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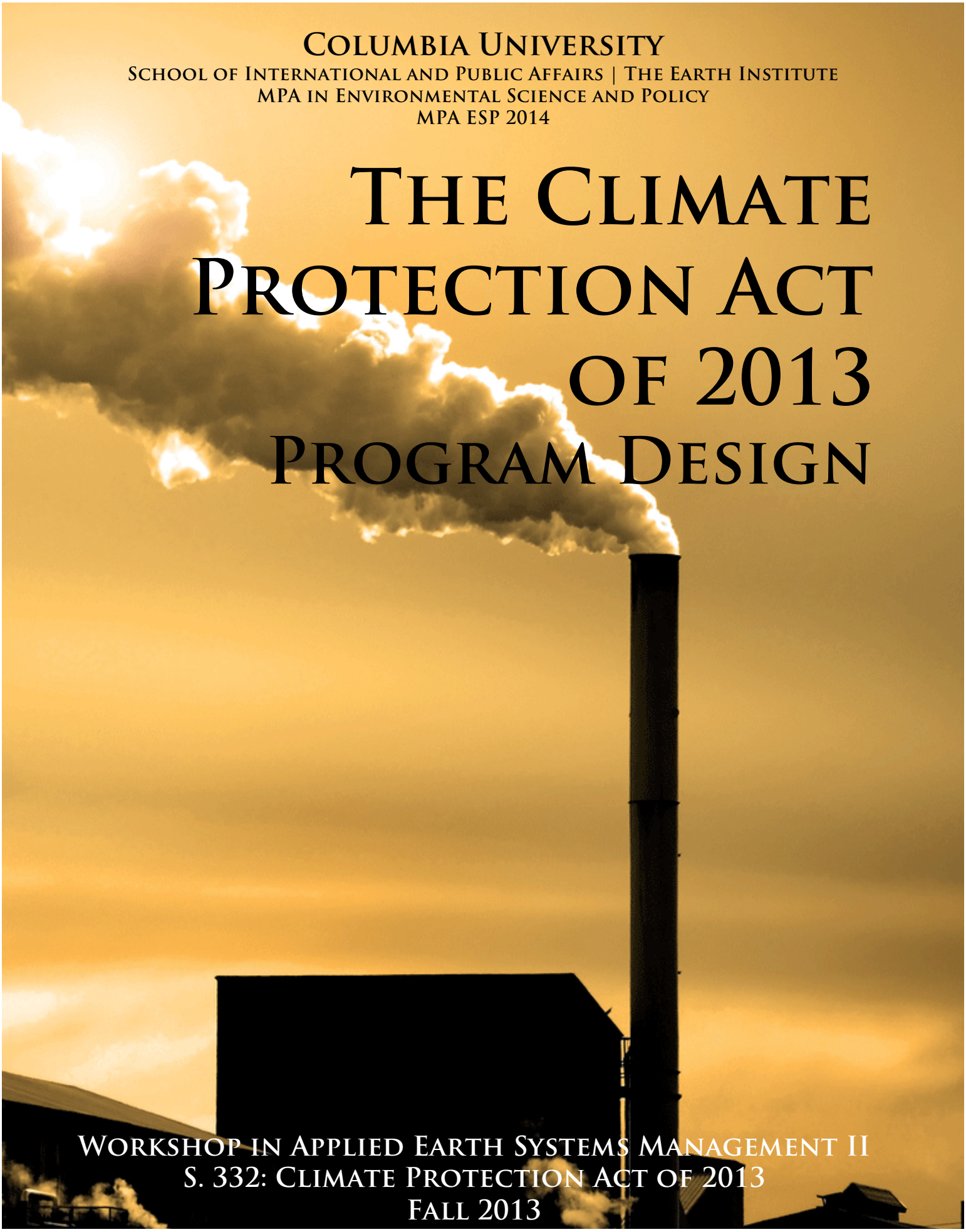
The Climate Protection Act of 2013 Program Design



Workshop in Applied Earth Systems Management II
S. 332: Climate Protection Act of 2013
Fall 2013

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Fall 2013

Final Report

Climate Protection Act of 2013: Senate Bill 332

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Executive Summary

Senate Bill 332, the Climate Protection Act of 2013 (CPA), aims to reduce U.S. emissions of carbon by 80% of 2005 levels by 2050. It will achieve this reduction via a $20 tax per ton of carbon dioxide content across all industry sectors, a carbon equivalency fee on carbon-intensive goods, and an equivalency fee set on imported goods. The tax is expected to raise 1.2 trillion dollars over 10 years, or approximately 100 billion dollars a year in revenues. If this law were enacted these revenues would be administered by the Environmental Protection Agency (EPA) and used to offset the negative impacts of the tax in two ways: a monthly residential rebate for American families to mitigate the increased cost of buying goods, and the establishment of a trust fund for industry subsidies to mitigate the increased costs of producing goods. The act also facilitates a transition to a low-carbon economy by increasing funding for renewable energy research and development, weatherization programs, and climate change adaptation and infrastructure resiliency projects.

This report will analyze the issue of climate change as an imminent global concern, and the role played by the United States as a major contributor of carbon emissions. It will examine the range of environmental, societal and economic ramifications of climate change and then identify sustainable technologies as scientific solutions to this issue, as well as the challenges of these technologies. The second half of the report introduces the Climate Protection Act as a way to reduce U.S. emissions by using a tax while protecting the economy from some of the economic impacts of such a tax. It will provide an overview of the key stipulations of the bill, the legislative and political background, and provide analyses of the rationale behind each of CPA's mandated programs. Finally, it will offer an original program design and outline the details of the organizational structure, budget and master calendar.

At the time of writing, this act has not come up for a vote in the Senate. This legislation arrives at a time of marked intransigence between the Democratic Senate and Republican House of Representatives under the Obama Administration. In the fall preceding this bill's introduction, Republican House leaders pledged not to pass any climate legislation that would raise revenues. However if enacted, S. 332 would reduce emissions, help the U.S. transition to cleaner fuel sources, and establish the United States as a leader in the global arena of climate change mitigation.

[**Note: This report focuses only on the carbon-related sections of S. 332. It will not address the proposed amendments to the Safe Drinking Water Act under Title III of the Act.**]

Table of Contents

Acronyms and Abbreviations

CCS	CARBON CAPTURE AND STORAGE
CPA	CLIMATE PROTECTION ACT OF 2013
CPIG	CARBON POLLUTION-INTENSIVE GOOD
CPRTF	CARBON POLLUTION REDUTION TRUST FUND
CPS	CARBON POLLUTING SUBSTANCE
DOE	DEPARTMENT OF ENERGY
EPA	ENVIRONMENTAL PROTECTION AGENCY
GHG	GREENHOUSE GASES
IPCC	INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
STFP	SUSTAINABLE TECHNOLOGIES FINANCE PROGRAM

Introduction

Since the mid-20th century, scientists have observed changes in our climate.[1] Today, these shifts are no longer apparent to just the scientific community. Each year, storms of unprecedented scale damage developing and developed nations. At the time of writing, a 1-in-1,000 year flood inundated Colorado[2] and Typhoon Haiyan caused more deaths in the Philippines than any other disaster in the country's recorded history.[3] Droughts are occurring with increasing intensity. Though they may not garner the same media attention as mega-storms, the 2012 drought in the West African Sahel affected 15 million people[4] and grain prices increased globally as a result of an American Midwest drought that occurred in the same year.

These events coincide with a record atmospheric carbon level of 400 ppm, which was observed in May of 2013. Greenhouse gas emissions are likely responsible for increasing temperatures and resulting climate change. In October of 2013, the Intergovernmental Panel on Climate Change published a report stating, "Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia."[5] The report concludes with 95% certainty that humans caused half (or more) of climate change in the last fifty years through activity like mass deforestation and the burning of fossil fuels.[6] Due to the chemistry of GHGs, high emissions from the developed world mix ubiquitously in the atmosphere, creating a global problem. Combined, the United States and the European Union account for around 33% of global carbon emissions, but less than 12% of the world's population.[7,8]

In 1997, 191 countries committed to reducing their GHG emissions when they signed onto the Kyoto Protocol. This agreement and other efforts like the United Nations Framework Convention on Climate Change are paving the path to a coordinated global effort to reduce emissions. However, it is up to each nation to determine how best to achieve reductions. Though the United States did not sign the Kyoto Protocol, Congress has made various attempts to address American GHG emissions over the years. In 2009,

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[1] Jenkins, Amber. "If climate changes naturally over time, why isn't the current warming just another natural cycle?" *NASA.gov.* NASA's Jet Propulsion Laboratory / California Institute of Technology, n.d. Web. 25 Nov. 2013.

[2] Ferner, Matt. "The 1,000 Year Storm: Colorado's Flood Is One For The History Books." *Huff Post Green*. TheHuffingtonPost.com, 20 Sept. 2013. Web. 25 Nov. 2013.

[3] Mahtani, Shibani, and Cris Larano. "Philippines Typhoon Deaths Surpass Record." *The Wall Street Journal*. Dow Jones & Company, Inc., 22 Nov. 2013. Web. 17 Nov. 2013.

[4] Haddad, Mohammed, and Azad Essa. "Interactive: Mapping the Sahel drought." *Al Jazeera*. n.p., 20 Jun. 2012. Web. 17 Nov. 2013.

[5] Stocker, Thomas F., et al. "Climate Change 2013 The Physical Science Basis: Summary for Policymakers." *Climate Change 2013: The Physical Science Basis*. Intergovernmental Panel on Climate Change, October 2013. Web. 28 Nov. 2013.

[6] Miller, Brandon. "Climate change report: It's 'extremely likely' that humans are responsible." *CNN World*. Cable News Network, 27 Sept. 2013. Web. 28 Nov. 2013.

[7] "Global Greenhouse Gas Emissions Data." *EPA*. United States Environmental Protection Agency, 9 Sept. 2013. Web 28 Nov. 2013.

[8] "The EU in the world population." *Eurostat.* Statistics Explained, 26 Feb. 2013. Web. 28 Nov. 2013.

serious climate change legislation, the Waxman-Markey bill[9], was passed in the House, but failed pass in the Senate. More recently, the Climate Protection Act of 2013 was introduced in the Senate, and it is the subject of this report. This report discusses the problem of climate change, and CPA as a solution to this problem. The purpose of this report is to demonstrate the feasibility of implementing this legislation, if it were to be passed.

[9] "H.R. 2454, The 'American Clean Energy and Security Act'." *Committee on Energy & Commerce.* n.p., n.d. Web. 25 Nov. 2013.

Part I: The Problem of Climate Change

Source: Associated Press

"Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use."

