governmental, non-governmental, and academic partnerships and private sector collaborations” (United States Global Change Research Program 2017, 4). Per its 2017 Triennial Update, the USGCRP noted challenges in addressing the “increase in demand for climate science, including science translation, downscaled information, climate information in risk-based frameworks, training and guidance, and monitoring and evaluation of response effectiveness” (Ibid, 49). Lack of direct engagement between decision makers and researchers is a major drawback, as these collaborations are imperative for efficient and substantive action to mitigate the climate crisis. For this reason, elevating the USGCRP to serve as the proposed federal entity leading a national climate information system would not be as effective as including current research and collaboration efforts under the umbrella of the R&D branch of the new department.

The creation of a new federal entity was the top recommendation from the 2015 GAO report. The strengths for this option were listed as “focused mission” and “consolidated expertise”, while the limitations were noted as “turf conflicts with existing agencies” and “disrupt[ion of] existing relationships” (Ibid, 33). While the transfer of programs with climate responsibilities to the DCC would certainly cause turf conflicts and disruption, the main problem of fragmentation noted by the GAO would be resolved. The DCC would become such a federal entity, akin to the one recommended by the GAO, as one of the functions of the DCC will be providing authoritative information on climate preparedness and resilience. The Department would thus secure links to on-the-ground decision makers, which was a major limitation of the USGCRP option. This would occur through the Department’s policy office. The DCC’s R&D branch would most comprehensively address the problems that were noted by the GAO in 2015 and improve the government’s ability to understand and address the effects of climate change.

Engaging with the Private Sector

For DCC research and development goals to be reached, it is crucial that the Department engage with the private sector. Private sector engagement is necessary, as it allows the DCC’s R&D branch to be more comprehensive in its scope, promote more intensive climate-related R&D in the private sector, and acquire additional funding outside of its budget. Such engagement would mean working with private companies through public-private partnerships to fund large projects such as road electrification and infrastructure resilience. It also includes promoting climate research by distributing grants to private research groups and providing subsidies to companies with sustainable policies. The DCC would also work with private technology labs to promote and advance not only climate-related development, but also consumer products. For example, the DCC would work with companies like Tesla to further improve electric vehicle technology to such a degree that electric vehicles are more accessible and economical for consumers.

Conclusion

The Department of Climate Change will mark the United States as the global leader in climate change research. The R&D branch of this Department will have several functions that will improve the

ability of federal, state, local, and tribal governments to understand and respond to the effects of climate change. It will also address the current challenges regarding the lack of national information systems on climate change, as noted by the GAO. The functions of the Research and Development branch include the consolidation of research programs, the translation of information to better inform decision makers, and the ability to streamline engagement between policymaking and research. The R&D division will interact with and inform every other division of the DCC in the creation of both scientific and political solutions in order to best serve the missions of the DCC.

References

Mervis, Jeffrey. "Why NOAA Is in the Commerce Department." *Science Magazine*, January 13, 2012.
<https://www.sciencemag.org/news/2012/01/why-noaa-commerce-department>

U.S. Government Accountability Office. *Climate Information: A National System Could Help Federal, State, Local, and Private Sector Decision Makers Use Climate Information*. GAO-16-37. Washington, DC: 2015.

U.S. Global Change Research Program. *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. D.R. Reidmiller et. al. Washington, D.C., U.S.A.: 2018.

U.S. Global Change Research Program. *National Global Change Research Plan 2012–2021: A Triennial Update*. Washington, DC: 2017.

Chapter 8

Departmental Overview

Policy and Regulation

Hannah Stephens

Background

The DCC's Regulation and Policy Office will be responsible for creating policies to serve the department's mission of addressing current and future threats to the U.S. posed by climate change. Through collaboration with the Department's other offices, the Policy and Regulation office will determine what actions will be taken by the Federal Government to combat climate change. Policies will be implemented in a variety of different forms such as regulations, codes, and guidelines. Regulatory authority will be the cornerstone of the DCC's policy making.

Well-crafted regulations that serve the Department's mission and do not impose undue burden on industry will be the most important type of policy for the DCC. It is essential that these regulations address climate dangers while not adversely affecting economic growth. Short-term and long-term perspectives must be considered jointly for optimal policymaking. The following section will propose examples of the kind of regulations the Department would implement. Decision makers will utilize iterative risk management in policy creation and implementation. This approach operates as a cycle of assessment, action, reassessment, learning, and response in order to have regulations that address current climate risks as they continue to evolve (USGCRP 2018).

Currently, one of the key functions of the EPA is to develop and enforce regulations. This regulatory branch of the EPA, the Office of Regulatory Policy and Management, would be re-designated as a part of the DCC given its objectives. The EPA works to protect human health and preserve the environment (U.S. EPA 2013), while the DCC's purpose would be to address climate change. Therefore, environmental protection measures that do not pertain to climate change would continue to remain the responsibility of the EPA. Environmental regulations already in force under the EPA would be upheld until modified, terminated, superseded, or revoked in accordance with issued law. The responsibilities of the regulatory branch would then be under the direction of the Department Secretary. In its current state, the EPA does not have the statutory authority necessary to establish regulations necessary for addressing climate change (Vig 2019). Rather, the EPA is controlled by Congress's intentions for the agency. Statutes authorized by Congress limit the EPA's regulatory power.

Title 3 Section 302 of the United States Code specifies the regulatory branch under the DCC would have more power than the EPA. This section applies to heads of executive departments, giving them authority to act for the president within their areas of responsibility as is specified by statutory

law². Therefore, having environmental concerns on par with interests from other cabinet departments would make regulatory goals practicable.

According to the U.S. Fourth National Climate Assessment, GHG emissions and climate change are inextricably linked, and considerably reducing GHG emissions would result in a notable reduction of climate risks. For this reason, mitigation of GHG emissions would undoubtedly be a central focus of the DCC's regulatory efforts. Atmospheric gases that are known to contribute to the ozone layer include carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons. These gases are produced from a number of activities and processes. Utilizing research that detects where large amounts of these emissions come from, the DCC would create regulations to mitigate impacts from each sector.

Emissions Sources

Gases that compose the atmosphere are released through some natural processes, but the harmful spike in concentrations is anthropogenic. Carbon dioxide is created by burning fossil fuels, changes in land use, and deforestation. Methane comes from waste decomposition, agricultural practices, and the digestion processes of domestic livestock. Each gas has a different radiative efficiency and lifetime, but carbon dioxide has the longest lifetime.

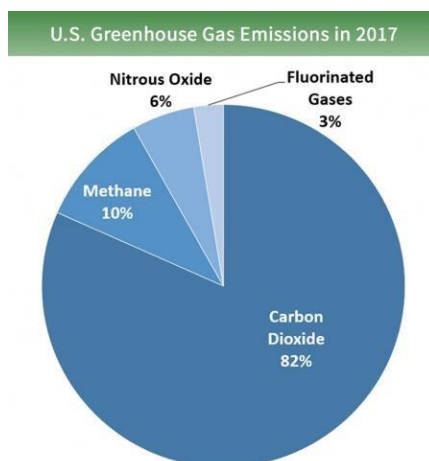


Fig 8.1: U.S. Greenhouse Gas Emissions in 2017

Source: US EPA, OAR. "Sources of Greenhouse Gas Emissions." Overviews and Factsheets. US EPA, December 29, 2015. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>.

Changes in impacts are analyzed through differing emissions scenarios. The Intergovernmental Panel on Climate Change established Representative Concentration Pathways (RCPs) to predict climate impacts of various emission scenarios. These were created to advise climate policies and have been

² 3 USC 302: Scope of delegation of functions, "The authority conferred by this chapter shall apply to any function vested in the President by law if such law does not affirmatively prohibit delegation of the performance of such function as herein provided for, or specifically designate the officer or officers to whom it may be delegated... nothing herein shall be deemed to require express authorization in any case in which such an official would be presumed in law to have acted by authority or direction of the President."

effective for understanding the scale of threats. RCP 8.5 depicts long-term accelerating GHG emissions causing record GHG concentrations. In this scenario, a lack of innovation results in growing energy demand continuing to be met by fossil fuels. The repercussions depicted in 8.5 can be used to justify the need for technological innovation. RCP 4.5 shows emissions peaking mid-century and then stabilizing and decreasing. This scenario can be used by decision makers as a target to drive change (Wayne 2013). Analysis of RCPs gives suggestions on how changes affect impacts. This approach is an example of how the DCC would create long-term goals to guide regulatory development.

Federal action has the potential to create public, private, and academic partnerships in order to enact comprehensive reform and reduce harmful emissions. Market-based strategies provide incentives for all to comply. A tax on carbon-producing energy sources could be a starting point. The tax is proportionate to the carbon content of various fuels. Fossil fuels are then more expensive for users. Costs increase for fossil fuel users, and increased costs prompt businesses to make changes to their operations. A cap and trade system could also help manage GHG emissions in the U.S. Under this policy, to cap emissions would subsequently allow the market to trade the allowances. Profit would highly incentivize companies to cut their emissions. Regulations, in turn, incentivize innovation because the involved parties must invest effort in new markets. This supports one of the DCC's core missions of advancing methods for resilience.

Resource Extraction

While the climate is threatened by the extraction of resources fundamental to providing energy for the United States, fossil fuel alternatives do not satisfy the current demand for energy at their current levels. Petroleum, natural gas, and coal make up 80% of U.S. energy sources (U.S. EPA 2015). Atmospheric methane levels have been rising noticeably in the past decade, and the processes of obtaining oil and gas contribute considerable amounts to rising emission levels. Extraction of these resources unintentionally releases emissions, known as fugitive emissions. The DCC would be responsible for regulating oil and gas operations to reduce fugitive emissions. Regulations would handle a variety of operations, including mining and handling practices for coal. Drilling and transportation of oil and natural gas would also have set standards.

Hydraulic fracturing (fracking) is a process for retrieving oil and gas from shale rock. In this process, mixtures of water, chemicals, and sand are injected into the rock at a high pressure to fracture the rock which releases the oil or gas. Injection and extraction procedures allow methane to be leaked into the atmosphere. Seeing as this is a relatively new practice, the research and development branch of the DCC will work closely with the regulatory branch to create regulations specifically for fracking.

Transportation

Transportation is heavily reliant upon energy produced by fossil fuels. This sector was responsible for 29% of greenhouse gas emissions in the U.S. in 2017 (U.S. EPA 2015). Areas of focus to reduce the impact of transportation on the climate have been identified by the U.S. Department of Transportation. They include increasing vehicle efficiency, use of alternative fuels, and transportation system efficiency, while reducing vehicle miles traveled (US DOT 2015).

The rate of progress for improving the fuel economy of passenger vehicles has slowed (IEA 2019). The creation of more efficient vehicles will not happen without the implementation of further regulations and incentives. Vehicles are made more efficient by improving engine and drive technology. Setting fuel economy standards would motivate technological progress. Shifting to electric vehicles would be the most effective way to increase average fuel economy due to electric motors being 2-5 times more efficient than traditional engines (IEA 2019). The DCC will implement purchase incentives to encourage individuals to buy more efficient vehicles.

Road freight transport is a large source of oil demand, specifically diesel demand. Finding viable fuel alternatives for these heavy-duty vehicles is challenging as there are many different groupings depending on what is being hauled and how far. The regulatory branch, with the help of the research and development branch, will devise regulations to apply to different trucking classes. Efficiency standards would be tailored to each class.

Electricity

Petroleum, natural gas, and coal are used to create electricity that powers homes, businesses, and industries. The main technique used to generate electricity is the combustion of fossil fuels. In 2017, fossil fuel combustion created about 63% of the electricity in the U.S. (EPA 2015). Carbon dioxide is the main gas emitted during combustion. Regulations for fossil-fired power plants require increased efficiency and thus the implementation of pollution control technology. Furthermore, regulations would be designed to motivate the transition to non-carbon sources of electricity generation. Construction of fossil-fired power plants would be prohibited. These regulations should include national standards for energy sources to be shifted to non-carbon. Examples of this could include but are not limited to:

- Minimum standards for investment in wind turbines.
- Utilization of solar resources through implementation of solar energy systems.
- Dams can be made hydroelectric to generate power, and of the U.S.'s 80,000 dams, only 2,400 of them are hydroelectric (Atkins, n.d.).
- The DCC would set standards for the use of geothermal energy because it is a renewable resource that does not emit GHGs.
- The use of nuclear power would be regulated by the DCC.

Each national standard would be uniquely tailored to be implemented in different areas and systems depending on where they are most effective. This is so undue burden is not placed on any sector. The DCC would devise a schedule for these transitions, greatly increasing the likelihood of achieving their intended result. Electricity demands are not expected to decrease, so the DCC would responsibly regulate electricity creation to ensure demands are still met.

Industrial Processes and Product Use

The manufacturing industry produces almost 25% of U.S. GHG emissions, both direct and indirect. A portion of this comes from equipment powered by electricity as discussed above. Industrial production processes also release GHGs themselves.

The adverse effects of construction would be an area of regulatory responsibility for the DCC. Construction produces emissions from its operations, materials, and processes throughout the lifecycle of buildings and other infrastructure. Effective regulations would improve the industry's entire value chain. The DCC would create regulations for efficiency and carbon fuel use. National standards would be set for the construction of sustainable buildings. Policies would be managed to improve resilience in construction, specifically in the way projects are designed, built, used, and deconstructed (World Green Building Council 2019). This requires cooperation and motivation from all businesses involved. In particular, the production of cement releases high levels of emissions, and it is a leading production material around the world. When the calcium carbonate in cement is decomposed, it releases carbon dioxide (US EIA 2011). Emission regulations would be set for cement production.

Chemical manufacturing uses chemicals to transform raw materials into other products. These processes emit numerous gases. Demand for this industry is substantial because primary chemicals contribute to the creation of plastic, synthetic fertilizer, and formaldehyde. The DCC would collaborate with the EPA in the regulation of the chemical industry. They would designate jurisdiction over the regulation of specific gases based on if their emissions contribute to climate change or are only pollutants. Reporting is essential as emissions vary by type of chemical, its state, and process. Standards for resilient processes to mitigate emissions would be set. This would include regulating the rate at which emissions are released relative to the intensity of production through implementation of more advanced practices. Emissions from chemical manufacturing are also largely emitted downstream, so the utilization and disposal of chemical products will be managed.

Agriculture

The majority of emissions produced by the agricultural industry come directly from practices rather than from electricity use. Practices such as land and soil management increase nitrogen levels in the soil thus emitting nitrous oxide. Fertilization would be regulated by the DCC to ensure that appropriate amounts are being added. The amount of nitrogen used to fertilize crops correlates to the amount of nitrous oxide emitted, so the amount of nitrogen would be closely regulated to reduce emissions.

