SUSTAINABLE DC MAYOR'S ORDER

Building Energy Performance Standards Task Force

LEAD AGENCY:DISTRICT DEPARTMENT OF THE ENVIRONMENT (DDOE)

PARTNER AGENCIES:
DEPARTMENT OF GENERAL SERVICES (DGS)
DC SUSTANABLE ENERGY UTILITY (DCSEU)
OFFICE OF THE CITY ADMINISTRATOR (OCA)
12/10/2014

The Building Energy Performance Standards Task Force was charged by the Mayor to develop plans and policy recommendations to drive energy performance in existing buildings to help meet the energy and climate goals of the Sustainable DC plan—reducing gas emissions and energy consumption by 50% by 2032. As buildings are responsible for 75% of the District's greenhouse gas emissions, addressing building energy performance is critical to achieving our climate goals. The Building Energy Performance Standard refers to a suite of interconnected policies and programs designed to drive investment in cost effective energy performance improvements in existing buildings, both public and private. We propose a set of measures to improve performance and set minimum performance standards for District government facilities, and propose a series of measures to improve transparency and accuracy of energy data. To drive deep reductions in private buildings, we recommend the further investigation of two options—a minimum energy performance standard for private buildings, and a revenue-neutral carbon pricing system.

Contents

Executive Summary…….2
Background & Methodology…….. 5
Findings & Recommendations……..10
Timeline……..40
References……..41

Executive Summary

The Building Energy Performance Standards Task Force was charged by the Mayor to develop plans and policy recommendations to drive energy performance in existing buildings to help meet the energy and climate goals of the Sustainable DC plan. The Sustainable DC plan aims to reduce climate change-causing greenhouse gas (GHG) emissions and energy consumption by 50% by 2032. As buildings are responsible for 75% of the District's GHG emissions, addressing building energy performance is critical to achieving the Districts climate goals.

The task force's recommendations are designed to significantly reduce energy use and greenhouse gas emissions, spur job creation, and stimulate economic development across the District. The "Building Energy Performance Standard" refers not just to one rule, but to a suite of interconnected policies and programs designed to drive investment in cost effective energy performance improvements in existing buildings, both public and private. The District Department of the Environment (DDOE), which is responsible for setting energy policy in the District, worked with the Department of General Services (DGS), the DC Sustainable Energy Utility (DCSEU), and private sector stakeholders to design a workable set of policies that can meet the aggressive goals of the Sustainable DC Plan and rise to the challenge posed by climate change, while enhancing the competiveness of the city.

The findings and recommendations of the task force are organized around three goals:

GOAL 1: Reduce greenhouse gas emissions and energy use in district facilities

ACTION 1.1: Reduce energy consumption by 20% at targeted facilities by the end of 2014. The District Government effort to reduce emissions began with the comprehensive benchmarking of energy use in all District facilities. The '*Game Change*' initiative, launched by DGS in 2012, sought to aggressively reduce energy consumption at targeted public facilities by 20%. Strategies to achieve this objective included: robust data acquisition, accurate and transparent benchmarking, data analysis and visualization, deployment and enhancement of building automation systems, facility audits, strategic retrofits and commissioning, optimizing building operations, targeted occupant engagement, and facility manager training. The *Game Change* initiative revealed both opportunities and challenges in achieving portfolio-wide reductions.

ACTION 1.2: Create a strategic plan to reduce energy use in District facilities by 50% across the Department of General Services (DGS) portfolio by 2032. DGS is developing a comprehensive plan for reducing energy consumption across the entire portfolio of 400 buildings by 20% by 2020 and by 50% by 2032. Achieving these energy efficiency targets will lower the District's energy costs and significantly reduce carbon emissions. The plan is designed to serve as an example for private building owners, demonstrate and apply new technology,

and provide opportunities for the energy efficiency industry to pilot innovative solutions with District agencies.

GOAL 2: Increase information transparency

ACTION 2.1: Improve online tools for tracking progress. The Mayor's Order calls for the creation of methods for tracking compliance with building energy standards and other measures adopted to meet the energy and emissions reduction goals of Sustainable DC. The Task Force recommends building on the success of the existing *BuildSmartDC.com* by creating new features to track aggregate progress on energy and water performance, waste diversion rates, and renewable energy production over time.

DGS commissioned *BuildSmartDC.com* to have a modular architecture that will allow data feeds and charts to be used by other District agencies and other supporting third parties. DGS will continue to collaborate with DDOE and other stakeholders to make future versions of the BuildSmartDC platform accessible for multiple uses. In addition, to the extent feasible, DGS encourages other agencies to build their IT assets in a similarly open way, including most importantly providing API web services for any data collected (an API is an "Application Programming Interface" that allows third-parties and internal users to easily draw on data and other program features).

ACTION 2.2: Improve and verify benchmarking data quality for public and private buildings. In order for energy data to be actionable and drive market transformation, the data must be trusted. Policies and practices that will improve data quality, and therefore trust, include technical assistance, the ability to automatically upload utility data to ENERGY STAR® Portfolio Manager® and other platforms, enhanced data quality checking pre-submission, professional education, and improved enforcement. DDOE has already begun the process of implementing many of these issues.

GOAL 3: Use new innovative policies to reduce greenhouse gas emissions and energy use in privately owned buildings.

ACTION 3.1: Establish Minimum Energy Performance Standards (MEPS) for new and existing buildings. Establishment of a Minimum Energy Performance Standard (MEPS) for Large Commercial Buildings would require buildings to meet a specified energy standard, such as an ENERGY STAR score. The District government would lead by example, as we have with other green building and energy efficiency programs. Much of the framework for this standard is laid out in the report, but a number of key strategy decisions require resolution. The task force therefore recommends that further study be undertaken into how a Minimum Energy Performance Standard would be enforced, and what standard would be most appropriate given the current building stock and the gains needs to yield a 50% energy use reduction for those buildings, per the goals of Sustainable DC.

ACTION 3.2: Explore the feasibility of a Revenue-Neutral Carbon Pricing System. The other option investigated by the task force is a revenue-neutral carbon pricing system for commercial buildings that would give building owners greater incentive to reduce their energy use. Driving improved building energy performance through carbon pricing is an innovative policy that will require further study to determine the best approach in setting the price and identifying how to collect and distribute the revenue. Pursuing carbon pricing would continue the District's leadership on green building and place the city at the vanguard of climate policy in the United States. The task force recommends that an analysis of carbon pricing policy options, and economic and environmental impacts thereof, be undertaken in FY 2015.

Background & Methodology

Background

The findings and recommendations of the Building Energy Performance Task Force are structured to significantly reduce energy use and greenhouse gas (GHG) emissions, spur job creation, and stimulate economic development across the District. As outlined below, the Building Energy Performance Standard is a suite of policies and programs designed to drive investment in cost effective energy performance improvements in new and existing buildings, both public and private. The District Department of the Environment (DDOE), which is responsible for setting energy policy in the District, worked with the Department of General Services (DGS), the DC Sustainable Energy Utility (DCSEU), and private sector stakeholders to design a workable set of policies that can meet the aggressive goals of the Sustainable DC Plan and rise to the challenge posed by climate change, while enhancing the competiveness of the city.

The District has made great strides in green building and energy efficiency, and continues to lead the nation in the most widely used green building standards on a per capita basis for large cities. At the end of 2012, there were 346 LEED (Leadership in Energy and Environmental Design) certified projects including almost 70 million sq. ft. of total LEED certified space.[1] In addition to the District's leadership in LEED certification, the city also surpasses other large U.S. cities in number of buildings that are ENERGY STAR® certified, both on a per capital and total square footage basis. This leadership extends to the Washington, DC metropolitan region, which has the second-highest number of ENERGY STAR certified buildings of any metropolitan area, ranking just behind Los Angeles, and is likely to become the leader in 2014.[2] On March 28, 2014, the District became the first city to fully adopt the International Green Construction Codes—as discussed in the work of the Green Construction Code Transition Plan Task Force.

The Sustainable DC Plan calls for a 50% reduction in climate change-causing greenhouse gas emissions and a 50% reduction in energy use by 2032, along with increasing renewable energy to 50% of the total energy supply by 2032. However, the existing market conditions are not sufficient to meet the ambitious goals set in the Sustainable DC plan, let alone the challenge posed by climate change. Incremental progress, even if it is nation leading, still leaves the District far short of its goal. If the District is serious about meeting these aggressive climate and energy goals, the District must expand on existing programs and policies, and take the lead in adopting new and innovative climate and energy policy.

