U.S. Leadership in Climate Change Policy:

Public comment on the draft guidance issued by Council on Environmental Quality (CEQ) for Federal agencies for improvement in their consideration of the effects of greenhouse gas (GHG) emissions

Tony Tancini

Table of Contents

Executive Summary

The following provides public comment on the draft guidance that the Council on Environmental Quality (CEQ) issued for "public consideration and comment on the ways in which Federal agencies can improve their consideration of the effects of greenhouse gas (GHG) emissions and climate change in their evaluation of proposals for Federal actions under the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq" (Council on Environmental Quality (CEQ), Memo). The three target areas that the CEQ should provide initial guidance for reducing GHG emissions are

1.) Net Zero Building Program

2.) Sustainable Military Installations, and

3.) Holistic Green FEDFLEET Program

The focus on these three areas is important because they are the three largest cumulative sources of GHG emissions within the federal government (EPA, 2009). Focusing on the three largest sources of GHG will help reduce the threat from climate change. There is now wide consensus that human activity has significantly contributed to climate change. Humans have significantly "contributed to emission of four long-lived GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and halocarbons (a group of gases containing fluorine, chlorine or bromine)" (Baumert, Herzog, and Pershing, 2005).

A leading factor for the nation's carbon footprint is the production of electricity. In 2007, the U.S. released 7,150.1 million metric tons of carbon equivalent (MMTCE) with approximately 34% (2,445.1 MMTCE) being emitted from the production of electricity (EPA Report, 2009). The reason this industry is the number one contributor to climate change is because fossil fuels comprise 67% of the energy needed to generate electricity (Goodell, 2006). The US transportation sector is the second largest contributor to the nation's GHG emissions. In 2007, this sector alone accounted for 28% of the nation's carbon footprint releasing 1,995.2 MMTCE into the atmosphere (EPA Report, 2009). The primary source of fuel for transporting people and goods is oil which the US consumed is close to 19.5 million barrels a day in 2008 (EIA, Website). Together, these two industries account for over half of the nation's carbon footprint.

In Massachusetts, the Supreme Court concluded that the Clean Air Act (CAA) gave the EPA the authority to regulate GHG. In reaching its decision in Massachusetts v. EPA, the U.S. Supreme Court considered scientific evidence supported by a large consensus of well qualified scientists and concluded that the "harms associated with climate change are serious and well recognized" (Massachusetts v. EPA,

549 U.S. 497; 127 S. Ct. 1438). The Court also considered evidence supported by climate experts and scientists which show that a cumulative increase in GHG emissions has resulted in a "well-documented rise in global temperatures" which have led to and will continue to have adverse environmental, health and economic consequences (Ibid). Using the Court's opinion in Massachusetts v. EPA as a guide, the CEQ should provide instruction that will help Federal Agencies reduce the cumulative effect of the GHG emitted from their operations. Such guidance should initially focus on efforts that will reduce GHG from the three largest emitting sources within the federal government.

Net Zero Building Program

The U.S. General Services Administration (GSA) is the property manager, owner and landlord of the federal civilian workforce (GSA, Website). GSA owns or leases over 8,600 properties which encompass 354 million square feet that houses the workplaces of 1.1 million federal employees (Ibid). Given the large number of buildings and the total square footage of its operations, the net cumulative effect of the GHG emitting from these facilities significantly adds to the public and environmental harm (Baum, M., 2007; Massachusetts v. EPA). CEQ guidelines for this Federal Agency should encourage the GSA to expand and improve on its efforts and adopt a Net Zero Building Program.

The goal of this program is to construct green buildings and renovate existing ones to achieve net zero emissions. An additional component of this program will include a timetable that will enable GSA to achieve an energy portfolio of 30% renewable energy generation by 2020. The Net Zero Building Program should begin in 2012 which will give the agency enough time to adequately plan for the new measures that will make this program more successful than the current one. GSA should continue with its current operational efforts and begin to phase in net zero building design into its new construction and renovation efforts.

Sustainable Military Installations

The Department of Defense (DoD) owns a large amount of real property which supports its mission of providing national and international security for the U.S. The Department's global real property portfolio comprises of 29 million acres of property divided into more than 5,570 sites that house more than 539,000 facilities (buildings, structures and linear structures) (DoD, 2010). CEQ guidance should provide instructions for the DoD on how to improve on its initiatives to build a sustainable, energy-efficient infrastructure that will support its mission (DoD, 2007). Given the size of DoD's property holdings, the net cumulative GHG effect of these emissions is quite extensive (Baum, M., 2007; Massachusetts v. EPA).

The DoD should enhance its current environmental programs and include a Net Zero Building Program similar to the program prescribed for federal buildings. In addition, the Department should invest in smart grid technology to enhance its efforts to create an energy portfolio by 2025 consisting of 25% of renewable energy that is generated, purchased, or both (DoD, 2007). Finally, its installations should encourage the use of sustainable transportation such as biking, walking or community transit. Since the Sustainable Military Installation Program is an enhancement to DoD current initiatives, it can be implemented in 2012 which will afford ample time for more detailed planning.

Holistic Green FEDFLEET Program

Given the large number of civilian and military vehicles in the federal fleet, the negative health and environmental effect of cumulative GHG emissions are extensive. The CEQ should provide guidance to the Federal Fleet Policy Council (FEDFLEET) and the U.S. Department of Agriculture (USDA) to develop a Holistic Green Fleet Program. The program will enhance efforts that are already in place pursuant to the Energy Policy Act (EPAct), Executive Order 13423 and the Energy Independence Act and Security Act (EISA) that require Federal Agencies to purchase alternative fuel vehicles (AFVs) (GSA AFVs Website). The Holistic Green Fleet Program will also require the sustainable production of alternative fuels as required under EPA policy regulating fuels and fuel additives (Federal Register, 2010).

Starting in 2010, the EPA will phase in the renewable fuel program which will achieve an annual average reduction of 4.5 billion tons of carbon dioxide equivalent (Federal Register, 2010; EPA, May 2009). A downside to these efforts will be related to the detrimental effects that increased agricultural production may have on the nation's freshwater supply and marine environments. The "dead zone" in the Gulf of Mexico is one such example. This Holistic Green Fleet Program will take a holistic approach to fuel development and will focus efforts to ensure that the agricultural methods for growing crops used for the manufacture of renewable fuels such as cellulosic biofuel and biomass based diesel do not have a detrimental affect on local and regional watersheds. To offset the adverse impact of growing more crops to support this important GHG reduction program, the USDA should encourage the agricultural industry to adopt methods that will reduce pollution runoff from the use of fertilizers and pesticides. Such methods will include the use of vegetive buffers and constructed wetlands to reduce nitrogen loading into the nation's watersheds. The Holistic Green Fleet Program should start in 2012 to give the farming industry adequate time to integrate these methods into their agricultural practice.

Introduction

The following provides public comment on the draft guidance that the Council on Environmental Quality (CEQ) issued for "public consideration and comment on the ways in which Federal agencies can improve their consideration of the effects of greenhouse gas (GHG) emissions and climate change in their evaluation of proposals for Federal actions under the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq" (Council on Environmental Quality (CEQ), Memo). In light of the Supreme Court's ruling in Massachusetts v. EPA, the CEQ requested comment on the specific levels of GHG that would be considered to have a significant cumulative effect and which agencies it should provide guidance regarding that effect. Massachusetts v. EPA is the landmark Supreme Court case in which the Court found that GHG is a pollutant under the Clean Air Act and the EPA has the authority to regulate it if the agency determined that GHG was a danger to the health and public welfare. The CEQ also requested comment on land management practices.

The three largest sources of the federal government's GHG emissions are from buildings, military installations, and vehicles (EPA, 2009). The following recommends that the CEO develop policy that requires Federal Agencies to focus its efforts in these three target areas. The following recommends that the CEQ develops policy; 1.) encouraging net zero buildings to significantly improve energy-efficiency and GHG emissions, 2.) supporting sustainable military installations which provide sustainable transportation, high density housing and self-sufficient renewable energy generation, and 3.) encourages a Holistic Green Fleet Program that not only supports the purchase of vehicles with high fuel-efficiency and low GHG emissions but also considers land management issues relating to agriculture. The third target area, federal vehicles, provides comment on land management and resource management issues relating to the agricultural production of alternative fuels. Once these three policies are established, future ones should focus on smaller sources of GHG emissions.