Specifically, rice cultivation emits large amounts of methane and nitrous oxide from bacteria in flooded soil. Practices on rice farms would be regulated to reduce methane emissions. Management of rice production would have sustainability requirements. With the assistance of the research and development branch, standards for more innovative practices could be made, such as rice-fish farming. This practice involves the wet rice production process providing protein for fish being farmed and reduces emissions (IPCC 2014).

Cattle, sheep, and goats naturally produce methane during their digestive processes, which contributes significantly to agricultural emissions. This digestive process, called enteric fermentation, can be mitigated (Eurostat 2018). Alteration of feeding methods through additives and other management processes can reduce enteric fermentation and increase the productivity of livestock (IPCC 2014). Enforcing regulations for pasture quality can reduce methane emissions.

The decomposition of manure from livestock produces methane and nitrous oxide. There are 94.8 million cattle in the U.S. which results in a considerable amount of radiative efficient emissions coming from their manure. Bedding and storage conditions can be altered to reduce emissions. Methods that dispose of manure would be regulated by the DCC to lessen the quantity of methane and nitrous oxide released.

Carbon Capture and Storage

Carbon Capture and Storage (CCS) is an increasingly common GHG concentration reduction method and the DCC would closely monitor these practices. CCS reduces the volumes of carbon dioxide released without requiring cutbacks on production for industrial and electricity generation industries which makes it popular among lawmakers.

Constant measuring, monitoring, and assessment would be necessary to verify the effectiveness of practices and effects on the environment and human health. The EPA has existing programs detailing CCS safety and reporting requirements. These programs would be absorbed by the DCC as they directly relate to climate change mitigation efforts.

Regulation Development and Creation Process

In order to create and implement a regulation, the DCC would go through a series of steps following the federal regulatory process. Federal regulations must be initiated by a statute passed by Congress. The act from Congress either requires or authorizes the issuance of a regulation. Then, the research and development branch of the DCC will provide analyses to advise the draft of the regulation. It will be written to be understandable to all involved parties, agency staff, and the general public. A portion of this requirement will be a clear cost-benefit evaluation by the information and threat analysis branch. Transparency of risk and costs as compared against benefits will be present in regulations. After the rule is proposed and approved within the DCC, it must be reviewed by the Office of Information and Regulatory Affairs (OIRA) (Carey 2013). Regulations that pass this step will be listed in the Federal Registrar for the consideration of the public, and comments will be discussed in the revisionary process. A final draft is then produced and published for congressional review. For this stage, it is necessary that a congressional committee for climate change is created. The committee holds hearings and makes changes to the proposed bill until it is ready to be sent to the full chamber. The proposed rule is then voted on, and granted regulations will take effect and be codified into the Code of Federal Regulation.

Conclusion

Given the goals of the DCC, the department would use regulations to combat the threats of climate change. The regulatory focus will be placed upon identified sources of emissions that contribute

to the greenhouse effect. Practices that release these gases would be evaluated to find the most effective way to diminish negative impacts without placing an undue burden on the function of energy, industrial, and agricultural industries. General practices of regulation development would cultivate cooperation between public and private entities.

Resources

- 3 U.S.C. § 302 (Cornell Law School 1951). <https://www.law.cornell.edu/uscode/text/3/302>
- Atkins, William. "Hydroelectric Power." 2010. <http://www.waterencyclopedia.com/Ge-Hy/Hydroelectric-Power.html>.
- U.S. Congressional Research Service. *The Federal Rulemaking Process: An Overview*. Maeve P. Carey. RL32240. 2013. <https://fas.org/sgp/crs/misc/RL32240.pdf>.
- "Carbon Capture." *Center for Climate and Energy Solutions*, 2017. <https://www.c2es.org/content/carbon-capture/>.
- U.S. Council on Environmental Quality. *Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act*. CEQ-2019-0003. 2020.
- European Union. *Archive: Agriculture - Greenhouse Gas Emission Statistics*. 2018. https://ec.europa.eu/eurostat/statistics-explained/index.php/Archive:Agriculture_-_greenhouse_gas_emission_statistics.
- "Hydraulic Fracturing and Your Health: Air Contamination." *Physicians for Social Responsibility*, 2020. <https://www.psr.org/wp-content/uploads/2018/05/fracking-and-air-pollution.pdf>.
- U.S. Congressional Research Service. *Congress's Authority to Influence and Control Executive Branch Agencies*. Todd Garvey and Daniel Sheffner. R45442. 2018.
- "Methane Emissions from Oil and Gas." *IEA*, 2019. <https://www.iea.org/reports/tracking-fuel-supply-2019/methane-emissions-from-oil-and-gas>.
- U.S. Committee on Governmental Affairs. Joseph Lieberman et al. n.d.
- U.S. Congressional Research Service. *The National Environmental Policy Act: Background and Implementation*. Linda Luther. RL33152. n.d.
- "Responding to Climate Change: Mitigation and Adaptation." *U.S. National Aeronautics and Space Administration*, n.d. <https://climate.nasa.gov/solutions/adaptation-mitigation>.
- Keywan Riahi, et al. "RCP 8.5—A Scenario of Comparatively High Greenhouse Gas Emissions." *Climatic Change* 109, art. 33. 2011. <https://doi.org/10.1007/s10584-011-0149-y>.

- U.S. Department of Transportation. *Background on Climate Change and Transportation*. 2015. <https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/background-climate-change-and-transportation>.
- U.S. Energy Information Administration. *Emissions of Greenhouse Gases in the U.S.* EIA-0573. 2011. https://www.eia.gov/environment/emissions/ghg_report/ghg_carbon.php.
- U.S. Environmental Protection Agency. "Regulations." 2013. <https://www.epa.gov/laws-regulations/regulations>.
- U.S. Environmental Protection Agency. "Sources of Greenhouse Gas Emissions." 2015. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>.
- U.S. Environmental Protection Agency. "Understanding Global Warming Potentials." 2016. <https://www.epa.gov/ghgemissions/understanding-global-warming-potentials>.
- U.S. Global Change Research Program. *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. D.R. Reidmiller et. al. Washington, D.C., U.S.A.: 2018.
- Norman J. Vig and Michael E. Kraft. *Environmental Policy: New Directions for the Twenty-First Century, 10th ed.* Los Angeles: CQ Press, 2019.
- G. P. Wayne. "The Beginner's Guide to Representative Concentration Pathways." *Skeptical Science*. 2013. <https://skepticalscience.com/rcp.php>.
- "New Report: The Building and Construction Sector Can Reach Net Zero Carbon Emissions by 2050." World Green Building Council, 2019. <https://www.worldgbc.org/>.

Chapter 9

Departmental Overview

Emergency Preparedness and Response

Gabriel Collins

Background

The Department of Climate Change's Emergency Preparedness and Response division will engage in threat analysis, assist community adaptation and resilience to climate threats, and bolster national emergency response measures.

Threat Analysis

In conjunction with coordination with states and cities on adaptation measures, this would hugely improve domestic emergency preparedness. Currently, the USGCRP creates and disseminates the National Climate Assessment, which highlights the biggest threats to the U.S. However, the USGCRP lacks not only centralization, but also a direct relationship with decision makers. The Department would take leadership over this function to better inform stakeholders throughout the U.S. Direct chains of communication between the Department and stakeholders would better facilitate emergency preparedness efforts.

Emergency Preparedness Planning

Organizations on their own often acquire resources to exploit in aims of very specific goals yet fall short of the long-term planning required to mitigate against less immediate threats. The Department will plan in conjunction with DOD, FEMA, and DHS to create plans to prepare communities at stake for the effects of climate change. This will consist of evaluating the most significant climate changes related risks and specifically outlining and developing preparedness plans in association with municipalities, state governments, and businesses. Further, the Department will coordinate with other federal entities in the creation of nation-wide climate preparedness programs, ensuring that all domestic stakeholders are well aware of the risks of climate change and the resources available to improve climate resilience. Such Plans will involve:

- Urban planning innovation
- Sustainable business practices
- Supply chain organization and emergency supply stockpiling
- Risk awareness

Businesses and communities can occasionally have more effective means of managing and assessing risk against infrastructure in a local capacity than the federal government. For example, "an energy company frequently exposed to extreme weather events may become particularly good at

developing crisis management and crisis response capabilities” (Linnenlueke and Griffiths 2010). In conjunction with the Department, FEMA, and other agencies, local entities would be consulted when developing plans for emergency response in their communities.

Emergency Response

The Department will act in accordance with the Federal Emergency Management Agency (FEMA) which responds at the request of and in support of states, tribes, territories, and local areas impacted by a disaster. The Department will be incorporated into the National Response Framework as well as under the National Disaster Recovery Framework (NDRF). The Department will be involved in natural disaster recovery and relief as needed by FEMA.

The NDRF’s Recovery Federal Interagency Operational Plan involves six key operational stages that ensure recovery partners and stakeholders at all levels have a shared understanding of the sequence and synchronization of activities around which they can operate:

- Monitoring and Situational Awareness.
- Advance Evaluation.
- FDRC and RSF Activation/Deployment.
- Recovery Support Strategy (RSS) Report Development.
- RSS Report Implementation.
- Transition and Return to Steady-State Operations.

Community Adaptation and Infrastructure Planning

Land Use

Climate change effects will require metropolitan and rural communities to adequately adapt their land use. Urban planning will become an integral part of adaptation in the long run, addressing various land use issues. Planning cities, towns, and communities in high flood-risk areas, for example, can result in costly mistakes and endanger the general public. Further, superior urban planning may alleviate the improper placement of water reservoirs which would face contamination risks during flooding seasons or periods of heightened rainfall. The Department will provide infrastructure and land-use guidelines created through interdepartmental and interagency cooperation. Guidelines will aid state governments, municipalities, cities, rural communities, and businesses in the development of sustainable business practices, supply chain reorganization, urban planning innovation, and risk awareness. These guidelines, based on region and locality, will enable key stakeholders to create scalable and contextually appropriate solutions.³ The Department will assist stakeholders with planning and incorporating novel infrastructure within communities across the U.S., and especially in locations most at risk of climate-related threats.

³ *The Department must assist “local-scale decision-making” that is “more likely to promote plural and cultural values that it incorporates culture by building on local and social norms and effecting change from within.” (Linnenlueke and Griffiths 2010)*

The Department would continue to support proper natural resource management as well. Coordinating with DOD, DOI, DOA, NOAA, and FEMA, the Department will complete inventory assessments of proposed and completed changes to land and water-related policies necessary to make watersheds, natural resources, ecosystems, and the communities and economies that depended on them resilient in the future.

References

- Chestney, Nina. "Green Bond Issuance Hit Record \$255 Billion Last Year, Research Shows." *Reuters*. 2020. <https://www.reuters.com/article/us-greenbonds-issuance/green-bond-issuance-hit-record-255-billion-last-year-research-shows-idUSKBN1ZF1GD>
- Kraybill, David and Lobao, Linda. "The Emerging Roles of County Governments in Rural America: Findings From A Recent National Survey." *American Agricultural Economics Associated Meeting*. 2001. https://www.researchgate.net/publication/23504556_The_Emerging_Roles_of_County_Governments_in_Rural_America_Findings_from_a_Recent_National_Survey
- Landberg, Reed, Massa, Annie, and Pogkas, Demetrios. "Green Finance is Now \$31 Trillion and Growing." *Bloomberg L.P.* 2019. <https://www.bloomberg.com/graphics/2019-green-finance/>
- Linnenlueke, Martina and Griffiths, Andrew. "Beyond Adaption: Resilience for Business in Light of Climate Change and Weather Extremes." *Business & Society* 49(3). 2010. doi: 10.1177/0007650310368814
- U.S. Government Accountability Office. *Climate Information: A National System Could Help Federal, State, Local, and Private Sector Decision Makers Use Climate Information*. GAO-16-37. Washington, DC, USA: 2015.

Chapter 10

Feasibility of Creation

Public Sector Objections

Ella Hammarstedt

Background

The proposal of the DCC will inevitably face objections from other government departments and agencies due to the loss of jurisdiction, funding, personnel, and status. The process of departmental reorganization will naturally incur inner government resistance. These objections are further heightened since the climate crisis defines a domain of significant and growing importance in the federal government. On top of this, conservative members of the government will likely resist the establishment of the Department as well, for a variety of reasons beyond this. The DCC will address government push back through direct outlining how current departments will be reorganized, how congressional committees will be persuaded through clear logic, and what changes in conservative thought will allow for bipartisan support of its creation. This chapter will accomplish this through examining established precedents of department consolidation efforts and then addressing them with specific reference to the DCC.

How the DCC Will Address Resistance from the US Government

The last significant reorganization of the federal government occurred under Carter's presidency in the 1970s in response to several inefficiencies with organizations managing civil rights, civil service, and disaster aid, such as the Department of Energy (DOE), the Department of Education (ED), and the Senior Executive Service (SES). The government has since failed to organize accordingly to contemporary problems, as the lack to address climate change solemnly has demonstrated. The reorganization of government from the Carter Administration holds lessons that the DCC can learn from and incorporate into solving issues such as climate change. The primary objection Carter faced from within the government derived from agencies and committees who did not want to lose jurisdiction (Wellford 2011). This same objection is anticipated to arise from the establishment of the DCC, as it would adapt and unify current policies as well as create new ones.

Leaders from the Carter Administration reorganization process informed the Obama Administration of six categories stating how to anticipate and counter resistance to major structural changes. These lessons include the following:

- Be concrete with the goals of the reorganization and highlight how much they stem from policy. This ties into the questions discussed previously which must be answered convincingly.
- A large amount of political capital and motivation are necessary to see a reorganization through. A reorganization can be seen as a full campaign with negotiation, debate and barter. In the case of the 1970s reorganization, this was led by President Carter.

- There will be resistance within the cabinet as adding a new cabinet level department changes the power structures and jurisdiction.
- Expect a turf war in congress again as jurisdiction changes. Reorganizations must be enacted by congress and committees are very territorial.
- The aid and support of external parties is key, as is an understanding of potential opponents. These include trade organization, interest groups, governors to enlist allies and preempt opposition.
- Organization and an organizational team are key in reorganizational projects.

While daunting, these lessons provide insight into what objections can be anticipated from within the government towards the DCC as well as inspiration for how these obstacles will be addressed by the DCC (Wellford 2011).