The District's climate mitigation plan, which outlines actions to meet the District's greenhouse gas emissions targets, is currently being updated by the District Department of the Environment

(DDOE). The current draft of that plan estimates that the combined impact of the current Green Building Act, DC Sustainable Energy Utility (DCSEU) programs, building energy codes, and Property Assessed Clean Energy (PACE) financing could reduce energy use in new and existing buildings by approximately 25%. These savings are projected to grow based on the availability of new technology. The plan assumes that only a fraction of buildings will be substantially rehabilitated or replaced each year. Compared to the 2006 baseline, these actions, coupled with the electric grid growing gradually cleaner (due in part to the District's Renewable Portfolio Standard), could reduce greenhouse gas emissions from commercial and residential buildings by approximately 30% in 2032 (compared to 2006), well short of 50% reduction target established by Sustainable DC.[3]

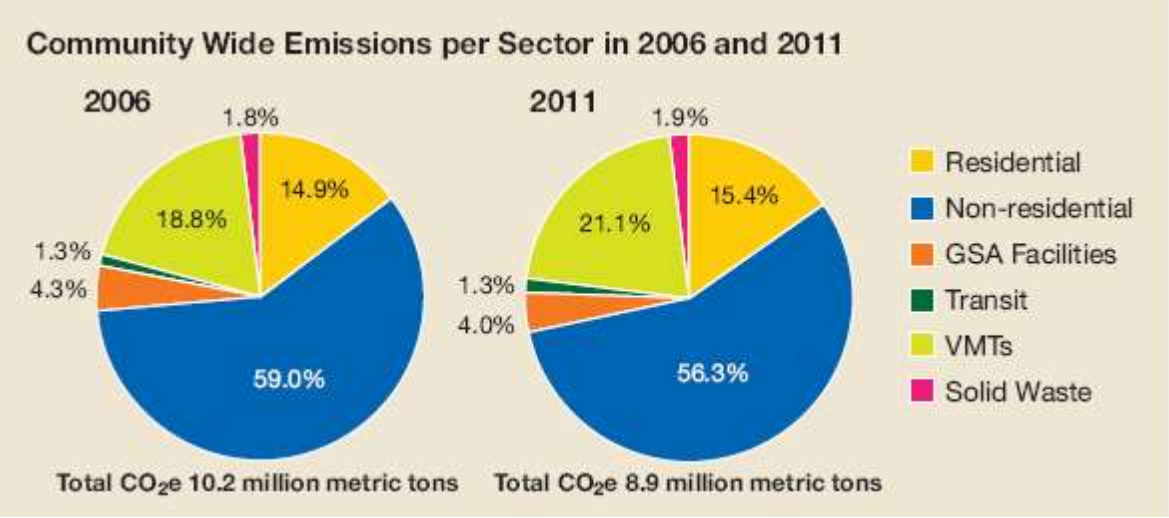


Figure 1: Citywide GHG Emissions

As shown in Figure 1, energy used in residential and commercial buildings account for 75% of the District's GHG emissions, with non-residential buildings alone accounting for 56%. Addressing the energy performance of buildings is, therefore, critical to achieving the Sustainable DC emission reduction goals. Without action, energy use and greenhouse gas emissions from both residential and non-residential buildings will grow as the District's population and jobs are projected to increase significantly. By 2032 the District will be home to more than 200,0000 more jobs—a 30% increase over the current job totals, with 80% of the growth coming from the private sector. This will necessitate an increase in both housing and office space (though mitigated somewhat through downsizing/consolidation) that will make meeting total reduction targets even more challenging.

Methodology

The Task Force

The Building Energy Performance Standards task force met every week from March 6, 2014 to September 15, 2014. The members of the task force included representatives from the following agencies:

- District Department of the Environment (DDOE)
- Department of General Services (DGS)
- DC Sustainable Energy Utility (DCSEU)
- Department of Consumer and Regulatory Affairs (DCRA)

Recognizing the value of input and advice from private sector stakeholders, the task force formed an advisory group of leading experts in energy efficiency, real estate, and property management. The Advisory Group met monthly and consisted of representatives from:

- Institute for Market Transformation
- Boston Properties
- EMO
- Capital E
- GHT Engineers
- Cassidy Turley
- Urban Green
- Akridge
- WRL Design
- Downtown DC BID
- Georgetown University

In order to receive additional input, the task force met with the following experts:

- DC Building Industry Association
- Resources for the Future
- Energy and Enterprise Initiative
- Natural Resources Defense Council
- Institute for Market Transformation
- City of San Francisco, California
- City of Portland, Oregon
- Ministry of Environment, Province of British Columbia, Canada
- City of Vancouver, Canada

- Simon Frasier University, British Columbia, Canada
- Coalition for Green Capital
- Latham & Watkins LLP

Task Force Principles:

An effective Building Energy Performance Standards for public and private buildings, as called for by the Mayor's Order, would achieve four key outcomes:

1. Reduce greenhouse gas emissions and achieve the energy reduction goals of the Sustainable DC plan;
2. Improve energy reliability, affordability, and transparency;
3. Create local jobs; and
4. Develop DC's market for energy and resource efficiency services.

In developing the task force recommendations, the task force followed these guiding principles:

1. The District Government must lead by example;
2. The policy should be performance-based, focused on the outcome of energy savings rather than a prescriptive set of energy efficiency actions, and provide flexibility for building owners and operators;
3. Recommendations need to be driven by data on actual building performance wherever possible;
4. New incentives are likely needed as well as regulations to overcome market barriers and provide a positive cost-to-benefit ratio for property owners;
5. Involvement from property owners and other key stakeholders is critical;
6. Building Energy Performance Standards policies and programs should complement each other and align well with other initiatives, especially those incentives and technical assistance provided by the DCSEU; and
7. An effective suite of policies will require a high level of data quality, a viable benchmarking methodology, and phased implementation.

Responding to Stakeholder Feedback:

As the task force investigated the options for Building Energy Performance Standards, and spoke with stakeholders, the task force found resistance to new prescriptive regulations. The Minimum Energy Performance Standard is structured to be performance-based and provide flexibility. However, this is nonetheless a regulatory approach and will require staff time and resources to ensure compliance. Stakeholders expressed greater support for a flexible market based policy. Specifically, there was interest in exploring the potential of revenue-neutral carbon pricing policies to drive energy performance. Such a policy would give building owners

an incentive to improve the performance of their buildings in order to save energy and reduce costs.

The task force continually asked itself, and was asked by the stakeholders involved: *will the performance standard we propose help us achieve the energy savings and greenhouse gas emissions targets established by Sustainable DC?* The task force recognized the fundamental connection between building energy performance and the need to reduce greenhouse gas emissions in order to mitigate the impacts of climate change. Improving the energy efficiency of new and existing buildings was seen as a necessary step to meeting the District climate goals.

The task force findings are organized into three areas:

1. **Leading by example**: efforts by the District government
2. **Information transparency**: Improvements to the benchmarking program to support next-generation policies
3. **Options for improving energy performance in private buildings**: a minimum energy performance standard, or a revenue-neutral carbon price.

Findings & Recommendations

GOAL 1: Reduce Greenhouse Gas Emissions and Energy Use in District Facilities (Lead by Example)

The District government owns and operates roughly 400 buildings and more than 30 million square feet of building space within the city. These facilities serve 77 agencies, approximately 33,000 employees, 55,000 students, teachers, and staff, more than 50,000 local businesses, and all of the District's 650,000 plus residents. The bulk of this space is constructed, renovated, operated, and maintained by the Department of General Services (DGS). Actions to lead by example and reduce energy use in District facilities must occur in all District facilities and agencies, not just in DGS facilities. However, because DGS is the largest single entity, and is singled out by the Mayor's order, the recommendations under this goal apply more directly to DGS. If successfully undertaken, these initiatives could be spread to the broader District portfolio.

ACTION 1.1: Reduce energy consumption by 20% at targeted facilities by the end of 2014.

a. **Summary:** Launched in 2012, '*Game Change*' was an ambitious DGS initiative, which sought to aggressively reduce energy consumption by 20% at targeted public facilities and to catalyze the broader effort of reducing energy use by 2020. Strategies to achieve this objective included: robust data acquisition, accurate and transparent benchmarking, data analysis and visualization, deployment and enhancement of building automation systems, facility audits, strategic retrofits and commissioning, optimizing building operations, occupant engagement, and facility manager training. *Game Change* achieved significant energy reductions at targeted buildings across the city. For example, DGS implemented low and no cost energy reduction measures such as temperature set points, occupancy scheduling and zoning, lighting retrofits, equipment tune ups, sequencing, and more, at many of the city's largest facilities, in some cases reducing consumption by more than 20 %. The implementation of *Game Change* initiatives is ongoing and measurement and verification results will be published for review as they become available. Once the most effective of these projects have had their impacts clearly tabulated, DGS will work to refine the methods learned and promote "the best of the best" of the approaches implemented.

Importantly, *Game Change* created the foundation for a city-wide energy conservation program and provided critical lessons learned that will shape future efforts. While *Game Change* has been successful in moving the city closer to its energy and carbon reduction targets, the program also was instrumental to help the city identify key barriers and challenges that will need to be overcome for the 2020 and 2032 reduction targets to be realized. These efforts will require strong leadership and both institutional and financial support, though many, if not all, interventions will pay for themselves over time.

DGS Initiatives supporting *Game Change* in FY14

Sprint to Savings

In 2014, 28 DC Public Schools (DCPS) schools competed in the inaugural Sprint to Savings, an innovative, first-of-its-kind student-led energy reduction competition, which saved the city $10,000 in only three weeks and taught students energy saving skills and behaviors. The competition, sponsored and coordinated by DGS, in collaboration with DC Public Schools and the US Green Building Council National Capital Region Chapter, paired over 50 volunteer building professionals with groups of interested students at schools around the city. Overall, 24 of the 28 participating schools succeeded in reducing their electricity consumption. Their efforts saved over 76,000 kilowatt-hours of electricity—enough to power 7 American households for nearly an entire year.

Langley Elementary School finished in first place with an enormous 30 percent reduction in electricity consumption. Powell Elementary School finished in 2nd place (18 percent reduction) and Anne Beers Elementary took the 3rd place position (12.5 percent reduction). Anacostia was the top performing high school and the only high school to surpass the 10 percent reduction threshold. Building on the overwhelming success of the inaugural competition, a second round is being held winter 2014.