-Intergovernmental Panel on Climate Change
Fourth Assessment Report: Climate Change 2007

Scientific Background on Climate Change

The Impact of Fossil Fuels

At current emissions rates, scientists have predicted a minimum of 2º Celsius global temperature rise by the end of the 21st century. Levels of several major greenhouse gases have increased by about 40% with the large-scale use of fossil fuels, which began around 150 years ago during the Industrial Revolution. Since that time, modern society has become increasingly reliant on this source of energy with its use steadily climbing over the past few centuries. With a growing global population demanding increasing amounts of consumer goods in the developing world, industry in countries like China and India has grown at impressive rates. This growth is powered by fossil fuels; during the past 20 years, with the advent of widespread industrialization, about three-quarters of human-caused emissions were the result of burning fossil fuels.[10]

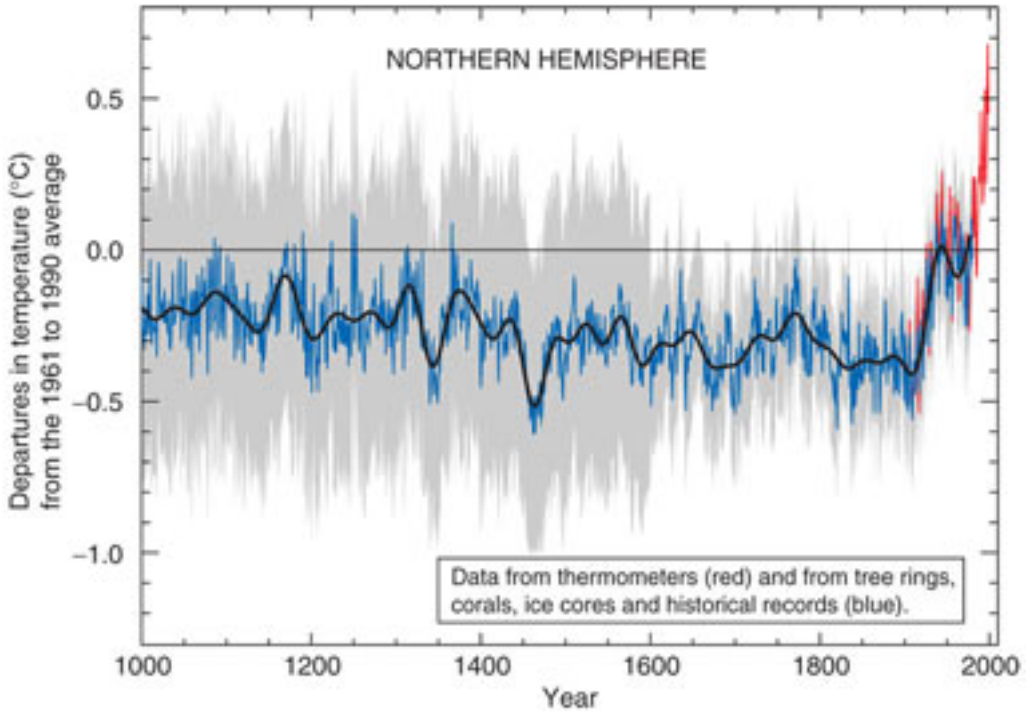

Figure 1: "Hockey Stick Graph" exhibiting the sharp increases in the Earth's average surface temperature in the last 150 years as compared to relatively stable fluctuations of the prior 800 years.[11]

Disruptions to the Carbon Cycle

There are two central problems with the widespread use of these fuels. First, fossil fuels are a finite resource. The earth cycles carbon through the atmosphere, oceans and organic matter through natural processes. Carbon dioxide exists naturally in the atmosphere. It is removed from the atmosphere through photosynthesis and ocean uptake.

[10] "Environment." *EIA.* U.S. Department of Energy, n.d. Web. 17 Jun. 2013.
[11] Pearce, Fred. "Hockey stick graph took pride of place in IPCC report, despite doubts." *The Guardian.* Guardian News and Media Limited, 9 Feb. 2010. Web. 25 Nov. 2013.

Carbon stored in decaying plants and animals moves deep within the earth and is transformed into fossil fuel over millions of years. Humans are burning fossil fuels at a rate much faster than these fuels are being replenished. This has two negative consequences: fossil fuel reserves are being depleted, and carbon is being released into the atmosphere faster than it can be absorbed back into the natural carbon cycle. This excessive release of carbon into the atmosphere is responsible for the greenhouse effect. "The burning of fossil fuels produces around 21.3 billion ton[s] of carbon dioxide (CO_2) per year, but it is estimated that natural processes can only absorb about half of that amount, so there is a net increase of 10.65 billion ton[s] of atmospheric carbon dioxide per year."[12] Greenhouse gases, of which carbon is the most common, exist naturally in the atmosphere and retain necessary heat. However, at the level they are produced now, they retain too much heat for our planet to maintain its natural homeostasis. Due to these excess gases, global mean surface temperatures have risen by 0.74°C ± 0.18°C when estimated by a linear trend over the last 100 years (1906 2005).[13] This global warming negatively impacts the global climate and causes the severe weather events that we see today.[14]

Impacts of a Warming Global Climate

Environmental Impacts

Changing weather patterns (Climate Change): A warmer climate means a change in climate. As the air heats up, more evaporation occurs from the ocean into the atmosphere, leading to higher rates of precipitation in some areas, drought in other areas and increased extreme weather occurrences.[15] (See Appendix I for an in-depth examination of other environmental impacts.)

Public Health Impacts

Changing weather patterns can cause significant threats to public health and safety which include: food shortages due to droughts and floods, higher frequency of deadly heat waves, reduced access to freshwater, poor air quality and spread of disease. Higher temperatures are increasing the intensity and length of heat waves. Other public health risks associated with climate change include the spread of disease from pathogens or vectors sensitive to temperature or rainfall, such as mosquitos that carry West Nile virus.[16]

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[12] Dukiya, J.J. "Energy Shortage, Climate Change and the Challenge of Intelligent Transport System (ITS) Adaption in African Countries." *International Journal of Humanities and Social Science* (3)14: 114. 9 June 13.

[13] Trenberth, Kevin E., et al. "Observations: Surface and Atmospheric Climate Change." *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Ed. Solomon, S., et al. Cambridge and New York: Cambridge University Press, 2007.

[14] "Causes of Climate Change." *EPA*. U.S. Environmental Protection Agency, 15 Jun. 2013. Web. 21 Jun. 2013.

[15] Knutson, Thomas R. "Global Warming and Hurricanes." *GFDL*. Geophysical Fluid Dynamics Laboratory/NOAA, 3 Sept. 2008. Web. 15 June 2013.

[16] "Climate Impacts on Human Health." *EPA*. U.S. Environmental Protection Agency, n.d. Web. 21 Jun. 2013. http://www.epa.gov/climatechange/impacts-adaptation/health.html

Economic Impacts

Ultimately, negative economic impacts may motivate the greatest response to climate change. Crop losses from drought cause spikes in food prices. Health costs will increase as greater numbers of Americans suffer from climate change related illnesses and conditions. Weather events like Superstorm Sandy cause billions of dollars in damage to infrastructure. Between 1980-2012, the U.S. experienced 123 weather-related disasters, each of which caused at least $1 billion dollars in damage at the time of the event. Twelve of these disasters occurred in 2011 alone, the highest of any year on record, totaling about $52 billion dollars in damage.[17] Insurance rates will soar as insurers realize that previously rare extreme weather events have become commonplace. Inevitably, these changes will necessitate resiliency measures and changes in our consumption and production habits.[18]

Global Context of U.S. Carbon Consumption

When compared to the rest of the world, the U.S. is a major contributor to climate change. With about 300 million of the world's 7 billion people, or 4.2 percent, the U.S. accounted for 19% of the world's 2008 carbon emissions. The U.S. ranks second after China, which accounted for 23% of global 2008 carbon emissions. China has 1.3 billion people, or 19% of the world's population. Although China has 5 times as many people as the United States, the U.S. emits nearly the same amount of greenhouse gases as China.[19]

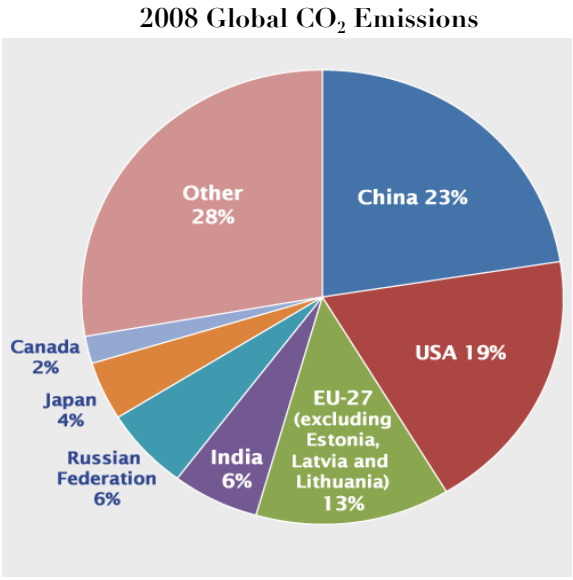

Figure 2: Global emissions from fossil fuel combustion and some industrial processes (million metric tons of CO_2)

[17] "Billion Dollar Weather Disasters." National Climatic Data Center. NOAA Web. 12 Dec. 2013

[18] "About the Project." *Risky Business: The Economic Risks of Climate Change in the United States.* Risky Business, 2013. Web. 25 Nov. 2013.

[19] "Greenhouse Gas Emissions." *EPA.* United States Environmental Protection Agency, n.d. Web 25 Nov. 2013.

U.S. Energy Mix

Of these domestic emissions, the majority is from the combustion of fossil fuels. In 2011, CO_2 accounted for about 84% of all U.S. greenhouse gas emissions from human activities.[20] The top 3 activities that produce these emissions are electricity, transport and industry.

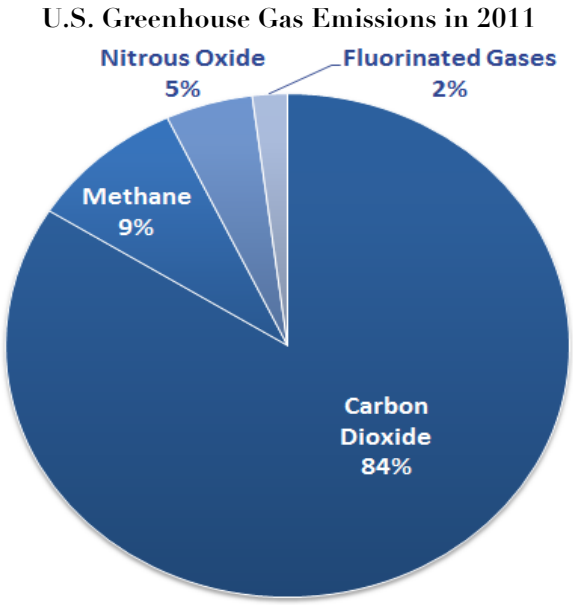

Figure 3: Total emissions in 2011 = 6,702 million metric tons of CO_2 equivalent

In 2011, the domestic fuel mix for electricity generation was: 42% coal, 25% natural gas, 19% nuclear, and 12% renewable (hydro, biomass, wind, solar).[21] Of these, coal is not only the most polluting fossil fuel, but it is also one of the most naturally abundant fuel sources in the United States. Recently, revisions to the Clean Air Act that include more stringent regulations on coal plant emissions have reduced domestic dependence on coal. Along with the fact that the price of natural gas is becoming cheaper and more competitive, coal-fired plants across the nation are shuttering their doors; 150 since the beginning of 2010 to be exact. Touted as a "bridge fuel," the use of natural gas has soared as our economy transitions away from coal. However, while natural gas results in fewer emissions than coal, it is still a fossil fuel, and as such provides only a temporary solution. Furthermore, concerns about methane leaks from natural gas extraction suggest that natural gas may be no less emission intensive than coal.[22]

[20] "Greenhouse Gas Emissions." *EPA.* United States Environmental Protection Agency, Web 25 Nov. 2013.
[21] "Energy and You." *EPA.* United States Environmental Protection Agency, n.d. Web. 17 Nov. 2013.
[22] "e360 Digest." *Yale environment 360.* Yale University, 10 Apr. 2012. Web. 17 Nov. 2013.

Sustainable Technologies: Solutions and Obstacles

This act seeks to support technologies for long-term renewable energy use. The sections below will examine two common renewable energy options: wind, solar, as well as CCS as a carbon pollution mitigation technology.

I. Wind Energy

Wind energy is used to make electricity that is typically generated by wind turbines. Incoming wind turns the blades of a wind turbine, which converts the kinetic energy of the wind into mechanical energy. The spinning blades of the turbine are connected to a rotor, which is connected to a main shaft. The main shaft spins a generator to create AC electricity.[23]

II. Solar Energy

Solar energy is also mostly used to produce electricity and is typically divided into two categories of energy absorption: photovoltaic (PV) and solar thermal or concentrating solar power (CSP). In PV solar energy, photons from incoming solar radiation are absorbed by a semiconductor material on the panel's surface, electrons are dislodged and light is converted to electricity.[24] In CSP solar thermal, reflective surfaces concentrate incoming light onto receivers that convert solar energy into heat, which then powers a steam turbine connected to an electricity generator. [25]

III. Carbon Capture & Storage

Carbon capture and storage, or carbon capture and sequestration is a set of technologies that can greatly reduce CO_2 emissions from new and existing coal and gas-fired power plants and large industrial sources. CCS is a three-step process that includes capture of CO_2 from power plants or industrial processes, transport of the captured and compressed CO_2 (usually in pipelines) and underground injection and geologic sequestration (also referred to as storage) of the CO_2 into deep underground rock formations.[26]

In addition to reducing carbon emissions at the source (e.g. coal-fired power plants), CCS technologies can also remove CO_2 from the atmosphere. An example of this technology is the synthetic tree, designed by scientist Klaus Lackner in collaboration with

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[23] "How Does A Wind Turbine Work?" *Energy Efficiency & Renewable Energy.* U.S. Department of Energy, 23 Jan. 2013. Web. 12 Aug. 2013.