Greenhouse Gases and Climate Change

Climate change is indeed real and occurring. The Intergovernmental Panel on climate change (IPCC) defines climate change as "a change in the state of the climate over time, whether due to natural variability or as a result of human activity ... that alters the composition of the global atmosphere" (Bernstein, et al., 2007). The global community now accepts the fact that the warming of the climate system is apparent based on empirical evidence showing an increase in average global air and ocean temperatures[1] (Ibid). There is now wide consensus that human activity has significantly contributed to climate change. Since the dawn of the industrial revolution, humans have significantly "contributed to emission of four long-lived GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and halocarbons (a group of gases containing fluorine, chlorine or bromine)" (Baumert, Herzog, and Pershing, 2005). In a recent report, the Environmental Protection Agency (EPA) acknowledged that the "primary greenhouse gas emitted by human activities in the United States was CO_2, representing approximately 85.4% of total greenhouse gas emissions" (EPA Report, 2009). To reduce the effects of climate change and avoid the most serious ones[2], the US must assume a leadership role and reduce its national carbon footprint.

A leading factor for the nation's carbon footprint is the production of electricity. The US produces an enormous about of electricity and the carbon emissions from this source of power exceeds the international rate. In 2007, the U.S. released 7,150.1 million metric tons of carbon equivalent (MMTCE) with approximately 34% (2,445.1 MMTCE) being emitted from the production of electricity (EPA Report, 2009). A reason that carbon emissions are so high is because the primary source of electrical generation in the US is coal. Burning over a billion tons per year, about half of the nation's electricity comes from this black rock (Goodell, 2006). Coal is by far the most pollutant emitting energy source to burn emitting 208,000 pounds of CO_2 per billion BTU of energy input (EIA, 1998). Not only does coal emit a large amount of carbon and other pollutants when burned as fuel, the mining process destroys the surrounding ecosystem and causes severe groundwater and surface water pollution (Ibid).

---

[1] The IPCC studied a twelve year period of temperature (1995 and 2006) and found that eleven out of twelve years were the warmest years in instrumental record going back to 1850. In addition, a 100-year trend of temperature recordings shows an increase of 0.74 (0.56 to 0.92)°C (Bernstein, et al., 2007).

[2] Models have shown that if left unchecked, climate change will result in hot extremes which could lead to severe droughts and heat waves resulting in a reduced water supply, greater amount of glacier melt, more severe tropical storms, loss of coastlines and coastal wetlands, food shortages, and increases in infectious diseases (Bernstein et, al., 2007).

Accounting for about 17% of the nation's electrical generation, natural gas is better, emitting almost half of the CO_2 emissions when compared to coal (EIA, 1998). While cleaner than coal, natural gas is not a true source of clean energy. It still emits 117,000 pounds of CO_2 per billion BTU of energy input (Ibid). Other environmental concerns include water use and contamination during mining operations. For example, operations in the Marcellus Shale located in Pennsylvania require substantial amounts of water for the drilling and stimulation of the gas well (Soeder & Kappel, 2009). There are also concerns regarding impact of local water resources, degrading streams and small watersheds, and contaminated fluids that may leach into the soil destroying groundwater resources (Ibid). The water pollution from these operations are expected to enter the Delaware Watershed system affecting the drinking water for 15 million people (DRBC, 2004). Considering its entire life cycle environmental impact, natural gas is only a short-term solution to the nation's carbon footprint reduction.

The US transportation sector is the second largest contributor to the nation's GHG emissions. In 2007, this sector alone accounted for 28% of the nation's carbon footprint releasing 1,995.2 MMTCE into the atmosphere (EPA Report, 2009). The primary source of fuel for transporting people and goods is oil which the US consumed close to 19.5 million barrels a day in 2008 (EIA, Website). While not all oil is used to power vehicles, the vast majority of it is refined for vehicle fuel which creates an additional step in the process and releases even more GHG emissions. A big problem associated with the current transportation sector is that Americans are driving longer commutes and in larger vehicles with poor fuel efficiency (Phillips, 2006; Girardet, 2008). A solution would be to decease the number of cars on the road by increasing the number of people utilizing public transportation and eventually wean the car industry off of oil as the primary source of fuel for their products.

The Path to Regulating Greenhouse Gasses

Background

The U.S. is posed to assume a leadership role in addressing global concerns relating to climate change. During the past three years, the U.S. has made strides in formulating a national policy aimed at reducing the country's carbon footprint. These efforts have occurred in all three branches of the federal government. For example, last summer Congressional leaders in the U.S. House of Representatives passed a bill that would reduce greenhouse gas (GHG) emissions, support energy efficiency and renewable energy programs and a cap and trade system (H.R. 2454). The Bill, known for its sponsors, Waxman-Markey, still hangs in the political balance as the Senate continues to consider its provisions. Despite making its way out of the Environment and Public Works Committee where it could be openly debated on the Senate Floor, the bill has not made any further progress to becoming law (S. 1733, known for its sponsors, Boxer-Kerry).

While the provisions of the pending Climate Change legislation may decrease the national carbon footprint by adopting policy that will reduce GHG emissions, it is not the only way the nation will be able to move forward with this effort. Once the Bill is passed and signed into law, a regulatory framework to effectuate its provisions will be required (H.R. 2454). For example, specific provisions under the Waxman-Markey Bill require the Environmental Protection Agency (EPA) to promulgate regulations within two years after the Bill is enacted (Ibid). The regulations will provide the mechanism that will guide business and industry towards GHG reductions, administer energy efficiency standards, and operate other climate change programs and mitigation efforts (Ibid). Rather than spend additional time waiting for Congress to pass a comprehensive Climate Change Bill and then expend efforts to promulgate regulations to administer the law, the national effort to reduce GHG emissions can come from the executive branch.

The EPA can regulate GHG emissions by using the existing legal framework that the federal legislative branch has already developed. To find the authority for developing a regulatory framework to regulate GHG, the EPA will have to look no further than the law that created it, the 1970 Clean Air Act (CAA) (Clean Air Act, 42 USCA § 7401, et seq.; EPA, Website, Clean Air Act). While this executive branch agency has regulated a variety air pollutants and particulates under the CAA, it has not regulated GHG because until recently the EPA had not determined whether GHG were pollutants that endangered public health. However, pursuant to a recent U.S. Supreme Court ruling, the EPA was directed to make such a determination (Massachusetts v. EPA, 549 U.S. 497; 127 S. Ct. 1438). In

Massachusetts v. EPA, the Supreme Court ordered the EPA to determine whether GHG were a danger to the public health (Ibid). After careful study of this issue, the EPA found that the atmospheric presence of GHG are a threat not only to the public health but to the environment's as well (EPA's Endangerment Finding). The EPA is now in the process of drafting regulations that will regulate GHG emissions.

The Clean Air Act

The legal basis providing the federal government the authority to regulate GHG was established four decades ago when President Richard Nixon signed the 1970 Clean Air Act into law (Clean Air Act, 42 USCA § 7401, et seq.; EPA, Website, Clean Air Act). The 1970 Clean Air Act was the first set of major amendment to the original Act of 1963 and shifted the federal government's role in preventing air pollution (Ibid). The 1970 Amendments gave the Administrator of the EPA the authority to promulgate regulations that would establish policy, procedures, and legal enforcement of the Clean Air Act and its provisions (Clean Air Act, 42 USCA § 7601). Subsequent amendments enhanced efforts aimed at preventing air pollution. The 1977 Amendments strengthened air enforcement efforts in areas that did not meet federal air quality standards (EPA, Website, Clean Air Act). And, the 1990 Clean Air Act Amendments created controls and measures to reduce the national threat relating to acid rain (42 USCA § 7651, et. seq.).

The Clean Air Act has made strides in reducing the amount of pollution discharged into the atmosphere. For example, problems associated with acid rain have been reduced in a large part due to the policy that was developed subsequent to the 1990 Amendments (Clean Air Act, 42 USCA § 7651, et. seq.; Speth, 2008). The main pollutants that cause acid rain are sulfur dioxide and nitrogen oxides which create precipitation that diminishes the planet's ecosystems resulting in marine losses, desertification, deforestation, freshwater system decline and loss in biodiversity (Speth, 2008). Acid rain is also linked to health problems that include increase in asthma and has been linked to deaths resulting from damaged lung tissue (EPA, Website, Acid Rain). Evidence of acid rain can be observed on weathered limestone and marble where carbonation has been enhanced resulting in these surfaces becoming pitted and worn (Christopherson, 2009). See Figures 1 and 2 showing damage from acid rain.