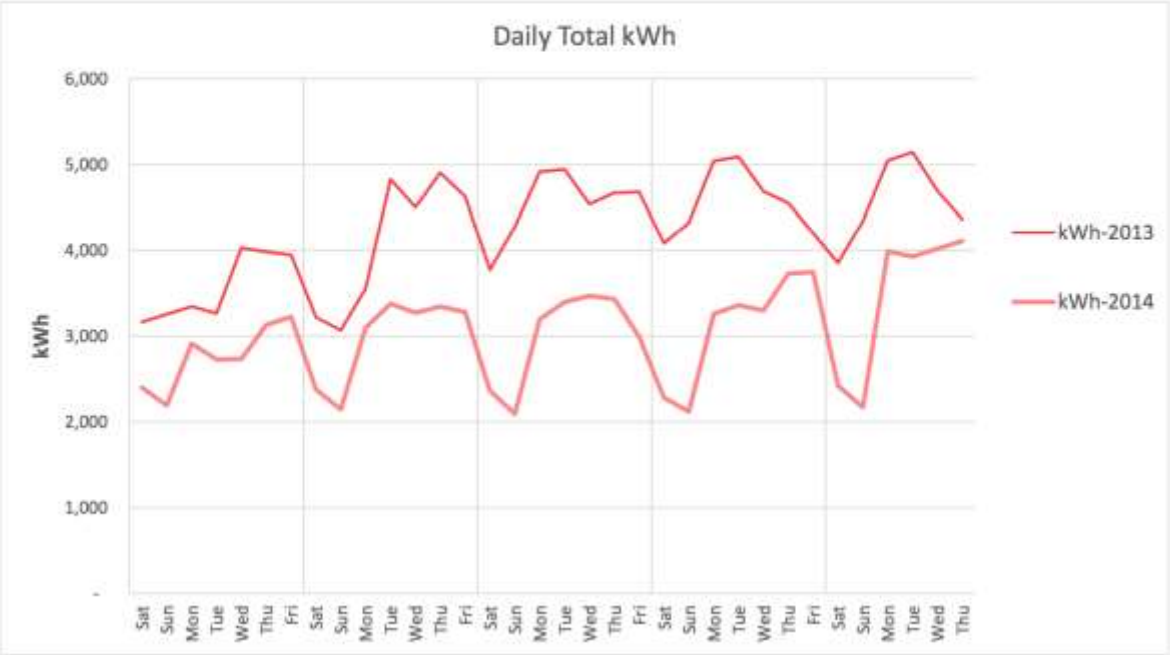
Retro-commissioning

For poorly performing buildings, DGS uses retro-commissioning to bring the controls and HVAC systems back up to their original design intent. By running initial commissioning or retro-commissioning in a data intensive and repeatable way, the performance of the building can be consistently and continuously tracked. Using data to monitor HVAC and controls systems helps assure that buildings perform the way they are supposed to every day and every season, and also helps facilities managers provide occupants a comfortable working environment.

Specifically, DGS retro-commissioning processes capture and manage highly granular data about building energy usage by zone, and equipment run-time schedules as well as other equipment performance data. These data are then used to help guide preventive maintenance and plan for targeted systems retrofits.

Because buildings that run well are more energy efficient, over time, these programs repay the funds invested in them through energy savings, often in as little as 18 months. In addition, equipment that is more carefully operated, and operated only when needed, has a longer lifespan, thereby improving long-term capital replacement costs.

Stoddert Elementary School
Retro-Commissioning Measurement and Verification
April 13 - May 16, 2013 vs. April 12 - May 15, 2014 (34 days) *



		2013	2014	Variance		Notes
Electricity Consumption	kWh	148,734	106,757	(41,977)	-28.2%	$4,900 for the period $48,000 anuualized *
Heating Degree-Days	Base 65	207.8	201.7	(6)	-2.9%	About equal
Cooling Degree-Days	Base 65	54.5	90.8	36	66.6%	Savings would be greater if degree-days were equal
Average Outdoor Air Temp.	Deg. F	61.3	62.2	1	1.4%	About equal

* There were only 34 days of comparible data between 2013 and 2014. Extrapolation to annualized values may or may not be valid. This report should be run periodically to verify savings in hotter and cooler weather.

Figure 2: Stoddert Elementary School: Retro-Commissioning Measurement and Verification

b. **Expected Benefits:** When fully realized, the effort will conserve an estimated ~75,000 MWh of electricity, conserve ~2.2 million therms of natural gas, avoid ~ 60,000 tons of GHG emissions, and save ~$10 million annually. Beyond resources, costs, and the climate crisis, the *Game Change* initiative altered portfolio and facility management practices at DGS by institutionalizing urgency

and shifting decision-making processes towards data-driven, evidence-based performance.

c. **Completion Date:** December 31, 2014. Best practices developed during Game Change will be integrated throughout DC 50x32, discussed below.

d. **Fiscal Impact:** *Game Change* anticipates a sustained 20% annual savings in electricity and natural gas expenditures for DC's public facilities.[1] More time is needed to accurately quantify and verify lifecycle savings verses project expenses.

e. **Political/Citizen Impacts**: Decreased spending on electricity and natural gas consumption provides additional funding for other priorities.

f. **Regulatory/Legislative Impacts:** The *Game Change* initiative was fully implemented under existing authority.

g. **Recommendations:** In addition to advancing the goal of reduced energy consumption and carbon emissions, implementing *Game Change* revealed key barriers and challenges that must be overcome if the city is to meet its long-term targets and comply with energy and sustainability mandates. The actions below are proposed as solutions to immediate barriers that limit the city's ability to deploy energy reduction efforts at all public facilities.

Action 1.2: Create a strategic plan to reduce energy use in District facilities by 50% across the Department of General Services (DGS) portfolio by 2032.

a. **Summary:** In 2011, President Barack Obama launched the Better Buildings Challenge with the goal to improve the energy efficiency of American commercial, institutional, and multifamily buildings and industrial plants by 20 % or more by 2020. The District government has joined thousands of state and local governments, leading corporations, and other partners in accepting the challenge. In fact, through *Game Change,* the District has already undertaken aggressive actions to reduce its energy consumption—and save millions of dollars. The Better Building Challenge target of a 20% reduction by 2020 is an important milestone along the way to even greater savings. Under the Sustainable DC Plan, the District is now aiming to reduce energy use by 50% by 2032.

[1] Normalized for weather, occupancy, portfolio changes, etc.

Recognizing that reducing portfolio-wide energy use by 50% will be a challenging endeavor, a strategic plan that prioritizes actions for achieving efficiency is required. *DC 50x32* is the DGS plan for aggressively pursuing energy efficiency in government buildings while promoting green job growth and energy resilience for the District. The centerpiece of *DC 50x32* is the Sustainable DC Plan, which mandates a 50% improvement in the energy efficiency performance of District government buildings by 2032 and 20% by 2020. Though efficiency is rightly stated as a top priority, also important will be the plan's focus on carbon emission reductions and energy costs.

From an economic perspective, *DC 50x32* is also intended to serve as an example for private building owners, demonstrating new technology and applications, and providing opportunities for the energy efficiency industry to pilot innovative solutions to District agencies.

Work on the strategic plan has not yet been completed but the outline of the report is available in draft. Some of the specific actions that can be taken are also listed later in this report.

<u>50x32 outline:</u>

1) Background
2) Portfolio Overview (published data sets)
3) Energy Use Profile
4) Key Findings and Conclusions
5) Baseline and Next Steps
   a) Strategy, Policy, and Tools
      i) Analytics: Innovate with Building Intelligence and Big Data.
      ii) Better Buildings: Transform District Facilities by Implementing Data-Driven, Energy-Saving Capital Projects and Leveraging the Marketplace.
      iii) Optimal Operations: Strengthen the Operations and Maintenance of District Buildings.
      iv) Supply and Demand: Transitioning to an Efficient, Distributed, and Clean Fuel Supply
      v) Good Government: Transform District Government into a Value-added Resource for Agencies
   b) Implementation

b. Expected Benefits: *DC 50x32* will be a data-driven performance plan focused on cost effective implementation and achieving quantifiable results. The plan will also help spur economic development, jobs, and market transformation. A

budget mechanism or fund whereby agencies see a share of the energy cost savings will incentivize agencies and occupants to help cut energy consumption and costs.

c. **Fiscal Impact**: Funds for the completion of *DC 50x32* are to be determined. Once implemented, the plan anticipates a sustained 20% annual savings in electricity and natural gas expenditures for public facilities (normalized for weather, occupancy, portfolio changes, etc.). More time is needed to accurately quantify and verify lifecycle savings verses project expenses.

d. **Political/Citizen Impact**: The creation and successful implementation of a plan for a 50% reduction in energy use by 2032 provides accountability and credibility to the Sustainable DC goals, as well as metrics against which progress can be tracked. Decreased spending on electricity and natural gas consumption will provide additional funding for other priorities.

e. **Legislative/Regulatory Impact**: There is no regulatory impact to creating the plan; however, the plan may end up recommending legislative or regulatory changes to help the District meet its energy goals.