The DCC will set a clear mission statement outlining the need for this reorganization, directly warranting strong policy to members of the government. It will state its legislative goals and connect these goals to how they would not be possible without the department itself (see chapter 8, Regulation and Policy Management). Outlining these goals with transparency will be more influential in the political arena, as a prepared plan and mission state will better deliver the Departments purpose. Within this there must be answers for: what urgency exists for reorganization, what will be accomplished, and how will the achievements be measured (Wellford 2011). Reducing uncertainty and doubt associated with the creation of such a department will strengthen the case for its existence. In effort to reduce uncertainty and argue for the creation of the DCC, the key obstacles to be addressed are resistance from other agencies, resistance from congress, and opposing arguments used by politicians.

Resistance from Agencies

A paramount motivation for the creation of a cabinet level department is to establish mainstream climate policy so that it can operate in the most effective manner possible. However, this change will take certain responsibilities away from other cabinet level departments, something that will be heavily resisted within the executive branch. The best way to mitigate such resistance is to analyze tactics used in the creation of other cabinet departments in order to anticipate objections and ensure the DCC is primed for success against oppositions. Two agencies serve this analysis most effectively. First, the DOE, introduced during Carter's major reorganization, spurred innovation and faced intra-agency resistance similar to that which the DCC will face. Second, the Department of Homeland Security was created in response to a threat with tangible outcomes as goals, however, it lacked sufficient organization, which caused inefficiency in accomplishing its goals.

The creation of the DOE provides insight to what objections may be cast against the establishment of a department on climate change. The Department of Energy was finally raised in 1977 under President Carter which aimed at creating a comprehensive and balanced energy plan. The goals he set for this reorganization intended to oversee certain sectors of energy policy. Explanations were explicitly outlined of which existing departments would and would not be absorbed. For example, the DOE adopted all authority from the Federal Energy Administration (FEA) and the Federal Power Commission (FPC) in order

to consolidate energy rates, but not the regulatory powers of the Nuclear Regulatory Commission due to public concern of safety regulation surrounding nuclear power. This mitigating tactic is addressed in Chapter 9 where it exemplifies how and why the DCC will absorb the regulatory sector of the EPA, indicating how additional planning on reorganization would work. Further objections faced by the DOE that the DCC will similarly experience is the fight over power from different agencies. One such struggle appeared in response to Carter's decision to leave the responsibility of leasing energy resources with the Department of the Interior but also give the DOE the power to enact regulations concerning energy production (Byse 1978, 194-195). While this sharing of powers was criticized, it was necessary to lessen pushback from the territorial agencies. Following this method, the DCC may choose to take a less direct involvement in favor of an oversight role for issues that are not direct factors in its primary objectives.

In contrast, the DHS was formed by Congress in response to the terrorist attacks of September 11, 2001. Originally, the DHS was a concoction of poorly justified pieces, absorbing U.S. Customs, Border Patrol, the Secret Service, and the Coast Guard. In total, the DHS consisted of 22 whole or partial pieces from departments, agencies and offices (Lute 2016, 147). Opposition manifested from both internal and external parties as the cohesion of absorbed agencies and the actual implementation of new ones proved difficult. Internally, the longstanding identity of absorbed agencies created resistance for changes within the department and to the change of oversight (Lute 2016, 149). While internal tension is not entirely avoidable, the DCC can learn from this by having clear roles and expectations for the specific pieces it absorbs. Externally, the necessity of the DHS was questioned as it faced continual turf wars with other departments such as the DOJ which includes the FBI and DEA and overlaps DHS' duties in intelligence gathering and sharing (Lute 2016, 150). Precaution for this jurisdictional overlap is outlined in Chapter 8 where it is shown specifically why consolidation of all necessary research is best under one department and how the DCC will accomplish this. Overall, while national security was already covered in a variety of ways by some departments, the DHS has unified many agencies and efforts, providing an umbrella to direct focus and better target national security threats and collaborate with local, inter-governmental, and foreign interests. The DCC will similarly consolidate all research and information regarding climate change to improve efficiency and efficacy in addressing the projected problems from such.

Resistance from Congress

Another anticipated obstacle is that the effort to make this cabinet seems too great for many in terms of governmental rearrangement. While the efforts to rearrange congressional subcommittees and organize an entire new cabinet department will be large, it should be argued that is a short-term issue and the outcomes that will hopefully be achieved from the department are for the long-term benefit. As a cabinet level department, the DCC will be able to consolidate climate change mitigation efforts, as well as serve as a hub for new projects and technological innovation. Other agencies will be able to directly communicate with the DCC regarding climate issues, therefore improving inter-governmental communication on this effort. Additionally, the private sector will be able to access the DCCs research and development to continue improving themselves. The anticipated turf war within congress can be addressed preemptively in two ways: that reorganization has been done effectively before and therefore be done again with sufficient effort through negotiation and highlighting how this project is necessary to tackle the imminent climate threat.

As discussed above, executive reorganization was done successfully under President Carter. Even farther back in United States history is the restructuring under President Truman and more. However, recent attempts have not been successful, namely President Obama's plan in 2012 to consolidate six separate departments into one agency for commerce. This failure is one the DCC will avoid duplicating. The six dealt with business and trade and the aim of the reform was to reduce redundancies, unnecessary expenditures, and miscommunication, while also streamlining policy to maximize efficiency and efficacy (PRESS RELEASE 2012). This was boasted to save taxpayers an estimated three billion dollars over ten years (Pianin 2013). This new department was proposed under the Government Reform for Competitiveness and Innovation Initiative which would analyze the functions of these government bodies and propose their reorganization (PRESS RELEASE 2012). However, these efforts proved unsuccessful and the plan terminated. While it is impossible to pinpoint, the failure of the reorganization can likely be blamed on Congress' desire to hold onto power and committee holds on jurisdiction. Firstly, Congress resisted giving President Obama the power afforded to them by the U.S. constitution to create, rearrange, or dissolve agencies. Secondly, special interest groups and congressional committees in both the house and the senate with a hand in commerce worked to bury the act in order to maintain their respective jurisdictions. Obama attempted to counter this struggle by giving congress some power to vote but ultimately the ambition was not there to continue negotiations and the act fell through (Pianin 2013). Both of these examples of resistance are an important lesson as the DCC is anticipated to face. Members of Congress will not be eager to potentially lose power as it is shifted towards a different department. It appears the failure to reorganize was due to the lack of political motivation in the face of severe animosity towards the change. In order to convince a stationary Congress to rearrange, the DCC must promote clear goals with a strong team pushing it unwaveringly, regardless of the objections and difficulty for congressional reorganization.

Conservative Resistance

As turf war is expected in any restructuring, climate change especially provokes the conservative members of the government. Historically, climate-based policies have been rejected by conservative law makers time and time again. This lack of support can be attributed to the approach (as addressed previously in this chapter) as well as disagreement on the floor about the direction of the department. To add to this, increased federal authority has deterred the party for decades. This fear of federal overreach has existed since the founding of the United States. Proposing a new cabinet level department with authority over climate matters will almost certainly kindle objections related to this area of concern. Conservative members of the US government will critique the increase in federal reach, as well as voice the proposal as a federal intrusion in the economy. Given the level of threat, neither the unilateral actions of the private sector nor any other level of government authority could deal with the climate crisis effectively. Therefore, understanding the reasoning for partisan lack of support is crucial. A key framework for discussing bipartisan climate action is acknowledging a recent progression in conservative thought. This change is a result of a new generation of conservative voters and the increasing appearance of climate change on U.S. soil.

Young voters who support conservative policies for climate action are a crucial demographic and their numbers are growing as younger demographics are increasingly concerned about climate change

regardless of party affiliation. Many conservatives believe it is necessary to propose conservative policies for atmospheric carbon reduction as an alternative to those proposed by more liberal policymakers. A specific group, Young Conservatives for Carbon Dividends, highlights a mix of agricultural, economic, infrastructural, and public health risks, among others, attributed to the changing climate. Their ideals vilify the intentions of certain liberal policies such as the Green New Deal, instead supporting the Baker-Schultz Carbon Dividends Plan, a bipartisan effort to lower carbon emissions (A New Free-Market Climate Advocacy Campaign 2020). This is an important factor for the DCC as each year new voters are registered and with climate change increasingly on everyone's doorstep, all parties' stances on climate change will have to reflect the opinions of younger voters.

Voters across the political spectrum are beginning to recognize and address climate-related threats. According to a representative survey done by the Yale program on Climate Change Communication, 73% of registered voters believe that climate change is happening, with 59% believing that it is caused by human activity. Only the most conservative-leaning Republicans lack a majority of voters who believe in climate change. Meanwhile, the number of conservative Republicans who are worried about climate change has grown from 23% to 30% since 2017 (Leiserowitz et.al. 2018). This is a proportionally significant amount which implies that conservative opinion will continue to change as more direct impacts of the climate crisis affect politicians and their constituencies. With constituent awareness towards climate change there is an increased political threat to conservative lawmakers and representatives. People face migration, infrastructure loss, and high emergency costs. The rust belt and the deep south are two of the most conservative regions in the country and are some of the first to face unprecedented damages resulting from climate change. This threat means that conservatives are already straying from party lines to support measures for combatting climate change, a fact that furthers the notion that conservative parties must adapt their stances on climate change in order to keep voters.

Conservative opinions often don't take into account the economic incentives to address climate change federally. These incentives include job creation and salvaged industries. As discussed in previous chapters, climate change is on track to cost taxpayers in private and public funds, and while a considerable amount of conservative money is tied up in carbon emitting energies, even these assets are not secure and the ability to fossil fuel reserves are not infinite. Already reflected in the market is uncertainty about energy's future, in 2019 it was the worst-performing sector on the S&P 500 index (Worland 2020). A prime example of conservative support for climate change mitigation on economic grounds can be found in Louisiana. Every year in recent decades, 25 square miles of land have been submerged by sediment in the Mississippi River delta. This will only worsen as sea level rise consumes more coastal land, and increased hurricane wind speeds and rainfalls further exacerbate flooding (What Climate Change Means for Louisiana 2016). Republican representative Garret Graves of Baton Rouge is aware that climate denial is an unsustainable stance given conservative fiscal principles. A leading congressman in climate change, Graves highlights the threat of losing constituents, as well as government time and money. This is an argument which he says does not conflict with economic conservative values. Graves has stated that he is unable to turn a blind eye to climate change any longer due to the severe effects on the American people (Graves 2020). In his time in Congress, Graves sponsored or cosponsored legislation such as the Pipeline Safety Improvement Act of 2019 and the Bridge Investment Act of 2020 which supports

investment into preventative measures such as flood control (Graves Congress, 2020). These are things that have earned him respect around the country but especially from his constituents who see the need for action to occur. This change of stance displays the ability to work across partisan lines in order to adequately address the climate issue.

One anticipated argument from conservatives is that there is no need for the DCC because energy innovation is better done by the private sector. Evidence of this appears on the Republican National Committees (GOP) website, “We oppose any carbon tax [instead] we urge the private sector to focus its resources on the development of carbon capture and sequestration technology ... We will strictly limit congressional delegation of rule-making authority” (Republican National Committee 2020). However, government prompted innovation is effective, as exemplified by the outcomes of many other departments as well as the necessity for one group to oversee the whole process of regulation in order to ensure effectiveness and efficiency all the way through to bipartisan satisfaction. A clear bipartisan way to look at this would be for the DCC to follow in the example of the ERDA which emphasized a short term planning focus for governmental technology development in which the Federal government assisted industry in accelerating the rate of research and commercialization of new energy technology (Byse 1978, pg. 194). This tactic of sponsoring innovation and research to aid in the push of new energy technology by the government is a key benefit of the DCC over separated and privately funded research.

Another anticipated argument against increased federal government overreach is the placement of responsibility on local and state governments. It is unrealistic to expect the necessary level of change to efficiently and effectively occur on the local level for two reasons. States and cities are unable to prioritize climate change effectively due to staffing and budget limitation and even if they did individually the change would not be enough. This is because states do not have a strong enough ability to internally push or externally coordinate with other states on large scale climate action. An older but strong example demonstrating federal leadership of the public sector is the Interstate highway system implemented by President Eisenhower. In 1947 the Bureau of Public Roads created 37,681 miles of main highways in both urban and rural locations. Action was not taken by many states until the federal government increased their support. In later years, the federal government would continue to support improvements on this system with such things as the Federal- Aid Highway Act of 1956 in which they called for the uniformity in design of signs along the roadways to eliminate surprises and confusions which could lead to crashes. This project was 90% funded by the federal government using increased gas and transportation taxes (Capka 2006). This project relied on the unification powers of the federal government in order to completely and dramatically overhaul our nation's transportation infrastructure. There were arguments concerning public and private land and local independence but in the end was agreed to be a necessary federal project. It was not in this case and remains true in the case of facing the climate crisis, to expect necessary outcomes for climate mitigation from individual state efforts. While conservative lawmakers and voters might dislike increased federal jurisdiction, there is a precedent for requiring federal involvement for large scale action. Furthermore, climate polluters such as oil and gas companies are powerfully backed by a lot of money and where carbon reduction strategies could hurt executive salaries or corporate short-term bottom lines, they will not change easily. Therefore, conservatives must not focus on exclusively private initiatives, but

rather on understanding what will be required to effectively manage climate threats, and on drafting and supporting wide-reaching climate policies that still hold true to conservative values.

An example of current creation of bipartisan climate action is the Citizens Climate Lobby (CCL). This group has garnered support from both parties, as well as the house and senate with three congressional committees and 80 cosponsors. It has consistently grown since its establishment in the 2000s. The primary policy supported by this lobby is the Energy Innovation and Carbon Dividend Act, which proposes to instate an excise tax on the producers or importers of the fuels that increases over time to drive down carbon pollution and to incentivize greener options over the long term. After administrative fees, the leftover money from the carbon fee is distributed evenly in a monthly stipend to the American people to use as they see fit. A key stipulation, likely used to increase bipartisan support, is that this policy puts a pause on current EPA regulatory systems for 10 years. If targets are not being met after this period, EPA regulations are reenacted (Climate Solutions Caucuses - Bipartisan Climate Conversation 2020). While this Act is not the only option for bipartisan climate legislation, it is promising because it is non-punitive. It is important to note that while acts like this that do give large concessions (pausing EPA regulation) to conservatives they will not be the primary focus of the DCC but rather stepping stools for larger policy. The most efficiently passed and effective policies are those that cater to the interests of all affected parties, such as new but initially low tax rates that are directed towards research and development. The key to bipartisan climate action is pro-growth, pro-economy, non-punitive cap and trade type systems and the DCC would not go against this. Conservatives are inherently in support of these methods in the name of energy security and innovation, making energy more reliable, secure, and affordable and the DCC plans to capitalize on this to gain momentum and open the discussion around climate change. These conservative viewpoints should not get in the way of the DCC, as the long-term progress that will be made will benefit all parties involved indirectly and directly.