[24] "Solar Basics: Energy from the Sun." *EIA.* U.S. Energy Information Administration, n.d. Web. 12 Aug. 2013.

[25] "Concentrating Solar Power Basics." *Energy.gov.* U.S. Department of Energy, 20 Aug. 2013. Web. 12 Nov. 2013.

[26] "Carbon Dioxide Capture and Sequestration." *EPA.* U.S. Environmental Protection Agency, 21 Jun. 2013. Web. 12 Aug. 2013.

Columbia University's Earth Institute, which could trap CO_2 in the air and collect it more efficiently than real trees,[27]

The Uncertainties of Technology

There are some uncertainties related to the technologies that will replace fossil fuels. First, renewable energy, especially wind and solar energy, are still far away from mass use due to their low production and high costs at present. In 2011, wind and solar energy only accounted for about 3% of U.S. electricity production.[28] Mass production and use will require innovation in these fields, and increased political support. Additionally, the negative environmental impacts of alternative energy should be noted. For example, carbon storage risks CO_2 leaks, manufacturing of photovoltaic cells produces toxins, and wind turbines cause disturbances to local eco-systems.

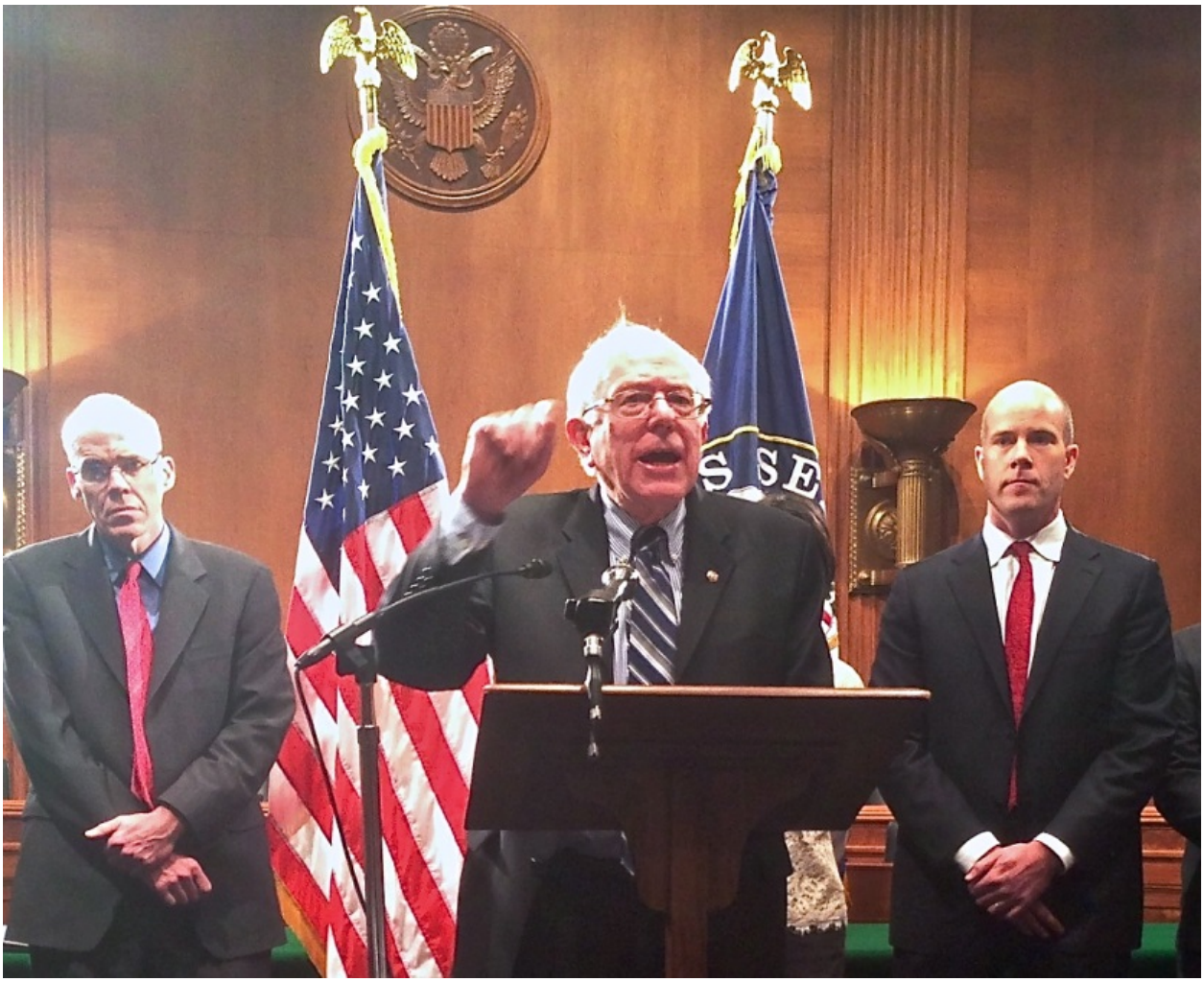
The Efficiency Gap

A large-scale market barrier to the adoption of cost-effective energy technologies is something economists called the "efficiency gap,"[29] which is the difference between the actual level of investment in a technology and the higher level of investment needed to actually deliver cost-beneficial performance for the consumer. This gap is often due to consumers' reluctance to make a higher upfront investment in order to reap lower operating costs in the long-term. Newer technologies are also slow to build consumer trust and gain the necessary distribution networks.

The Climate Protection Act of 2013 seeks to correct these market failures by introducing the actual cost of carbon with a tax, providing funding for capital investments to make sustainable technology competitive with current options, and providing a more complete producer market for energy.

[27] "University Joins 'Synthetic Tree' Venture." *The Earth Institute Columbia University*, 15 Mar. 2010. Web. 12 Aug. 2013.
[28] "International Energy Statistics." *EIA.* U.S. Department of Energy, n.d. Web. 12 Aug. 2013.
[29] Brown, Marilyn. "Market failures and barriers as a basis for clean energy policies." *Energy Policy* 29.14 (2001): 1197-1207. Web. 17 Nov. 2013.

Part II: The Climate Protection Act of 2013
Program Design



Source: Talk Radio News Service

"What we are dealing with today is not political… What we are dealing with today is physics. What this bill does is address the crisis."

-Sen. Bernie Sanders [D-VT] introducing the act
February 14, 2013

Key Stipulations

The bill will be implemented as an amendment under Title I of the Clean Air Act of 1970, with the following key stipulations:

- The Administrator will impose fees on the "manufacturer, producer, or importer of a carbon polluting substance." Importers must pay a carbon equivalency fee.

- The bill taxes carbon polluting substances (CPS) and carbon pollution-intensive goods (CPIG). The tax is $20 per ton of carbon content for CPS, and will increase annually by 5.6%. The fee for CPIG will be determined each year.

- The EPA will administer the tax and the revenues will be used to fund various initiatives:

    1) Three-fifths (3/5) of all funds collected from taxation of CPS will be used for the Residential Rebate program. This program provides funds to American citizens to partially offset increased energy costs that will occur as a result of the tax.

    2) The remaining 2/5 of funds will establish the Pollution Reduction Trust Fund (PRTF) in the Treasury of the United States. The bill stipulates that $7.5 billion per year go towards the Energy Intensive and Trade Exposed Industry Program to mitigate the economic effects of the tax on industry. Other uses of funds include: $5 billion per year for weatherization for low-income households, $2 billion per year will go to ARPA-E for clean energy research and development, $1 billion per year for job transition and training programs, and any remaining funds will be used for deficit reduction.

    3) Half of all funds collected from taxation of CPIG will be administered by the EPA to provide funds to state and local programs that invest in resiliency. The other half of these tax revenues will be administered by the Secretary of Transportation to provide funds for state and local programs that invest in resiliency and projects that reduce transportation-related emissions, like carpool programs or the installation of electric vehicle charging stations.

    4) Finally, $2 billion will be allocated to Advanced Research Projects Agency-Energy. This program provides loans and research grants to organization or individuals that research and develop energy efficient or renewable energy technologies.[3]

    5) The bill also stipulates that a Sustainable Technologies Finance Program be established, and receive $5 billion per year to offer loans, loan guarantees and other financial tools to spur the development sustainable technology projects.

- The remaining funds will be used to pay down the national deficit.

[**Note: The program design addresses only the funds received from the tax revenues. It does not address the funds collected from the equivalency fees on imported CPS' and CPIGs.**]

Legislative History

Senators Bernard Sanders [D-VT] and Barbara Boxer [D-CA] introduced the Climate Protection Act of 2013 (S. 332) on February 14th, 2013. It was referred to the Committee on Environment and Public Works[30].

S. 332 was preceded by several pieces of climate change legislation, none of which were successfully enacted. In 2007, Senator Sanders and Senator Boxer introduced a similar bill called the Global Warming Pollution Reduction Act of 2007 at the time when Senator Boxer became the new head of the Senate Environment and Public Works Committee. Although this act did not propose a tax, its measures included funding for research and development on CO_2 sequestration, set emissions standards for new vehicles and a renewable fuels requirement for gasoline, established energy efficiency and renewable portfolio standards and low-carbon electric generation standards for electric utilities. In 2009, Representatives Henry A. Waxman [D-CA] and Edward J. Markey [D-MA] introduced the American Clean Energy and Security Act of 2009, also known as the Waxman-Markey Bill. The bill passed in the House, but died in the Senate.[31]

In 2010, Senators John Kerry [D-MA], Lindsey Graham [R-SC] and Joseph Lieberman [D-CT] attempted to pass a bill that would impose a linked fee for oil companies that emit over 25,000 tons of GHG in a year. This bill quickly lost traction because conservative opponents billed it as a tax, and thus it faced opposition from Republican house members. Also in 2010, Senators Susan Collins, [R-ME] and Maria Cantwell [D-WA] tried to pass a similar "cap-and-dividend" bill. This bill would use emissions caps and then return the revenues to taxpayers to compensate for energy hikes. Kerry, Graham and Lieberman opposed the bill because it competed with their own. [32]

Issue and Political Background

Carbon taxes are supported by a diverse group of opinion leaders, pundits and economists. The former Secretary of State and Treasury George Shultz, a Californian who served under President Reagan, promoted the idea on Capitol Hill. Former NASA climate scientist James Hansen is also a proponent, saying that putting a price on carbon may be the only way to prevent catastrophic climate change.[33] Senator Sanders has declared that he believes that the United States must lead the world in reducing greenhouse gas emissions and reversing global warming, to preserve a safe and stable planet for our children and grandchildren.[34]

The main opponents of this bill are the Republican Party, The National Association of Manufacturers, and coal and oil companies. At the time of this report, there is a

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[30] "The Climate Protection Act of 2013." *THOMAS*. The Library of Congress, n.d. Web. 12 Sept. 2013.
[31] "American Clean Energy and Security Act of 2009." *THOMAS*. The Library of Congress, n.d. Web. December 7, 2013.
[32] Samuelsohn, Darren. "As Senate Trio Advances Climate Measure, Energy-Only Bill Remains a Possibility." *The New York Times*, 18 Mar. 2010. Web. 25 Nov. 2013.
[33] Lochhead, Carolyn. "Battle lines forming on carbon tax." *San Francisco Chronicle*, 12 Mar. 2013. Web. 17 Nov. 2013.
[34] "Energy & Environment." *Bernie Sanders: United States Senator for Vermont*, n.d. Web. 12 Sept. 2013.

stalemate in the House on account of the fact that Republicans have collectively pledged to refuse their support of any climate change legislation that would result in a tax. Although this act includes rebates to consumers and industry to mitigate the impact of the tax, it is still a tax and would therefore most likely not be enacted. Republican lawmakers and pro-fossil-fuel advocates have long held that the Obama Administration is planning to promulgate a carbon tax without Congress' consent, and they have found their evidence for this in the administration's revised estimate for the social cost of carbon (SCC). The SCC will be used in the cost-benefit analyses for agency rulemakings. And Republican opponents of those rulemakings say that businesses will pass the cost of compliance to their customers, making it a de facto levy on carbon emissions. "Without Congressional action, the EPA will continue to promulgate regulations using this carbon tax, and the costs of these regulations will be passed onto American businesses and American consumers," Rep. John Culberson (R-Texas), one of the most vocal critics of the administration's new estimate, said in a statement.[35]

The National Association of Manufacturers weighed in with a study claiming that a carbon tax would devastate the economy. The study omits the economic cost of the impact of droughts, floods and hurricanes and other impacts that may come from climate change.