f. **Completion Date:** Fall 2015

g. **Recommendations**: The task force recommends that DGS complete and implement the *DC 50x32 Strategic Plan*. Based on the lessons learned from the *Game Change* initiative and best practices in the private sector and in other jurisdictions, we further recommend that DGS consider in the strategic plan the following specific methods to drive reductions in energy use.

    i. ENERGY STAR certification for eligible DGS buildings over 50,000 square feet. This will be phased in, with buildings larger than 200,000 gross sq. ft. certified by the end of Fiscal Year 2016 (FY16) and the remainder, by the end of FY20.
    ii. Installation of energy management systems for new buildings and major renovations larger than 50,000 sq. ft., as well as smaller buildings using disproportionately large amounts of energy, by FY15.
    iii. Connection of energy management systems to cloud-based, centralized network operations center for new buildings, major renovations, and existing systems, by FY17.
    iv. Enhanced commissioning for new buildings and major renovations larger than 50,000 sq. ft., as well as smaller buildings using disproportionately large amounts of energy, by FY16.

v. Building Operators Certification and Training. Train operators of buildings larger than 50,000 sq. ft., to attain a Building Operators Certification (BOC) designation, at a minimum, with a pathway towards Certified Energy Manager (CEM) certification. This will be phased in from FY16 to FY18.
vi. Adding energy performance as key performance indicator (KPI) for building operators and facility managers, by FY16.
vii. Pilot budget mechanism or dedicated energy efficiency fund for sharing the cost benefits of energy savings through improved occupant behavior and optimized building operations, by FY15.
viii. Establish sustainability coordinator at each agency and require each agency to establish a sustainability and energy conservation plan, by FY17.
ix. Fund and support occupant engagement and conservation activities that focus on energy conservation and sustainability, by FY16
x. Establish minimum energy performance standards for District facilities over 50,000 sq. ft.

GOAL 2: Increase information transparency

Action 2.1: Improve online tools for tracking progress

a. **Summary**: The Mayor's Order calls for the creation of methods for tracking compliance with building energy standards and other measures adopted to meet the energy and emissions reduction goals of Sustainable DC. Fortunately, the District has a good starting point in the existing BuildSmartDC.com web platform for tracking the DGS portfolio. BuildSmartDC is an interactive website that allows anyone to view the energy performance of any DGS building, displaying electricity consumption in 15-minute intervals in near-real time (next day) and monthly and annual electricity and gas consumption, annual greenhouse gas emissions, annual energy costs, and other metrics. For schools and offices, the ENERGY STAR score is also shown, with a graphical A-G grade scale explaining what that score means. BuildSmartDC can shine a light on anomalies and inefficiencies in a very powerful way that leads to real energy reductions and cost savings. However, while BuildSmartDC is very useful at tracking performance at the building level, it does not yet have substantive aggregate analysis or aggregate trend-tracking features, any tracking of renewable energy generation, or the ability to easily connect to other software platforms. We propose the creation of a set of features described below to allow for accurate aggregate tracking of trends in total consumption and generation for all District-owned buildings, along with other new features for reporting and accessibility.

These should be integrated into BuildSmartDC or a successor platform, and could be integrated into other sustainability and performance tracking websites.

In addition, DDOE and DGS will use BuildSmartDC to disclose energy performance data about privately owned buildings in a more user-friendly format than the spreadsheets currently provided on DDOE's website. This is an important step to providing performance data from public and private buildings in one place. Data from private buildings could also be aggregated.

In service of this goal—or any level of real interoperability—the District will need to standardize on a universal building identifier. While there is a one-to-one match between the tax lot number and the building in ~80% of cases, in other cases it is much more complicated, and in some cases, the definition of a "building" differs based on the context. This is a resolvable problem, but one that needs work. As the District is not the only jurisdiction struggling with this issue, the District can benefit from coordination with other efforts in this arena.

b. **Expected Benefits**: Sustained progress towards the goals of Sustainable DC requires that the District government accurately and easily track how its portfolio of buildings is doing, both over time and in aggregate. Portfolio-level and Department-level tracking will greatly enhance accountability and accelerate progress, and allow for emissions reductions to be incorporated into standard performance metrics, such as Key Performance Indicators (KPIs).

c. **Completion Date:** December 2015

d. **Fiscal Impact:** Adding capacity and functionality to BuildSmartDC.com will require additional funding and staffing resources to build out new functions of the site and provide ongoing maintenance and support for services offered.

e. **Political/Citizen Impact**: Citizens will be better able to track how the government is doing at reducing its own footprint, as well as compare privately-owned buildings more easily. Providing automated, machine-readable access will allow third-party applications to directly connect to the data sources in real-time and display it in new and innovative ways.

f. **Legislative/Regulatory Impact**: None; the disclosures are fully within existing authority.

g. **Recommendations**: The task force recommends building on the success of the existing BuildSmartDC.com by creating new features to track aggregate progress

on energy and water performance, waste diversion rates,[2] and renewable energy production over time. Specific features should include:

- **i.** The ability to generate custom reports on the energy use data on any and all District facilities displayed on BuildSmartDC and download them as a spreadsheet and as a machine-readable API web service (an API is an "Application Programming Interface" that allows third-parties and internal users to easily draw on data and other program features). Graphs showing the total annual energy use, greenhouse gas emissions, water use, and utility expenses across all buildings, by property type, and by government department.
- **ii.** Graphs showing the trends in energy performance score, energy use, water use, and emissions, across all buildings and by property type and by government department, going back to 2010 (or the fiscal year good quality data is available), and highlighting the percent reduction achieved against performance targets.
- **iii.** Integration with the API used by the Standard Energy Efficiency Data (SEED) Platform that DDOE used to manage energy and water benchmarking data.
- **iv.** Graphs showing the trends in energy performance score, energy use, water use, and emissions from privately-owned buildings, across, all buildings and property type and by ward.
- **v.** Tracking of onsite (solar) and offsite (wind) renewable energy generation by DGS overall and at the building level, in near-real-time.

ACTION 2.2: **Improve and verify benchmarking data quality for public and private buildings.**

a. **Summary:** In Fiscal Year 2015, DDOE completed the full implementation of the energy benchmarking provisions of the Clean and Affordable Energy Act. All of the District's approximately 1,500 privately-owned buildings over 50,000 gross sq. ft. are now required to report energy benchmarking data to DDOE. On February 25, 2014, DDOE became the second city (after New York City) to make publicly available its energy benchmarking data on private buildings. This data, along with similar datasets in New York City and San Francisco, represent some the richest and most granular data on building energy performance ever collected at a city level. DDOE's benchmarking program is widely seen as a

[2] *The collection of waste diversion data is not currently mandated for privately-owned buildings*

national model. There are three fundamental purposes to the energy benchmarking program. First, individual building owners and managers will gain information they need to improve their buildings. DDOE has found that mandatory benchmarking is making people more aware of energy saving opportunities in their buildings. Second, the program provides the District government with much more granular energy data than ever before, which is already being used to improve comprehensive energy planning, design more effective programs, and help target technical assistance and incentives. Third, the public disclosure of building-level energy and water performance, as mandated by law, can drive market transformation as energy performance becomes well-understood. Public disclosure allows interested parties to consider energy performance when evaluating different rental or purchase options, similar to the way in which consumers now use miles-per-gallon ratings on cars or nutrition labels on foods, thus turning energy efficiency from something invisible into something with real market implications.

However, in order for the disclosure of energy data to create market demand for energy efficiency, people must have confidence in the quality of the data. Unfortunately, there remain serious questions about the reliability and quality of the benchmarking data. Therefore, actions to improve data quality are critical and urgent.

The errors of concern are of three types — (1) complete absences of required data fields; (2) inaccurate energy and water data; and (3) inaccurate data on the scope or use of the space (such as gross building area, operating hours, number or workers, or percentage air conditioned) that will distort the accuracy of the ENERGY STAR score. The available methods to improve the data can be organized into "upstream" methods that improve the quality of initial benchmarking reports, and "downstream" methods that seek to clean and iteratively improve benchmarking reports after they are first submitted.

Upstream Methods:

- *Technical Assistance:* DDOE and the DCSEU have provided extensive technical assistance to the community of building owners, managers, and contractors, most notably in the form of the Benchmarking Help Center, which has been funded and operated by the DCSEU. The DCSEU Benchmarking Help Center operates phone and email hotlines, and provides in-person training events. Through these efforts, the Help Center fielded more than 1,000 requests for assistance in FY13, and fielded over 800 requests for assistance in FY14. Over 70% of

buildings reporting in 2013 got help from the help center, and in 2014 to date, 39% have received assistance. The lower numbers speak to the success of the program, as fewer buildings were reporting for the first time. This technical assistance has been critical to improving the accuracy of the data submitted thus far, and will continue to do so.