Figure 1. Diminished Tree Health in Adirondack due to Acid Rain

(Adirondack Council, Website)

Figure 2. Damage to Limestone due to Acid Rain

(New York State, Department of Environmental Conservation, Website)

Under the 1990 Amendments, the regulations for decreasing the primary pollutants responsible for acid rain, sulfur dioxide and nitrogen oxides, went into effect in 1995 (Clean Air Act, 42 USCA § 7651). To alleviate the burden on industry, the initial phase only targeted the highest emitting sulfur dioxide units which totaled 263 units and were located at 110 different power plants (Johnston, Sefcik & Soderstrom, 2008). The second phase went into effect five years later and targeted the smaller emitters including coal fired power plants (Clean Air Act, 42 USCA § 7651d). Nitrogen oxides were regulated on a different timetable with coal-fired power plants being required to limit this pollutant according to policy EPA regulations (Clean Air Act, 42 USCA § 7651f). The 1990 Amendments required each primary acid rain pollutant be cut in half of those that were emitted in 1980, which would be a ten million ton reduction in sulfur dioxide and a two million ton reduction in nitrogen oxides (Stavins,

2008). The result of the 1990 Amendments have been moderately successful (Speth, 2008). For example, as of 2005 sulfur dioxide emissions were reduced by more than seven million tons, or 41% below 1980 levels (EPA, Website, Acid Rain; Speth, 2008; Stavins, 2008).

EPA's Acid Rain Program prohibits emitters from annually releasing sulfur dioxide and nitrogen oxides in excess of the number of allowances permitted (Clean Air Act, 42 USCA § 7651g). To regulate this program, the EPA issues permits that are valid for five years (Ibid). Emitters are required to submit a permit application that includes a compliance plan that details how they will control and measure the amount of acid rain pollutants discharged into the atmosphere (Ibid). Those who violate the CAA and emit more acid rain pollutants than are allowed are subjected to the EPA enforcement authority and those emitters may be penalized for surpassing their allowances (Clean Air Act, 42 USCA § 7661).

While the CAA provides the EPA enforcement authority, the Federal Agency also offered incentives and other measures that were aimed at gaining early compliance, making participation in the program less burdensome, and reducing the cost of compliance (Johnston, Sefcik & Soderstrom, 2008; Stavins, 2008) For example, the EPA provided incentives to the first utilities who installed scrubbers and had successfully decreased their emissions (Stavins, 2008). The Acid Rain Program also provided consideration for those utilities in the Midwest (Ohio, Indiana, and Illinois) whose operations relied on coal that was high in sulfur by providing these utilities additional permitting allowances (Ibid). In addition, the program established a trading system (cap and trade program) that gave utilities the flexibility to sell excess permits to others who may need additional allowances to comply with the CAA (Johnston, Sefcik & Soderstrom, 2008). The acid rain cap and trade program was successful at reducing the cost of compliance and resulted in an annual savings of $1 billion to the electrical generation sector (Ibid). Some of policy that made the Acid Rain Program successful can may be adopted and applied to the regulatory framework that the EPA is creating to reduce the nation's GHG emissions.

Regulating GHG under the Clean Air Act

Massachusetts v. EPA

The EPA's turn towards regulating GHG came after the U.S. Supreme Court's decision in Massachusetts v. EPA. In Massachusetts, the Supreme Court determined whether the EPA had the legal authority to regulate GHG from new motor vehicles and whether its refusal to do so was consistent with the legislative authority of the CAA. In finding that the EPA did have the authority, the Court concluded that the CAA authorized the EPA to regulate GHG emissions from new motor vehicles if the Federal Agency determined that GHG contribute to climate change (Massachusetts v. EPA). The Supreme court also determined that GHG fell within CAA definition of air pollution (Ibid). The Court held that the

EPA's refusal to decide whether GHG cause or contribute to climate change was arbitrary and capricious, and further held that the EPA must adequately explain its reason for regulating or not regulating GHG under the CAA (Ibid).

This is case initially started on October 20, 1999 as a rulemaking petition filed by a group of 19 private organizations[3] asking the EPA to regulate GHG emissions from new motor vehicles under § 202 of the CAA (Massachusetts v. EPA). Under § 202 of the CAA, the EPA is required to promulgate rules that regulate the emissions of any new motor vehicle which in the EPA's judgement causes or contributes to air pollution that may endanger the health and welfare of the public (CAA § 202). The Petitioners maintained that the heat trapping GHG emissions have significantly accelerated climate change as 1998 was the "warmest year on record" (Massachusetts v. EPA). The Petitioners further argued that climate change will have serious adverse effects on human health and the environment (Ibid). Prior to the filing, EPA counsel already advised the agency of its legal authority to regulate GHG under the CAA (Ibid). During the five month public comment period which started 15 months after the filing, the EPA received more than 50,000 comments including a 2001 report submitted by the White House that was written by the National Research Council (NRC Report) who concluded that GHG are "accumulating in Earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise" (Ibid).

Despite the scientific support and legal authority for regulating GHG, the EPA entered an order on September 8, 2003 denying the rulemaking petition (Massachusetts v. EPA). The EPA concluded that despite legal advice from its counsel stating otherwise, the CAA did not authorize it to address a global problem like climate change and that even if it had the authority to do so, it was not a good time to start regulating GHG (Ibid). The EPA reasoned that if Congress had wanted the EPA to regulate GHG, it would have specifically authorized the agency to do so when it amended the CAA in 1990 (Ibid). The EPA further reasoned that the reach of the CAA was to regulate local pollution and not those that affected the world's atmosphere (Ibid). The EPA also cited concerns over the national economy and determined that regulating GHG would adversely effect the economic health of the U.S. (Ibid). Based on its reasoning, the EPA concluded that GHG were not considered air pollution under the CAA (Ibid).

---

[3] These organizations include: Alliance for Sustainable Communities; Applied Power Technologies, Inc.; Bio Fuels America; The California Solar Energy Industries Assn.; Clements Environmental Corp.; Environmental Advocates; Environmental and Energy Study Institute; Friends of the Earth; Full Circle Energy Project, Inc.; The Green Party of Rhode Island; Greenpeace USA; International Center for Technology Assessment; Network for Environmental and Economic Responsibility of the United Church of Christ; New Jersey Environmental Watch; New Mexico Solar Energy Assn.; Oregon Environmental Council; Public Citizen; Solar Energy Industries Assn.; The SUN DAY Campaign.

The EPA further stated that regulating emissions from new motor vehicles would conflict with the Bush Administration's policy of voluntary private sector reductions in GHG emissions, technological innovations and further research on climate change rather than regulation (Ibid).

On appeal of the EPA's denial of the rulemaking petition, the Petitioners were joined by several intervenor States and local governments[4] (Massachusetts v. EPA). The Petitioners maintained that the harms associated with "climate change are serious and well recognized" (Ibid). The Supreme Court examined the overwhelming scientific evidence presented by the Petitioners in support of their argument and the NRC Report presented by the EPA (Ibid). In its opinion, the court pointed out that even the NRC Report that the EPA relied upon to form its conclusion denying the Petitioner's rulemaking petition supported the Petitioners case[5] (Ibid). The NRC Report stated that a number of environmental changes have already inflicted significant harms, including "the global retreat of mountain glaciers, reduction in snow-cover extent, the earlier spring melting of rivers and lakes, [and] the accelerated rate of rise of sea levels during the 20th century relative to the past few thousand years" (Ibid). Petitioners also cited evidence from scientific experts who studied and researched climate change. These scientists concluded that if climate change was left unchecked the result will be "severe and irreversible changes to natural ecosystems;" all of which will adversely affect human populations in the U.S. and around the world (Ibid).

Before rending its decision, the Supreme Court researched the laws that Congressional passed to address climate change, such as the Global Climate Protection Act in which Congress found that anthropogenic GHG were producing substantial increases in the Earth's temperature (Massachusetts v. EPA). In addition, the Court reviewed the historical development of the CAA and the major amendments to it (Ibid). The Court also considered all IPCC reports prepared by the large and coordinated U.N. effort of scientists who researched climate change and its adverse affects it has caused and will continue to have on human health and welfare (Ibid). After its review of relevant law and facts,

---

[4] The intervenor States and local governments include Massachusetts; Boston, MA, Washington, D.C.; California; Oakland, CA; Connecticut; Hartford, CT; Illinois; Chicago, IL; Maine; Augusta, ME; New Jersey; Tenton, NJ; New Mexico; Sante Fe, NM; New York; New York, NY; Oregon; Oregon Dept. of Justice; Salem, OR; Rhode Island; Providence, RI; Vermont; Montpelier, VT; Washington; Olympia, WA; South Washington, D.C.; American Samoa; Pago Pago, American Samoa; Baltimore, MD; San Diego, CA; Center for Biological Diversity; International Center for Technology Assessment; Center for Food Safety; Environmental Advocates; Greenpeace; Conservation Law Foundation; Environmental Defense; Burlington, Vermont; San Francisco, CA; Friends of the Earth; National Environmental Trust; Natural Resources Defense Council; Sierra Club; Union of Concerned Scientists; and U.S. Public Interest Research Group.