Political Changes Needed to Enact the Bill

The 2012 election maintained the prior balance of power in the United States Congress. The Republicans held their majority in the House of Representatives, and the Democrats held their majority in the Senate. Because of this, the 113th Congress (2013 2014) could be much like the 112th Congress (2011-2012), in which over 100 bills dealing with climate change were introduced, and two of which were enacted into law. Reflecting an anti-regulatory mood on Capitol Hill, there were nearly as many proposals in the 112th Congress to block efforts to curb carbon emissions as proposals to strengthen them. And, reflecting the general state of gridlock in Congress, virtually none of the bills proposed were enacted. Only one other carbon tax proposal has been released to date in the current Congress besides the Climate Protection Act of 2013. In March 2013, Rep. Henry Waxman (D-CA) and Sen. Sheldon Whitehouse (D-RI) released a discussion draft of a carbon pollution fee bill. Sen. Whitehouse was expected to formally introduce a carbon pollution fee proposal late this year.[36]

Current chances of the Climate Protection Act of 2013 passing are slim due to the polarized political atmosphere surrounding the issue. In order to pass the bill, a larger part of the Republican Party would need to be convinced that the bill would not hinder economic growth or cause negative consequences for businesses. Changes to the bill could help grow support political support for the legislation. As a solution to the Republican Party's refusal to pass a carbon tax, James Handley, an opinion columnist for Carbontax.org

[35] Chemnick, Jean. "GOP launches offensive on Obama admin's regulatory 'carbon tax'." *E&E Daily*, 2 Aug. 2013. Web. 15 Sept. 2013.

[36] "American Clean Energy and Security Act of 2009." *THOMAS*. The Library of Congress, n.d. Web. December 7, 2013.

suggests returning more of the tax as dividends to the general public instead of using the tax to finance government programs.[37]

Mandated Programs

Carbon Tax: An Economic Solution

At least 10 successful national carbon tax schemes exist, namely in Europe including Finland, Netherlands, Norway, Denmark, all of which have had a tax in place since the early 1990s. On a regional and local level, the province of British Columbia, Canada[38] has achieved a 17.4% reduction of carbon emissions since its inception in July 2008, until July 2012, as compared to a 1.5% increase in emissions for the rest of the country. Both California and New York use energy surcharges to fund statewide renewable energy and energy efficiency projects. And in Boulder, Colorado, since 2007, residents and businesses have been paying a tax on electricity usage, called the Climate Action Plan or CAP. The city of Boulder has achieved just fewer than 50 percent of its reduction targets, which are based on the Kyoto Protocol.

Currently, the prices of gasoline, electricity and fuels in general include few of the long-term costs associated with devastating climate change or even the well-quantified near-term health costs of burning fossil fuels. A carbon tax acts as an economic intervention to correct for our current market, which favors carbon intensive goods. Funds could also be used to decrease the marginal tax rate via a tax swap for income tax.[39] Economists favor a carbon tax over cap-and-trade as more efficient and transparent; as a consumption tax, some prefer it to income or investment taxes. Finally, the inclusion of a border tariff on the carbon content of imports that is equivalent to the tax would create a big incentive for exporting countries like China to impose their own carbon tax in order to retain the revenue.

The Potential to Pay Down the Deficit

A number of studies suggest that this type of tax would produce huge revenues that could be used to pay down the national deficit. A 2012 report from the Congressional Research Service, "Carbon Tax: Deficit Reduction and Other Considerations," found that a carbon tax of $20 per ton that rises 5.6 percent annually could cut the projected 10-year deficit by 50 percent: from $2.3 trillion down to $1.1 trillion.

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[37] Handley, James. "Sanders-Boxer Set "Gold Standard" But Write Off Fiscal Potential of Carbon Tax" *Carbontax.org*, 15 Feb. 2013. Web 6 Dec. 2013.

[38] McCarthy, Shawn. "B.C. carbon tax showing positive results." *The Globe and Mail*, 23 Jul. 2013. Web. 2013.

[39] Dinan, Terry, et al. "Effects of a Carbon Tax on the Economy and the Environment." *Congressional Budget Office*. Congress of the United States, May 2013. Web. 17 Jun. 2013.

Residential Rebate Program: Assistance for Households

The monthly residential rebates proposed in the bill are modeled on the Alaska Permanent Fund, a sovereign wealth fund that was established in the late 1970's following the discovery of the largest oil field in North America, in Prudhoe Bay, Alaska. Since this oil field was on state lands, it was considered publicly owned and therefore would share its profits with Alaskan residents. The rationale behind this type of fund was to allow for a renewable source of financial returns that would pay dividends to future generations when the oil was no longer available. Under this program, revenues from oil production are shared with Alaskan residents in the form of an annual dividend. By 2002, the fund had grown in size so as to account for 6 percent of total household income. Every person receives the same size dividend, regardless of income. Although few official studies have been done on the spending habits of families who receive this dividend every year, it can safely be said that the dividend has helped reduce income disparity in Alaska. From 1992 to 2002, data collected by the Economic Policy Institute showed that the income of the poorest fifth of Alaskan families increased by 28% as compared to a 7% increase for the richest fifth, whereas over the same time period, the increase for the poorest fifth of the entire U.S. was 12% as compared to a 26% increase for the richest fifth.[40] The rebate also helps to stabilize cash flow for lower-income households who will be more vulnerable to the effects of economic fluctuations as the outlook on energy prices remains unpredictable into the future. Like the Permanent Fund in Alaska, the CPA would return a large portion of carbon tax revenues to American households, with rebate amounts likely based on annual household income.

Carbon Pollution Reduction Trust Fund: Assistance for Industry

Recently, Australia abolished its national carbon tax. The tax had been in effect for just over a year but citizens called for its revocation due to its consequent negative economic impacts after over 10,000 businesses filed for insolvency and average electricity prices rose 15 percent, representing the largest quarterly rise in the country's history.[41] These immediate impacts on carbon-intensive industries as a result of the CPA will need to be anticipated and addressed accordingly. The act will distribute $7.5 billion dollars per year to energy intensive and trade exposed industries based on need. The manufacturing industries expected to be most heavily impacted by levying a tax are: steel, iron, cement, glass, pulp and paper, and aluminum. The most heavily impacted energy intensive sectors include public utilities and the transportation industry.

As carbon-intensive industries constrict, displacing a portion of their current labor force, this bill calls for a robust workforce transition program. The bill dedicates $1 billion dollars per year to the Secretary of Labor to invest in "job training, education, and transition assistance for individuals employed by the fossil fuel industry seeking to transition to clean energy jobs." Historically, government assistance programs have enabled

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[40] Goldsmith, Scott. "The Alaska Permanent Fund: An Experiment in Wealth Distribution." Basic Income European Network, Sept. 2002. Web. 5 Nov. 2013.

[41] DuHamel, Jonathan. "Carbon tax failures lessons from Australia and Germany." *TusconCitizen.com*. Gannett Co., Inc., 7 Sept. 2013. Web. 5 Nov. 2013.

the American labor force to successfully transition the displaced workers of negatively impacted industries. Examples of this include the G.I. Bill for returning military servicemen, the Trade Adjustment Assistance Program under the Trade Expansion Act of 1962 for workers displaced by imported goods markets, and the Clean Air Employment Transition Program of 1990 (Apollo Alliance) for workers displaced by sectoral reallocations under the Clean Air Act.

This fund also increases federal funding for weatherization projects that make low-income family homes in regions of the country that experience the most annual variability in climate less expensive to heat and cool.

Sustainable Technologies Finance Program

The EPA will establish the Sustainable Technologies Finance Program, which will provide loans, credit instruments, loan guarantees, and other financial assistance (including public-private partnership) for projects in the US that reduce carbon emissions. Projects eligible to receive assistance will use technology for energy efficiency, combined heat and power (CHP), solar energy, wind, geothermal, electric vehicle infrastructure, advanced battery or energy storage, and other sustainable technologies. As of 2012, the U.S. invested $36 billion into renewable energy. During that same year, China invested $66.6 billion into renewable energy, and Europe invested 79.9 billion.[42] While Europe's energy mix boasts around 18% of energy supplied by renewables,[43] renewables account for only around 10% of the U.S. energy mix.[44] Increased investments in sustainable technologies are expected to shift the U.S. energy mix to include a greater percentage of renewables.

The Department of Energy (DOE) already engages in such financial support, as is now common knowledge thanks to the infamous case of Solyndra, which received millions of dollars in DOE loan guarantees before filing for bankruptcy. However, government investments are responsible for many successful renewable energy projects, like the Ivanpah Solar Electric Generating System (ISEGS). ISEGS received $1.6 billion in loan guarantees from the DOE. It is the largest solar thermal project in the world, which will supply 377 megawatts of power to Southern California once fully operational. Initial tests in September 2013 successfully synched the thermal plan to the grid.[45]

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[42] "Global Trends in Renewable Energy." Frankfurt School of Finance and Management, 2013. Web. 25 Oct. 2013.

[43] "Key Figures." *Market Observatory for Energy.* European Commission, Jun. 2011. Web. 28 Oct. 2013.

[44] "Monthly Energy Review November 2013." U.S. Energy Information Administration, 25 Nov. 2013. Web. 28 Nov. 2013.

[45] "Ivanpah Solar Electric Generating System." BrightSource Energy, Inc., 24 Sept. 2013. Web. 5 Dec. 2013.

Program Implementation

The previous sections have examined the rationale behind the structure of the Climate Protection Act of 2013. The following sections will detail year one of its implementation. It will outline the new roles needed within the EPA to carry out the program design, the budgetary resources needed for the program, and the performance management and improvement system design. (For the Master Calendar, please see Appendix IV.)

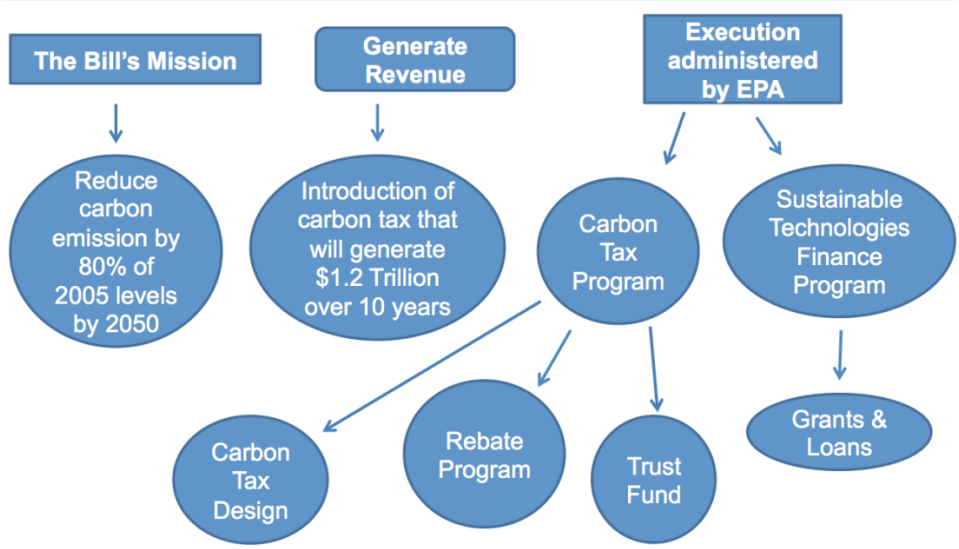

Figure 4: Overview of the Legislation's Purpose and the Program Design

Organizational, Contracting and Staffing

Currently, EPA has 12 Headquarters Offices, 10 Regional Offices, and 14 national research centers or laboratories. The Office of the Administrator supports the leadership of EPA's programs and activities. Other Headquarter Offices provide EPA's services in all aspects, such as air/water/solid waste environmental problems, financial services, research, enforcement, etc. Regional offices are responsible for the execution of their programs within states and territories. Research centers and laboratories develop knowledge and scientific tools for EPA's regulations and enforcement.[46] (See Appendix II, Figure 7 for the Current Organization of EPA's Headquarter Offices.)