Conclusion

Creation of the Department of Climate Change will generate objections from conservatives both in and out of the government due to the increased federal oversight, historically bipartisan positions on climate change, and the economic concerns it raises. Gaining unified support in the US stratified government can be a challenge, it must be recognized that climate change is a universal risk, and one that will affect everyone regardless of party identification. Both parties must commit to taking enough action to mitigate climate threats, which will only be possible through multilateral involvement. The costs proposed by opposing members of the governments do not outweigh the benefits of creating a department. The DCC is an opportunity for bringing the government together on an issue that is irrevocably faced by all.

References

- “A New Free-Market Climate Advocacy Campaign.” Young Conservatives for Carbon Dividends. Accessed on February 13, 2020. www.yccdaction.org/solution.
- Buck, Alice. “A History of the Energy Research and Development Administration.” U.S. Department of Energy, Office of Management, Office of the Executive Secretariat, Office of History and Heritage Resources, March 1982.
- Byse, Clark. "THE DEPARTMENT OF ENERGY ORGANIZATION ACT: STRUCTURE AND PROCEDURE." *Administrative Law Review* 30, no. 2 (1978): 193-236. Accessed February 24, 2020. www.jstor.org/stable/40709042.
- Capka, Richard. “Celebrating 50 Years: The Eisenhower Interstate Highway System.” U.S. Department of Transportation, June 2006. <https://www.transportation.gov/testimony/celebrating-50-years-eisenhower-interstate-highway-system>
- “Climate Solutions Caucuses - Bipartisan Climate Conversation.” Citizens’ Climate Lobby accessed February 2020. <https://citizensclimatelobby.org/climate-solutions-caucus/>
- Conathan, M., Buchanan, J., Polefka, S. “The Economic Case for Restoring Coastal Ecosystems.” Center for American Progress. OXFAM America, April 2014. https://www.americanprogress.org/wpcontent/uploads/2014/04/CoastalRestoration_report.pdf
- Dahl, T.E., and S.-M. Stedman, 2013: Status and trends of wetlands in the coastal watersheds of the Conterminous United States 2004 to 2009. U.S. Department of the Interior, Fish and Wildlife Service, and NOAA National Marine Fisheries Service.
- Graves, Garret. “Congressman Garret Graves.” Accessed February 2020. <https://garretgraves.house.gov/>
- Graves, Garret. “Garret Graves.” Congress, accessed 2020. www.congress.gov/member/-garretgraves/G000577?searchResultViewType=expanded&KWICView=false.
- Inglis, Bob. “Bob Inglis, Former U.S. Representative for South Carolina.” Voices in Leadership, 16 Oct. 2018. <https://www.hsph.harvard.edu/voices/events/bob-inglis-former-u-s-representative-for-south-carolina/>
- Leiserowitz, A., Maibach, E., Roser-Renouf, C., Rosenthal, S., Cutler, M., & Kotcher, J. (2018). *Politics & Global Warming, March 2018*. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication.

Lute, Jane Holl. "Rethinking the Architecture of U.S. National Security: Lessons from the Homeland." In *America's National Security Architecture: Rebuilding the Foundation*, edited by BURNS NICHOLAS and PRICE JONATHON, 147-56. Washington, DC: Aspen Institute, 2016. Accessed February 24, 2020. www.jstor.org/stable/j.ctt1pwt5r.14.

Pianin, Eric. "Why Obama's Pitch for Government Reform Hit a Wall." *The Fiscal Times*, February 2013. <https://www.thefiscaltimes.com/Articles/2013/02/20/Why-Obamas-Pitch-for-Government-Reform-Hit-a-Wall>

"Republican National Committee." GOP, accessed February 2020. <https://www.gop.com/platform/americas-natural-resources/>

Wellford, H., Kohli, J., and Hariston, J, 2011: Executive Reorganization. Six Lessons from the 1970s. Center for American Progress. <https://www.americanprogress.org/issues/general/reports/2011/06/09/-9732/executive-reorganization/>

"What Climate Change Means for Louisiana." United States Environmental Protection Agency, August 2016. <https://19january2017snapshot.epa.gov/sites/production/files/201609/documents/climate-change-la.pdf>

Worland, Justin. "The Reason Fossil Fuel Companies Are Finally Reckoning with Climate Change." *Time*, January 2016. <https://time.com/5766188/shell-oil-companies-fossil-fuels-climate-change/>

The White House, Office of the Press Secretary. 2012. "President Obama Announces proposal to reform, reorganize and consolidate Government." <https://obamawhitehouse.archives.gov/the-press-office/2012/01/13/president-obama-announces-proposal-reform-reorganize-and-consolidate-gov>

Chapter 11

Feasibility of Creation

Citizen Objections

Katie Pekarske

“It don’t much matter if you breathe the cleanest air and drink the purest water on the planet if you have no electricity or no house, if your town is on fire, or if you are clinging to a tree in one more 100-year-flood” – Jake, a concerned U.S. citizen

Background

The U.S. public has been divided on the topic of climate change for decades. This divide reflects political and cultural views rather than scientific ones, and thus suggests that some portion of the citizenry would likely object to the federal government establishing the Department of Climate Change. However, it is evident that a majority of those living in the U.S. accept the reality of the climate crisis and are concerned about its impacts on the health and well-being of themselves and their loved ones. Public concern and demand for action have been influential for motivating the establishment of new federal departments including Homeland Security, the Department of Energy, and the Environmental Protection Agency. For this reason, it will be crucial for the DCC to sustain public interest and foster support in both the establishment and consequential progress of the department.

Departmental Necessity

Despite heightened concern about climate change within the last several years, there remains a lack of concerted effort to directly address the climate crisis. The prioritization of certain traditional “American” values over addressing climate change coupled with the overall lack of public awareness have stalled significant action on the national level. These two factors have enabled politicians to delay addressing the climate crisis, as representatives invest their efforts in “short-term” challenges that exclude climate change from the discussion. Ultimately, this has created vulnerability for the citizens of the United States to the devastating impacts of climate change. The extent to which the general public will continue to be impacted depends directly on current actions of the federal government, suggesting the urgency for the establishment of the DCC.

The prioritization of deeply held “American” values such as keeping taxes low, refraining from regulatory policies and supporting economic growth above all else, have resulted in worsening climate conditions that cost the public greatly. The case of Hurricane Harvey is particularly illuminating. For the past several years, Houston officials and politicians have lacked the political or economic pressure to implement regulations and climate action plans, largely out of fear that such efforts could potentially hurt the petrochemical industry. As a result, the government found itself unequipped to adequately and

efficiently respond to the toxic waste and pollutants released from some 500 chemical plants and 10 refineries during the flooding brought on by Hurricane Harvey. There were more than 100 Harvey-related toxic releases, including well-known carcinogens released directly into surrounding neighborhoods and waterways. The public health impact was devastating. Many officials have now conceded that the state's industry-friendly approach "weakened efforts by the city of Houston to build cases against and force cleanups by the companies" in the weeks following (Bajak et. al, 2018). Despite the knowledge that Houston would likely face a storm such as Hurricane Harvey within the next decade, politicians and stakeholders continued to prioritize the petrochemical industry and economy. Representatives must address demands and criticisms from their constituents if they hope to get reelected, which poses a critical reason for the public to also reconsider its priorities. U.S. citizens cannot afford to prioritize other concerns over climate change. Instead, the public must streamline various efforts into a concerted demand for the national government to address the climate crisis.

The overwhelming lack of public awareness around climate change has also delayed significant action, leaving people increasingly vulnerable to more severe and frequent climate-related disasters. By virtue that no comprehensive or easily accessible information system exists to consistently inform the public regarding climate change and updated research, people's exposure to climate change information is incredibly varied. In recent years, articles and reports dedicated to climate change have appeared more frequently in mainstream media. However, the majority of research about the science of climate change and its anticipated impacts is shared through publications in scientific journals or reports from government agencies that are inaccessible to large portions of the general public. Often times, content that the media chooses to publish about climate change does not resonate until people become individually impacted. For example, Stanley Gruber, a farmer in South Carolina, was disinterested in the news about climate change until recently. For the first time in 50 years, he will not make any money on his corn crop due to the onslaught of a flash drought, brought on by unprecedented heat and lack of precipitation. He admitted that he is "starting to pay attention to some of this climate change they are talking about," realizing that a changing climate will threaten his economic livelihood (Begnaud 2019). Other times, there is a deliberate effort on behalf of powerful stakeholders to minimize public awareness of climate change. As recently as 2015, officials in Florida's Department of Energy were ordered not to use the terms "climate change" or "global warming" in any official communications or reports, which impacted climate-related educational efforts and public policy. Additionally, longtime employees, including Everglades scientists, were laid off or fired while top positions went to people who had previously been consultants for developers and polluters. These decisions ultimately hindered the Department's ability to effectively communicate with the public regarding the extent to which climate change will impact Florida (Korten 2015). Efforts to limit public awareness of climate change have effectively limited the public's ability to advocate for climate policy, which is why public outreach is a crucial component for fostering support for climate action.

The DCC will prioritize the climate crisis, incorporating the most updated research and information into policies, projects, and programs that will adequately shield the public from greater consequences of climate change. By working with states and local governments, the DCC can prevent inconsistency and confusion with regards to policies and projects to ensure that families and communities are sufficiently

prepared. In order to minimize the extent and severity of life-altering impacts as a result of the climate crisis, there must be bilateral support between the DCC and the public.

Establishing Public Outreach

Due to the scale of the climate crisis, public outreach will be a crucial component of the DCC's work. The DCC will meet the public's needs for information, advice, and education through consistent and involved efforts to make all information accessible and transparent. Public engagement is necessary for the successful implementation of the DCC's policies, programs, and plans, which is why the DCC will make it a priority to keep the public informed and invested. Public outreach will be effectively fostered through the accessible and comprehensive diffusion of information working with state and local governments.

The DCC will ensure the public can access information and updates in a variety of ways, all of which will be comprehensive, accessible, and relevant. One such way will be a website, which will serve as an archive of the department's progress through research and development updates, amended policies accompanied with explanations, and information about mitigation and adaptation programs and projects. The DCC will also consolidate state and local recommendations and programs into an extensive resource database, which can allow communities and individuals to identify specific region-based information and solutions. Additionally, the DCC will develop a thorough timeline with milestones of policy, program and regulation goals per region. With each milestone, there will be in-depth explanations of what will be required to hit each milestone, how it will be achieved (monetarily and otherwise), and why it is fundamental to the work of the DCC. This will establish transparency with the public, who can access specific information about different policies and action plans as well as enabling them to remain updated on how the department is progressing with these goals. Beyond ensuring the public is informed and updated, the DCC is also committed to listening and demonstrating responsiveness to the public's input. While people will be able to individually contact members of the DCC through the website, there will also be public forums held at the local and state levels to address anticipated policy, action plan, and program implementation. Through these forums, the public will have the opportunity to directly ask questions, voice concerns, and request more information. State and local representatives will ensure that popular concerns and questions are consolidated at the federal level and addressed through announcements and/or information sessions (County of San Diego 2016).⁴

Although the climate crisis will impact all U.S. citizens to some extent, its impacts will certainly be disproportionate. Many adaptation and mitigation plans will require the DCC to work extensively with state and local governments to ensure that plans are most effectively addressing community needs on a case by case basis. Therefore, the DCC will generally seek to establish close working relationships with local and state bodies that are already developing adaptation and resilience-building plans. For example, the DCC will support local units in the implementation of community forums, events, and workshops similar to the Climate Change Public Conversation Series that has experienced wide success in Scotland

⁴ Proposals for public engagement were heavily influenced by the work of Climate Outreach, an organization based in Europe that produces world-leading advice and practical tools for engagement through a combination of scientific research methods and hands-on experience. Additionally, specific methods for engagement were adopted from similar strategies in the Public Outreach and Engagement Plan created by the County of San Diego in March 2016.

(Shaw et.al, 2018). Initiated in 2009 by the Scottish government to encourage public discussion about climate change, these workshops sought to directly engage the public in the national conversation around climate change and government policies. Additionally, members of the ClimateXChange Center⁵ were able to identify the amount of climate change information and education different communities had received as well as more thoroughly understand reasons for attitudes about climate change policies. With this information, subsequent workshop leaders were able to frame the discussion about climate change in a more constructive, relevant, and engaging way. This ultimately resulted in greater public engagement and support for climate change policies (Shaw et.al, 2018). A similar approach will help the DCC to sustain public investment in the department, as well as strengthen the public's important role in climate action.

Addressing Federal Policy Impact

While the vast majority of people living in the U.S. have accepted that climate change is happening, the debate has shifted to what should be done and who should be responsible for doing it. In this arena, the U.S. remains more divided. While 90% of progressives say climate change policies will either help or have no effect on the economy, nearly 62% of conservatives believe such policies will hurt the economy (Funk et.al, 2019). When asked specifically about carbon taxes, only 44% of people questioned said they supported a carbon tax as a climate policy for reducing greenhouse gases, while 29% opposed it (Center for Public Affairs Research 2018). In many parts of the United States, negative connotations accompany any discussion about taxation or regulation. Since these components are often associated with limits on personal freedoms, they are conceived as being a disproportionate burden on the public. While these concerns are valid, the climate crisis demands these aspects of response. The U.S. simply cannot manage or avert the impacts of the climate crisis without implementing policies that significantly reduce greenhouse gas emissions. Overall, public support for these policies is vital.

One of the most controversial market-based climate policies among the public is carbon pricing, followed closely by other policies intended to regulate and discourage fossil fuel emissions. People fear that such taxes could negatively impact the economy and/or disproportionately impact families, as opposed to major corporations. Carbon pricing and similar policies address climate change as a market failure, which essentially means that fossil fuel emissions cost our society a significant amount of money, though this isn't accounted for in the market price of the goods we consume (Kelly, 2019). The general public experiences these costs through climate-related disasters and public health debilitation. Ultimately, these impacts cost the general public far more than regulatory or taxation policies would. People pay with their property, health, livelihoods, communities, and even their lives. Economists, scientists and international organizations alike agree that these costs will only increase. In 2019, the International Monetary Fund (IMF) concluded that "action to date has been inadequate," as the commitments countries made to decrease emissions fell significantly short of those needed to limit global warming to levels considered safe by scientists. The report also found that "of the various mitigation strategies to reduce fossil fuel emissions... carbon taxes are the most powerful and efficient," particularly because they enable

⁵ The ClimateXChange Center provides independent advice, research and analysis to support the Scottish government as it develops and implements policies. The Center has a variety of focuses, though one of their most prominent includes public engagement and public outreach.

firms and households to find the lowest-cost ways to reduce energy use. Addressing concerns about equity, the report acknowledged how revenues from the tax can be utilized in a variety of ways that can support the public through the transition of carbon-dependent economies to non-carbon economies (International Monetary Fund 2019).