- *Direct Upload of Utility Data to Portfolio Manager®:* In order to reduce data input errors, it is considered a best practice for utility data to be directly uploaded to ENERGY STAR Portfolio Manager, rather than input by hand. This is currently being done in Seattle and Chicago. The Sustainable DC Act of 2014 requires Pepco and Washington Gas to provide building owners with aggregated building-level consumption data upon request, and to upload this data directly to Portfolio Manager. Under the act, Pepco is required to provide direct upload of data to Portfolio Manager by January 1, 2015, and Washington Gas is required to provide direct upload of data to Portfolio Manager by January 1, 2018. Thanks to Pepco's adoption of the green button standard and close collaboration with DDOE, Pepco will launch their new upload tool in late 2014, ahead of schedule. Washington Gas will need to update their billing system in order to provide this service, which is why the Act gives them three additional years to comply. There is currently no legal mandate for DC Water to upload data to Portfolio Manager, which should be addressed

- *Requiring data quality checking prior to submission*: In July 2013, the EPA introduced a new feature, the "data quality checker." This is a simple verification that compares the entered data with typical values, to help identify energy values and property use details that are unusual, along with possible typos, missing information, incorrect units of measure, and other common data entry problems. While DDOE's benchmarking guidance documents currently "strongly recommend" the use of the data quality checker, it remains optional due to technological limitations in Portfolio Manager. For public buildings, no technical change in Portfolio Manager is required. DGS and other District agencies should implement internal procedures to verify the accuracy of the ENERGY STAR scores and other data in Portfolio Manager. DDOE is working with the EPA to enable a municipality to require the use of the data quality checker so that data for private buildings can also be verified.

- *Verification*: Another method for verifying data quality would be to require owners to have their submissions verified by a licensed professional prior to submitting them to DDOE. When a building applies for ENERGY STAR certification from the EPA, the application must be signed off on by a Registered Architect or Professional Engineer. Because of the costs this would impose on building owners, the District has thus far opted not to require verification by a licensed professional. Chicago and Montgomery County have now both adopted benchmarking laws that require professional verification by licensed professionals. To reduce the cost, the verification is required only once every three years, even though reporting must still be done annually. It is the hypothesis of DDOE that most errors are accidental, as it is easy to make data entry mistakes, and there is currently little incentive to game the system.

Downstream Methods:

- *Identification of Questionable Submissions:* DDOE is currently funding research into benchmarking data quality through a grant issued to New York University's Center on Urban Science and Progress and the Institute for Market Transformation. Work on this project has begun and is expected to be completed in 2015. The goal of this innovative project is the creation of a data quality grade for each building that has an ENERGY STAR score, indicating the degree of confidence in the reliability of that score. These grades will not be made public. However, they will allow DDOE to quickly identify which building reports are most in need of review. DDOE can then review the benchmarking data and, if needed, require the owners to correct errors and resubmit reports. In addition, the grant will produce a report which DDOE will publish, outlining the major drivers of data quality errors. This report will be used to create new educational resources to help building owners benchmark more accurately.

- *Conduct periodic audits:* Thus far, DDOE has primarily used its enforcement authority for benchmarking against buildings that have not reported at all. However, the enhanced ability to identify errors thanks to the above research initiative above, along with increased staff resources, will allow DDOE to begin conducting "spot audits" to verify data quality and investigate potential issues of fraud. The end

goal should be to give real meaning the regulatory requirement that the reports be "complete and accurate."

b. **Expected Benefits:** Increasing the accuracy of the benchmarking data is essential to the ability of the benchmarking program to drive change in the marketplace and provide a foundation for future programs. On the other hand, if people come to believe that the benchmarking data is too error-ridden to be useful, and lose faith in it, much of the potential for transforming the market will be lost—and once lost, it will be difficult to regain. For this reason, action to improve and assure data quality is one of DDOE's top priorities for the benchmarking program.

c. **Completion Date:** September 2015

d. **Fiscal Impact:** The technical assistance and increased enforcement require an additional FTE, which is already budgeted and paid for in FY15. The data quality grant is funded out of the Green Building Fund at $68,600, which is also already budgeted for.

e. **Political/Citizen Impacts**: The actions currently recommended are all minor administrative tweaks and will not engender political opposition. However, if the District moves to require professional verification of benchmarking results, it would likely stimulate opposition due to the cost of hiring a licensed architect or engineer. If DDOE were to expand the range of qualifications required to verify a submission beyond the narrow set that EPA allows to submit ENERGY STAR certification applications, then that would lower the costs of verification and garner greater support.

f. **Regulatory/Legislative Impacts:** All the current recommendations can be executed under existing legislative and regulatory authority.

g. **Recommendations:** The task force recommends that the District government take the following actions to improve benchmarking data quality:

- The Benchmarking Help Center should continue to be operated, in coordination with the DCSEU;
- DGS should require that the accuracy of building data in Portfolio Manager, including the square footage and any modifications to programming that would affect the ENERGY STAR score, if applicable, be annually verified for each of its buildings;
- DDOE should require that, for each private building covered by the benchmarking law, the building owner or their agent run the data

quality checker in Portfolio Manager, and correct any errors prior to submitting data to DDOE;

- Work with DC Water, to provide direct upload of water data to Portfolio Manager; and
- Increase the use of enforcement actions to require that building owners not just submit *something*, but that their submission is complete and accurate.

The task force does not, *at this time*, recommend that the District require that building owners have their submissions verified by a licensed professional. Further analysis of data quality is needed first to determine if this is necessary.

GOAL 3: Use Innovative Policies to Reduce Greenhouse Gas Emissions and Energy Use in Private Buildings

The task force investigated two options for reducing the greenhouse gas emissions and energy use in private buildings. One option would be to establish a Minimum Energy Performance Standard (MEPS) for large commercial buildings. The second option would establish a revenue-neutral carbon pricing system for commercial buildings. Both options are innovative policies with no precedent for adoption at the city-level. Therefore, the task force is recommending they be investigated further to identify best practices and gain better understanding of the potential impacts.

ACTION 3.1: Establish Minimum Energy Performance Standards for New and Existing Buildings ("BEPS Option 1")

a. **Summary:** The Minimum Energy Performance Standard (MEPS) naturally builds on the successful energy benchmarking program. Commercial buildings over 50,000 gross sq. ft., including multifamily housing, would be required to meet a minimum energy performance metric, or follow one of various alternate compliance paths. As the District should lead by example, any such standard would naturally need to apply to publicly-owned facilities, including, but not limited to, those operated by DGS.

Existing Buildings:

There are 128,000 buildings in the District. However, that figure includes a large number of small buildings that are not covered by the Green Building Act or the benchmarking law, which only apply to private buildings over 50,000 sq. ft. and public buildings over 10,000 sq. ft. The buildings covered by the Green Building Act and benchmarking law account for fewer than 2,000 buildings, which

account for only 1.6% of all properties in the District, but capture more than 48% of the total floor area (and 85% of the commercial floor area). If the District limits new building performance policies to the set of buildings already subject to benchmarking regulations, then the policy development can be driven by real data, while also increasing regulatory consistency. Table 1 shows the breakdown of covered buildings. Federal buildings and foreign missions will not be covered by this program as the District lacks authority to enforce laws on these entities.

Sector	Covered Property Size (sq. ft.)	Covered Floor Area (million sq. ft.)	Covered floor area as % of Sector floor area
Commercial	50k+	183	85%
Multifamily	50k+	91	60%
Institutional	50k+	36	69%
Municipal	10k+	35	96%
Industrial	50k+	6	50%
Single Family*	50k+	-	0%
Federal**	N/A	-	0%
Total		351	48%
There are no single-family properties this large. ****The District has no authority over Federally owned properties.***			

Table 1: Sectorial breakdown of floor area subject to benchmarking requirements

When considering applying MEPS to the public building portfolio, it should be noted that the 10,000 sq. ft. threshold used for benchmarking may not be the right threshold. The lesser energy consumption of smaller facilities, along with the staff and resource demands, may mean that when it comes to performance standards, a higher minimum size for public buildings may be appropriate; perhaps the same 50,000 sq. ft. threshold as is recommended for the private sector. If it is necessary for the District requirements to exceed the private-sector ones, it would be better to apply a more aggressive standard rather than including more facilities.

The task force considered multiple metrics for an energy performance standard, but the consensus from the Advisory Group and other experts is that, while imperfect, the ENERGY STAR score from US EPA is the most viable and widely applicable performance metric. Used by over 300,000 buildings nationwide, ENERGY STAR Portfolio Manager—the software tool that calculates the score—is

the industry standard for measuring operational performance. The ENERGY STAR score compares the energy performance of any building to similar buildings nationwide, adjusting for weather and occupancy characteristics such as operating hours, number of occupants, and number of computers. The building is then given a score that corresponds to the percentile it performs in—a building with a score of 50 is exactly average, a building with a score of 75 performs better than 75% of similar buildings, a building with a score of 10 performs worse than 90 percent of buildings, and so forth. Adjusting for the ways the building is occupied and used is of critical importance. Energy use intensity (energy use per square foot) is a poor measure of the *performance* of a building. For example, a building that is densely occupied and open for longer hours will use more energy but also will produce more economic value, and cannot be fairly compared to a building used less intensely. Therefore, the ENERGY STAR score adjusts for factors that are significantly correlated with energy consumption, such as operating hours and number of workers. Looking solely at energy use intensity would unfairly penalize buildings with energy-intensive uses like data centers and hospitals, and could negatively affect the competitiveness of District businesses. However, with respect to new construction, one might be able to apply a threshold based on the Energy Use Intensity (EUI) of a building designed to code, which would be important for buildings of types that cannot get an ENERGY STAR score. Fortunately, the number of buildings not eligible for a score is much smaller than it used to be.

On September 16, 2014, the EPA unveiled a score for Multifamily Buildings. As a result, an ENERGY STAR score can now be calculated for 95% of the privately-owned properties over 50,000 sq. ft. The small number of private buildings over 50,000 gross sq. ft. that are not eligible for a score cleanly fit into the ENERGY STAR system—including museums, libraries, mixed-use properties, and complex university campuses—could be exempted, or could work with DDOE on a case-by-case basis to determine a custom EUI threshold.