Rationale for New Programs

The Carbon Tax Program is the first environmental program that includes taxation as a way to reduce carbon emissions.[47]As a new and important program within the EPA, its implementation would require an entirely new team. The case of the Sustainable

[46] "About EPA." *EPA*. United States Environmental Protection Agency, n.d. Web. 12 Oct. 2013.
[47] Levinson, Arik. "Taxes and the Environment: What Green Taxes Does the United States Impose?" *Tax Policy Center*. Urban Institute and Brookings Institution, n.d. Web. 13 Oct. 2013.

Technologies Finance Program is similar to the Carbon Tax Program. As a new initiative to support the development of new technologies, it should have a team dedicated solely to managing it.

As a US federal organization, the EPA may not obtain incremental federal positions. Consequently, the EPA will keep the management teams within its organization and outsource the specific design and execution to qualified contractors. This is a customary operational structure within EPA; management is in-house and contractors are hired to do the implementation, as is the case with the CERCLA Superfund remediation program. In addition, this is a good way to reduce excess costs because the EPA will not have to hire new staff and train them to carry out the detailed requirements of program design and implementation. Contractors will be hired through a competitive bidding process.

Proposed Plan

In the EPA's current organization, the Office of Air and Radiation develops national programs, policies, and regulations for controlling air pollution and radiation exposure. This office includes the Office of Atmospheric Programs which addresses issues like climate change, and runs other market based programs such as the Ozone Layer Protection, ENERGY STAR, and the Green Power Partnership. Thus, the new Carbon Tax Program will be established under the Office of Atmospheric Programs.

The Sustainable Technologies Finance Program will be located under EPA's Office of Research and Development, as this office has experience and resources in both the energy and sustainability fields. Also, the Office of Research and Development has supported finance programs before, making it a suitable office for the Sustainable Technologies Finance Program. This program includes an internal management team, as well as an outsourced program team.

I. Carbon Tax Program's Organizational Design

The proposal for the Carbon Tax Program includes separate teams for each of the following: management of the program, carbon tax imposition design, Residential Environmental Rebate Program, and a Pollution Reduction Trust Fund. (See Appendix II, Figure 8: The Organizational Design of the Carbon Tax Program.) They will also report program related information/data analysis and reports to the Congress.

The management team and other team leaders are staffed within the EPA. They consist of a Management Director, Deputy Director, and Chief Director of each sub-program. The design and the implementation of the programs should be outsourced through a bidding process to hire consultants who work in the programs previously mentioned. Consultants will work under the direction of the management team.

As this program has economic and legal issues, coordination with other offices of the EPA must be established, such as the Office of the Administrator (coordination and EPA's policy decisions), Office of Administration and Resources Management (outsourcing contracts), Office of the Chief Financial Officer (money transfers, EPA's budget policies), Office of Environmental Information (reporting, EPA's information policies, and Office of General Counsel (legal advisory). This program also should be connected with other offices inside the Office of Air and Radiation, like with the Office of Air Quality Planning and

Standards (existing air quality policies, development of new policies). Even as a new program is contemplated in this case, the program is inside the EPA so the program must rely on EPA administrative and development policies. (See Appendix II, Table 1: Carbon Tax Program's Staffing List).

II. Sustainable Technologies Finance Program's Organizational Design

This program will have a management team and a program team. The management team and manager of the program team will be staffed in the EPA, and have a Management Director and a Deputy Director for overall management, in addition to one Chief Director for the program. The design and the implementation of the program will be outsourced through a bidding method, bringing on consultants who will work on the programs under the direction of the management team. (See Appendix II, Figure 9: The Organizational Design of Sustainable Technologies Finance Program.)

This program also has economic and legal issues, specifically with financing. In addition to coordination with the Office of the Administrator, Office of Administration and Resources Management, Office of the Chief Financial Officer, Office of Environmental Information, and Office of General Counsel, the Sustainable Technologies Finance Program will build a strong partnership with the EPA's Center for Environmental Finance.

III. Management and Analytic Support Contract

The Carbon Tax Program and Sustainable Technologies Finance Program will outsource the primary programs: Carbon Tax Imposition Design, Residential Environmental Rebate Program, Carbon Pollution Reduction Trust Fund, and Sustainable Technologies Finance Program. The head of each program is the Chief Director, as mentioned above within EPA. Outsourced contractors will build up the whole team to design and implement their program. Each program will have a competitive bidding process to solicit contractors. The EPA's Office of Administration and Resources Management will supervise the contracts. (See Appendix II for a list of minimum requirements for outsourced employees.)

Analysis

Only a few employees of the EPA will be reallocated to the newly established programs and they represent a very small proportion in comparison to the estimated 16,000 existing staff in the EPA.[48] Thus, the Climate Protection Act's programs will not significantly impact the EPA's current organization or personnel. The self-sustaining financial organization of the bill will reduce any impacts the creation of these programs may have on the EPA's current financial resources. By minimizing changes to the EPA's existing structure through outsourcing, the chief aim is to limit any unintended adverse effects and trade-offs associated with enacting the bill. The proposed organizational, contracting and staffing plan's objective is to successfully design and implement the Carbon Tax Program, the Carbon Pollution Reduction Trust Fund, and the Sustainable Technologies Finance

[48] Sheppard, Kate. "Government Shutdown Would Force 94 Percent of EPA Staff To Stay Home." *The Huffington Post*. TheHuffingtonPost.com, Inc., 30 Sept. 2013. Web. 12 Oct. 2013.

Program. In doing so, it strives to ensure that the outsourcing contract requirements it sets forth are met, maintain open communication among coordinating offices, and retain robust management over the new programs.

Budget and Revenue

This legislation introduces a carbon tax that is expected to generate $1.2 trillion over 10 years. Of the estimated $100 billion that the tax generates per year this budget discussion will only take into account the proportion of the yearly-allocated funds that are administered by the EPA.

The following will give a breakdown of how much of the revenue generated during the first year of implementation will be dedicated to the Carbon Tax Program and the Sustainable Technologies Finance Program. A program budget will be presented for each of these programs and the line-item budget provides totals for both of these programs combined. These budgets include funding amounts, costs generated by EPA staff salaries and outsourcing teams, and overhead costs. After total operational costs have been considered, the remaining amount of funding will go towards grants, loans, rebates to eligible citizens and energy-intensive industries, and research and development. The budget will not include any additional costs generated by outsourced staff since those have been accounted for in the cost of the staffing contracts.

I. The Carbon Tax Program

The Carbon Tax Program is made up of four teams. The Management team heads three other teams: the Tax Design team, the Rebate team and the Trust Fund team. These teams will receive funding generated from the tax. The program budget for the Carbon Tax Program includes the funding, staff expenses and the general and administrative costs for operating the program amongst all teams. Funding for this program is expected to be approximately $57.5 billion, with $50 billion being distributed to the Rebate Program and $7.5 billion to the Trust Fund Program.

Staff Expenses

For internal (EPA) staff expenses, an estimated $2,700,000 of the program budget is dedicated to the staff salary for the Management team, and $400,000 for each of the subcategory teams. External costs are for outsourced teams. The outsourced Carbon Tax Design team requires $1,600,000, the outsourced Rebate team requires $4,800,000, and the outsourced Trust Fund team requires $1,600,000.

There are 30 staffing positions within the EPA among the four teams. The combined base salaries for all the internal staff is $4,000,000. A fringe benefit rate of 25% adds $1,000,000 to the base salary total. The outsourced teams consist of 50 staff members each with a staffing cost of $160,000, totaling $8,000,000. This staffing cost accounts for salaries and all additional costs incurred by the outsourced staff. Fringe benefits are not considered for the outsourced teams. In conclusion, the total staff expense is $13,000,000 for the Carbon Tax Program. (See Appendix III, Table 3: Carbon Tax Program Budget.)

Overhead

The program budget for the Carbon Tax Program also includes the overhead and general expenses as previously mentioned. The funds from the carbon tax will be used to cover overhead expenses for the Management, Rebate, Carbon Tax Design, and Trust Fund teams. As stated above, the outsourced staffing costs cover all expenses associated with the outsourced groups, and thus the contracted teams are responsible for their own overhead expenditures. Overhead and general costs may vary between the first six months and the second half of the year, especially due to initial investment costs. (See Appendix III, Table 3: Carbon Tax Program Budget.)

II. The Sustainable Technologies Finance Program:

The Sustainable Technologies Finance Program is made up of two teams: the Management team and the Grants and Loans team. The primary sources of funding for these teams are distributed from the US Treasury and will be allocated on October 1st of each year. The bill allocates $5 billion for the Sustainable Technologies Finance Program. The program budget will include funding, salary expenses for each team (internal and external), and general and administrative costs. The program budget in this discussion will only account for the second half of the first year of implementation. This is because the overall program design for this legislation seeks to focus first on the implementation of the Carbon Tax Program and also on mitigating the economic impacts of this tax on citizens and energy-intensive industries. The Sustainable Technologies Finance Program will be incorporated in the second half of the year and will run year-round following the first year.

Staff Expenses

For internal (EPA) staff expenses, $350,000 of the program budget is dedicated to the staff salary for the Management team and $150,000 for the Grants and Loans team. External costs are all the costs associated with the outsourced team, which consists of 10 members. This contract will cost $800,000 for the first six-month period.

There are seven staff members within the EPA. Positions include directors, a program manager, financial and legal advisors, and information support. The combined base salaries for all internal staff is $500,000. Fringe benefits were calculated as 25% of total base salaries and equals $125,000. In addition, the outsourced team of 10 employees with a cost of $80,000 per member added $800,000 to the program's staffing budget. In conclusion, the total staff expense is $1,425,000 for the Sustainable Technologies Finance Program. (See Appendix III, Table 4: Sustainable Technologies and Finance Program Budget.)

Overhead

The program budget for the Sustainable Technologies Finance Program, similarly to the Carbon Tax Program budget, includes overhead and general costs. The Management team and Grants and Loans team will share the allocated funds to cover their expenses for overhead. As for the outsourced team, they are responsible for their own overhead expenditures because it has already been included within the contract and agreed upon staffing costs. As noted above, the overhead and general costs that are presented are only

for the second half of the year. (See Appendix III, Table 4: Sustainable Technologies Finance Program Budget.)

The Line-Item Budget

The line-item budget will look at all expenses from staff and general operating costs compared to the overall funding for the two major programs established by the Climate Protection Act of 2013. The overall cost of staffing for both programs adds up to $14,425,000, while the total amount of both programs for overhead/general accounts for $315,500. This brings the total amount of operational costs for the Carbon Tax Program and the Sustainable Technologies Finance Program to $14,740,500. (See Appendix III, Table 5: Line Item Budget for the Carbon Tax Program and the Sustainable Technologies Finance Program.)

Analysis

Total operational and administrative cost as displayed in the line-item budget is $14,740,500. This is less than 1% of overall program funding. This leeway within the budget leaves room to make any unexpected adjustments to the budgets. For example, audits were not considered within the budget, nor were any other unexpected expenses the programs may face. In addition, depending on the success and growth rate of the Carbon Tax Program and Sustainable Technologies Finance Program, additional employees may be required in the future. This may be a low estimate for resources needed, but through evaluating revenue and expenses for each newly established program for the first six-month period and second six-month period, the directors are able to adjust funding priorities accordingly and project future incomes and expenses.

Program Management and Improvement

In order to ensure that the bill is achieving its goals the EPA will set up a performance management system to monitor the economic, social, and industry impacts of the bill. The performance management system will establish a baseline of data for each program, and will then measure, collect and report data. The EPA will use this feedback to improve the performance of the various programs.

Measurement and Collection

Much of the information is already collected by government and for profit agencies for economic evaluation. The EPA will have to set up some collection mechanisms for specific data gaps.

