STATEMENT OF

RICHARD KIDD

PROGRAM MANAGER

FEDERAL ENERGY MANAGEMENT PROGRAM

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

U.S. DEPARTMENT OF ENERGY

BEFORE THE

SUBCOMMITTEE ON FEDERAL FINANCIAL MANAGEMENT,

GOVERNMENT INFORMATION, FEDERAL SERVICES AND

INTERNATIONAL SECURITY

COMMITTEE ON HOMELAND SECURITY AND GOVERNMENT AFFAIRS

U.S. SENATE

JANUARY 27, 2010

INTRODUCTION

Good afternoon Chairman Carper, Ranking Member McCain, and other distinguished members of the subcommittee. I lead the Department of Energy's (DOE) Federal Energy Management Program (FEMP), which is part of the Office of Energy Efficiency and Renewable Energy. FEMP's mission is to facilitate the Federal Government's implementation of sound, cost-effective, energy management and investment practices to enhance the Nation's energy security and environmental stewardship.

I am responsible for advising Federal agencies on how best to comply with statutory requirements related to Federal energy management such as those in the Energy Security and Independence Act of 2007 (EISA), as well as the requirements of Presidential Executive Orders such as Executive Order 13514, signed by President Obama on October 5, 2009.

I am pleased to have the opportunity to address this subcommittee about the Federal Government's efforts to increase energy efficiency in Federal facilities and operations, and to undertake other sustainability measures. It is clear from past Federal performance and documented success in the private sector that saving energy can save money. Investments in energy savings will not only reduce the Federal energy bill, they can also lead to a range of other important benefits including safeguarding our environment, increasing the productivity of the Federal workforce and improvements to our Nation's energy security.

I would like to address the following topics:

- Energy use in the Federal Government;
- Current Federal authorities;
- Executive Order 13514;
- Economics of greenhouse gas (GHG) management; and
- Progress in the Federal sector.

ENERGY USE IN THE FEDERAL GOVERNMENT

For perspective, the Federal Government is the single largest user of energy in the Nation. In fiscal year (FY) 2008, total energy consumption of Federal Government buildings and operations was 1.6 quadrillion British thermal units (Btu "quads"), roughly 1.5 percent of U.S. total consumption. The Federal Government's site-delivered energy bill was $24.5 billion. This represented approximately 0.8 percent of total Federal expenditures ($2.983 trillion) that year. Of the $24.5 billion, over $7 billion was spent on energy to operate Federal buildings.

In FY 2008, energy use and production at Federal facilities resulted in direct and indirect emissions of 42.7 million metric tons of carbon dioxide equivalent ($MMTCO_2e$). This does not include lifecycle emissions.

ENABLING AUTHORITIES FOR FEDERAL ENERGY MANAGEMENT

The actions of Federal Agencies in the area of energy management are governed by a variety of Congressional Acts, the most salient of which are:

- National Energy Conservation Policy Act, as amended by the Energy Independence and Security Act of 2007 and the Energy Policy Act of 2005 (EPAct 2005);
- Energy Conservation and Production Act, as amended by EISA and EPAct 2005;
- Energy Policy Act of 1992 (EPAct 1992); and
- Annual appropriations.

Included in these Congressional Acts are a variety of specific goals and targets, the most salient of which include:

- Reducing energy intensity (Btu/ft^2) by 15 percent by the end of FY 2010, compared to a FY 2003 baseline and by 30 percent by the end of FY 2015;
- Increasing renewable electric energy equivalent to at least five percent of total electricity use in FYs 2010-2012 and at least 7.5 percent in FY 2013 and beyond; at least half must come from sources developed after January 1, 1999; and
- Achieving 20 percent reduction in vehicle fleet petroleum use by 2015.