The concept of regulatory market-based climate policies isn't new or radical. In fact, approximately 40 countries and more than 20 cities, states, and provinces are already using such mechanisms. These policies have proven incredibly successful, as the majority of these countries and states have experienced economic growth alongside decreased fossil fuel emissions (World Bank 2020). Perhaps no case better exemplifies the possibility of decoupling better than Sweden, which has witnessed a GDP growth of 60%, while their overall emissions have reduced by 25%. Sweden was the first country to introduce a carbon tax in 1991, and now boasts the highest carbon tax rate in the world (World Bank Group 2016). Part of Sweden's success with their world-leading carbon tax can be attributed to extensive public dialogue and social deliberation, which has reinforced political trust and transparency throughout all stages of climate policy (Funke et.al, 2018). This suggests that successful outcomes are highly plausible when the public is actively involved and engaged in the process of addressing the climate crisis. Another example is that of British Columbia, which more closely mirrors the public opinion in the U.S. regarding climate policies and regulation in general. When the carbon tax was first implemented in 2008, the public response was overwhelmingly negative. However, despite an increase in fuel prices, more than 60% of residents now support the tax, with the percentage of those opposing it at an all-time low (Environics Institute 2015). This can be at least partially attributed to the success British Columbia has experienced since 2008. The province's economy did not collapse, but rather grew faster than its neighbors' even as its greenhouse gas emissions declined (Porter 2016). In fact, the province is now home to a growing clean technology sector, which generates an estimated \$1.7 billion in revenue annually (Carbon Pricing Leadership Coalition, 2016). British Columbia's tax is now one of the steepest and broadest in the world, which has put it on the map as one of the leaders of climate change action and policy (Porter, 2016). Both the cases of Sweden and British Columbia provide an optimistic truth that addressing climate change is not a sacrifice, but rather an opportunity that can result in significant benefits for the general public.

Conclusion

Although the public has become increasingly concerned about climate change and its projected impacts, there is still a lack of far-reaching efforts to meaningfully address climate change. While this is largely attributable to the prioritization of certain values and the general lack of public awareness, the national government has also drastically failed to lead the way towards addressing climate change. The establishment of the DCC will ensure that the public is informed and engaged, which will mobilize the kind of widespread support that is required to effectively address the climate crisis. The U.S. has stalled on climate action long enough. With public support of the DCC, the U.S. can finally formulate a national response to the climate crisis that will prepare, protect, and sustain the general public.

References

- Bajak, Frank; and Olsen, Lise. "Hurricane Harvey's toxic impact deeper than public told." *Phys.org*, March 22, 2018 <https://phys.org/news/2018-03-hurricane-harvey-toxic-impact-deeper.html>
- Begnaud, David. "Record-Breaking heat threatens southern crops." *CBS*. October 2, 2019. <https://www.cbsnews.com/news/heat-wave-record-breaking-temps-threaten-southern-crops-2019-10-02/>
- Center for Public Affairs Research. "Is the Public Willing to Pay to Help Fix Climate Change?" *AP-NORC Center*, last modified 2018. <http://apnorc.org/projects/Pages/Is-the-Public-Willing-to-Pay-to-Help-Fix-Climate-Change-.aspx>
- Carbon Pricing Leadership Coalition. "What is the Impact of Carbon Pricing on Competitiveness?" *CPLC Executive Summary*, June 2016. <http://pubdocs.worldbank.org/en/759561467228928508/CPLC-Competitiveness-print2.pdf>
- County of San Diego. "Public Outreach and Engagement Plan: Climate Action Plan." *Ascent Environmental, Inc.* March, 2016.
- Funk, Cary; and Hefferon, Meg. "U.S. Public Views on Climate and Energy." *Pew Research Center*, November 25, 2019 <https://www.pewresearch.org/science/2019/11/25/u-s-public-views-on-climate-and-energy/>
- Funke, Franziska; and Mattauch, Linus. "Why is carbon pricing in some countries more successful than in others?" *Our World in Data*, August 10, 2018. <https://ourworldindata.org/carbon-pricing-popular>
- International Monetary Fund. "Fiscal Monitor Report: How to Mitigate Climate Change" *IMF Executive Summary*, October 16, 2019. <https://www.imf.org/en/Publications/FM/Issues/2019/09-12/fiscal-monitor-october-2019>
- Kelly, Karen. "Debunking the Myths of a Carbon Tax." *Carleton Faculty of Public Affairs*, last modified 2019. <https://m.carleton.ca/fpa/story/debunking-the-myths-of-a-carbon-tax/>
- Korten, Tristram. "In Florida, officials ban term 'climate change'." *Miami Herald*, March 8, 2018. <https://www.miamiherald.com/news/state/florida/article12983720.html>
- Porter, Eduardo. "Does a Carbon Tax Work? Ask British Columbia." *New York Times*, March 1, 2016. <https://www.nytimes.com/2016/03/02/business/does-a-carbon-tax-work-ask-british-columbia.html>

“Pricing Carbon,” World Bank, last modified January 2020. <https://www.worldbank.org/en/programs/-pricing-carbon>

Shaw, Christopher; Corner, Adam; and Messling, Lydia. “Scotland’s Climate Change Public Conversations Series.” *Climate Outreach*, September 22, 2016. <https://climateoutreach.org/resources/-scotlands-climate-change-public-conversations-series/>

The Environics Institute. “Canadian Public Opinion about Climate Change.” *David Suzuki Foundation*, 2015. <https://davidsuzuki.org/science-learning-centre-article/focus-canada-2015-canadian-public-opinion-climate-change/>

World Bank Group. “When it comes to emissions, Sweden has its cake and eats it too.” *World Bank*, May 26, 2016. <https://www.worldbank.org/en/news/feature/2016/05/16/when-it-comes-to-emissions-sweden-has-its-cake-and-eats-it-too>

Chapter 12

Feasibility of Creation

Private Sector Objections

Aiden Hitchcock

Background

The majority of objections to the proposed Department of Climate Change will be from the private sector, the most prominent of which will be from the oil and gas industries, the coal industry, and the transportation sector. Their basis in or reliance on fossil fuels and consequent high atmospheric carbon emissions levels make them major contributors to climate variability, and major targets of DCC regulation.

Oil & Gas

Petroleum and natural gas have a high degree of responsibility in generating atmospheric climate emissions and will consequently be disproportionately affected by efforts to disincentivize emissions, diversify energy sources, and otherwise reduce greenhouses gas emissions. This is sure to result in significant additional costs to these industries.

21st Century Trends: Oil & Gas

According to the International Comparative Legal Guides (ICLG), the United States has become the largest producer of natural gas in the world, largely by virtue of the development of shale gas. Shale gas is expected to continue playing a major part in expanding U.S. natural gas production, thus allowing the United States to achieve greater energy independence. Since 2005, the share of U.S. consumption met through domestic oil production has risen. In “2018, 86% of the petroleum consumed by the U.S. was provided by domestic production, and only 11% depended on net petroleum imports, the lowest percentage since 1957”. The rising energy independence of the U.S. is largely thanks to the Trump Administration, which has aggressively rolled back regulations, encouraged technologies such as directional drilling and fracking, and prioritized “energy independence” and “energy dominance”. This has increased the profitability of companies affiliated with the domestic production of gas and oil. While decreased regulation leads to increased profits for oil and gas companies in the short term, the threats of climate change would also increase, leading to economy-wide risks. The United States has not only increased domestic oil and gas production and become more energy independent, it has also increased petroleum exportation. The quantity of crude oil and other petroleum product exports has since risen from approximately 968,000 barrels per month in 2005 to 88,458,000 barrels per month in 2019 (“U.S. Exports of Crude Oil”). One significant factor that stimulated greater exportation of crude oil in particular was the lifting of the 40-year ban on crude oil exportation, which occurred in December of 2015 (Cogan 2020).

Limitations of Profitability

One anticipated objection that will surface from oil and gas companies is the limitations on profitability posed by regulatory efforts. The United States currently operating in one of the largest gas booms in history and the regulatory atmosphere created by the Trump administration will yield resistance to increased regulations on oil and gas production. Whereas companies currently achieve profits largely uninhibited by additional regulation costs, the projected effects of climate change will demand more money in the long term than money currently saved with minimal regulations. One document from the EPA elaborates on this point, stating that “inaction now could prove extremely costly in the future”, while taking preventive action today “can help reduce future costs that might otherwise be necessary to deal with the impacts of climate change” (“Framework”). While short term profitability may seem enticing, the long-term economic consequences of inaction, when fully understood, should stimulate oil and gas companies to act accordingly.

Economic Consequences

In addition to profitability, regulations will have short-term limiting effects on the greater economy. Rapid changes effecting the economy, such as those found in the Trump Administration, can create uncertainty, and the Department of Climate Change would impose regulations over time to allow the economy to respond and stabilize accordingly. The DCC will also encourage cities to adopt low carbon investments, which would unlock potential for significant emission reductions, and attract low-carbon investments with an estimated net value in today’s terms of \$24 trillion (Lazer *et al.* 2019). Whereas “most of these returns are the result of cost savings from decreased energy use and improved energy efficiency. . .”, the figure of \$24 trillion underestimates the potential scale of returns “. . . because they do not include the wider socioeconomic and environmental benefits that arise from, for example, a healthier and more productive population, reduced traffic congestion or robust ecosystem services” (Lazer *et al.* 2019). The pace of incremental regulations along with the unaccounted benefits to low carbon investments will ultimately stimulate the growth of the economy.

Coal

As the combustion of coal produces 20 individual hazardous air pollutants and is the leading source of sulfur dioxide emissions, the coal sector would inevitably cast objections (Ratner *et al.* 2018). Coal accounted for more than a quarter of total energy generated in 2018, at 27% (“Electricity Explained” 2019). That same year, coal was also responsible for 13% of total U.S. energy consumption (“U.S. Energy Facts Explained” 2019). These statistics suggest that coal remains an important U.S. energy source, constituting a significant portion of its energy consumption. However, the trends over the past couple decades also suggest that coal-based energy production is declining.

21st Century Trends: Coal

Despite the United States possessing the largest coal resources in the world, the total production and total consumption of coal has fallen significantly from its peak in 2007 and 2008. Whereas total coal production reached 1,171.8 million short tons (mst) in 2008, that number has fallen to 774.1 mst in 2017. Similarly, whereas the total consumption of coal was 1,120.5 mst in 2008, the consumption has fallen to 717 mst in 2017. Reasons for these trends include “improvements in natural gas combined-cycle generation technology since 2000, and the costs of compliance with environmental regulations”. Both of

these variables have caused older and less efficient coal plants to become underemployed or to retire from service. Ratner *et al.* describe the projections of how these trends will fare in the future:

“With the retirement of many coal-fired power plants and the building of new gas-fired plants, accompanied by lower demand for electricity, there has been a structural shift in demand for U.S. coal. A structural shift would mean long-term reduced capacity for coal-fired electric generation. Thus, coal would likely be a smaller portion of total U.S. energy consumption for years to come, replaced by natural gas and renewable energy, particularly as fuel used for power generation”.

Another notable trend that impacted coal in the 21st century was the Clean Power Plan (CPP). Established under the Obama Administration in 2015, the plan was designed “to strengthen the fast-growing trend toward cleaner and lower-polluting American energy . . . [with] strong but achievable standards for power plants (FACT SHEET 2016). Moreover, the CPP had required individual states to address how they planned to curtail CO₂ emissions from gas- and coal-fired power plants. In addition, the CPP would have encouraged states to adopt more low carbon sources of energy, such as natural gas plants, wind, solar, or nuclear. Under the CPP, the consumption of coal would have fallen to under 400 mst, whereas without it, coal consumption is estimated to be as high as 800 mst (Ratner *et al.* 2018). As innovative as this plan was, the existence of the CPP lasted only two years until it was terminated by the Trump Administration. It is the recommendation of the DCC to either reestablish the Clean Power Plan or create a new plan that consists of similar regulatory measures to reduce emissions from fossil fuel-based power plants and incentivize carbon-free energy sources for electricity production.

Coal Job Insecurity

A federal body that has the authority to impose more regulations would limit the growth of the coal industry by constraining profits, resulting in significant industry job loss. The coal sector is becoming less significant in the production of electricity due to competition with less expensive natural gas and with increased environmental regulations, both of which stunt growth. Employment has decreased in turn. However, the production of electricity from non-carbon sources has grown to supply 17.6% of electricity generated in the US. Moreover, for the next 30 years, “it is projected that the production and consumption of [non-carbon] energy will increase by 2.7 per cent per year, a greater increase than we will see in any other energy source” (Cogan 2020). In addition, “. . . wind and utility-scale solar power [are] already cost-competitive with electricity from fossil fuels in many locations [and] provide 50 percent more jobs for the same amount of energy” (Lazer *et al.* 2019). Further information on job increases for wind electricity production specifically can be found within chapter 13. Considering the projected growth of non-carbon energy sources and the amount of atmospheric carbon currently generated from coal energy, a shift from the production of electricity by coal to non-carbon sources of energy is necessary in order to curb the worst climate outcomes. While the United States holds the largest global coal reserves, it will likely remain significant in the domestic energy supply, but the question of how large this role will be is debatable. (Ratner *et al.* 2018).

Transportation

The transportation sector “is the backbone of economic activity, connecting manufacturers with supply chains, consumers with products and tourism, and people with their workplaces, homes, and communities across both urban and rural landscapes”. Its extensive role on the everyday lives of the public make large-scale change both necessary and difficult. However, given that the transportation sector became the largest contributor to greenhouse gas emissions in 2016, regulations on the transportation sector would be vital to prevent worst case scenarios for climate change impacts (“Fourth National Climate Assessment” 2018).

21st Century Trends: Transportation

According to the Fourth National Climate Assessment Vol II, the system of transportation is growing rapidly to meet market demand and innovation (2018). Every year, new drivers and automobiles are created and circulated in use, wearing on current infrastructure. In addition, innovative transportation technologies such as autonomous vehicles, non-carbon propulsion cars, shared mobility, and others are increasing in popularity. These innovations, particularly ride-sharing and non-carbon propulsion vehicles, are suspected to decrease emissions, however the vulnerability to and impact on climate change remain uncertain. However, it is estimated that “by 2050, making passenger fleets more efficient and electric could support 20 million jobs, and increasing the share of passengers who travel on mass transit could support another 12 million jobs” (Lazer *et al.* 2019). Both the creation of jobs and the reduction of emissions from diversifying the vehicles in the transportation sector would promote growth in the greater economy and alleviate some degree of future climate impacts. This diversification “could make climate mitigation and adaptation progressively more challenging to implement and more important to achieve” (Fourth National Climate Assessment 2018).