In a few cases, private sector stakeholders have raised legitimate concerns about the accuracy of the ENERGY STAR score. However, most of these concerns relate not to the methodology behind the score, but to the quality and scope of the statistically representative reference data that buildings are compared to. We expect many of the concerns to be resolved when Portfolio Manager is updated in 2015 with new reference data from the 2012 Commercial Building Energy Consumption Survey (CBECS). Furthermore, DDOE is also working on developing new methodologies for assessing and improving the quality of data submitted by building owners which will also help to alleviate concerns.

A specific ENERGY STAR MEPS threshold has not been determined at this time. Ideally, the District would want to use the benchmarking data to calculate what minimum score across the portfolio would be needed to yield a certain energy use reduction. The District can do this for public buildings. As shown in Table 2, the District know that if all District government office buildings and schools (the only property types eligible for a 1-100 ENERGY STAR Score for which the task force had data) had an ENERGY STAR score of at least 75, their combined energy use would be reduced by 36%. If they all had a score of 90 or above, their combined energy use would be reduced by 48%. As for non-ratable buildings, the District knows that if they all used less than the national median energy use for their property type, their combined energy use would be reduced by 34%. If all non-ratable buildings performed at least 25% better than the median site EUI, their combined energy use would be reduced by 46%.

DGS Building Type	Performance Standard	Estimated aggregate energy reduction for DGS buildings
Schools and Offices (Ratable)	ENERGY STAR 75	36%
Schools and Offices (Ratable)	ENERGY STAR 90	48%
Other DGS (Non-Ratable)	National Median EUI	34%
Other DGS (Non-Ratable)	25% above National Median EUI	46%

Table 2: Estimates for energy use reductions for DGS portfolio at different performance thresholds. Non-DGS government properties were not analyzed.

Unfortunately, technological barriers that have thus far prevented similar calculations from being done for the private buildings that submitted benchmarking data. From the task force's initial research, the task force is confident that an ENERGY STAR score of 50, the national average for each building type, would be insufficient to drive needed energy performance improvements in buildings. The task force analyzed the benchmarking data reported to date to determine how much energy would be saved if all the buildings required to report achieved a score of at least 50. The task force found that energy use would only be reduced by 12% due in part to the relative high performance of District buildings compared to the national average. On the other hand, a score of 75, which is the requirement for ENERGY STAR certification, would drive greater energy savings as more buildings would need to improve their current performance. The results for the public buildings suggest that even this might not be sufficient to yield a 50% reduction in energy

use, so it is further expected that the standard would also need to be raised over time. A threshold of 75 or above would allow DDOE to rely on EPA's ENERGY STAR certification process as verification on the quality of scores for buildings above the threshold, partially resolving concerns about data quality raised previously in this report.

New Construction:

There are several special considerations in how the MEPS would apply to newly constructed buildings. The District has made major strides in improving the energy and environmental performance of new construction in the past decade. Per the Green Building Act, LEED certification and models of the project's energy performance using the ENERGY STAR Target Finder tool are required for new construction and substantial improvements of private commercial buildings 50,000 gross sq. ft. and larger. In March 2014, the District adopted the latest versions of the International Energy Conservation Code (IECC 2012) and the city's first Green Construction Code based on the International Green Construction Code (IgCC 2012). The Green Construction Code's scope includes all commercial projects 10,000 sq. ft. and larger and all residential projects both larger than 10,000 sq. ft. and four stories and higher. Because the District has a history of progressive green building policies, the District is particularly well-positioned to implement MEPS with regard to new construction. The District would need to ensure that the minimum requirements of the current code align with the minimum performance threshold in order to ensure that a new building, operating as designed, would be able to meet the MEPS requirements once it began operation. The District has already taken a major step in direction with respect to District-owned buildings, as the Clean and Affordable Energy Act of 2008 mandates that all new public buildings over 10,000 sq. ft. of types eligible for an ENERGY STAR score be designed to earn an ENERGY STAR score of 75 or higher. However, being designed to earn a given score, and actually earning it, are two different things.

Although buildings can be designed using advanced energy models, it is quite common for buildings to underperform relative to the level of performance they were designed to achieve. The actual performance of buildings is greatly reliant on the behavior of the tenants in the building, how building systems are operated, the maintenance of major systems and equipment, weather patterns, the plug load of modern electronics, and other factors. Therefore, a number of jurisdictions and stakeholders are interested in "outcome-based" codes, wherein the building's compliance with the code depends on its actual energy

performance outcomes. An outcome-based pathway has been proposed for inclusion in the 2015 IgCC, which the District will likely adopt.[4]

When applied to new construction, the MEPS is very similar to an outcome-based code. However, instead of being an optional path, it would be mandatory for large buildings. For flexibility, owners could choose if they wanted the outcome standard to be based on an ENERGY STAR score, or based on the minimum energy use intensity requirements from the code. This would also allow the MEPS to be applied more easily to new buildings of types that cannot get an ENERGY STAR score, as a maximum Energy Use Intensity (EUI) can be calculated based on the code. For older buildings that cannot earn a score, a custom approach would be needed to determine a maximum EUI (perhaps based on minimum energy use intensity for that building type) or whether the building should be exempt.

If a building, once operating for one year, was not performing as it needed to, it would be judged non-compliant with the Minimum Energy Performance Standard. It would then have to pursue an alternate compliance path just as with any existing building, as described above.

The MEPS in Action:

The MEPS compliance cycle for existing buildings is shown in Figure 3. The MEPS would have a regular compliance cycle, for example five years. If a building's ENERGY STAR score is above the Performance Standard threshold and they are compliant, or if they do not meet the performance threshold but demonstrate significant reductions in energy use, they would be eligible for various rewards and recognition. Exemptions would also be provided in certain cases, such as financial hardship, use of renewable energy, or pending sale or demolition. Special considerations would also need to be made for affordable housing properties or historic buildings, though such buildings will not be exempt.

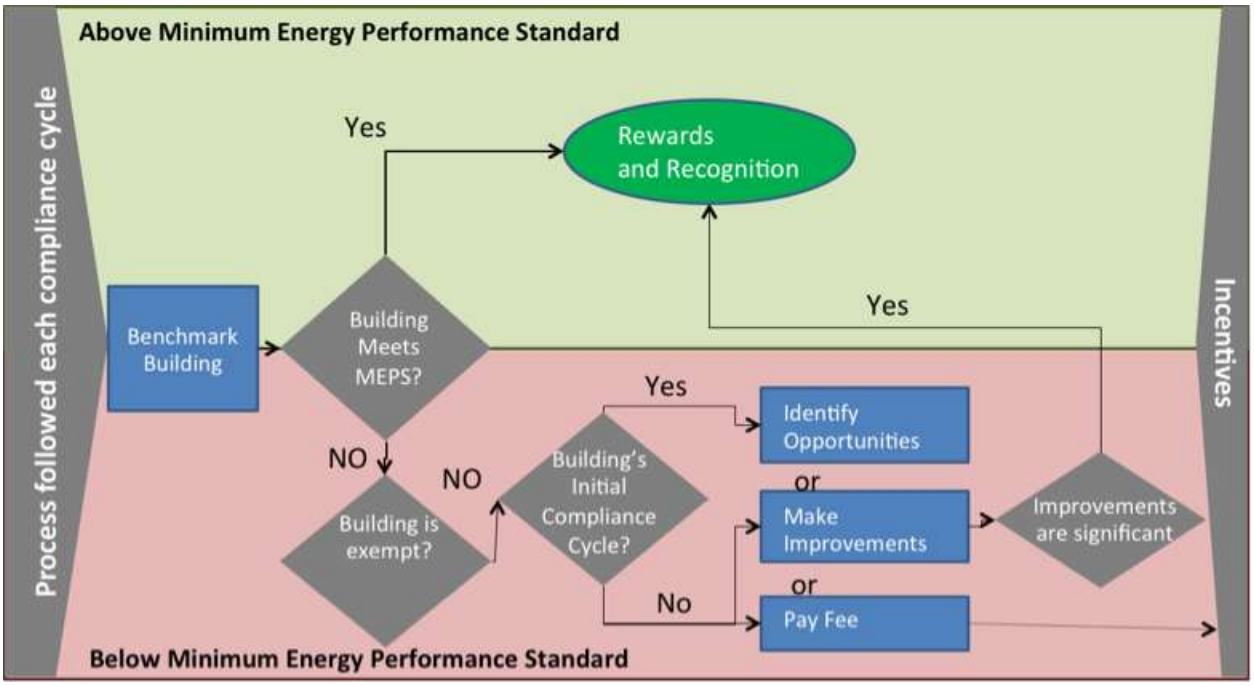


Figure 3: Flow chart of a single BEPS compliance cycle

For buildings that do not meet the MEPS, there are three alternative compliance paths. In the first compliance cycle, the building owner would only need to take actions to identify opportunities. Potential actions that could be recommended or required include:

- *Energy Audits*: Building owners would undertake an ASHRAE Level II energy audit or other energy assessments deemed to qualify as equivalent.[4] To comply, the owner would then submit the audit results to the District. Audits can be expensive, so the District should work closely with stakeholders to identify ways to reduce costs. A number of companies are developing lower-cost remote auditing tools that need to be evaluated to see if they can meet the rigor of an ASHRAE Level II energy audit. DGS has begun this investigation,

[4] *ASRHAE Level II Energy Audits consist of analyzing energy bills and conducting on-site surveys of buildings including their systems, uses, and operations and maintenance. Opportunities to reduce energy consumption are provided ranging from no-cost/low-cost operational changes to capital-intensive improvements. A cost-benefit analysis is provided for each opportunity.*

performing both remote audits and traditional ASHRAE Level II audits on a selection of its buildings.