EXECUTIVE ORDER 13514

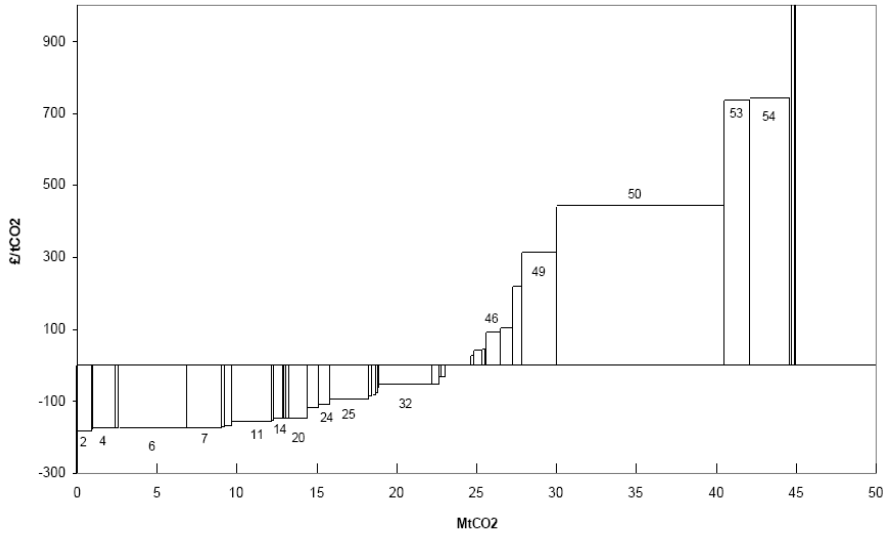
Executive Order (E.O.) 13514, signed by President Obama on October 5, 2009, establishes GHG reduction as an overarching integrated metric to guide Federal actions and investments as existing statutory requirements are met. Each agency is required to develop and annually update a Strategic Sustainability Performance (SSP) Plan that will outline planned actions, policies, and metrics necessary to achieve the sustainability goals and targets, including GHG reduction targets, established by E.O. 13514. Each agency establishes its own goals based on its circumstances. The SSP Plan will be integrated into an agency's strategic planning and budget process. It will promote actions based on a full accounting of both economic and social benefits and costs for agencies to achieve the best lifecycle return on investment. This is the first time that legislation or an Executive Order related to Federal energy management has explicitly required agency level planning, clearly linking that planning with the budget formulation process. The impact of this change should guide agencies to adopt rigorous analysis to ensure that all proposed energy-related investments result in the highest possible return to the American taxpayer.

ECONOMICS OF GREENHOUSE GAS MANAGEMENT

GHG emission reductions achieved through energy savings can be cost-effective. However, realizing some of these energy savings requires up-front capital investments. One way to show potential GHG reductions and associated costs is through a marginal abatement cost curve (MACC). **Figure 1** shows an illustrative example of a MACC created for the United Kingdom (UK) commercial and public building sector prepared for

the UK Committee on Climate Change.[1] The MACC displays potential GHG reduction measures by how much carbon dioxide (CO_2) is reduced and the associated net savings or costs. In a MACC, options are ranked according to their unit cost, with the most cost effective measures on the left-hand side. Those below the x-axis have a negative marginal cost, which reduce energy costs more than the initial investment cost over the life of the project. An even higher level of reduction is achievable by bundling these measures with projects that have a positive net cost, which can simultaneously reduce GHGs and save money.