[5] The EPA did not dispute the existence of a causal connection between anthropogenic caused GHG emissions and climate change.

the Court agreed with the EPA that regulating emissions from motor vehicles would not by itself reverse climate change. However, it determined that the Agency had the authority to take incremental steps to mitigate the severity of climate change and that the authority to do so was found in the CAA (Ibid). The Court rejected the EPA's argument that its regulation of GHG would be ineffective given the cumulative impact of GHG emissions from nations like China and India. The Court instead found regardless of what other nations did, a reduction in U.S. emissions would still slow the pace of global emissions (Massachusetts v. EPA).

EPA Action After Massachusetts v. EPA

After the Supreme Court ruling in Massachusetts v. EPA, the EPA published an Advance Notice of Proposed Rulemaking: Regulating Greenhouse Gas Emissions under the Clean Air Act (ANPR) on July 11, 2008 (EPA, Website, Climate Change). As required under federal law, the EPA published ANPR in the Federal Register which started the 120 day public comment period on the proposed rulemaking for regulating GHG emissions under the CAA in both stationary and mobile sources (Federal Register, 2008). The comment period for the ANPR expired on November 28, 2008 and the EPA will use these comments when developing rules that will regulate GHG (EPA, Website, Climate Change; Federal Register, 2008).

The EPA also complied with the Supreme Court's ruling in Massachusetts v. EPA by considering whether GHG were a danger to the public health and welfare. On December 7, 2009, the EPA Administrator signed the Endangerment and Cause or Contribute Findings for GHG under Section 202(a) of the CAA (EPA, Website, Climate Change). The EPA found that elevated levels of six GHG (carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6)) were present in the atmosphere did indeed threatened the public health and welfare for both current and future generations (Federal Register, 2009). The EPA determined that the cumulative emissions from these GHG from new motor vehicles also harmed the public's well-being (Ibid). To better assess the amount of GHG that are emitted each year in the U.S., the EPA has promulgated rules that require "suppliers of fossil fuels or industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports" (EPA, Website, Climate Change). The rules for mandatory reporting of GHG went into effect on December 29, 2009 (Ibid).

In consideration of the public comments that it received, the EPA began developing rules to regulate GHG emissions from new motor vehicles and stationary sources. On April 1, 2010, the EPA in

conjunction with the Department of Transportation issued announced a joint final rule for Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards (EPA, Website, Climate Change). This rule covers model years 2012 to 2016 for a variety of consumer motor vehicles including automobiles, light-duty trucks, and medium-duty passenger vehicles (Ibid). The rules require manufactures to reduce its level of GHG that are emitted from these vehicles to "250 grams of carbon dioxide per mile" (Ibid). The rule provides guidance of increasing fuel efficiency to 35.5 per gallon (MPG) if automotive manufacturers are able to meet the GHG requirement by just improving fuel economy (Ibid). The EPA estimates that its rule will reduce GHG by about "960 million metric tons and save about 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program" (Ibid).

The EPA is also in the process of drafting a rule for a GHG permitting program that will cover nearly 70% of the GHG emissions from stationary sources (EPA, Website, Climate Change). On September 30, 2009, the EPA announced its Proposed Rule: Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule (Ibid). The rule is focused on large facilities emitting over 25,000 tons of greenhouse gases a year (EPA, September 2009). These facilities would be required to obtain permits to show that they are using the best available control technology to minimize GHG emissions (Ibid). While the regulations are in the process of being completed for a final rule, Administrator Jackson informed Senator Jay Rockefeller and a number of other interested Senators on February 22, 2010 of the EPA's initial plan to regulate stationary sources of GHG (Jackson, 2010). Administrator Jackson stated that the EPA will phase-in permit requirements for large stationary sources sources of GHG emissions during the first half of 2011 (Ibid). The EPA is also considering to increase the 25,000 ton threshold limit that it initially proposed (Ibid). Administrator Jackson further explained that the smallest sources of GHG will not be regulated until 2016 or thereafter (Ibid).

Another part of GHG regulation may be a cap and trade system, similar to the one that was part of the Acid Rain Program. While the EPA has not promulgated rules regarding an extensive cap and trade program, it indicated that it might do so in the future when it released its proposed rules for its GHG permitting program (EPA, September 2009). A well developed cap and trade system that is properly monitored will be an effective means of further carbon reductions because the system will enhance efforts to reduce fossil fuel use. However, the system itself is not a silver bullet that will ensure a significant GHG reductions. If not carefully constructed and monitored as the system was in the Acid Rain Program, the net effect of a cap and trade program will prove to be fruitless. It is necessary to have a system that will accelerate the cost parity between renewable sources of energy and traditional ones

which include fossil fuels and nuclear power generation (Clean Edge, et al., 2008). If people see renewable and clean energy as economically feasible solutions, they will be more willing to invest in them.

Cap and trade must be part of the solution to leveling the cost of energy and must remain true to the desired goal of carbon reduction. To ensure that these objectives are met, all pollution allowances should be auctioned with no free giveaways and no offsetting (Shellenberger & Nordhaus, 2009). The initial price of CO_2 should be capped at about $10 a ton, an amount that will increase over time (Ibid). Not only will this system achieve price parity, given the amount of CO_2 that is expected to be allowed under the first year of the program, this type of cap and trade system will create about $60 billion in revenues (Ibid). The revenues realized under this type of program could used to fund and accelerate "development and deployment of clean energy technologies" (Ibid). Such funding will help increase green energy jobs and further stimulate the economy as the nation moves from a fossil fuel based industry to a carbon free one.

Under the proposed cap and trade plan presented here, there will be no chance for the manipulating the system by claiming false carbon offsets and it eliminates the problem of defining what a reasonable offset should be. The positive advantages of offsetting which include tree planting, energy efficiency programs, use of alternative energy and other measures will be not be forestalled if they are absent under cap and trade. The beneficial practices associated with offsetting will continue because they tend to provide many benefits including a money saving mechanism for reduce energy costs as in the case of energy efficiency programs.

Recommendations for the Council on Environmental Quality

In reaching its decision in Massachusetts v. EPA, the U.S. Supreme Court considered scientific evidence supported by a large consensus of well qualified scientists and concluded that the "harms associated with climate change are serious and well recognized" (Massachusetts v. EPA, 549 U.S. 497; 127 S. Ct. 1438). The Court also considered evidence supported by climate experts and scientists which show that a cumulative increase in GHG emissions has resulted in a "well-documented rise in global temperatures" which have led to and will continue to have adverse environmental, health and economic consequences (Ibid).[6] Using the Court's opinion in Massachusetts v. EPA as a guide, the CEQ should provide instruction that will help Federal Agencies reduce the cumulative effect of the GHG emitted

[6] In reaching its decision, the Court considered the historical development and the growing understanding of climate change as documented by the scientific research of the Intergovernmental Panel on Climate Change (IPCC) and other climate experts (Massachusetts v. EPA, 549 U.S. 497; 127 S. Ct. 1438).

from their operations. Such guidance should initially focus on efforts that will reduce GHG from the three largest emitting sources within the federal government.

The three target areas that the CEQ should provide initial guidance for reducing GHG emissions are 1.) those that encourage net zero buildings to significantly improve energy-efficiency and GHG emissions, 2.) constructing sustainable military installations which provide sustainable transportation, high density housing and self-sufficient renewable energy generation, and 3.) those that encourage a Holistic Green Fleet Program that not only encourages the purchase of vehicles with a high fuel-efficiency and low GHG emissions but also consider land use issues relating to agriculture. The third target area concerning federal vehicles provides comment on land use and resource management issues relating to the agricultural production of alternative fuels. Once these policies are established, future ones can then focus on other sources of GHG emissions.

Net Zero Building Program

Recommended CEQ Guidelines

The U.S. General Services Administration (GSA) is the property manager, owner and landlord of the federal civilian workforce (GSA, Website). GSA owns or leases over 8,600 properties which encompass 354 million square feet that houses the workplaces of 1.1 million federal employees (Ibid). Given the large number of buildings and the total square footage of its operations, the net cumulative effect of the GHG emitting from these facilities significantly adds to the public and environmental harm (Baum, M., 2007; Massachusetts v. EPA). In the U.S., the operational component of a building life "accounts for 38% of U.S. carbon dioxide emissions, 71% of electricity use and 40% of total energy used; this number increases to an estimated 48% when the energy required to make building materials and construct buildings are included" (Baum, 2007). To decrease the cumulative effect of its GHG emissions, GSA has started to construct energy efficient buildings and improve energy efficiency in existing structures (GSA, Website).[7] CEQ guidelines for this Federal Agency should encourage the GSA to expand and improve on its efforts and adopt a Net Zero Building Program. The goal of this program is to construct green buildings and renovate existing ones to achieve net zero emissions.[8] An

[7] The federal government defines green building as "the practice of 1) increasing efficiency with which buildings and their sites use energy, water and materials, and 2) reducing building impacts on health and the environment, through better siting, design, construction, operation, maintenance, and removal - the complete building life cycle" (Office of the Federal Environmental Executive, 2003).