Scattered Climate Information

There exists a lack of sufficient data to accordingly plan for the infrastructural network of transportation. This sector is among the largest in the nation and therefore is subject to the greatest impacts of climate change. According to the Fourth National Climate Assessment Vol II, disregarding projected impacts from climate change, an estimated \$1.2 trillion gap exists in transportation infrastructural needs (2018). To put that into perspective, that is approximately one twentieth of the Gross Domestic Product (GDP) for the year of 2019. That is also not accounting for the costs associated with greater wear on transportation infrastructure from climate change. To contribute to this problem, “the climate information needs of federal, state, local, and private sector decision makers are not being fully met, which hinders their planning efforts” (GAO 2015). Furthermore, “[the] transportation network is also interdependent on other sectors, such as energy and telecommunications, which have their own climate-related vulnerabilities and existing costs” (Fourth National Climate Assessment 2018). Although there are existing federal efforts for collecting climate information, they largely fail to meet climate information needs of federal, state, local, and private sector decision makers, which will result in greater long-term costs for developing infrastructure for withstanding future climate impacts (GAO 2015). Consequently, the DCC would consolidate all efforts for climate change reduction into a single organization.

Lobbying Efforts

The economic sector that contributes the most financially towards lobbying is oil and gas. In fact, the amount of money annually funneled into lobbying for gas and oil companies has been reported to consistently be over 120 million U.S. dollars since 2008 (Oil & Gas Lobbying Profile). These efforts have been made to fund Congressional members during biennial elections. Since the year 2000, the percentages of donations to either liberal or conservative candidates has largely favored the latter, with anywhere from 76% to 89% (“Oil & Gas: Long-Term Contribution Trends”). This suggests that oil and gas companies generally favor conservative candidates to promote their interests, as conservative members of the government generally believe that less government intervention is preferred. On these grounds, oil and gas lobbyists are anticipated to reject the DCC on argumentative grounds of regulation and competition.

There have been efforts to call on Congress to promote “market-driven” solutions to prevent climate change, such as the CEO Climate Dialogue. This group “aims to build bipartisan support for climate policies that will increase regulatory and business certainty, reduce climate risk, and spur investment and innovation needed to meet science-based emissions reduction targets” (“About”). As hopeful as this appears, the gas giant Exxon⁶ had previously researched CO₂ impacts during the early 1980s but produced widespread doubt after the research revealed the threat severity of climate change (Lavelle 2019). Exxon since has fueled anti-climate information to create dubiousness, which calls into question the confidence for private companies to curb emissions themselves. Thus, government intervention would appear a better response to lower climate impacts.

In addition, objections are anticipated for stimulating competition against oil and gas companies, which would impact profit margins and shareholder confidence in their future gains. Whereas these impacts would manifest to a degree, the necessity to curb climate change projections trumps minor impacts to their bottom line of profit. To reiterate, long-term economic impacts will far outweigh the short-term loss of profits. It is the recommendation of the DCC that oil and gas companies shift their focus from fossil fuel energy production to become general energy companies, employing alternative methods of electricity production to conform to the must of long-term emission reduction.

Conclusion

The establishment of a Cabinet-level department on climate change will generate objections from the private sector for reasons including but not limited to profitability, future economic growth, employment in carbon-based energy, and the lack of consolidated information regarding climate change impacts. Due to the limitations of this conceptual framework, there are undoubtedly other objections that would arise, however those listed are anticipated to be the most prolific. Though regulated private sector profits will be affected by the creation of new regulations, the financial burden of long-term climate devastation from inaction is guaranteed to greatly outweigh short-term profit loss. The DCC will aim to reduce national emissions over time while minimizing adverse economic impact. Coal usage has only decreased, while non-carbon-based energy sources are growing and providing more and more employment opportunities in renewable energy. Lastly, the consolidation of climate change programming

⁶ This occurred before Exxon and Mobile merged to form Exxon-Mobile as we know today.

and enforcement within the DCC will allow the private sector to adequately address climate impacts in the future. These impacts from the DCC represent only a fraction of how the department would contribute to addressing the diverse issues from climate change. The subsequent chapter provides greater detail on the projected impacts of the Department of Climate Change.

References

"About." *About*, 2019. (This citation is for the Climate Dialogue document just to note).

Cogan, John, and James Cogan. "Oil & Gas Regulation 2020: Laws and Regulations: USA: ICLG." International Comparative Legal Guides International Business Reports. Global Legal Group, January 3, 2020. <https://iclg.com/practice-areas/oil-and-gas-laws-and-regulations/usa>.

"Electricity Explained." Electricity in the US. US Energy Information Administration, April 19, 2019. <https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php>.

"FACT SHEET: Clean Power Plan By The Numbers." Clean Power Plan. Environmental Protection Agency, July 14, 2016. https://19january2017snapshot.epa.gov/cleanpowerplan/fact-sheet-clean-power-plan-numbers_.html.

Fourth National Climate Assessment, 2 Fourth National Climate Assessment § (2018). <https://nca2018.globalchange.gov/>.

Framework for Protecting Public and Private Investment in Clean Water Act Enforcement Remedies, Framework for Protecting Public and Private Investment in Clean Water Act Enforcement Remedies § (n.d.).

GAO. A National System Could Help Federal, State, Local, and Private Sector Decision Makers Use Climate Information, A National System Could Help Federal, State, Local, and Private Sector Decision Makers Use Climate Information § (2015).

Lavelle, Marianne. "Former Exxon Scientists Tell Congress of Oil Giant's Climate Research Before Exxon Turned to Denial." InsideClimate News, October 24, 2019. <https://insideclimatenews.org/news/23102019/exxon-scientists-climate-research-testify-congress-denial>.

Lazer, Leah, Catlyne Haddaoui, and Jake Wellman. "Low-Carbon Cities Are a \$24 Trillion Opportunity." World Resources Institute, October 11, 2019. <https://www.wri.org/blog/2019/09/low-carbon-cities-are-24-trillion-opportunity>.

"Oil & Gas Lobbying Profile." OpenSecrets, 2019. <https://www.opensecrets.org/federal-lobbying/industries/summary?cycle=2019&filter=p&id=E01>.

"Oil & Gas: Long-Term Contribution Trends." OpenSecrets.org, February 3, 2020. <https://www.opensecrets.org/industries/totals.php?cycle=2020&ind=E01>.

Ratner, Michael, Kelsi Bracmore, Phillip Brown, Mark Holt, Richard J. Campbell, Marc Humphries, Robert Pirog, and Brent D. Yacobucci. 21st Century U.S. Energy Sources: A Primer, 21st Century U.S. Energy Sources: A Primer § (2018).

Sadasivam, Naveena. "Economy Would Gain Two Million New Jobs in Low-Carbon Transition, Study Says." InsideClimate News, November 18, 2015. <https://insideclimatenews.org/news/18112015/low-carbon-economy-may-create-2-million-jobs-study-finds-clean-energy>.

"Sources of Greenhouse Gas Emissions." Greenhouse Gas Emissions. Environmental Protection Agency, September 13, 2019. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>.

"U.S. Exports of Crude Oil." Petroleum & Other Liquids. U.S. Energy Information Administration, January 31, 2020. <https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCREXUS1&f=M>.

"U.S. Energy Facts Explained." U.S. Energy Facts Explained - Consumption and Production. U.S. Energy Information Administration, August 28, 2019. <https://www.eia.gov/energyexplained/us-energy-facts/>.

Why is Shale Gas Important?, Why is Shale Gas Important? § (n.d.).

Chapter 13

Projected Impacts

Energy, Agriculture, Transportation, Infrastructure, and Industry

Alexander Zhuk

Background

The establishment of the Department of Climate Change will have considerable economic and environmental benefits for Energy, Agriculture, Transportation, Infrastructure, and Public Safety. The anticipated outcomes of a Cabinet-level department on climate change are analyzed below. The “stabilization triangle” concept is used to demonstrate how the U.S. already possesses the resources and technology capable of stabilizing carbon dioxide (CO₂) emissions when led by a streamlined government effort.

Concept of ‘Stabilization Wedge’ as Way to Highlight DCC Benefits

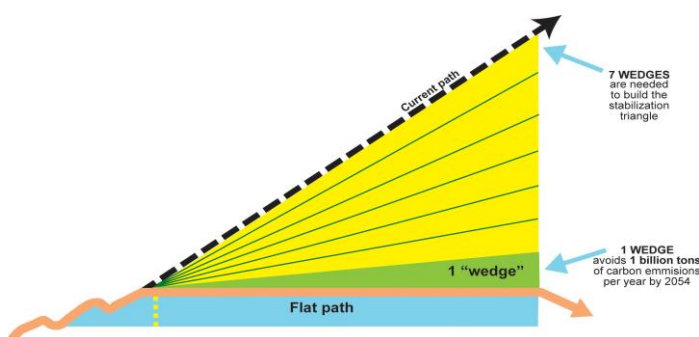


Fig. 13.1 Stabilization Wedges

Source: Steve Pacala & Rob Socolow. *“Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies”* Science, 2004.

In 2004 Pacala and Socolow created the concept of stabilization wedges to achieve atmospheric carbon dioxide (CO₂) stabilization at around 500ppm with two different phases:

- Phase 1: Preventing any further increase in emissions until 2054 through the use of existing technologies, even as energy production continues to expand
- Phase 2: Rapidly reducing global emissions after 2054. Final emissions of all greenhouse gases must level off by 2100 to 1.5Gt/yr, or 20% of present global emissions. (Pacala and Socolow 2004)

Carbon emissions generated by burning fossil fuels are expected to double in the coming 35 years. The black line, shown in the graph, represents the path consistent with present emission levels. It will lead to global warming and increased threats to national security, public safety and agriculture. If emissions were to be maintained at the level represented by the orange line, as opposed to increasing

as they are currently, the resultant reductions would limit carbon dioxide emissions significantly and skirt the worst predicted consequences of climate change. In order to keep emissions flat, the world needs to cut carbon output by 7 billion tons per year by 2054 “keeping a total of ~175 billion tons of carbon from entering the atmosphere (yellow triangle)” (Pacala and Socolow 2004). The “stabilization triangle” shown in the graph can be filled with the 7 smaller triangles “wedges” that each represents at least 1 billion tons of carbon that needs to be cut. The DCC will implement the “Wedge Strategy” to stabilize carbon dioxide, a strategy proposed to reduce emissions without decreasing economic growth, that considers large increases in energy usage.

By promoting the implementation of 7 wedges at the same time, the DCC will stabilize carbon dioxide emissions. Having succeeded in involving all states in plans for carbon reduction, the department will share its domestic experience with the international community. It is clear from the climate stabilization triangle that the sooner the United States champions carbon reduction on the global stage and convinces more countries to do the same, the more effective and less costly the path will be to stabilizing carbon dioxide emissions and mitigating further ramifications.

Energy

The Department of Climate Change will focus extensively on reducing emissions from energy production and use. In the U.S., energy-related greenhouse gas emissions comprise nearly 80% of the total and more than 90% of those for carbon dioxide and methane. Progressively reducing such emissions via DCC policies and actions will hugely benefit the nation in a number of ways. Increasing energy efficiency, both in production and consumption, will provide large economic benefits. Supporting and implementing programs for upgrading the national grid will greatly reduce outages and improve overall reliability, thus saving many millions of dollars each year while increasing productivity in every economic sector. Similarly, projects to advance non-carbon sources of electricity, including renewable technologies and nuclear power, will expand existing industries, generate thousands of new jobs, and reduce all forms of pollution associated with fossil fuels.

Such are but a few of the myriad benefits to result from DCC actions in the energy realm. These actions will not only help drastically lower climate-changing emissions and pollution but will help improve the health and quality of life for U.S. citizens.

The Smart Grid

The Smart Grid will be used to address an aging electric grid infrastructure that needs to be replaced or upgraded. The economic benefits of using a Smart Grid system are greater than the costs. It will take between \$338 billion and \$476 billion to deploy the entire Smart Grid, with the potential benefits ranging between \$1.3 trillion to \$2 trillion. (Guo, Bond and Narayanan 2015). The Smart Grid is a safe system that is not vulnerable to cyberattacks as it is equipped with multiple sensors that monitor weather conditions, power line temperature, and power line carrying capacity. The Smart Grid is therefore less impacted by terrorist attacks or natural disasters on any individual nexus of power. Moreover, as suggested by the Electric Power Research Institute (EPRI), the Smart Grid will be also used to incorporate non-carbon electricity “reducing environmental pollution and the associated external

costs” (Guo, Bond and Narayanan 2015). The full deployment of the Smart Grid according to the United States Government Accountability Office will result in:

- lower electricity rates due to the ability to improve the overall efficiency of the system operation, in particular by shifting peak demand
- improved reliability: fewer and shorter outages
- improved ability to detect and respond to attacks and outages related to the grid
- improved ability to incorporate intermittent alternative energy sources, such as wind and solar
- improved information to consumers, allowing them to make more-informed choices about electricity consumption (Guo, Bond and Narayanan 2015).

Solar

One of the DCC’s goals will be to encourage and support expansion of the solar energy market through favorable financing, investment tax credits, direct subsidies, and public investment in order to reduce emissions of greenhouse gases and dangerous pollutants while simultaneously reducing energy costs. Photovoltaic systems, along with distributed storage systems, can help customers store solar power, reduce their reliance on the central power grid, and redistribute excesses via the Smart Grid during peak hours. Larger deployment of solar power systems will also result in reduced electricity prices for customers, particularly in areas with high retail prices. This is because solar power that “generate[s] electricity near the point where it is consumed, can potentially reduce how much electricity grid operators have to transmit to customers, which can help defer the need to upgrade distribution or transmission lines, thus avoiding potential cost increases for customers” (GAO 2017).

Solar and distributed storage systems will be crucial for islands outside of the continental U.S. which are currently expensive to supply electricity to, such as Puerto Rico and Hawaii. Puerto Rico was devastated by a deadly Category 5 hurricane in 2017 that disabled the fossil-fuel power plants and the central electrical grid for few months. In fact, “Puerto Rico’s faulty electrical grid failed the island after Maria, while solar power sustained Casa Pueblo” (Crunden 2018). The DCC will work on deploying solar power systems in areas with high electricity prices, such as in Hawaii where electricity “costs twice the national average” (HNN 2018).

According to the World Bank’s Development Research Group Environment and Energy Team, the cost of solar systems has been declining when compared to coal, nuclear, and wind energy technologies (World Bank 2011). The greatest benefits of deploying solar are a result of its quick development, installation, and implementation, making it very attractive for investors. According to the U.S. Energy Information Administration (EIA), solar systems will constitute 43% of total cumulative electricity generating capacity additions by 2050 (EIA 2019).