Figure 1. United Kingdom Commercial/Public Sector Building Cost Curve in 2022



1	Lights- Most EE Replacement Tungsten Total	31	OffEq - Most EE Monitor Total
2	Heating - More efficient air conditioning Total	32	presence detector Total
3	Compressed air Total	33	Motor - 4 Pole Motor - EFF1 replace 4 Pole Total
4	Heating - Optimising Start Times Total	34	Heating - TRVs Fully Installed Total
5	Lights - Sunrise-Sunset Timers Total	35	Heating - most EE boiler Total
6	Heating - Programmable Thermostats High Total	36	Most EE pitched roof insulation Total
7	Lights - Basic Timer Total	37	Most ee double glazing Total
8	Lights - Light Detectors Total	38	Most EE flat Roof insulation Total
9	stairwell timer Total	39	Most EE external wall insulation Total
10	Most EE fridge Total	40	Lights - HF Ballast Total
11	Heating - Reducing Room Temperature Total	41	Most ee cavity wall insulation Total
12	Most EE freezer Total	42	Biomass
13	Photocopiers - Energy Management Total	43	Lights- Most EE Replacement Tungsten Total
14	Monitors - Energy Management Total	44	Most EE fridge-freezer Total
15	Printers - Energy Management Total	45	Lights - Metal Halide Floods Total
16	OffEq Fax Machine switch off Total	46	Lights - IRC Tungsten-Halogen - Spots Total
17	Vending Machines Energy management Total	47	Variable Speed Drives Total
18	OffEq - Most EE Monitor pc only Total	48	Heating - most EE boiler Total
19	Computers - Energy Management Total	49	Most EE fridge-freezer Total
20	Lights - Turn off Lights for an extra hour Total	50	Most EE freezer Total
21	OffEq - Most EE Monitor Total	51	Most EE fridge Total
22	presence detector Total	52	Most ee cavity wall insulation Total
23	Motor - 4 Pole Motor - EFF1 replace 4 Pole Total	53	Lights- Most EE Replacement 26mm Total
24	Heating - TRVs Fully Installed Total	54	Most EE pitched roof insulation Total
25	Heating - most EE boiler Total	55	Most EE flat Roof insulation Total
26	Most EE pitched roof insulation Total	56	Lights - HF Ballast Total
27	Most ee double glazing Total	57	Lights- Most EE Replacement 26mm Total
28	Most EE flat Roof insulation Total	58	Most EE external wall insulation Total
29	Most EE external wall insulation Total		
30	Lights - HF Ballast Total		

[1] AEA Energy and Environment. *Review and Update of UK Abatement Cost Curves for the Industrial, Domestic, and Non-Domestic Sectors.* Final Report to the Committee on Climate Change. August 2008.

Social Benefits

There are many social benefits associated with GHG reductions through improved energy efficiency. In a 1999 report, the General Services Administration states that indoor environments (including lighting and temperature) can affect worker productivity by 5 to 15 percent.[2] With Federal agencies spending almost 30 times as much on salaries and benefits as on energy, even a few percentage points of productivity gain could be immensely valuable.

The public and private sectors are recognizing that potential climate change impacts, such as sea level rise, extreme weather events, droughts, floods, and the increased spread of life-threatening diseases, will have significant consequences on business operations. An analysis conducted by the CNA Corporation and a military advisory board concluded that additional climate change stressors and disasters pose a threat to our Nation's security and stability while exacerbating conflicts around the world.[3] Federal Agencies may encounter direct impacts on their missions due to climate change. For example, the Department of Transportation predicts that the Nation's infrastructure will be at greater risk of damage and failure due to climate change effects such as extreme weather events.[4] The Department of Defense's (DoD) Strategic Environmental Research and Development Program has also recognized that climate change will affect national security and DoD operations. A number of built and natural infrastructure sites, for instance, are at risk of flooding due to sea level rise and damage from erosion. The cost and availability of energy required for DoD operations are also threatened by climate change.[5]

PROGESS IN THE FEDERAL SECTOR

All Federal agencies submit energy use data to FEMP for analysis annually. The data show that the Federal Government has made significant progress in reducing its energy use during the past decade. The total site-delivered energy consumption in FY 2008 was 23.5 percent less than in FY 1985 and 2.3 percent less than in FY 2003. Compared to FY 2003, direct and indirect GHG emissions from energy use in Federal buildings subject to the National Energy Conservation Policy Act energy reduction requirement decreased 9.3 percent,[6] from 47.1 $MMTCO_2e$ to 42.7 $MMTCO_2e$ in FY 2008. Performance in a few other key areas is summarized below.