- *Retrocommissioning*: Commissioning is the process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs and most efficient use of that equipment. Retrocommissioning is the same systematic process applied to existing buildings that have never been commissioned, or whose operations have drifted away from what was originally designed.[5] Essentially, retrocommissioning is a building "tune-up." Proper commissioning or retrocommissioning is one of the most cost-effective ways to improve energy efficiency, resulting in savings of 15% on average.[6] In addition, retrocommissioning can be a useful a tool to evaluate and correct issues relating to occupant behavior. It is encouraged that any retrocommissioning effort assure that the data feeds out of building automation systems are as open and easy for the owner to access as possible – which generally means communications will occur in the BACnet IP standard to the extent feasible.
- *Certification of Building Operators*: Building operator certification ensures that the people operating a building are properly trained. There are a number of certifications in the marketplace and different building types may need different forms of certification. The District would need to decide what certification program to use or develop. Local universities and technical schools can help provide the training.
- *Disclosure of Interval Energy Use:* The installation of AMI Smart Meters throughout the District allows for timely monitoring of energy use. As discussed above, DGS' experience has shown that tracking 15-minute interval data can reveal major inefficiencies and problems resulting in dramatically improved operations. The BuildSmartDC website could easily be used by private owners to disclose their interval data in the same manner as is now done by DGS.

It has yet to be determined which of these actions should be mandatory or optional, and under what circumstances. As a first step, the building owner would provide the District with a report detailing which of the planned improvements they would implement to achieve the MEPS by 2032. This plan would need to be updated each compliance cycle that a building still hasn't met the standard.

In five years, it is expected that a combination of these measures would result in operational changes that improve the building's score above the MEPS when the next compliance cycle rolls around since most buildings can save 10-20% due to operational changes alone. DDOE would evaluate options for enforcement should the building remain below the MEPS. In the next cycle the owner would have two options—make improvements, or pay a fine.

- *Make improvements:* After identifying improvements in their first compliance cycle, buildings still below the MEPS can comply by improving their energy performance over the next five year period. In keeping with the principles of performance-based policies, there should not be any requirements to undertake *specific* actions. For example, a policy of requiring building owners to perform all improvements recommended by an audit with a 5-year or less payback period is too prescriptive, and would introduce a strong motivation to game the system by reducing the conservation measures recommended by an audit, or claiming unrealistically long payback periods. However, compliance metrics need to be evaluated in order to ensure continual improvement.
  Nonetheless, many property owners, especially those whose property has an exceptionally low score, will need a plan to reach the MEPS target. This plan will help building owners determine whether to pursue a holistic deep retrofit project or make incremental improvements over the compliance cycle. If a property owner can schedule improvements at the optimum time and align energy conservation measures with shorter and longer payback periods, improvements with fast paybacks can help pay for the long-term projects. This is essential to helping owners not only implement simple changes, but to capitalize on deeper energy efficiency and utility savings. [7]
- *Pay Alternate Compliance Fee*: Building owners not willing to implement changes could have the option to pay a fee rather than meeting the standard. The revenue from this payment could go to the DCSEU to help fund improvements in other buildings. In order to ensure the payment was an adequate alternative to making the improvements in the building it would not be proposed as a flat rate. Rather, it would be calculated relative to the current energy use of the building and then energy improvements that would be needed to meet the MEPS. The result is that buildings with lower scores would have to pay more. Supplementing the DCSEU's Sustainable Energy

Trust Fund allocation with revenue from the alternate compliance fee would allow the money to be reinvested in the energy efficiency, and increase the leverage of the DCSEU.

b. **Expected benefits:** The Sustainable DC Plan calls for a 50% reduction in energy use, and a 50% reduction in greenhouse gas emissions by 2032. Large buildings, which account for the majority of energy use and carbon emissions from the District, are essential to meeting these goals. The Minimum Energy Performance Standard will work to accelerate the already impressive gains in energy performance occurring in the District. It will stimulate local job creation in energy auditing, building management, and construction. Improving the energy efficiency of buildings will also lower energy costs for building owners and their tenants.

c. **Completion Date:** Further investigation should be completed by December 2015

d. **Fiscal Impact:** Implementing the MEPS is estimated to cost approximately $500,000 in new FTEs and other administrative support at DDOE. The additional cost of increasing incentives to make compliance with the MEPS feasible, as described below, is substantial and has not been quantified. However, there are other funding options for those incentives besides District monies, as described below in the incentives section for this action.

e. **Political/Citizen Impacts:** While the proposed MEPS allows building owners considerable flexibility and time to comply, it would nonetheless likely face opposition from some owners and developers worried about additional regulatory burden. Building owners and their tenants, however, stand to benefit significantly from lower energy costs, and more comfortable and competitive buildings. The proposed phased implementation, combined with the first compliance cycle being focused on identifying improvements will allow building owners ample time to plan for the coming standards and incorporate anticipated improvements into their regular capital improvement planning. The policy would support the creation of green jobs by driving building owners to pursue energy efficiency projects, and through the certification of building operators and the generation of business for engineers.

f. **Legislative/Regulatory Impacts:** A Minimum Energy Performance Standard policy would require new legislation and supporting regulations.

g. **Recommendation:** The task force recommends that further study be undertaken into how a Minimum Energy Performance Standard would work most effectively in the District. Distinct issues will need to be addressed for both public and private buildings. Specific issues to be addressed with respect to District government buildings include:

1) What minimum ENERGY STAR score is reasonable;
2) What EUI ranges are created by energy codes for particular buildings;
3) What is the appropriate universe of public buildings to include;
4) Whether the code-based energy target should be a certain percentage above the code;
5) Who would enforce this, and how; and
6) What exemptions should be provided?

Specific issues to be addressed with respect to private buildings include:

1) The minimum ENERGY STAR score that would be required to yield a 50% energy use reduction by 2032 within that building group;
2) What EUI-based standards could be imposed for building types that are not eligible for an ENERGY STAR score;
3) What are the most viable legal structures for imposing these standards;
4) What the potential costs of compliance, and cost savings, would be;
5) What the non-compliance fees should be;
6) Where fees should be directed;
7) What exemptions should be provided;
8) Applicability for buildings less than 50,000 gross sq. ft.; and
9) Estimates of the cost of compliance and cost savings for sample buildings.

Providing incentives to help building owners upgrade their buildings is of critical importance to the success of this action. For public buildings, the task force recommends the creation of a budget mechanism or fund whereby agencies can receive a share of the energy cost savings. This should provide an incentive for agencies and occupants to help their buildings meet or exceed the minimum performance standard. The task force received the following feedback on effective incentives for private buildings from the Advisory Group and other stakeholders consulted:

- Simplicity is key.

- Incentives need to address all building owners and types, and in some cases technical assistance is needed to help owners identify cost-effective opportunities for improvement.
- Multifamily and small commercial buildings value technical assistance, project management, audit and design assistance, and so forth. This is especially true with performance-based programs that do not require prescriptive energy efficiency measures.
- Reaching the owner *at the right time* is critical—there is only rarely an opportunity for a deep energy retrofit. If a renovation is done without major energy efficiency improvements, a chance for deep savings is lost.

As the entity charged with driving energy demand reduction in the District, the DCSEU can and should be given a role in helping to achieve the MEPS goals. Furthermore, in order to meet the ambitious goal of reducing energy use by 50% by 2032, the amount of investment in energy efficiency, both private and public, will need to increase significantly. Smart incentives can play an important role in driving more private investment. Currently, DCSEU's programs are funded by District utility ratepayers through the Sustainable Energy Trust Fund. Many states, in addition to similar public benefit funds, have enacted energy efficiency resource standards (EERS) to expand the level of investment in energy efficiency and increase the resulting economic benefits. These 25 states require utilities to meet long-term, binding energy savings targets (up to 2.5% per year in leading states); and, importantly, provide utilities incentives and the ability to recover program costs in order to ensure sufficient funding is available to meet the targets. A recent survey by the American Council for an Energy-Efficient Economy (ACEEE) found that "every state that reported statewide electricity savings of over 1% in 2011 had an EERS in place."[8] In order to increase the level of investment and funding available for energy efficiency incentives, DDOE should work with the DC Public Service Commission (PSC) to explore policy options such as an EERS.