[8] While these recommendations focus on GHG emission reduction, efforts should continue to address and improve the entire ecological footprint of owned and leased federal buildings.

additional component of this program will include a timetable that will enable GSA to achieve an energy portfolio of 30% renewable energy generation by 2020.

The overall goal of the Net Zero Building Program is to construct new buildings and renovate existing buildings so that each facility's cumulative net environmental affect is zero. This standard includes not only the operational phase of a building's life cycle, but also the manufacturing of materials, construction and deconstruction phases as well. To assess the amount of GHG reduced each year, GSA should annually measure the emissions of all facilities. These measurements should be base on utility bills and other accounting measures that track the electricity, natural gas, oil and other energy usage of its facilities. GSA should also measure the success of existing energy efficiency programs and the amount of GHG that is not discharged into the atmosphere based upon its ongoing efforts. The GSA should track the carbon and ecological footprint of all materials used during the construction and renovation of its buildings. And, GSA should take steps to reduce GHG emitted during the deconstruction phase of a building's life cycle.

To take advantage of prior successful reductions in GHG emissions by building and renovating buildings to achieve LEED standards, GSA should focus its efforts on those facilities that have not achieved these standards. The Net Zero Building Program will give the agency the opportunity to focus its efforts on facilities that have a larger cumulative effect on GHG emissions. It will further reduce the agency's carbon footprint because the end product will be an increase in facilities whose cumulative GHG impact is zero. Because GSA already has a LEED certification program in place, the switch to the Net Zero Building Program should not be difficult because the agency is already considering the ecological impact of the buildings that support the federal civilian workforce. The Net Zero Building Program should begin in 2012 which will give the agency enough time to adequately plan for the new measures that will make this program more successful than the current one. GSA should continue with its current operational efforts and begin to phase in net zero building design into its new construction and renovation efforts.

Support for Recommended Guidelines

An analysis of the life cycle of buildings reveals that these structures have a large carbon footprint (Baum, 2007; Mazza, 2007). This footprint is generated from the natural resource destruction and manufacture of materials to construct the buildings, transportation of those materials, construction of the building which is energy intensive, to deconstruction when the building's use is complete (Ibid).

Given the cumulative nature of a buildings affect on the health of the environment, the building's entire life cycle should be addressed and steps taken to create and operate net zero buildings (Mazza, 2007).

Since the turn of the century, the main certification for green building design in the U.S. is through the Leadership in Energy and Environmental Design Green Building Rating Program (LEED), a program developed and implemented by the U.S. Green Building Council (Sarkis, 2006). LEED certification is divided into five categories relating to siting, water conservation, energy, materials, and indoor environmental quality (Editors, Building Design and Construction, 2003). Each category contains a specific amount of credits which carries one or more possible points (Ibid). The points are tallied to give a final score rating the building from LEED Certified (26 points), Silver (33 points), Gold (39 points), and Platinum (52 points) (Ibid).

While a LEED building is a better building, it does not come close to the growing consensus in the design community to build build structures that adequately address the looming energy and environmental crisis (Mazza, 2007). A building that is LEED certified does not necessarily mean that it is addressing a variety of environmental concerns because the certification is based on a point system. Those applying for LEED certification may focus on one area while ignoring important considerations in others. To better address environmental issues there is a movement in the building community to use a holistic approach and construct net zero buildings which are those that "either do not require energy from any fossil fuel source or have a zero carbon footprint" (Karolides, 2002; Mazza, 2007). As the bar for environmental performance continues to increase, "the methods and tools for scoring, facilitating and promoting" those buildings should continue to increase as well (Wedding & Crawford-Brown, 2008). If not, older certification programs run the risk of becoming obsolete.

Any type of building can be constructed or renovated to be more energy efficient including office buildings, educational facilities, historic renovation, corporate buildings, cultural centers and factories (Thibaudeau, 2008). New buildings possess great potential to have a net zero impact on the environment. For example, a new building can reach energy savings of 75% or higher of typical usage if they are designed and operated as complete systems (Metz, et al., 2007). To achieve this optimal performance, new building design and construction must be holistic and account for multiple environmental factors (Karolides, 2002). A way to visualize this holistic approach is to view the entire structure as a living, breathing organism (Mazza, 2007). In the end, the completed "organism" will bring forth "a better quality, healthier, more productive indoor environment while at the same time operating with minimal fossil fuel demand" (Ibid). A way to achieve this holistic approach is to interlink

the "individual components of the building, the architectural elements, structure, and mechanical systems" (Ibid).

Just as a new building can be constructed as net zero building, the same process can be applied to renovated buildings. A way to decrease a structure's carbon footprint is to reduce the GHG emissions from generating electricity and heat. The most efficient, cost-effective way to reduce the amount of energy that an existing building consumes is to reduce the amount of energy needed (Karolides, 2002). Energy efficiency programs do not rely new technology. These techniques are available right now and some even incorporate nature into building design (Oberndorfer, et al., 2007). Simply defined, energy efficiency is an effective strategy for reducing heating and cooling loads, "selecting systems that make the most effective use of ambient energy sources and heat sinks, and using efficient equipment and control strategies" (Metz, et al., 2007). Some of the mandatory energy efficiency systems that should be implemented include passive solar designs, high efficiency lighting and appliances, highly efficient ventilation, heating and cooling systems, solar water heaters, insulation, and energy saving windows (Ibid).

Energy reduction can be employed by using simple energy efficiency methods such as installing double-pane windows, properly insulating, caulking, and using energy efficient equipment and products such as those that bear the Energy Star label.[9] In addition, incorporating nature into the design of the renovation process (or even newly constructed buildings) will have a positive energy reduction component (Oberndorfer, et al., 2007). For example, green roof tops provide a cooling effect during warmer weather because they reduce the amount of heat transferred through the roof (Ibid). Other positive effects of green roof tops include "urban storm-water management because they make use of existing roof space and prevent runoff" (Ibid). Less runoff also translates into reduced energy needs for waste water treatment because there would be less contaminated water to flowing into the nation's streams which would have to be cleaned for human consumption.

Energy efficiency is just one step in reducing a building's carbon footprint. There is potential in every structure to push the envelope further for decreasing reliance on fossil fuels. New and existing buildings "should be viewed as an opportunity to produce sustainable energy, a chance to reduce the community's carbon footprint and to reduce our collective dependance on fossil fuels" (Beatley, 2000). Increased use of renewable energy will further reduce the cumulative effect of GHG emissions from

---

[9] Energy Star is a voluntary EPA program that was introduced in 1992 with an aim at reducing greenhouse gas emissions (Energy Star, Website). It started as a labeling program designed to identify and promote energy efficient products and expanded in 1999 to cover commercial and industrial buildings, and new homes (Ibid).

GSA factilities. CEQ guidelines should include steps of how GSA can increase its own energy portfolio to a generation of 30% renewable energy by 2020. This policy initiative will show the federal government's commitment to using renewable sources of energy for its future electrical production. In addition, it will send a powerful message around the globe that the U.S. Government is committed to renewable energy. Such a message may help other nations increase their renewable energy portfolios as well which assist in the international effort to reduce GHG emissions and their overall cumulative effect.

Sustainable Military Installations

Recommended CEQ Guidelines

The Department of Defense (DoD) owns a large amount of real property which supports its mission of providing national and international security for the U.S. The Department's global real property portfolio comprises of 29 million acres of property divided into more than 5,570 sites that house more than 539,000 facilities (buildings, structures and linear structures) (DoD, 2010). The majority of its 426,016 buildings are located in the U.S. which numbers total 247,209 with an additional 60,086 buildings located overseas and in U.S. Territories (Ibid). The structures and linear structures comprise the operational, medical and housing support for military operations such as training facilities, warehouses, hospitals, family and troop housing, and small and large dining facilities (Ibid). See Table 1 for an inventory of DoD global property holdings.

Table 1. Inventory of Department of Defense Property Holdings

Area	Buildings	Structures	Linear Structures	Total
United States	247,209	140,953	37,854	426,016
Territories	6,381	3,331	842	10,554
Overseas	53,705	39,515	9,563	102,783
Grand Total	307,295	183,799	48,259	539,353

(DoD, 2010)

CEQ guidance should provide instructions for the DoD on how to improve on its initiatives to build a sustainable, energy-efficient infrastructure that will support its mission (DoD, 2007). Given the size of DoD's property holdings, the net cumulative GHG effect of these emissions is quite extensive (Baum, M., 2007; Massachusetts v. EPA). The large number of buildings alone account for over a third of the Department's GHG emissions (Baum, M., 2007; EPA, 2009). To reduce the GHG impact of its structures, the DoD should enhance its current environmental programs and include a Net Zero Building

Program similar to the program prescribed for federal buildings. In addition, the DoD should invest in smart grid technology to enhance its efforts to create an energy portfolio by 2025 consisting of 25% of renewable energy that is generated, purchased, or both (DoD, 2007). Finally, its installations should encourage the use of sustainable transportation such as biking, walking or community transit. Since the Sustainable Military Installation Program is an enhancement to DoD current initiatives, it can be implemented in 2012 which will afford ample time for more detailed planning.