I. Carbon Tax

To measure the effectiveness of the carbon tax, the EPA will need to establish whether or not carbon emissions are decreasing. The EPA will start with a baseline collection of carbon concentration in the atmosphere using data supplied by the National Oceanic and Atmospheric Administration's (NOAA) Earth System Research Laboratory

(ESRL) Global Monitoring Division (GMD).[49] If necessary the EPA will establish further carbon monitoring stations throughout the U.S. The EPA will also measure projected carbon emissions from industrial activity and consumer purchasing habits using Energy Information Administration to estimate the amount of carbon emitted through carbon polluting substance use and carbon intensive good purchase.[50]

II. Energy Intensive and Trade Exposed Industry Program

To measure the effect on energy intensive industries under the Energy Intensive and Trade Exposed Industry Program the EPA will assess consumer trends: is consumption of carbon intensive goods and carbon polluting substances decreasing? The EPA will also need to measure the import of carbon-intensive goods and the percent increase of taxes, as well as the change in volume of imports. The EPA will source financial reports focusing on after tax profits, sourced from the Department of Commerce.[51] The EPA can also use the EIA's Manufacturing Energy Consumption Survey[52] to track industry. To adequately measure the effect of the tax on the carbon industry, the EPA will measure the rate of closure of carbon-intensive industries, such as the coal industry and the percent change in the establishment of renewable energy sources in the energy industry. The EPA will look at industry specific surveys such as the EIA's Quarterly Coal Report,[53] which monitors coal exports and imports, as well as coal consumption by industry sector. The EPA will also conduct sample surveys of large businesses to collect data on the perceived effect of the tax on their business.

III. Residential Rebate Program

In order to monitor the residential rebate program, the EPA will have to measure the percent change in income spent on energy and transport, focusing on low and middle-income earners. The EPA must also measure regional differences in spending, as some regions will be harder hit by the tax due to climate. Finally, the EPA will measure changes in energy consumption behavior and the awareness of increasing cost of energy. The EPA can collect data from the Department of Treasury reports on rebate distribution,[54] the Department of Labor reports on consumer expenditures,[55] the Census Bureau data on income and poverty levels,[56] and the Bureau of Labor statistics on consumer price indexes.[57]

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[49] "NOAA ESRL GMD Tall Tower Network." *National Oceanic and Atmospheric Administration*. Earth System Research Laboratory Global Monitoring Division, n.d. Web. 29 Oct. 2013.
[50] "Quarterly Coal Report." *EIA*. U.S. Energy Information Administration, 2 Oct. 2013. Web. 29 Oct. 2013.
[51] *Commerce.gov*. United States Department of Commerce, n.d. Web. 29 Oct. 2013.
[52] "Manufacturing Energy Consumption Survey (MECS). *EIA*. U.S. Energy Information Administration, n.d. Web. 29 Oct. 2013.
[53] "Quarterly Coal Report." *EIA*. U.S. Energy Information Administration, 2 Oct. 2013. Web. 29 Oct. 2013.
[54] "Services: Taxes." U.S. Department of the Treasury, n.d. Web. 29 Oct. 2013.
[55] "Consumer Expenditures (Annual) News Release." *Bureau of Labor Statistics*. United States Department of Labor, 10 Sept. 2013. Web. 29 Oct. 2013.
[56] DeNavas-Walt, Carmen, Bernadette D. Proctor, and Jessica C. Smith. "Income, Poverty and Health Insurance Coverage in the United States: 2011." United States Census Bureau, Sept. 2012. Web. 29 Oct. 2013.
[57] "Consumer Price Index." *Bureau of Labor Statistics*. United States Department of Labor, n.d. Web. 29 Oct. 2013.

The EPA will use these statistics as baseline data and then monitor fluctuations in the data. Additionally, the EPA will collect data using random sample surveys to monitor the overall attitude about the bill's effect on individuals.

IV. Research and Financing Program

After setting up the Research and Financing Program, which provides loans and grants to companies and organizations to research energy efficient and renewable technologies, the EPA will have to measure the amount grants applied for, as well as the number of loans that are successfully paid back. The EPA can also collect data on project establishment from the Department of Energy's Advanced Research Projects Agency.[58]

V. Energy Efficiency and Weatherization Program

Finally, under the Energy Efficiency and Weatherization Program, the EPA will need to measure the cost savings achieved by energy efficiency projects and the number of energy efficiency projects undertaken under the program. This can be monitored through data collection on the amount of families and individuals that apply for weatherization assistance programs. The EPA should simultaneously collect data on the effectiveness of the implementation of the assistance by monitoring energy bills and requirements for homes that have received assistance. The EPA will also deliver sample surveys to such homes to assess the perceived quality of these programs.

Reporting, Feedback, and Improvement

The information will be reported in the form of quarterly reports. However, each sector's manager should continuously monitor the data for extreme trends or discrepancies. Quarterly progress reports will be delivered to the EPA Administrator for evaluation. If there are specific extremes or discrepancies before a quarterly report is due, those should be addressed to the EPA Administrator immediately. Reports will also be available to the public and will be disseminated to regional officials.

Reports will be given in Congressional briefings, and all data will be publicly available on the EPA website. This information will be assessed to enact changes in the bill. Midcourse changes may be necessary to ensure the success of the bill and its intended outcomes. This section provides guidelines for the necessary steps to take in order to modify the bill's effectiveness in the case of ineffective implementation.

I. Carbon Tax

Data such as the quarterly business reports and individual expenditures will determine whether or not it is necessary to reassess the tax or carbon equivalency fee.[59,60] If there are major swings in the market, it may be necessary to decrease the tax and gradually reintegrate it. The most effective monitoring will be consumer expenditure on carbon

[58] *Advanced Research Projects – Energy*. U.S. Department of Energy, n.d. Web. 29 Oct. 2013

[59] "Consumer Expenditures (Annual) News Release." *Bureau of Labor Statistics*. United States Department of Labor, 10 Sept. 2013. Web. 29 Oct. 2013.

[60] "Reports." U.S. Securities and Exchange Commission, n.d. Web. 29 Oct. 2013.

polluting substances and carbon intensive goods. If those rates are not falling, it may be necessary to reconsider the tax structure or rate.

II. Residential Rebate Program

Quarterly reports for the Residential Rebate Program will determine whether individuals are receiving their rebates in a timely manner. Data will be used to monitor whether the tax is negatively affecting lower and middle-income earners. If there are significant increases in poverty levels and very negative random sample surveys, it will be necessary to determine whether the rebate format is the best way to incentivize change in energy use. If change is necessary, the Management Director will have to determine if it is necessary to use ad hoc improvement measures in consult with local agencies, or if the problem is a larger systemic problem that necessitates change at a higher level. Congressional action is necessary to change the overall tax rate, so this will be a last resort.

III. Energy Intensive and Trade Exposed Industry Programs

The Management Director will have to assess whether the subsidies for these industries are adequate and if this is the correct method for assisting with negatively impacted industries. Data collected will determine whether it is necessary to find or fund alternative technologies if interim energy solutions are insufficient. However, if energy production is insufficient it will be necessary to determine if technology is not widely disseminated or if it necessary to create additional incentives for renewable energy use if cost competitiveness of renewables is not happening at a significant pace.

IV. Research and Financing Program

If there are not enough applications, or if the quality of the material produced is insufficient, it will be necessary to do more outreach or reconsider award criteria. Revenues from the carbon tax fund this program. If there are not adequate funds to entice grant proposals, or relevant technology research, it may be necessary to divert funds from other programs, such as the weatherization program. Fortunately, this program is relatively self-contained. The most realistic issue will be lack of awareness, in which case the EPA should conduct large-scale media outreach campaigns.

V. Energy Efficiency and Weatherization Program

If the increase in the number of projects or energy and cost savings initiatives is insufficient it will be necessary to determine whether more funding is needed, or if the scale of the project should be increased, or technology being used should be switched.

Analysis

This bill goes far beyond the scope of prior EPA legislation, and as such it will require macro-economic indicators as well as environmental indicators to properly measure its success. Close monitoring and constant reassessment is necessary to implement renewables, accurately redistribute income and successfully transition our society's energy reliance.

Conclusion

We are at a pivotal point in our political, social and physical environment. The decisions we make now will affect our long-term viability and security as a nation. While it may not be possible to reverse the current degree of global warming, we can prepare future generations for climate change by investing in sustainable infrastructure and technology.

This shift will not be easy, but it is necessary. However, the deep divides within Congress need to be resolved before a carbon tax bill can be passed. There is heated debate about the potential negative economic impacts a carbon tax could create, and this bill offers generous provisions to diminish the initial setbacks of the tax. The analysis presented within this report demonstrates that such a bill is feasible to enact. The Climate Protection Act of 2013 could, in fact, allocate resources that would serve to insulate the economy from the uncertainty of global energy markets once properly implemented.

Indeed, climate change is the defining issue of our time and how we plan to address it should be of paramount concern.

Appendices

Appendix I: Environmental Impacts of Climate Change

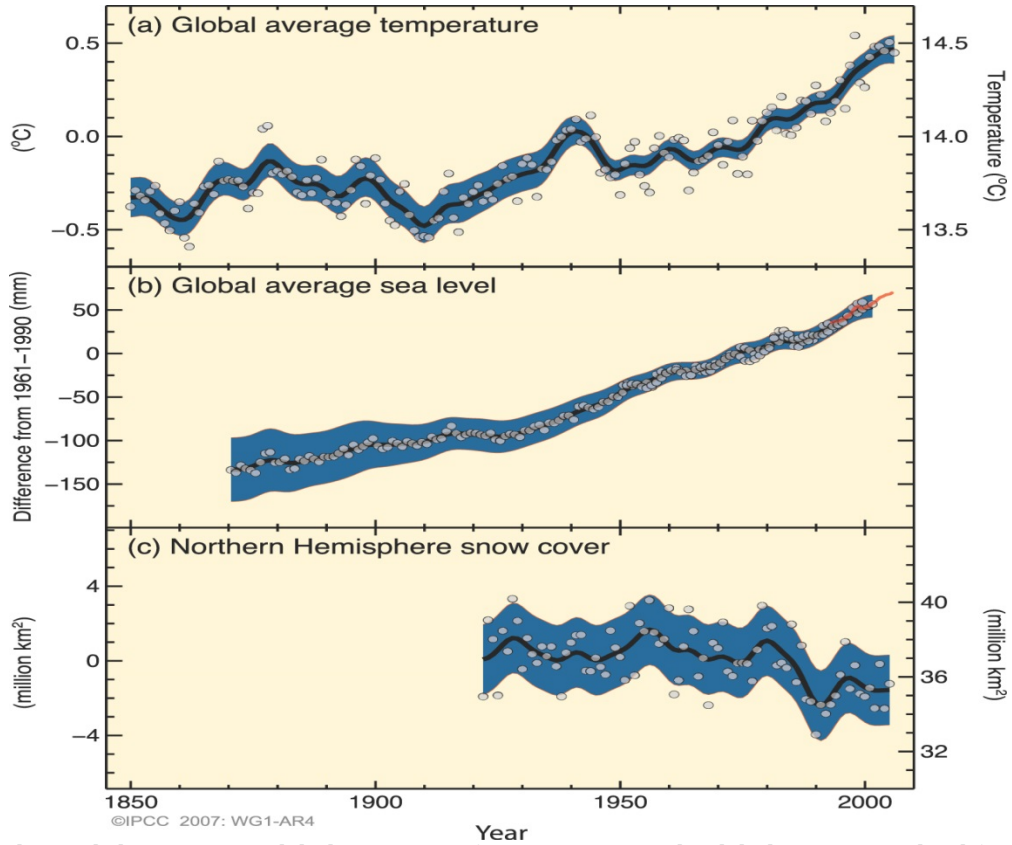

Figure 5: *Observed changes in (a) global average surface temperature, (b) global average sea level from tide gauges (blue) and satellite (red) data and (c) Northern Hemisphere snow cover for March-April. All changes are relative to corresponding averages for the period 1961–1990. Smoothed curves represent decadal average values while circles show yearly values. The shaded areas are the uncertainty intervals estimated from a comprehensive analysis of known uncertainties (a and b) and from the time series (c)*[61]

[61] Alley, Richard B., et al. "IPCC 2007: Summary for Policymakers." *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.* Ed. Solomon, S., et al. Cambridge and New York: Cambridge University Press, 2007. Web.