---

[2] *An Overview of the Integrated Workplace: A Comprehensive Approach to Developing Workspace.* pp. 30. Office of Real Property within the General Services Administration. 1999. http://www.gsa.gov/gsa/cm_attachments/GSA_DOCUMENT/integrated_workplace_rpt_pdf_R2OD26_0Z5RDZ-i34K-pR.pdf

[3] CNA. "National Security and the Threat of Climate Change." 2007. http://securityandclimate.cna.org/

[4] Transportation Research Board. "The Potential Impacts of Climate Change on U.S. Transportation." 2009. http://144.171.11.107/Main/Public/Blurbs/156825.aspx

[5] Strategic Environmental Research Development Program. "SERDP and ESTCP Launch Climate Change Efforts." Information Bulletin Late Fall 2009. http://www.serdp.org/general/Publications/upload/2009-LateFallBulletin-Final.pdf

[6] This includes reductions achieved through the purchase of renewable energy credits.

Energy Intensity
Based on FY 2008 data, the Federal Government's energy intensity in its buildings subject to EISA/EPACT goal requirements was 110,914 Btu/ft^2 or 12.4[7] percent lower than the FY 2003 base year energy intensity of 126,583 Btu/ft^2.

Renewable Energy
Federal agencies reported purchasing or producing 1,903.6 gigawatt hours (GWh) of renewable electric energy in FY 2008, equivalent to 3.4 percent of the Federal Government's electricity use of 56,172.1 GWh. This represents a doubling of renewable energy as a percentage of total facility electricity use since 2003.

The Federal Government has shown significant leadership in supporting renewable energy use. The Navy's geothermal power plant in China Lake, California delivers an average of 1.4 million megawatt hours (MWh) of electricity to the state's grid and represents nearly ten percent of the total U.S. geothermal power production.[8] The Nellis Air Force Base in Las Vegas, Nevada, is home to one of the largest solar photovoltaic system in the country, with more than 72,000 solar panels generating 30,000 MWh of electricity.[9] Additionally, in California Fort Irwin will soon produce nearly 2.5 million MWh of solar power[10] and DOE's Savannah River Site recently broke ground on one of the largest biomass plants in the nation,[11] with the potential to generate 77.5 million MWh annually.

Federal Investments
Capital costs for making energy efficient investments can come from a number of sources. Agencies may use appropriated funds, or if conditions merit, Energy Savings Performance Contracts (ESPCs) or Utility Energy Savings Contracts (UESCs). ESPCs and UESCs are generally budget neutral contracts paid over time from future energy savings, to fund energy efficient projects. These performance-based, third-party financed contracts are used to provide investment capital to improve Federal facilities and reduce their energy use in a timely manner. Building improvements that reduce energy and operating costs are paid for from the savings, making Federal facilities more efficient and productive.

Approximately $2.3 billion[12] has been invested in Federal facilities through ESPCs, saving more than 18 trillion Btu annually—equivalent to the energy used by a city of

---

[7] This includes reductions achieved through the purchase of renewable energy credits.
[8] Energy Information Agency. *Renewable Energy Trends in Consumption and Electricity, 2007.* http://www.eia.doe.gov/cneaf/solar.renewables/page/trends/table1_11.xls
[9] Nellis Air Force Base. *Nellis Activiates Largest PV Array in Nation. 2007.* http://www.nellis.af.mil/news/story.asp?id=123079933
[10] Cooler Planet. *Largest Solar Panel Array in Military History to be Built at Army National Training Center*. August 2009. http://solar.coolerplanet.com/News/8040902-largest-solar-panel-array-in-military-history-to-be-built-on-army-national-training-center.aspx
[11] Biomass Magazine. *DOE Secretary Chu to Attend SC Biomass Plant Groundbreaking.* November 2009. http://www.biomassmagazine.com/article.jsp?article_id=3259
[12] The investment costs at the time of award for all Federal ESPCs (but not UESCs or direct funding) awarded since 1992 in unadjusted dollars. The investment is solely the cost to implement the project, i.e. no financing costs are included.