Support for Recommended Guidelines

Efforts to improve renewable energy programs are important to ensure that maximum sustainable energy is produced. Renewable energies are only as effective as the infrastructure that transport the electricity they generate (Ball, 2008). The current infrastructure is incapable of efficiently transporting renewable energy because it relies on mid-twentieth century technology, is inefficient, and incapable of responding to the inconsistencies of renewable energy (Crane, 2009). For example, Texas utilities which have installed more wind-power capacity than any other state have to shut down their wind turbines because the grid cannot handle the electrical surge that occurs when there is a high volume of wind (Ball, 2008). Another example is found in California where electricity generated from solar panels are unable to reach energy starved markets because there is a shortage of transmission lines (Ibid). New technologies associated with what has been called the smart grid will modernize the current grid and improve electrical transmission by enhancing the "security, reliability, capacity, functionality, and flexibility" of the electrical grid (Lightner & Scheer, 2008).

The smart grid is an advanced technological network of electronic devices and software programmed to handle the typical problems associated with electrical production. Included in this advanced network are "cutting-edge advancements in metering, transmission, distribution, and electricity storage technology, as well as providing new information and flexibility to both consumers and providers of electricity" (Hledik, 2009). Once fully operational, this system of technological devices and software will transform the way electricity is bought, sold, and used (Wamsted, 2008). It will also include wireless devices that enhance customer service through cell phone communication, better management of electric flow, outage prevention and decreasing response time when outages do occur (Crane, 2009). For example, if there is an outage the wireless devices will "provide automated restoration by communicating with the command center, isolating problems and quickly re-routing electricity" (Ibid).

Another feature of the smart grid is the smart meter which will give customers unprecedented control over the electrical energy that is supplied and utilized by providing a direct connection between the customer and the transformers that from energy generators (Pernick & Wilder). This connection will establish a link between customers and the grid, giving customers flexibility and control over their electrical requirements and make informed decisions over the cost of energy usage (Ibid). Customers will be better informed and begin to reduce their own peak demand usage by switching off nonessential equipment and adequately plan the use of high energy demand items during off-peak hours. Customers will also be able to make hourly changes depending on their specific energy requirements and allow them to use renewable sources when they are available (Ibid).

In conjunction with developing a more holistic energy system, the DoD should integrate holism to installation design. The military installations in DoD's property portfolio are large communities that include housing, shopping, recreational activities, lodging, and training and operational facilities (DoD, 2010). These communities can be designed to take advantage of high density housing areas by structuring them in a central location near recreational and operational areas. An example of such a community is Sonoma Mountain Village which is a "200-acre, mixed-use, solar-powered, zero-waste community" (Sonoma Mountain Village, Website). The development plan for Sonoma Mountain Village includes 1,900 homes that offer a "five minute lifestyle" where parks, retail, dining, and employment are located in a safe walking distance from your home (Ibid). See Figure 3 for a view of the site plan. In addition, natural methods of storm water control should be integrated to reduce runoff and thereby decreasing the energy needed to ensure clean water (Newman, 1996; Girardet, 2009). These natural systems can include rain gardens, swales and other types of similar structures that slow the flow of water and recharge the aquifer (Ibid).

Figure 3. Sonoma Mountain Village Site Plan

(Sonoma Mountain Village, Website)

Building sustainable communities that provide easy access to work and recreational locations will decrease the carbon footprint relating to transportation. Military installations are idea places to support sustainable commuting. They can become more walkable by designing pedestrian friendly walkways and encourage biking by having separate bike paths that completely detach bikes from motorized vehicles. To increase the walkability and biking in military installations, DoD should create "cycling lanes, good walking space on streets and in public squares, and traffic-free shopping streets" (Newman, 1996). Traffic calming measures, such as narrow streets, can also be employed to encourage the use of biking and walking because people will not fear being hit by a car commuting in this very sustainable fashion (Ibid). Efforts should also be taken to encourage military and civilian personnel working and living on military installations to incorporate walking or biking as part of their commuting routine. Not only would installation policy that encourages biking and walking reduce the overall carbon footprint, it will also help increase the health of people from additional exercise and less air pollution. It is true as expressed by Girardet, 2009 "[g]ood links between mass transit, walking and cycling, mean fast journeys, lower transport costs and healthier people."

If the distance people need to travel is further than biking or walking would allow, then a sustainable transit system that is operated by fuel efficient vehicles with low emissions can be used as an additional option. The transit system needs to provide people with the security and peace of mind that they will be able to travel from place to place efficiently with comfort and ease. The transit system needs to be punctual and reliable, operate in separate lanes and have preferential traffic signals, offer night-time service, and be efficient and operate frequently (Girardet, 2009). It should also be developed to reduce cumulative GHG emissions. As seen in European communities, electric-powered streetcar systems have provided inexpensive and efficient service (Minerd, 1999). The key is the fact that the streetcar are so light (7 to 10 metric tons per axle) that they do not need rails and can run on rubber tires, which saves money on building rails and can costs about 30% less than traditional light rail systems (Ibid). Also, travel on the streetcars provide a faster transportation experience because they operate in separate lanes and have preferential treatment at traffic signals (Girardet, 2008). Operating in separate lanes provides a faster commuting experience because transit vehicles are not tied to congestion associated with the large amount of cars and trucks on the roads. The initial planning for new transit lines does not have to be complex. It can simply be planned to run from housing areas of the installation to high density work and entertainment areas. Overtime, the system can develop along with the operational needs of the installation.

Holistic Green FEDFLEET Program

Recommended CEQ Guidelines

Given the large number of civilian and military vehicles in the federal fleet, the negative health and environmental effect of cumulative GHG emissions are extensive. For example, GSA alone reported that its fleet consisted of 212,000 vehicles in 2008, which included "automobiles, passenger vans, light, medium and heavy trucks" (GSA Fleet Website). In 2007, the national transportation sector accounted for 28% of the overall U.S. GHG emissions (1,995.2 MMTCE), the second largest sector amount (EPA Report, 2009). The largest source of GHG were from automobiles which accounted for 33% of the total emissions and was followed by light duty trucks (28%), freight trucks (21%) and commercial aircraft (8%) (Ibid). Even more pressing is the fact that from 1990 to 2007, overall GHG emissions from this sector increased by 29% because of increased travel and stagnate fuel efficiency standards (Ibid). Moreover, GHG emissions from individual vehicles increased as well. GHG emissions from automobiles increased from 656.9 MMTCE in 1990 to 664.6 MMTCE in 2007, and GHG emissions from light duty trucks increased from 336.2 MMTCE in 1990 to 561.7 in 2007 (Ibid).

CEQ policy should focus on decreasing the net cumulative effect of GHG emissions from the federal fleet, encourage the use of alternative fuels and ensure that those fuels are sustainably produced.

CEQ should provide guidance to the Federal Fleet Policy Council (FEDFLEET)[10] and the U.S. Department of Agriculture (USDA) to develop a Holistic Green Fleet Program. The program will enhance efforts that are already in place pursuant to the Energy Policy Act (EPAct), Executive Order 13423 and the Energy Independence Act and Security Act (EISA) that require Federal Agencies to purchase alternative fuel vehicles (AFVs) (GSA AFVs Website). The program will increase efforts already in place to green the fleet of both civilian and military vehicles through the purchase and lease of models that are highly fuel efficient, operate on alternative fuels and have low GHG emissions. Current efforts to reduce the carbon footprint of the federal fleet have been successful. For example, GSA has the largest AFV fleet in the nation with an inventory of 80,000 AFVs (GSA AFVs Website). The agency will further reduce its use of fossil fuels and GHG emissions by replacing 5,603 its least fuel efficient models and with fuel efficient hybrids (PR Newswire, 2010). The result will be reducing gasoline consumption by 7.7 million gallons of gas which equal to 385,000 barrels of oil (Ibid).