Global mean sea level rise: Sustained global warming greater than 1.5-2.5° Celsius is a threshold beyond which there is likely to be at least an 18 to 59 cm (7.1 to 23 in) rise in sea level by the end of the 21st century, and possibly even lead to partial deglaciation of the Greenland ice sheet as well as the West Antarctic ice sheet. This would cause sea level rise of 4-6 meters in the coming centuries.[62] NASA scientists have tracked the correlated sea rise since 1900:

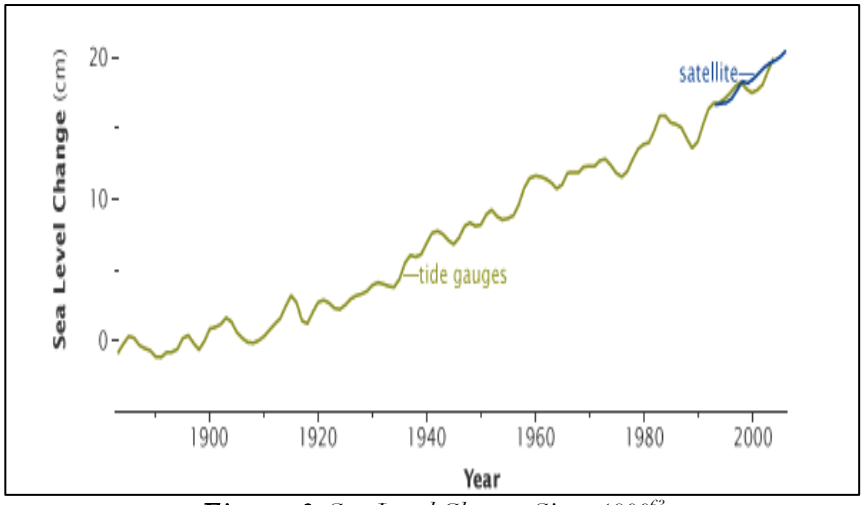

***Figure 6**: Sea Level Change Since 1900*[63]

From 1961 to 2003, the average rate of sea level rise was 1.8 ± 0.5 mm/yr. For the 20th century, the average rate was 1.7 ± 0.5 mm/yr. There is high confidence that the rate of sea level rise has increased between the mid-19th and the mid-20th centuries.[64]

Acidification of the oceans: The oceans absorb carbon from the atmosphere. Since there is more atmospheric carbon than the cycle can naturally absorb, the dissolved carbon reacts with the water to form an acid.[65]

Mass loss of glaciers and ice caps: The degree of glacial retreat and ice cap deterioration is estimated to be 0.50 ± 0.18 mm/year in sea level equivalent (SLE) between 1961 and 2004, and 0.77 ± 0.22 mm/year SLE between 1991 and 2004. The maximum extent of seasonally frozen ground has decreased by about 7% in the NH from 1901 to 2002, with a decrease in spring of up to 15%.[66]

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Hydrological cycle disturbances: The global water cycle will be affected and lead to higher risks of drought and flood. The number of additional people at risk of clean water scarcity is projected to increase substantially with increasing temperature from 0.4-1.1 billion for 1-1.5°.[67]

Loss of ecosystems and species: A 2-3° Celsius increase in global mean temperature would increase the risk of extinction for 20-30% of species and have widespread adverse effects on biodiversity and ecosystems[68]. There are additional impacts on animal migration and hibernation habits, as well as elongation of the grow season for many plants, leading to failing crops[69].

D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

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Appendix II: Organizational Structure

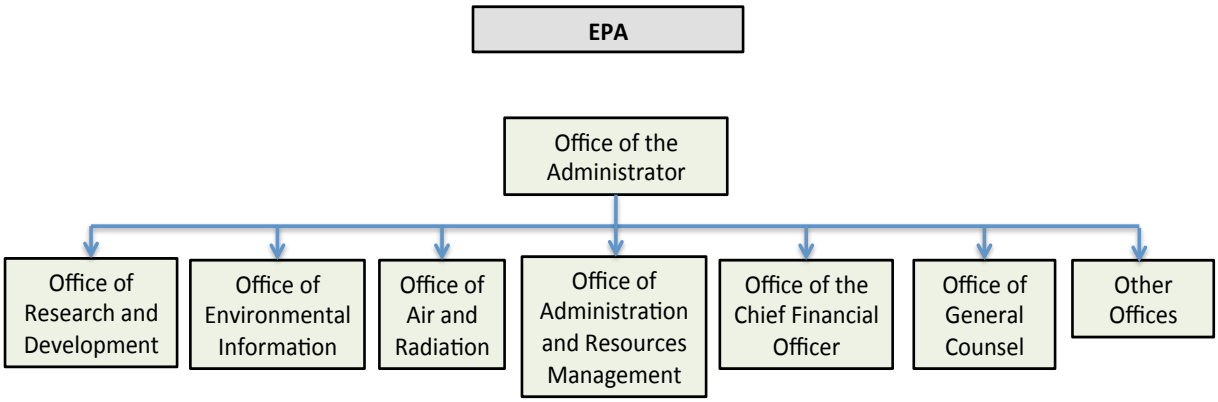


Figure 7: Current Organization of EPA's Headquarter Offices

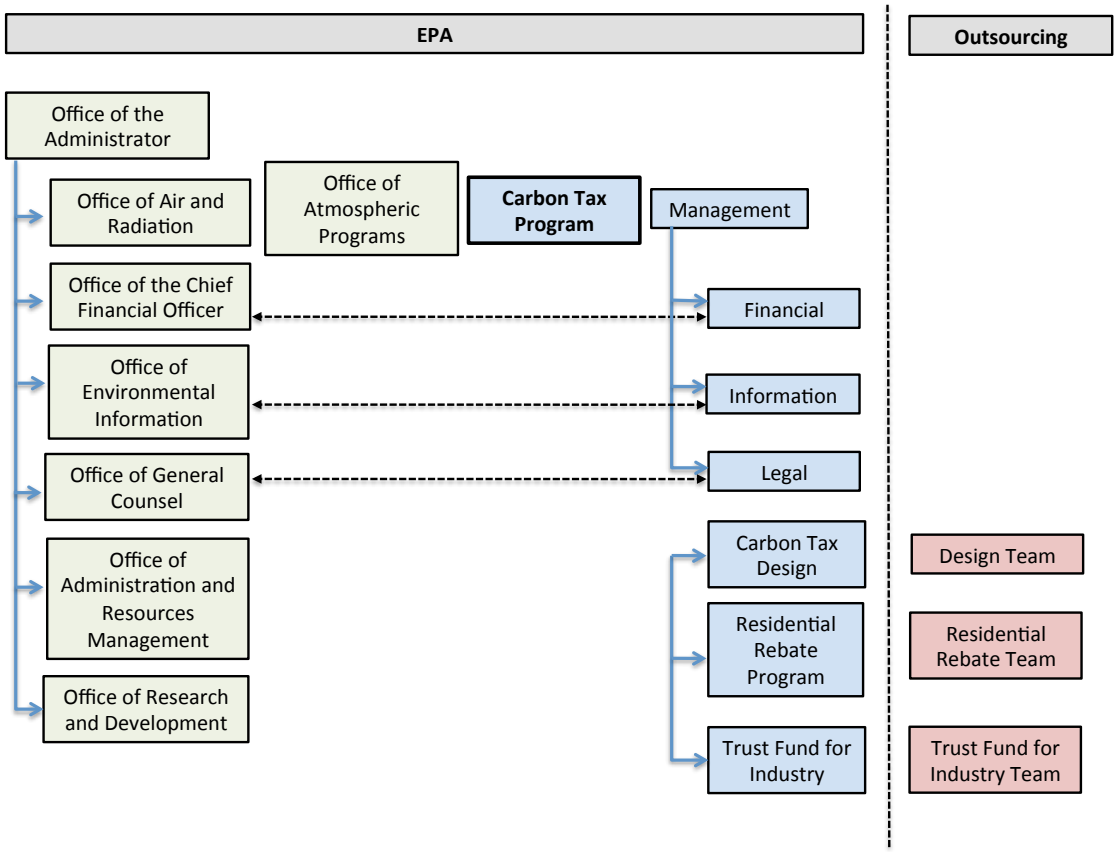


Figure 8: The Organizational Design of Carbon Tax Program

Table 1: Carbon Tax Staffing List

Team	Internal Organizational Design	Major Functions	Key Skills	Reports To	Coordinates With
Management	Director, Deputy Director, Regional Director (10)	Manage Carbon Tax Program, bridge program with Administrator & contracted team, administrative support	Strong communication, delegation, motivational abilities	Office of Atmospheric Programs	All other Carbon Tax Program teams
Financial Services	Clerk (3)	Budget management, transfer/distribution of funds	Financial analysis, accounting, budget planning	Management Team	EPA's Office of the Chief Financial Officer
Legal	Legal Advisors (3)	Legal support for Carbon Tax Program	Legal, negotiation, communication	Management Team	Office of General Counsel
Information	Information Analyst (3)	Collect information to report to Congress	Information technologies, data analysis, website development	Management Team	Office of Environmental Information
Carbon Tax Design	Chief Director, Program Managers (2), Outsourced team members (10)	Design carbon tax	Financial analysis, tax policy, statistics	Management Team	Management Team
Residential Rebate	Chief Director, Program Managers (2), Outsourced team members (30)	Design & implementation of Residential Rebate Program	Finance, economics, statistics, community relations	Management Team	Management Team
Carbon Pollution Reduction Trust Fund	Chief Director, Program Managers (2), Outsourced team members (10)	Design & implementation of Trust Fund for trade-exposed & energy-intensive industries	Finance, economics, statistics, experience with energy-intensive industry	Management Team	Management Team

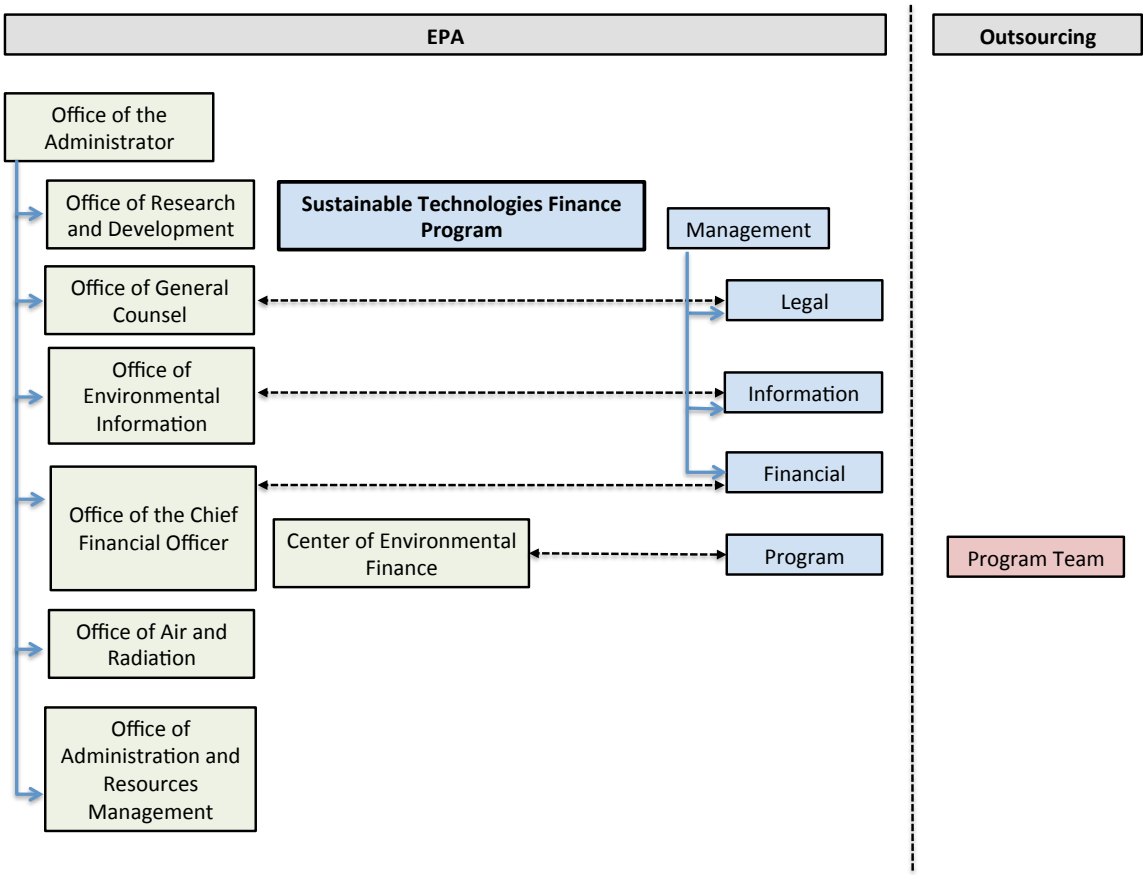


Figure 9: The Organizational Design of Sustainable Technologies Finance Program

Minimum Requirements for Contractors:

The contractors must at minimum meet the following requirements:

1) Be eligible to work with EPA;
2) Have previous or related experience in evaluating new sustainable technology and financing technology programs for Sustainable Technologies Finance Program;
3) Proven reliability;
4) For Sustainable Technologies Finance Program, they should be able to form and manage a mixed task force comprised of staff with a finance background, and energy/sustainable technology history;
5) For Carbon Tax Program, they should be able to form a mixed task force comprised of staff from a finance and development company;
6) Price under program budget.