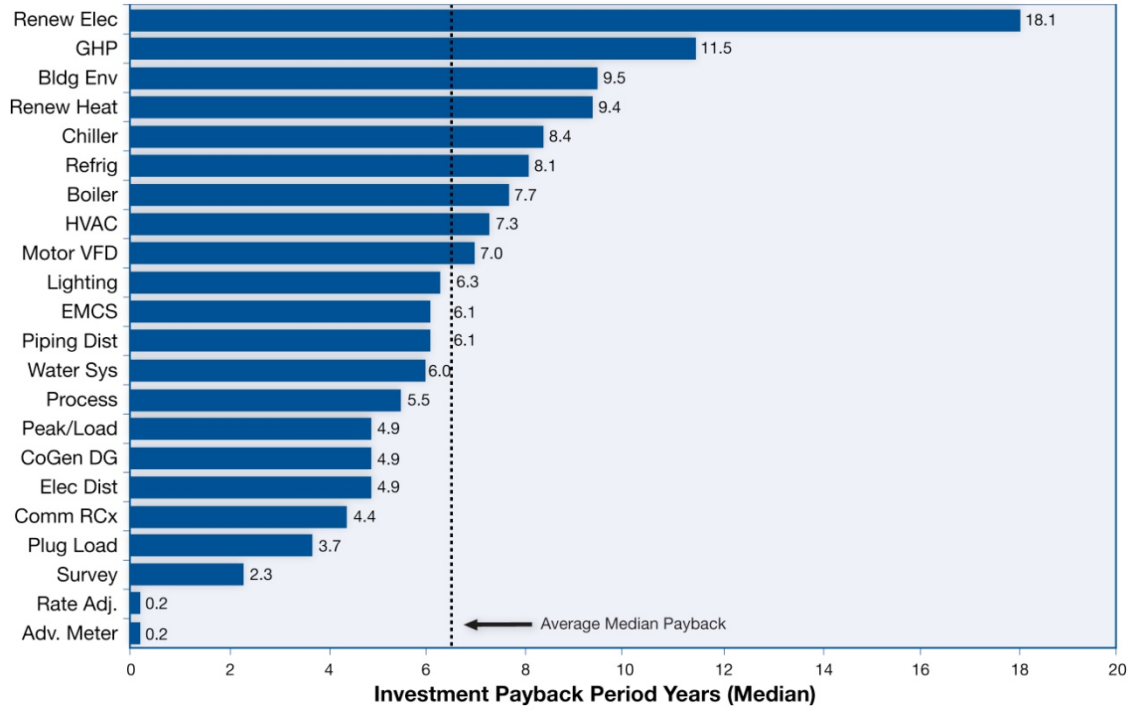
more than 500,000 people. These ESPC projects contain guarantees that will result in $6 billion in avoided energy costs over the life of the contracts.

These energy efficiency investments have proven to be cost effective. Historical data collected from FEMP's ESPC database were used to determine average investment payback periods for the implemented energy conservation measures (ECMs).[13] Based on a Department of Energy study, Figure 2 shows that renewable technologies have the longest average payback period (about 18 years), while advanced metering and rate schedule changes have the shortest average payback periods (less than one year). The average payback period for all ECMs is just over six years.[14] It is worth noting that these data are drawn from projects that started as long as a decade ago. For many of these ECMs, better technology is now available, meaning that the investment payback period is now even shorter. Many energy service companies used by the Federal Government have comprehensive expertise with the full range of ECMs and will often bundle technologies with different payback periods to produce optimal energy and cost saving results.