The Holistic Green Fleet Program will also require the sustainable production of alternative fuels as required under EPA policy regulating fuels and fuel additives (Federal Register, 2010). Starting in 2010, the EPA will phase in the renewable fuel program which will achieve an annual average reduction of 4.5 billion tons of carbon dioxide equivalent (Federal Register, 2010; EPA, May 2009). To put this in perspective, the EPA's estimate is equal to taking about 24 million cars off the road. (EPA, May 2009). The EPA also considered the life cycle of the GHG emitted during "the production of biofuels as compared to the petroleum-based fuels they would replace" (Ibid). This additional step increased the understanding of biofuel's effectiveness in reducing GHG emissions. A downside to these efforts will be related to the detrimental effects that increased agricultural production may have on the nation's freshwater supply and marine environments. The "dead zone" in the Gulf of Mexico is one such example.

This Holistic Green Fleet Program will take a holistic approach to fuel development and will focus efforts to ensure that the agricultural methods for growing crops used for the manufacture of renewable fuels such as cellulosic biofuel and biomass based diesel do not have a detrimental affect on

---

[10] FEDFLEET serves as a focal point for implementing policy and programs for the coordination of managing the fleet of vehicles used by Federal Agencies (FEDFLEET Charter). The council is comprised of representatives and alternatives from various Federal Agencies and is directed by a steering committee of five members from the Department of Defense, law enforcement, civilian agency, small fleet and large fleet (Ibid).

local and regional watersheds. The feedstock for the production of renewable fuels includes corn starch; soy bean oil; algal oil; annual overcrops; and cellulosic biomass from agricultural residues, slash, forest thinnings and switchgrass (Federal Register, 2010; 40 CFR § 80.1426). The EPA acknowledged that as the production of these crops increases to meet the demand for manufacturing renewable fuel, freshwater quantity and quality may be adverse affected which could impact human and ecological health (Federal Register, 2010). To offset the adverse impact of growing more crops to support this important GHG reduction program, the USDA should encourage the agricultural industry to adopt methods that will reduce pollution runoff from the use of fertilizers and pesticides. Such methods will include the use of vegetive buffers and constructed wetlands to reduce nitrogen loading into the nation's watersheds.

Holistic Green Fleet Program should start in 2012 to give the farming industry adequate time to integrate these methods into their agricultural practices. The initial phase of the program will start before the 2012 growing season whereby the agricultural industry will implement protective measures to control runoff for 25% of the crop grown for the alternative fuel industry. Each year thereafter the protected areas will increase by 25% until 2015 when runoff from all crops planted for the alternative fuel industry will be required to have vegetive buffers and constructed wetlands to reduce nitrogen loading. The timetable for the Holistic Green Fleet Program also provides greater protections with the projected increase in the production of alternative fuels. This program could have even an greater impact and could expanded in 2016 to begin a phase-in of the entire agricultural industry for all of the crops that it grows.

Support for Recommended Guidelines

The disastrous effects resulting from agricultural and urban runoff that flow into the Gulf of Mexico Basin are well documented. Since the 1950's, we have seen the "dead zone" expand in size, chiefly related to the excess nutrient load that flow down into the Gulf (Costello, et al., 2009). This nutrient load which is comprised mostly of nitrogen and phosphorus creates large algae blooms which results in the depletion of dissolved oxygen as plants die off and their decomposition takes the oxygen out of the water (Dodds, 2006). The result is a hypoxic zone where the dissolved oxygen content of the water falls far below the level necessary to support marine life. Research have shown that "about 90% of the total freshwater-derived nutrient load to the Gulf comes from the Mississippi (about 70%) and the Atchafalaya Rivers" (Ibid). A recent study revealed that the largest yields of nitrogen flowing into the Gulf "closely coincide with intense agriculture in Indiana, Illinois and Iowa" (Robertson, et. al., 2009).

Phosphorus loads were seen over a much broader area and were largely associated with urban runoff (Ibid). While urban runoff is a pressing problem, these comments are focused on the agricultural industry because of the expected increase in renewable fuel production which will provide "an expanded market for agricultural products such as corn and soybeans and open new markets for the development of cellulosic feedstock industries and conversion technologies" (EPA, May 2009).

The concern stems from the fact that farmers will increase their use of nitrogen based fertilizers to grow more corn and soybeans. The problem is even more pressing because the three states with the largest nitrogen yields into the Gulf are among the largest producers of corn and soybeans in the nation. Iowa and Indiana are the top two producers of corn and soybeans, while Indiana is ranked fifth in corn and fourth in soybeans[11] (U.S. Department of Agriculture). Increasing the amount of corn and soybean that is grown in the Gulf Watershed will lead to an higher levels of nutrients flowing into the Gulf resulting from increased nitrogen based fertilizers used to grow these crops. The additional runoff from the increased production of these agricultural products will contribute to an already fragile ecosystem, watershed and contribute to increasing the size of the "dead zone" (Costello, et al., 2009; Robertson, et. al., 2009). Unless methods are used to reduce this threat, the result will be an increase in the hypoxic zone, meaning less fish for fisheries and further collapse of the ecosystem.

Reducing nitrogen runoff is not expensive. Simple techniques to mitigate nitrogen loading include "wetland construction, using vegetative buffers, tillage management, and precision fertilizer applications" (Costello, et al., 2009). Using natural remedies such as constructing wetlands and planing vegetative buffer strips will reduce nutrient loads because the plants absorb the excess nutrients from field runoff (Ibid). The plants also reduce pesticide and sediment loads because they act as natural buffers (Ibid). A recent study confirmed that if all crops had a vegetative buffer, nitrogen loading could be reduced by about 55 to 65% depending on the climate and other environmental conditions (soil, tillage, grade, etc.) (Ibid). While these measures will not eliminate nitrogen loading into the Gulf, they at least provide mechanisms that can be used for growing crops that will reduce the impact from an increased reliance on corn and soybeans.

In the alternative to planting more corn and soybean, other plant may be beneficial. For example, the manufacture of cellulosic biofuel will be from grasses such as switchgrass, which "are a

---

[11] In 2009, Iowa accounted for 13,700 thousand acres of corn, Illinois had 12,000 thousand acres, Nebraska had 9,150 thousand acres, Minnesota had 7,600 thousand acres, and Indiana had 5,600 thousand acres. For the same year, Iowa accounted for 9,600 thousand acres of soybeans, Illinois had 9,400 thousand acres, Minnesota had 7,200 thousand acres, and Indiana had 5,450 thousand acres. (U.S. Department of Agriculture). We focused on the acres rather than harvest because nitrogen based fertilizers are used whether the crop is harvested or not.

promising potential cellulosic feedstock because they reduce losses of nitrogen and phosphorus to the environment compared to monocrops such as corn" (Costello, et al., 2009). Switchgrass is also promising because it only requires half the amount of nitrogen based fertilizers to grow them, the land does not need to be tilled, and the grass density slows runoff (Ibid). An additional added bonus of switchgrass is that it improves water quality and has better infiltration for groundwater recharge (Ibid). Cellulosic fuel has the additional benefit of emits 10% less carbon than biomass fuel during its entire lifecycle (EPA, May 2009).

Conclusion

Significant GHG reductions can be achieved if the federal government focuses on three target areas; buildings, military installations, and vehicles. The success of these proposed NEPA programs will depend largely on the willingness of Federal Agencies to implement their measures and to continue with efforts to reduce GHG emissions. Through these efforts, federal government will be taking the very much long awaited for steps to reduce the threat from climate change. As the federal government's support for these programs grow, so will its leadership in the area of mitigating and reducing the effects of climate change. U.S. citizens will be encouraged to make their own homes and work places more energy-efficient and to purchase vehicles with high fuel efficiency and low GHG emissions. In addition, U.S. leadership in this area will extend overseas and nations will be encouraged to follow in the nation's footsteps.

Works Cited

Adirondack Council. Website. Accessed, 4/7/2010, www.adirondackcouncil.org.

Baum, M. (2007). Green Building Research Funding: An Assessment of Current Activity in the United States. U.S. Green Building Council.

Baumert, K. A., Herzog, T. and Pershing, J. (2005). Navigating the Numbers: Greenhouse Gas Data and International Climate Policy, World Resources Institute.

Ball, J. (2008). The Matrix Overloaded: Clean Energy will Depend on a New 'Smart' Grid. *Wall Street Journal*, Oct. 24, 2008, A.14.

Beatley, T. (2000). Green Urbanism: Learning from European Cities. Island Press, Washington, DC

Bernstein, et al. (2007). An Assessment of the Intergovernmental Panel on Climate Change, Climate Change 2007: Synthesis Report, November, 2007.

Clean Air Act, 42 USCA § 7401, et seq.

Clean Edge, Inc. and Co-op America Foundation. (2008). Utility Solar Assessment (USA) Study: Reaching Ten Percent Solar by 2025. June 2008, 4-18.

Christopherson, R.W. 2009. Geosystems: An Introduction to Physical Geography. Seventh Edition. Pearson Prentice Hall, Upper Saddle River, NJ, 687 p.