Achieving one small wedge of the “stabilization triangle” consists of preventing the production of 1 billion tons of carbon emissions by 2054 on a yearly basis. Doing so would require a 2000GW peak, while 2004’s capacity was 3.7GW. That would require 2 million hectares, or about 12% of the area of

Washington state, to be covered in solar paneling (Pacala and Socolow). As of 2016, capacity was 303 GW, requiring a 6.6-fold increase for a wedge to be completed (IEA 2017). By pushing for a 2000GW peak, the DCC will be able to achieve one of the seventh wedges required to stabilize carbon dioxide emissions.

Wind

Energy that is generated from wind systems will positively impact the local community both economically and environmentally. Wind energy benefits farmers and ranchers, who would be able to lease part of their farming land for “as much as \$4000 per turbine per year” and still be able to grow crops and livestock that can be grazed up to the base of turbine (National Renewable Energy Laboratory 2005). Wind power will also generate new jobs in construction, from 40 to 160 jobs per 100MW of generating capacity, or 1-2 jobs per 1.5 MW turbine. Thirdly, operation of every 100MW of generating capacity after their construction will create 25 permanent jobs (Union of Concerned Scientists 2007). The energy generated through wind turbines will be shared into the Smart Grid system, allowing the community to benefit financially from reduced electricity costs as well as economically as the result of increased government and private investment in alternative energy development. The wind energy will increase the tax base for rural areas. For example, Texas generated \$13.3 million in tax revenue as a result of the 912 megawatts of new wind power (National Renewable Energy Laboratory 2005). Wind energy will also lead to environmental benefits as it does not directly generate emissions or pose a threat to public health and water safety.

According to the EIA an estimated 11 gigawatts of wind capacity was brought online in 2019, the largest installment since 2012. The EIA expects wind electricity generation to surpass hydropower with an “additional 8 GW of wind capacity scheduled to come online in 2020” (EIA 2019). The DCC will generate a larger demand for U.S. wind energy with expanded tax credits. The “20% Wind Energy by 2030” report projects six main impacts for the environment, water savings, U.S. energy consumers, local economics, and American workers that will generate positive impacts as a result of greater implementation and usage of Wind Systems by 2030:

- Environment: Avoids air pollution and reduces GHG emissions; reduces electric sector carbon dioxide emissions by 825 million metric tons annually
- Water savings: Reduces cumulative water use in the electric sector by 8% (4 trillion gallons)
- U.S. energy security: Diversifies electricity portfolio and represents a local energy source with stable prices not subject to fuel volatility
- Energy consumers: Potentially reduces demand for fossil fuels, in turn reducing fuel prices and stabilizing electricity rates
- Local economics: Creates new income source for rural landowners and tax revenues for local communities in wind development areas
- American workers: Generates well-paying jobs in sectors that support wind development, such as manufacturing, engineering, construction, transportation, and financial services; new manufacturing will cause significant growth in wind industry supply chain (Energy Efficiency & Renewable Energy 2008).

According to the “Wedge Strategy” it would take one million 2-megawatt windmills displacing coal power to fulfill one wedge by 2054 (Pacala and Socolow 2004). In 2004 the world had about 50,000-megawatts (2.5% of the requirement) and by the end of 2018, capacity had increased to 591,000 megawatts. Almost 29% of a wedge was achieved in less than 15 years. One million 2-megawatt windmills displacing coal power would require an area of land the size of Montana. However, land beneath the turbines could still be used for grazing, farmland and many other activities (Dargan 2018). Wind energy will have to increase by 8% on average per year to achieve one wedge out of the required seven wedges.

Tidal

Implementation of wave-damping steel nets for shielding coastal infrastructure from rising sea levels is a necessary measure for not only protecting coastal areas and buildings, but also for generating electricity from waves. Implementation of “stable vertical walls submerged at minimum 20m below sea level” with integrated turbines will greatly reduce destruction from flooding and tsunamis (Scheel 2014). The United States does not have tidal power, however several countries such as France, Canada, South Korea and Ireland do. Several power plants run off of tidal energy globally, such as a power plant built in Rance, France as well as the Sihwa Lake tidal power plant in South Korea (Scheel 2014). The DCC will encourage the implementation of wave-damping steel nets to protect coastal infrastructure and for generating tidal energy.

The Department of Climate Change will prioritize the protection of coastal areas as well as the interests of the communities and businesses that are threatened by sea level rise. The DCC’s policies will stimulate more active participation in the development of tidal energy by the private sector and appropriate congressional funding for this endeavor. This will decrease risk at the early stages of these investments.

Nuclear

The Department of Climate Change will build more nuclear energy plants due to their low cost of power production, lack of carbon emissions, and low fuel demand. Total cost of producing a nuclear plant with a 5% discount rate is 4.675 cents per kilowatt hour (c/kWh), and with a 10% discount rate is 7.650 c/kWh, whereas the cost of generating power for the US through coal, gas, or wind power is 6.2 c/kWh and 8.3 c/kWh at the given 5% and 10% discount rates (Lombaard, A.L. & Kleynhans, E.P.J., 2016). A cost benefit analysis reveals nuclear energy as a viable option for future energy production, as it is less expensive than other methods of power production and because nuclear energy power output is already expected to increase by 58% until 2035 (Lombaard, A.L. & Kleynhans, E.P.J., 2016). Nuclear plants generate among the lowest amounts of carbon of any energy source, both in production and in use. First of all, the steam that spins a turbine and generates electricity does not generate harmful pollutants. Nuclear plant emissions are similar to wind turbines at 12 g CO/ kWh (McCombie & Jefferson 2016) Secondly, their footprint is small, and they generate more electricity on less land than other non-

carbon sources. Implementing effective radiation elimination and waste management would aid in preventing negative health outcomes. Moreover, some advanced reactors can operate on used fuel.

The DCC will prepare for the increased demand for energy in 2035 by building nuclear energy plants in 2029. Nuclear electricity would require 700GW or 700 nuclear plants to fulfill one wedge by 2054 and displace coal power. Nuclear power generation has decreased slightly since 2004, however by crowdsourcing R&D to address and solve concerns with the disposal of the nuclear waste, DCC will aim for a larger amount of nuclear plants.

Carbon Capture

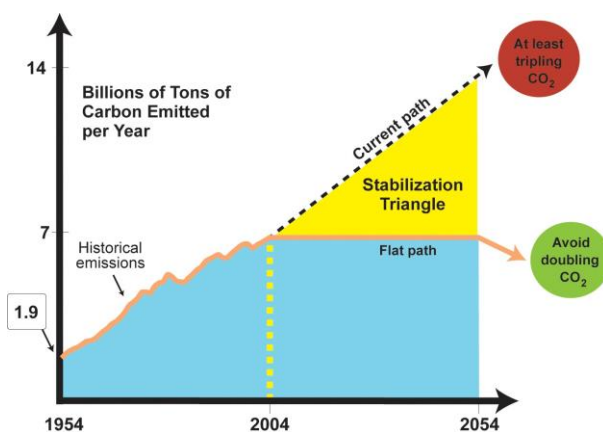


Fig. 13.2 Carbon emissions from fossil fuel burning are projected to double in the next 50 years

Source: Steve Pacala & Rob Socolow. "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies" *Science*, 2004.

The world will need to reduce 7 gigatons of carbon dioxide per year from 2029 through 2054 in order to stabilize CO₂ emissions. The Department of Climate Change will be able to avoid from 1 to 2 billion tons of greenhouse gas emissions by 2054 by enforcing the implementation of carbon capture and storage by coal and natural gas industries (Pacala and Socolow 2004). Firstly, the DCC will reduce global carbon emissions by at least 1 billion tons (1 wedge) by capturing and storing emissions from 800 coal electric plants. Secondly, by implementing Carbon Capture and Storage at 1600 GW natural gas electric plants, the DCC will achieve another reduction of 1 billion tons. Currently there are only 3 carbon capture and storage projects that capture 1 million tons of carbon dioxide per year. By 2054, 3500 such storage projects will be needed (Dargan 2018). SINTEF's estimates show that the cost of large-scale (i.e. millions of tons per year) capture, transport, and storage of carbon dioxide from coal-fired power plants will be approximately \$93 per ton (Benjaminsen 2019).

Transportation

The Department of Climate Change will focus on eliminating reliance by the transport sector on oil products for energy by decarbonizing fuels and replacing them with electric alternatives.

Decarbonized Fuels & Fuel Displacement by Low-Carbon Electricity

The transportation sector, according to the IPCC special global warming report, accounts for 28% of global energy and 23% of global energy CO₂ emissions in 2014 (IPCC 2018). There is an urgent need to diversify transport's energy reliance on oil, as 92% of transport energy demand consists of oil products (IPCC 2018). According to the IPCC the share of low-carbon fuel in the transport sector should increase "to 10% and 16% by 2030 and to 40% and 58% by 2050" through efficiency improvements, biofuels, electrification, and a popular shift to public transportation use (IPCC 2018). Efficient use of fuel can be achieved through a decrease in the number of miles driven per car, 5,000 instead of 10,000 miles per year, as well as doubling the fuel efficiency of cars from 30 miles per gallon to 60 miles per gallon. Achieving both of these goals could result in the completion of two wedges (Pacala and Socolow 2004). Lowell, Dana, Amlan Saha, and Christopher Van Atten in their "Decarbonizing Transportation" report discuss high levels of vehicle electrification and reduced carbon intensity with the specific targets that need to be reached in order to reduce transportation's GHG emissions. The targets are 6% and 17% reduction by 2030 and 2050 under the Mid case, and 10% and 32% reduction by 2030 and 2050 under the High case. "Under the Mid Case scenario, the cumulative net societal 'investment' required to implement the modeled abatement strategies is estimated to be \$12.2 billion (2015) through 2028", whereas "under the High Case scenario, the cumulative net societal investment required to implement the modeled abatement strategies is estimated to be \$25.4 billion (2015) through 2030" (Dana, Saha and Atten 2018). The authors estimate financial and environmental benefits to be \$311 billion with the Mid scenario and \$383 billion with the High scenario and state that the High scenario provides a larger environmental and economic benefit. They claim that "financial benefits are primarily net fuel cost savings, after subtracting the costs of more expensive vehicles, and charging infrastructure for EVs. The cumulative environmental benefits shown are the monetized value of reduced GHG, NO_x, and PM_{2.5} emissions resulting from more efficient conventional vehicles and EVs" (Dana, Saha and Atten 2018).

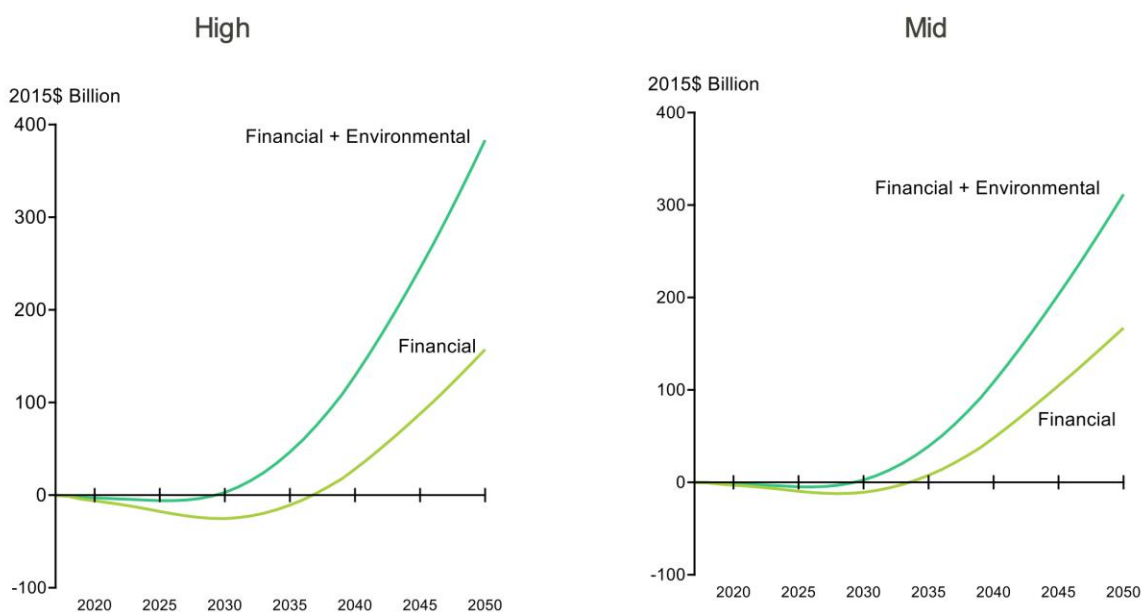


Fig. 13.3 Cumulative Net Benefits of Abatement Scenarios

Source: Lowell, Dana, Amlan Saha, and Christopher Van Atten “*Decarbonizing Transportation*” 2018

The Department of Climate Change, knowing the difficulties of decarbonizing fuels, will form an urgent national security authorization for the creation of new infrastructure projects, implementation of low-carbon strategies, and the introduction of carbon pricing. The DCC will work on projects to integrate more convenient public transportation options, making demand more elastic to changes in fuel prices. There are two main options that should be considered in meeting the goals for GHG emissions. First of all, the existing quantity of transportation needs to be maintained at the present level, and carbon-free vehicles should replace current models. Secondly, the government needs to stimulate a larger demand for public transport. These steps would require significant government investment into better trains, buses, and subway systems. Raising the Federal Gasoline Tax will be used by the DCC as one of the primary tools to increase funding for future transport infrastructure projects. An increase of 25-35 per cents per gallon on gasoline and per gallon diesel will be the first step enacted by the department, leading the United States toward more sustainable energy sources and decreasing transport dependence on oil. To achieve greater public approval and understanding, the DCC will work on the Gasoline Tax that is proportional to both urban and rural incomes. Higher fuel taxes will allow the US to decrease hazardous pollutants, stimulate lower oil demand, explore more alternative energy options, and encourage greater public transportation usage (Rapier 2018).

Stimulating demand for electric vehicles and public transport and decreasing the United States’ reliance on carbon-based energy sources will both be priorities of the Department of Climate Change. The money received from increasing the Federal Gasoline Tax will be used both for infrastructure projects to make commuting more affordable and for exploring low-carbon electricity options.