Each contract must include, at least:

1) Objective(s) of the specific task(s);
2) Detail of the activities needed;
3) Detailed methodology to develop the tasks;
4) Detailed profile of the team needed;
5) Time frames;

6) Reports and deadlines;
7) Available budget;
8) Logistics (periodic communications, meetings, rent a place, format of reporting, etc.)

Table 2: Sustainable Technologies Finance Program Staffing List

Team	Internal Organizational Design	Major Functions	Key Skills	Reports To	Coordinates With
Management Team	Director, Deputy Director	Manage STFP, bridge program with Administrator & contracted team, administrative support	Strong communication, delegation, motivational abilities	Office of Research and Development	All other STFP teams
Financial Services	Clerk	Budget management, transfer/distribution of funds	Financial analysis, accounting, budget planning	Management Team	EPA's Office of the Chief Financial Officer
Legal	Legal Advisor	Legal support for STFP	Legal, negotiation, communication	Management Team	Office of General Counsel
Information	Information Analyst	Collect information to report to Administrator	Information technologies, data analysis, website development	Management Team	Office of Environmental Information
STFP	Chief Director, Program Manager, Outsourced team members (10)	Design & implement STFP	Finance, economics, energy technology, market analysis	Management Team	Management Team

Appendix III: Budget

Table 3: Carbon Tax Program Budget

STAFFING				
Position	# of Employees	Salary		Positional Total
Director	1		$200,000	$200,000
Deputy Director	1		$200,000	$200,000
Chief Director	3		$200,000	$600,000
Regional Director	10		$150,000	$1,500,000
Program Manager	6		$100,000	$600,000
Financial	3		$100,000	$300,000
Legal	3		$100,000	$300,000
Information	3		$100,000	$300,000
		Total Base Salaries		$4,000,000
		Fringe Benefits (25%)		$1,000,000
Outsourcing Teams	50		$160,000	$8,000,000
		TOTAL STAFFING		$13,000,000
OVERHEAD & GENERAL				
Travel				$180,000
Office Supplies				$12,000
Furniture				$6,500
Telephone and Fax				$2,000
Repairs/Maintenance				$3,000
Advertising				$7,000
Computers, Printers, Software				$24,000
Information Technology				$10,000
Postage and Shipping				$3,000
		TOTAL OVERHEAD & GENERAL		$247,500
FUNDING				
Tax Revenue - Residential Rebate				$50,000,000,000
Tax Revenue - Pollution Reduction Trust Fund				$7,500,000,000
		TOTAL FUNDING		$57,500,000,000
		PROGRAM TOTAL		**$57,486,752,500**

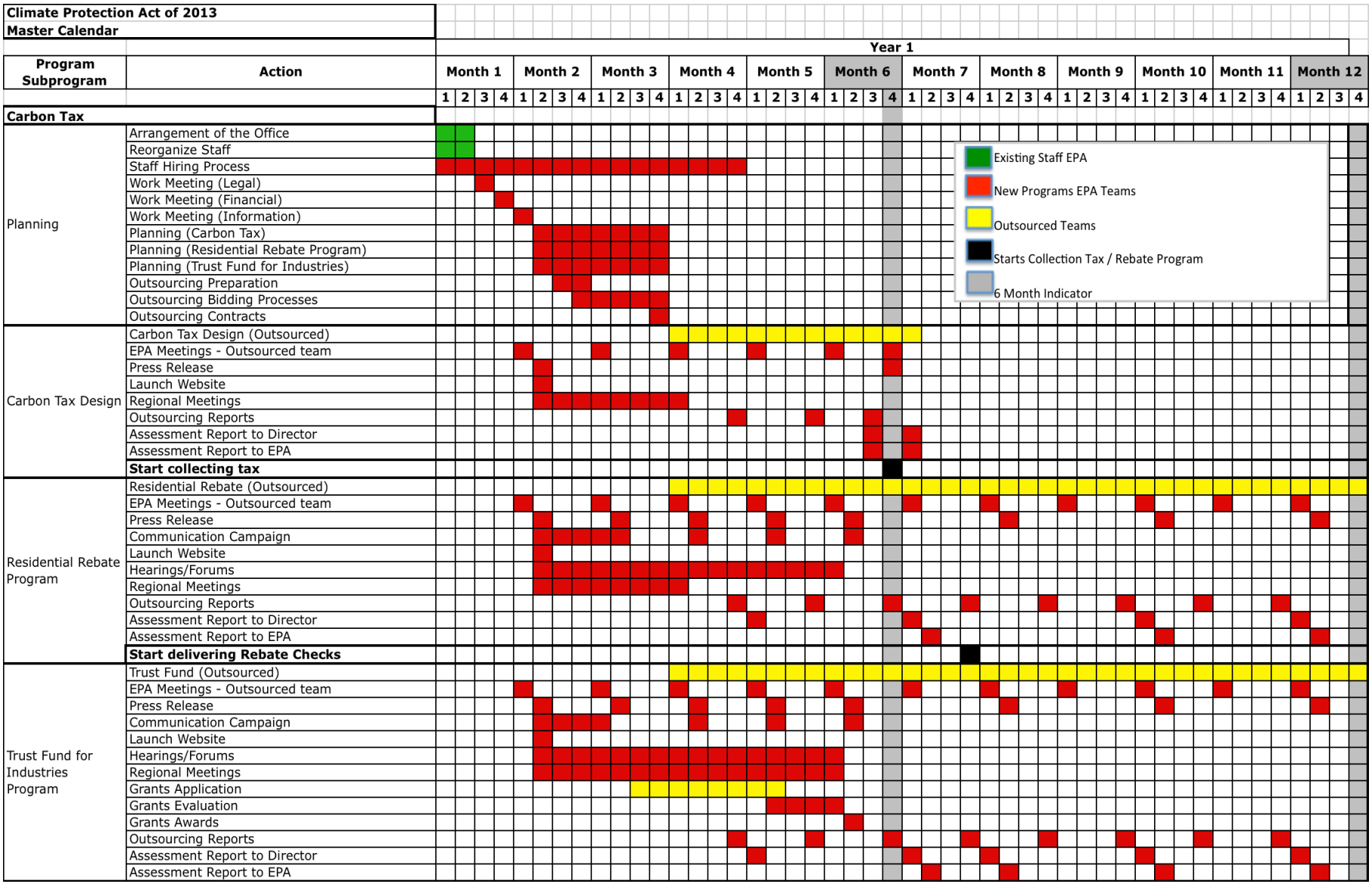
Table 4: Sustainable Technologies Finance Program Budget

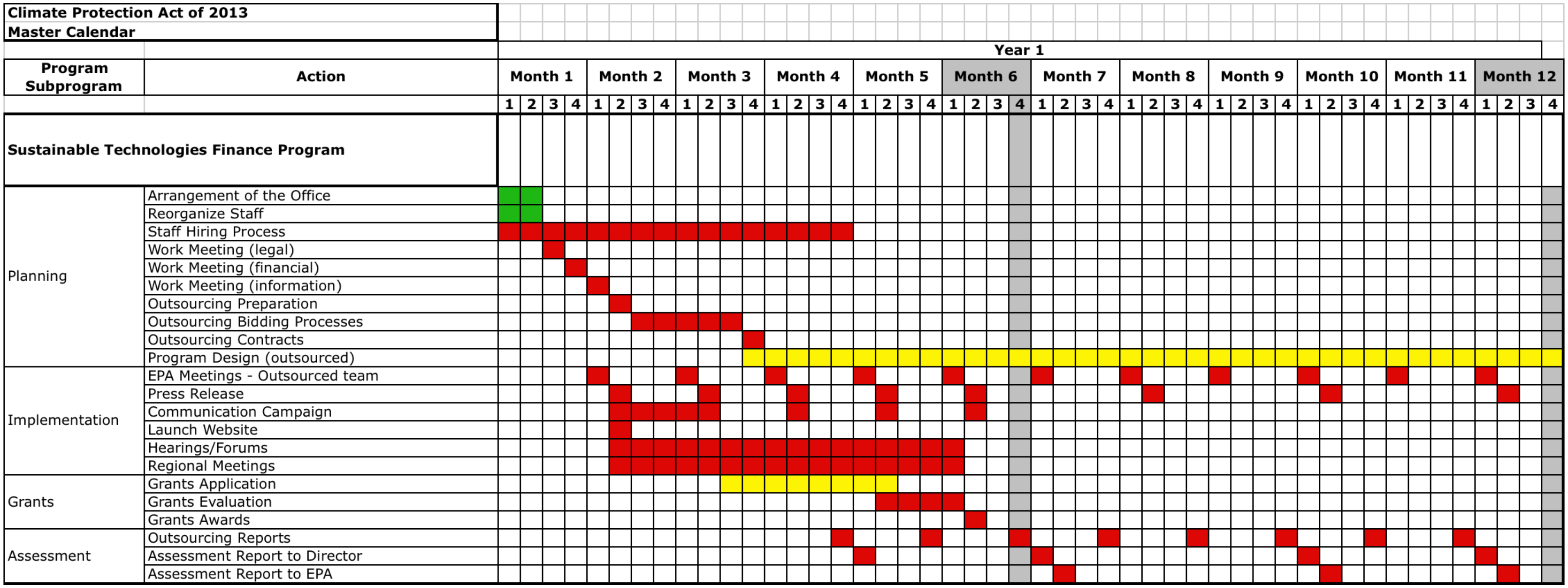
STAFFING			
Position	# of Employees	6 Month Salary	Positional Total
Director	1	$100,000	$100,000
Deputy Director	1	$100,000	$100,000
Chief Director	1	$100,000	$100,000
Program Manager	1	$50,000	$50,000
Financial	1	$50,000	$50,000
Legal	1	$50,000	$50,000
Information	1	$50,000	$50,000
		Total Base Salaries	$500,000
		Fringe Benefits (25%)	$125,000
Outsourcing Teams	10	$80,000	$800,000
		TOTAL STAFFING	$1,425,000
OVERHEAD & GENERAL			
Travel			$50,000
Office Supplies			$4,000
Furniture			$1,750
Telephone and Fax			$600
Repairs/Maintenance			$900
Advertising			$1,750
Computers, Printers, Software			$5,000
Information Technology			$3,500
Postage and Shipping			$500
		TOTAL OVERHEAD & GENERAL	$68,000
FUNDING			
Grants and Loans			$5,000,000,000
		TOTAL FUNDING	$5,000,000,000
		PROGRAM TOTAL	**$4,998,507,000**

Table 5: Line-Item Budget for the Carbon Tax Program and the Sustainable Technologies Finance Program

Line- item Budget		
STAFFING		
Salaries		4,500,000
Fringe Benefits (25% Base Salary)		1,125,000
Outsourcing Teams		8,800,000
	TOTAL STAFFING	**$14,425,000**
OVERHEAD/GENERAL		
Supplies		53,250
Travel		230,000
Office Expenses		32,250
	TOTAL OVERHEAD/GENERAL	**$315,500**
	TOTAL OPERATIONAL COSTS	**$14,740,500**
FUNDING		**$62,500,000,000**
	TOTAL PROGRAM BUDGET	**$62,485,259,500**

Appendix IV: Master Calendar





The first 6 months are dedicated to carbon tax program, rebate program, and STFP design, as well as the hiring of these program staff. The carbon tax goes into effect in Month 6.

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