[13] The average percent variation in ECM standard deviations was determined for the entire ESPC contract database. New ECM averages and ranges were calculated from the smaller data sets. Wide variations in the results suggest potential issues with data quality and reporting.

[14] Department of Energy. *2008 Federal Energy Management Program Market Report*. July 2009. http://www.nrel.gov/docs/fy09osti/46021.pdf

Figure 2. Energy Conservation Measure Median Payback Periods



Renew Elec – renewable electricity	Water Sys – water and sewer systems
GHP – geothermal heat pump	Process – process improvements
Bldg. Env. – building envelope	Peak/Load – maximum load
Renew Heat – renewable heating	CoGen DG – cogeneration and distributed generation systems
Chiller – chiller improvements	Elec Dist – electrical distribution
Refrig – refrigeration improvements	Comm RCx – commissioning and retro-commissioning
Boiler – boilers	Plug Load – plug load reduction
HVAC – heating, ventilating, and air conditioning	Survey – energy surveys
Motor VFD – motor variable frequency drive	Rate Adj. – rate adjustments
Lighting – lighting	Adv. Meter – advanced metering
EMCS – energy monitoring and control systems	
Piping Dist – piping and distribution systems	

Power purchase agreements (PPAs) are another method through which Federal Agencies are able to implement on-site renewable energy projects without up-front government financing. Under a PPA, a developer installs, owns, operates and maintains a renewable energy system on agency property while the agency agrees to purchase the power generated by the system. The agency simply purchases the power generated by the system at a set price over the length of the contract. This price is typically less than what would have been paid to the utility without a PPA. Through PPAs, agencies are able to use renewable energy at a known, long-term electricity price, offering a type of insurance against future price increases while incurring no up-front capital costs. Though a typical PPA term length is 20 years, DoD, and the Power Management Authorities (e.g. Western Area Power Management Authority) are the only agencies that currently have the authority to enter into PPA's beyond 10 years.

INTEGRATED SUSTAINABILITY PLANNING LEADS TO RESULTS

The Private Sector Business Case for Sustainability

Businesses in the private sector have made commitments to sustainability performance measures and successfully increased revenues while achieving their goals. A leading environmental think tank concluded new building sustainability does not have to cost more. A two percent increase in upfront costs to support sustainable design has been shown to save 10 times the initial investment during a building's 20-year life cycle. An increasing number of companies are setting GHG and energy reduction goals. In 2009, 169 of the S&P 500 corporations set GHG emission reduction targets, representing a 52 percent increase over the previous year.[15] While there are thousands of examples from the private sector, here are a few illustrative examples from American industry (identities omitted in order not to endorse any particular firm). A major public corporation and international retailer reported that it set a GHG reduction goal of 20 percent below 2005 levels by 2012 and has already achieved a 38 percent increase in fleet efficiency, in addition to being in the process of opening a new store that will be 25-30 percent more energy efficient than standard buildings. A major multinational information technology (IT) software and services company reported that it was an early adopter of sustainability measures and has made public commitments on climate protection and energy efficiency. Between 1990 and 2008, this IT company indicated that it saved 4.9 billion kilowatt-hours of electricity consumption, avoided nearly 3.3 million $MTCO_2e$, an amount equal to 48 percent of the company's 1990 global CO_2 emissions, and saved over $343 million through its annual energy conservation actions. A major chemical company has indicated that it achieved an 80 percent reduction of GHG emissions below 1990 levels, saving $3 billion. A company that is among the world's largest global private energy corporations met its operational carbon reduction goals eight years early, saving $2 billion.[16] The private sector has learned that reducing GHG emissions through energy efficiency improves the bottom line.

Federal Sector Taking a More Integrated Approach

Federal agencies are realizing the value of taking a more integrated, strategic approach to their sustainability efforts, which can lead to lower energy costs, increased energy security and reliability, and higher worker productivity.