Costello, C., Griffin, W. M., Landis, A. E., and Matthews, H. S. 2009. Impact of Biofuel Crop Production on the Formation of Hypoxia in the Gulf of Mexico, *Environmental Science & Technology*, 43(20), 7985-7991.

Council on Environmental Quality (CEQ). Memo. Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse. February 18, 2010. Accessed, 3/22/2010, http://ceq.hss.doe.gov/current_developments/new_ceq_nepa_guidance.html.

Crane, J. P. (2009). Illinois Smart Grid Work Advances at National, State Levels, *Utility Automation & Engineering T&D,* 14(1), 40-42.

Department of Defense (DoD). (2010). Base Structure Report: Fiscal Year 2009 Baseline (A Summary of DoD's Real Property Inventory. Accessed, 4/12/2010, http://www.acq.osd.mil/ie/index.shtml

Department of Defense (DoD). (2007). 2007 Defense Installations Strategic Plan: Combat Power Begins at Home, Reposition, Reshape and Sustain. Accessed, 4/12/2010, http://www.acq.osd.mil/ie/index.shtml

Dodds, W. 2006. Nutrients and the "Dead Zone": The Link between Nutrient Ratios and Dissolved Oxygen in the Northern Gulf of Mexico. *Frontiers in Ecology and the Environment*, 4(4), 211-217.

Energy Information Administration (EIA). (1998). Natural Gas 1998: Issues and Trends. DOE/EIA-0560(98).

Energy Star. Website. Accessed, 3/23/2010, http://www.energystar.gov/.

Energy Information Administration (EIA), Website. Accessed, 1/29/2010**,** http://tonto.eia.doe.gov/energyexplained/index.cfm?page=oil_home#tab2

EPA's Endangerment Finding, Website. Accessed, 3/2/2010, http://www.epa.gov/climatechange/endangerment.html.

EPA Report. (2009). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007, EPA 430-R-09-004, April 15, 2009.

Environmental Protection Agency. (May 2009). EPA's Proposes New Regulations for the National Renewable Fuel Standard Program for 2010 and Beyond, EPA-420-F-09-023.

Environmental Protection Agency. (September 2009). Proposed Rule: Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule. EPA-HQ-OAR-2009-0517.

EPA. Website. Acid Rain. Accessed, 3/2/2010, http://www.epa.gov/acidrain.

EPA. Website. Clean Air Act. Accessed, 3/24/2010, http://www.epa.gov/air/caa/caa_history.html

EPA. Website. Climate Change. Accessed, 3/14/2010, http://www.epa.gov/climatechange.

Federal Fleet Policy Council (FEDFLEET) Charter. Accessed, 4/9/2010, www.gsa.gov/vehiclepolicy

Federal Register. (2010). Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program. EPA-HQ-OAR-2005-0161. 40 CFR 80 et al. March 26, 2010. 75(58), 14669-15320.

Federal Register. (2009). Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act. EPA–HQ–OAR–2009–0171. 40 CFR 1. December 15, 2009. 74(239), 66496-66546.

Federal Register. (2008). Advance Notice of Proposed Rulemaking: Regulating Greenhouse Gas Emissions under the Clean Air Act. 73 FR 44354.

Girardet, H. (2008). Cities People Planet: Urban Development and Climate Change, Second Edition. John Wiley & Sons Ltd., Chichester, West Sussex, England, 320 p.

Goodell, J. (2006). Big Coal: The Dirty Secret Behind America's Energy Future. Houghton Mifflin Company. New York, NY. p. 324.

Hamilton, J. (2009). Understanding Crude Oil Prices. *The Energy Journal*, 30(2), 179-206.

Hledik, R. 2009. How Green is the Smart Grid? *The Electricity Journal*, 22(3), 29-41.

H.R. 2452. House of Representatives Bill 2452. (2009). An Act to Create Clean Energy Jobs, Achieve Energy Independence, Reduce Global Warming, Pollution, and Transition to a Clean Energy Economy.

Jackson, L. (2010). EPA Administrator Lisa Jackson Letter to Senator Jay D. Rockefeller IV. February, 22, 2010

Johnston, D., Sefcik, S., & Soderstrom, N. (2008). The Value Relevance of Greenhouse Gas Emissions Allowances: An Exploratory Study in the Related United States SO2 Market. *The European Accounting Review*, 17(4), 747-764.

Karolides, A. (2002). Chapter 1, Green Building Approaches. In, Green Building: Project Planning & Cost Estimating. Construction Publishers & Consultants, Kingston, MA.

Lightner, E. and Scheer, R. (2008). Transforming the Grid. *Electric Perspective*, 33(6),72-71.

Massachusetts v. EPA, 549 U.S. 497; 127 S. Ct. 1438.

Mazza, R. (2007). Sustainable Design has Changed Building Design. *Journal of Green Building*, 2(3), 12-17.

Minerd, J. (1999). Streetcars Make a Comeback in Europe. *Futurist*, 33(6), 18.

Newman, P. 1996. Transport: Reducing Automobile Dependence. *Environment and Urbanization*, 8(1), 67-92

New York State. Department of Environmental Conservation. Website. Accessed, 4/7/2010, www.dec.ny.gov/environmentdec/18654.html.

Pernick, R. and Wilder, C. 2008. Utility Solar Assessment (USA) Study: Reaching Ten Percent Solar by 2025. Clean Edge, Inc., Co-op America Foundation, June 2008.

Phillips, K. (2006). American Theocracy. Penguin Group, New York, NY. 462 p.

PR Newswire. (2010). GSA Doubles the Federal Hybrid Fleet, DOE Takes the Lead in Updating to Hybrids. March 31, 2010. Accessed, 4/9/2012, http://www.prnewswire.com/news-releases.

Renault. Website. Accessed, 4/2/2010, http://www.renault.com.

Robertson, D. M., Schwarz, G. E., Saad, D. A. and Alexander, R. B. 2009. Incorporating Uncertainty Into the Ranking of SPARROW Model Nutrient Yields From Mississippi/Atchafalaya River Basin Watersheds. *Journal of the American Water Resources Association*, 45(2), 534-549.

Oberndorfer, E., Lundholm, J., Bass, B., Coffman., R., Doshi, H., Dunnett, N., Gaffin, S., Kohler, M., Liu, K., & Rowe, B. (2007). Green Roofs as Urban Ecosystems: Ecological Structures, Functions, and Services. *BioScience*, 57(10), 823-833.

Office of the Federal Environmental Executive. (2003). The Federal Commitment to Green Building: Experiences and Expectations. September, 18, 2003.

S. 1733. Senate Bill 1733. (2009). Clean Energy Jobs and American Power Act § 702

Sarkis, J. (2006). Making a Sustainability Business Case for Alternative Building Designs Using the LEED Requirements. *Journal of Green Building*, 1(4), 58-66.

Shellenberger, M., & Nordhaus, T. (2009). The Cap and Trade We Need. *Power Engineering*, 113(9).

Soeder, D. J. S. & Kappel, W. M. (2009). Water Resources and Natural Gas Production from the Marcellus Shale. US Department of the Interior, USGS, Fact Sheet 2009-3032.

Sonoma Mountain Village. Website. Accessed, 4/12/2010, http://www.sonomamountainvillage.com.

Speth, J. G. (2008). The Bridge at the Edge of the World: Capitalism, the Environment, and Crossing from Crisis to Sustainability. Yale University Press, New Haven, CT 295 p.

Stavins, R. N. (2008). A Meaninful U.S. Cap-and-Trade System to Address Climate Change. *Harvard Environmental Law,* 32(2), 293-371.

Thibaudeau, P. (2008). Integrated Design is Green. *Journal of Green Building*, 3(4), 78-93.

U.S. Department of Agriculture, National Agriculture Statistics Service, Accessed, 4/12/2010, http://www.nass.usda.gov/QuickStats/PullData_US.jsp.

U.S. General Services Administration (GSA). Website. Accessed, 4/2/2010, http://www.gsa.gov.

U.S. General Services Administration (GSA), Alternative Fuel Vehicles (AFVs). Website. Accessed, 4/9/2010, www.gsa.gov/afv.

U.S. General Services Administration (GSA), Fleet Vehicles. Website. Accessed, 4/9/2010, www.gsa.gov/vehiclepolicy

Vilasic, B. (2009). Mapping a Global Plan for Car Changing Stations. *New York Times*, February 9, 2009.

Wamsted, D. 2008. Smart Grid Potential, Real-World Caution. *Electric Perspectives*, 33(6), 80.

Wedding, C. & Crawford-Brown, D. (2008). Improving the Link Between the LEED Green Building Label and a Building's Energy-Related Environmental Metrics. *Journal of Green Building*, 3(2), 85-105.