Agriculture

Methane Management

The Department of Climate Change will work to reduce methane emissions, which will help slow down anthropogenic climate change and decrease the amount of harm resulting from the thinning of the ozone layer. Primary methane emitters are landfills, rice cultivation, wastewater treatment, livestock, and fossil fuel production. Subsidies that have led to overproduction in the agricultural sector will be carefully reevaluated to decrease methane emissions. It is estimated that a one million ton decrease in methane (CH₄) emissions can help avoid approximately “239 premature cardiovascular and pulmonary deaths and 591 premature global respiratory deaths among the population aged 30+ due to long-term peak ozone exposure” (Sarofim, Waldhoff and Annenberg 2015). The public health benefits of avoiding cardiovascular and pulmonary mortality as a result of reducing methane (CH₄) emissions are substantial, as mentioned in the study by Sarofim, Waldhoff and Annenberg, and can result with the long-term and short term public health benefits that “increase from \$1301 in 2010 to \$3846 and \$634 to \$1,428 in 2050” (Sarofim, Waldhoff and Annenberg 2015) The DCC will assess the benefits of methane (CH₄) mitigation policies and work on their implementation.

Forests & Soils

The DCC will work on reforestation projects to protect and promote biodiversity and to stabilize carbon dioxide (CO₂) emissions. Reforestation, particularly when conducted with indigenous plantlife in mind and varied in density, species mix, size, and location, helps improve the soil, water, and air quality, stability of organic matter, root growth, and seedling establishment, as well as preventing erosion (Cunningham, Nally, Baker, Cavagnaro, Beringer, Thomson and Thompson 2012). Reforestation is an important way through which atmospheric carbon can be sequestered. Specifically, “net ecosystem production of forests is estimated globally to be 1.0 t C ha⁻¹ year⁻¹, while improved pastures and croplands sequester on average 0.5 t C ha⁻¹ year⁻¹” (Cunningham, Nally, Baker, Cavagnaro, Beringer, Thomson and Thompson 2012). Carbon capture and sequestration, according to Barnard, will cost between \$120-\$140 per ton of carbon dioxide (Barnard 2016).

Infrastructure

Electrical Grids

The DCC will streamline the permitting process for the construction of more transmission lines across the electrical grid. The existing Eastern, Western and Texas interconnected electrical grid is functioning at its full capacity and not withstanding severe weather impacts. This is due to most of the electric grid being constructed in the 1950s and 1960s with a 50-year life expectancy. According to the Energy Report Card, weather events as well as attacks and vandalism on the electrical grid resulted in 3,571 total outages in 2015 with an average duration of 49 minutes (ASCE 2017). The Energy Report Card calculated annual inflation-adjusted average costs of between \$18 billion to \$33 billion to the U.S. economy due to weather-related outages and aging infrastructure between 2003 and 2012 (ASCE 2017).

The DCC will promote the usage of remote sensors, enhance and expand existing monitoring and inspection technologies to lower the risk and repercussions of storm events as well as terrorist and cyber-attacks, and work on engineering standards for the electrical grid to ensure safety and reliability as well as to increase the amount of new distribution lines better designed to withstand impacts from wind, snow, and higher temperatures.

Buildings

The Department of Climate Change will address emissions that result from the construction of buildings by creating policies to reduce operational carbon emissions from heating, cooling, and lighting, and regulate what materials are used in manufacturing. Carbon emissions are expected to double by 2050 if appropriate measures are not put in place (Budds 2019). In order to meet the goals established by the Paris Agreement that “all buildings must be net zero carbon emission by 2050”, the DCC will aim for a reduction in energy consumption through the establishment of efficient design. Efficient design means replacing existing fossil fuels in buildings with carbon-free renewable energy. The DCC will promote the establishment of more certification programs for the building industry like “Energy Star”, “Passive House”, and “LEED”, as well more business cooperation with the construction sector. This will allow leading experts that work toward net-zero emissions, such as “Architecture 2030”, to contribute their expertise. Efficient use of electricity in all residential and commercial buildings is expected to lead to a 25-50% reduction in electricity usage by 2054, or the equivalent of one wedge. In fact, just changing

all light bulbs to compact fluorescent lamps would lead to the avoidance of 33% of a billion tons of greenhouse gas emissions by 2054 (Pacala and Socolow).

Dams

The DCC will develop an emergency plan for dams with a high hazard potential, create a dam rehabilitation fund for communities affected by dam failure, and create Federal Guidelines for dam safety. Dam safety is very important for the public as the failure of dams will result in millions of dollars in damages. Many existing dams will not be able to safely remain in their current state for long due to their age. According to the Dams Infrastructure Report Card, “the number of high-hazard potential dams is growing rapidly; as of 2015, there are approximately 15,500 dams in the United States that are classified as high-hazard potential” and their average age is 56 years” (ASCE 2017). The combined total cost to rehabilitate the nation’s non-federal and federal dams exceeds \$64 billion (ASCE 2017). Repairing existing dams and fortifying the, with modern technology while increasing regulatory oversight will help ensure improved dam safety.

Bridges

The DCC will work on increasing available funding for rebuilding deficient bridges via the Federal Highway Trust Fund by increasing taxes on gasoline and diesel. According to the Bridges Infrastructure Report, as of 2016 9.1% of bridges were structurally deficient (ASCE 2017). Congress was unable to pass the 2015 Fixing America’s Surface Transportation (FAST) spending bill. The DCC will therefore be responsible for generating at least \$123 billion dollars via an increase of 25-30 cents per gallon on gasoline and per gallon diesel to the Federal Gasoline Tax for the structural rehabilitation of structurally deficient bridges.

Roads

The Department of Climate Change will aim to increase funding from the private sector as well as from the government to meet the existing financial needs for highway and road maintenance. This includes safety improvements and solving congestion problems. Part of this will be through increasing the Federal Gasoline Tax. 21% of highways in 2015 were in poor condition, costing U.S. motorists \$120.5 billion in extra vehicle repairs and operating costs in 2015, or \$533 per driver (ASCE 2017). Additionally, the Federal Highway Administration estimates that each dollar spent on bridges, highways, and roads results in \$5.20 in returns due to lower vehicle maintenance costs, reduced fuel consumption, decreased delays, lower road and bridge maintenance costs, improved safety, and decreased emissions due to improved traffic flow (ASCE 2017).

Conclusion

By implementing seven projects in solar, wind, and nuclear energy, diversifying the transportation sector’s reliance on oil, promoting more energy efficient construction, and enforcing regulations on industry, the DCC will be able to drastically reduce carbon dioxide (CO₂) emissions and move the U.S. closer to mitigating the threats caused by the climate crisis. The U.S. could accelerate this process by encouraging action from the international community, whose efforts will be vital if

anthropogenic climate change is to be adequately combatted. By leading efforts to combat climate change, the DCC will help solve the carbon problem and mitigate future threats. By implementing the 7 wedges of the Stabilization Triangle, the Department of Climate Change will stabilize carbon dioxide levels and prevent further disruptions to U.S. physical, biological, ecological, and public health systems.

References

- Amann, Markus et al. "Global Air Quality and Health Co-benefits of Mitigating Near-term Climate Change Through Methane and Black Carbon Emission Controls." *Environmental Health Perspectives* 120, no. 6 (2012): 831-839.
- Andries Lombaard, and Ewert P.J. Kleynhans. "The Feasibility of a Nuclear Renaissance: A Cost-benefit Analysis of Nuclear Energy as a Source of Electricity." *Acta Commercii* 16, no. 1 (2016): E1-E11.
- Barnard, Michael. "Carbon Capture Is Expensive Because Physics." *CleanTechnica*, 2016.
<https://cleantechnica.com/2016/01/19/carbon-capture-expensive-physics/>.
- Benjaminsen, Christina. "This Is What You Need to Know about Carbon Capture and Storage." *Phys.org*, October 8, 2019. <https://phys.org/news/2019-10-carbon-capture-storage.html>.
- Budds, Diana. "How Do Buildings Contribute to Climate Change?" *Curbed*, September 19, 2019. <https://www.curbed.com/2019/9/19/20874234/buildings-carbon-emissions-climate-change>.
- Cunningham, S.C., et al. "Balancing the Environmental Benefits of Reforestation in Agricultural Regions." *Perspectives in Plant Ecology, Evolution and Systematics* 17, no. 4 (2015): 301.
- Dargan, Frierson, "The Predicament", *Department of Atmospheric Sciences*, 2018
- Dreyer, Stacia J, Hilary Jacqueline Polis, and Lekelia Danielle Jenkins. "Changing Tides: Acceptability, Support, and Perceptions of Tidal Energy in the United States." *Energy Research & Social Science* 29 (2017): 72-83.
- "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply." *Energy.gov*, 2020. <https://www.energy.gov/eere/wind/downloads/20-wind-energy-2030-increasing-wind-energys-contribution-us-electricity-supply>.
- "EPA Alumni Association: Behind the Scenes at the Creation of EPA in 1970". 2020. <https://www.epaalumni.org/history/video/interview.cfm?id=14&c=3>.
- Guo, Christopher., Bond, Craig A, and Narayanan, Anu. "The Adoption of New Smart-Grid Technologies Incentives, Outcomes, and Opportunities". Santa Monica: RAND Corporation, 2015.
- Ironcore. "Energy." ASCE's 2017 Infrastructure Report Card. n.d.
<https://www.infrastructurereportcard.org/cat-item/energy/>.

- Ironcore. "Bridges." ASCE's 2017 Infrastructure Report Card. n.d.
<https://www.infrastructurereportcard.org/cat-item/bridges/>.
- Ironcore. "Roads." ASCE's 2017 Infrastructure Report Card. n.d.
<https://www.infrastructurereportcard.org/cat-item/roads/>.
- Ironcore. "Ports." ASCE's 2017 Infrastructure Report Card. n.d. <https://www.infrastructurereportcard.org/cat-item/ports/>.
- Lowell, Dana, Amlan Saha, and Christopher Van Atten. "Decarbonizing Transportation."
 n.d. <https://www.ucsusa.org/sites/default/files/attach/2018/10/reducing-emissions-northeast-report-full.pdf>.
- Mccombie, Charles, and Michael Jefferson. "Renewable and Nuclear Electricity: Comparison of Environmental Impacts." *Energy Policy* 96 (2016): 758-69.
- U.S. Department of Energy. *Wind Energy Benefits. Wind Powering America Fact Sheet Series*. Washington, D.C.: 2005.
- Pacala, Steve, and Rob Socolow. "Technology Already Exists to Stabilize Global Warming."
 Princeton University. The Trustees of Princeton University. n.d.
<https://pr.princeton.edu/news/04/q3/0812-carbon.htm>.
- Rapier, Robert. "There Are Some Benefits to a Higher US Gas Tax." *Business Insider*, February 27, 2018. <https://www.businessinsider.com/there-are-some-benefits-to-a-higher-us-gas-tax-2018-2>.
- Sarofim, Marcus, C. Waldhoff, and Stephanie Anenberg. "Valuing the Ozone-Related Health Benefits of Methane Emission Controls." *Environmental and Resource Economics* 66, no. 1 (2017): 45-63.
- Scheel, Hans. "Tidal Energy and Large-Scale Fish Farming, Benefits of Novel Tsunami and Flooding Barriers." *International Journal of Environmental Science and Development* 5, no. 5 (2014): 484-90
- Staff, HNN. "Ranking: Electricity Costs Twice the National Average in Hawaii." <https://www.hawaiinewsnow.com>, February 21, 2018.
<https://www.hawaiinewsnow.com/story/37551087/ranking-electricity-costs-twice-the-national-average-in-hawaii/>.
- Timilsina, Govinda R., Kurdgelashvili, Lado, and Narbel, Patrick A. A Review of Solar Energy:

Markets, Economics and Policies. Policy Research Working Papers. Washington, D.C.: World Bank, 2011.

Twitter, E.A. Crunden. "Meet the Puerto Ricans Who Were Pushing for Renewables Long before Hurricane Maria." ThinkProgress, August 31, 2018. <https://thinkprogress.org/puerto-rico-solar-maria-recovery-f7fbb38e4a1a/>.

United States Government Accountability Office, GAO. Status of Residential Deployment of Solar and Other Technologies and Potential Benefits and Challenges, February 2017

Union of Concerned Scientists. "Wind Power in New England." Union of Concerned Scientists.

Accessed February 28, 2020. <https://www.ucsusa.org/resources/wind-power-new-england-benefits-local-communities#5>.

U.S. Energy Information Administration. *Independent Statistics and Analysis*. 2020.

<https://www.eia.gov/todayinenergy/detail.php?id=38053>.

Conclusion – Call to Action

Cameron Tarzaban

This Task Force report upholds the affirmative standing in the creation in the Department of Climate Change in order to effectively address the climate crisis facing the United States and the greater world. As the U.S. currently lacks a thorough, streamlined, federal response to both the indirect and direct threats caused by climate change. The country is in a fundamentally heightened state of vulnerability unable to adapt and withstand inevitable damage in all sectors. This report therefore presented the advantages posed from creating a Cabinet-level department, from symbolism to overall functionality. Much consideration was given to the capabilities of the Department, process of inter-governmental responsibility consolidation, and its goals translated into tangible projected impacts. While there are clear and inhibiting foreseen obstacles impacting the feasibility of the creation of the Department, this Task Force responds to such barriers with concern and preparation. This report thoroughly details the concept of creating a Department of Climate change in order to meet the defining crisis with deserving effort and priority.

In context of this extremely sensitive crisis that concerns the world, it is important to consider the expected cultural impact of such a response via the United States government. The projected impacts through the Department's efforts in areas such as mitigation, regulation, research, and much more, go beyond its emissions targets and anticipated economic results. Communities, not only within the United States but also abroad, will feel this shift in government upon the environment. This shift will alter human lives tremendously, regardless of any background; socioeconomic status, race, gender, and nationality are irrelevant to mask any human from this environmental change. As climate change is explicitly made a priority via the United States government, people will mirror such behavior and begin to do the same thing. The United States has the opportunity and capacity to be a global leader responding to the mass issue and set a precedent through such federal response. Once Department of Climate Change is created, there will be no stranger to the fight against climate change.

Waiting for a governmental response to the climate crisis is not an environmentally sound resolve nor is it effective in achieving its own goal, however, a mass cultural shift is needed. Creating a Department will of course take time. In fact, if any federal action is to be demanded then multi-lateral participation is still necessary. Intentional environmental protection and awareness bringing will continue to pressure the government. No mass cultural shift within the United States has happened overnight. Grassroots, community based, and local government involvement are all some examples of essential components of multi-lateral involvement to bring the United States federal government to face the issue. Therefore, it is in the hands of the many to pursue action against polluters, to use cleaner energy on an individual basis, to take the fight against climate change in their own hands to the degree of which they are capable. Survival of the planet is contingent upon this mass involvement, and the potential lies within the United States population. The time is now to protect life, as there is no other choice.