DoD perhaps best illustrates how strategic thinking about energy use has already been integrated into Federal Agencies. The Army, Navy, Air Force, and Marines have all developed strategies to reduce energy use and improve energy security. This is critical because, as the Air Force states, "energy is a key enabler of U.S. military combat power

[15] Carbon Disclosure Project 2009 S&P 500 Report http://www.pwc.com/gx/en/carbon-disclosure-project/s-p-500.jhtml

[16] Amory Lovins. *Profitable Solutions to Climate, Oil, and Proliferation.* Rocky Mountain Institute. 31 December 2009.

and, as such, must be managed in an integrated manner."[17] The Navy acknowledges that "energy efficiency increases our combat effectiveness."[18]

Each year FEMP recognizes outstanding energy efficiency projects across the Federal Government. In FY 2008, 32 winning projects, only a fraction of all Federal efforts, will save the taxpayers more than $26 million per year in energy and operating costs.

EPA's energy and water management project at their Research Triangle Park Campus in North Carolina reduced energy demand by over 46 billion Btu, the equivalent of over 8,500 $MTCO_2e$ at the national emissions rate. With the total cost of the project at slightly under $2 million, and first year savings of $1.5 million, the project can be expected to pay for itself during its second year of operation.

The U.S. Army's Base at Fort Hood, Texas, implemented a web-based Utility Management Control System (UMCS) to allow for efficient management of installation-wide facilities. The system provided $200,000 in energy savings the first year, with future savings expected to be around $500,000 annually, resulting in a simple payback period of a little over 10 years for the $5.65 million project. In addition, lifetime emissions reductions total approximately 86,000 $MTCO_2e$ and 124 tons of nitrous oxide.

The VA's James J. Peters Medical Center in Bronx, New York, modernized its energy management control system at the Facility Management Service Center. The project cost only $129,000 and delivered $187,000 of savings in just one month. The project is expected to reduce emissions by 4,000 $MTCO_2e$ annually with energy savings expected to be around one million dollars annually.

WHAT IS THE REALM OF THE POSSIBLE FOR THE FEDERAL GOVERNMENT?

Looking forward, there is every reason to conclude that the Federal Government can be a leader in generating savings while increasing performance through energy efficiency. Executive Order 13514 already outlines the expectation that, by 2030, all new Federal buildings must save or produce as much energy as they use. This may sound challenging, however the necessary technology exists today and with integrated whole-systems design approaches 30-60 percent of current energy use can be eliminated in retrofits and 40-90 percent of energy use can be saved in new facilities.[19]

There are many untapped energy reduction measures in the Federal Government. Behavior change can also be a powerful driver in reducing energy consumption and ultimately GHG emissions. The American Council for an Energy Efficient Economy

[17] U.S. Air Force Energy Plan 2010. http://www.safie.hq.af.mil/shared/media/document/AFD-091208-027.pdf

[18] Naval Energy: A Strategic Approach. October 2009. http://www.onr.navy.mil/en/naval-energy-forum/~/media/5EFD428CFEB0412391CC321DCAF67138.ashx

[19] Amory Lovins. *Profitable Solutions to Climate, Oil, and Proliferation.* Rocky Mountain Institute. 31 December 2009.

estimates U.S. residential energy use could be reduced by as much as 11 percent as a result of consumer behavior change and lifestyle choices alone[20]. The widespread use of operations and maintenance best practices also falls under the category of behavior and culture change.

CONCLUSION

In conclusion, energy efficiency investments in Federal facilities and operations save taxpayer dollars while reducing energy consumption, water consumption, and petroleum use. Ongoing federal investments will save money, protect the environment, enhance security, reduce energy use and water consumption, while also reducing GHG emissions.

I would be pleased to answer your questions.

[20] The American Council for an Energy Efficient Economy. http://www.conference-energy-behaviour.nl/downloads/Karen%20Ehrhardt.pdf