In most states, utility ratepayer-funded energy efficiency programs are prevented from claiming savings from any actions being taken due to an existing law. As these improvements would have to happen anyway, there is no "additional" savings from the utility program's involvement. Several states, however, are recognizing the important role the utility-funded incentive and technical assistance programs can play in supporting compliance with building energy codes. Similarly, the DCSEU could be potentially allowed to support compliance with the MEPS and count the resulting energy savings towards their performance goals.[9]

ACTION 3.2: Explore the feasibility of a Revenue-Neutral Carbon Pricing System. ("BEPS Option 2")

a. **Summary:** Carbon pricing creates a financial incentive for building owners and managers to reduce greenhouse gas emissions by capturing the environmental costs associated with energy use. Rather than requiring building owners to meet a minimum energy performance standard or prescribing a set of energy efficiency actions, a building would be assessed a periodic carbon pricing system based on the greenhouse gas emissions that are produced as a result of that building's operations. Greenhouse gas emissions would be measured based on energy use (e.g. electricity and natural gas purchased), accounting for both emissions from on-site consumption of natural gas and other fuels ("scope 1"), and emissions from the power plants that generate the electricity ("scope two"). Building owners would then have the flexibility and incentive to reduce their energy use anyway they choose in order to reduce their carbon footprint. The combined financial benefit of carbon pricing savings and utility bill savings increases the return on investment for energy efficiency. Buildings owners have four strategies to lower their carbon footprint, (1) reduce their energy use by improving their buildings' operations; (2) make capital improvements to improve their energy efficiency; (3) purchase cleaner, renewable energy through a Power Purchasing Agreement (PPA) or similar structure; or (4) install their own renewable energy systems. The carbon pricing would be revenue neutral, meaning that all of the revenue raised through the carbon pricing would be returned equitably in the form of tax reductions or dividends to all impacted entities, regardless of their carbon footprint. For those building owners that decrease their carbon footprint by improving the performance of their buildings, the carbon pricing could be smaller than their dividend or tax reduction. Figure 4 below illustrates one possible compliance pathway for carbon pricing. Electric suppliers (e.g., Pepco), purchase electricity from various power generators which they then supply to buildings in the District. The amount of carbon per unit of electricity (i.e., the emission factor) depends on the mix of coal, natural gas, nuclear and renewable power that is purchased by the supplier. Coal and natural gas create greenhouse gas emissions when they are burned to generate electricity, while renewable and nuclear energy do not. The emission factor is then multiplied by the amount of electricity used in the building (or tenant space if the building has individual meters or sub-meters) to calculate the carbon pricing structure. Building owners pay for their carbon footprint (either through their utility bills or some other mechanism), and then the money is returned to the building sector through dividends, tax credits, or incentives.

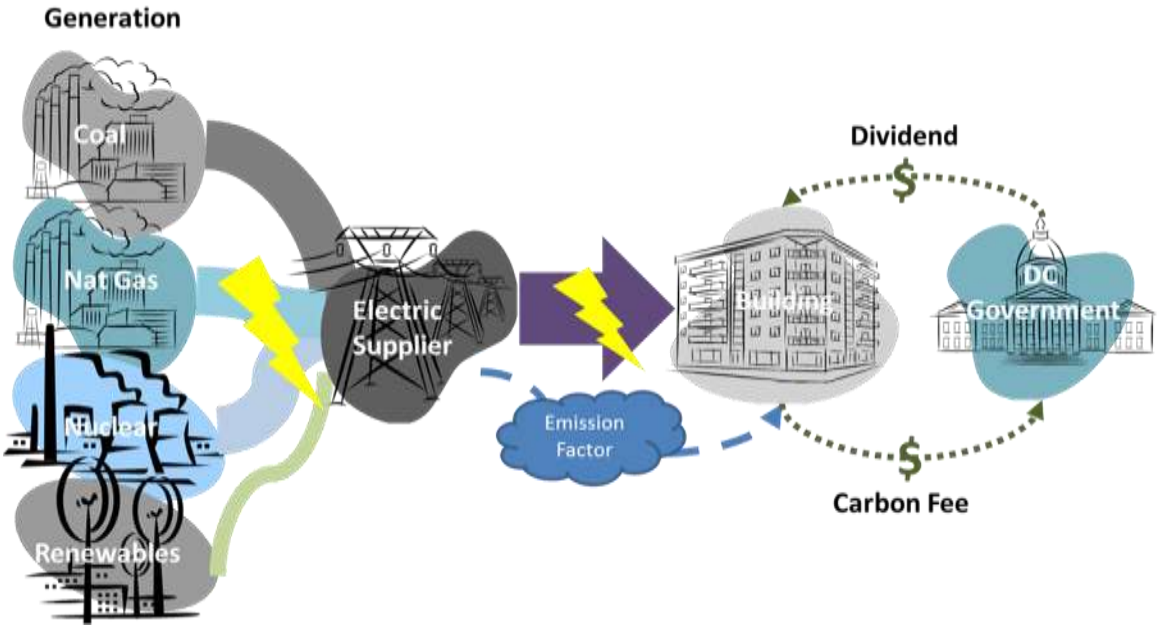


Figure 4: Potential Carbon Pricing Compliance Cycle

This program is similar to the one pioneered in North America by the Canadian Province of British Columbia, specifically to the commercial building sector. Other sectors could be included, or phased in over time, such as residential buildings and transportation, as is the case in British Columbia.

b. **Expected benefits:** Sustainable DC calls for the creation of financial tools that support climate protection by capturing the environmental costs of products and services. The proposed carbon pricing structure would capture the cost to public health, the environment, and the economy of emitting greenhouse gas pollution. By capturing this cost, the carbon pricing creates an economic incentive to reduce energy use and invest in distributed renewable energy; thus reducing greenhouse gas emissions while supporting additional economic growth in the clean energy sector. Because revenue would be returned equitably, buildings that cut their carbon footprint would receive the greatest dividend or tax reduction. This net tax reduction for many businesses and residents will help make the District more competitive and attractive to commerce. The Institute for Market Transformation has analyzed the impacts of a hypothetical carbon pricing program in the District and has shown that while carbon pricing would increase the cost of carbon-intensive electricity and natural gas (as intended);

the higher cost would encourage a corresponding reduction in energy consumption; and therefore actual monthly utility bills would not rise significantly, and on average could decrease. The policy would be designed to be phased in over time (slowly ramping up over 5-10 years), giving building owners time to upgrade their buildings and train their building operators to take advantage of opportunities to cut energy use.

c. **Completion date:** The recommended study of carbon pricing policy options and impacts could be completed by the end of FY2015.

d. **Fiscal impact:** Further analysis is necessary to determine the effective carbon pricing structure, which would determine the revenue raised and returned. The recommended study could be funded in part through the existing Green Building Fund. However, additional funding would allow for a more robust economic analysis.

e. **Political/Citizen Impacts:** Opposition to carbon pricing stems from the fact that a carbon price, by design, would increase the cost of energy. However, the political appeal of carbon pricing, compared to other regulatory approaches to reducing greenhouse gas emissions, is its flexibility and clarity. Following the example set in other jurisdictions, namely British Columbia, the carbon pricing should be phased in over time to allow building owners to adjust and take action to reduce their energy use in advance. Building owners should be free to choose the best strategies to reduce their carbon footprint. A similar carbon pricing policy, as has been established in British Columbia (2008), is being considered by the city of Portland and the state of Oregon. British Columbia's carbon pricing policy was established with limited business opposition by incorporating business input, gradually phasing in costs and by committing to return 100% of the revenue to residents and businesses through corporate and income tax cuts.[10] Support for the policy has grown while opposition has fallen, with early two-thirds of British Columbians approving it in 2012.[11] The carbon pricing policy is credited with contributing to British Columbia's greenhouse gas emissions falling 4% more per year than other Canadian provinces. The policy would support the creation of green jobs by driving building owners to pursue energy efficiency and distributed renewable energy projects to reduce their carbon footprint. Owners would also have an incentive to provide training and certification for building operation and maintenance staff to maximize their potential for energy savings. The impact on different sectors (i.e. private, university, affordable housing, etc.) would depend on how the revenue is returned. For example, the dividend approach could be structured in such a way to limit the economic impact on low-income residents

and affordable housing owners. British Columbia's experience has shown the importance of communicating clearly and often the connection between the carbon pricing and the tax cuts and dividends that the carbon pricing policy supports.

f. **Legislative/Regulatory impacts:** Legislation would be necessary to establish the carbon pricing policy and compliance framework. However, the task force's recommendation to first conduct an analysis of various carbon pricing approaches would not require additional legislation.

g. **Recommendation:** The task force recommends that an analysis of carbon pricing policy options, including the potential economic impacts and costs and benefits for property owners, be undertaken in FY 2015. It will also be important to gather input from a wider range of stakeholders so all parties are on notice that this is under consideration.
Driving improved building energy performance through carbon pricing is an innovative policy approach that will require further study to determine its viability and if determined to be viable, the best approach to move forward. Pursuing carbon pricing would continue the District's leadership on green building and place the city at the vanguard of carbon policy in the United States. The study would also provide an opportunity to gather input from stakeholders that would be impacted by the policy.

As a first step, the task force recommends that the District, in FY2015, conduct an analysis of various carbon pricing approaches to determine:

1) The potential economic impacts, including job creation benefits;
2) The carbon price necessary to drive needed greenhouse gas emissions reductions;
3) The optimal approach for returning revenue raised through the carbon pricing policy to maximize cost-effective energy savings and minimize the impact on lower-income residents;
4) How best to incorporate tax-exempt entities
5) How to properly reward renewable energy power purchases [5];

[5] *It is important that the carbon pricing not create a disincentive for investment in renewable energy. Many building owners in the District—including DGS—already purchase Renewable Energy Credits (RECs), otherwise known as "Green Power." A building owner purchasing RECs can't be exempt from the carbon pricing because (a) the REC market prices are so much lower than the carbon pricing options and (b) RECs are often purchased from existing renewable energy projects and do not necessarily spur new*

6) What if any building sectors should be exempt; and
7) Should sectors in addition to commercial buildings be included, such as residential buildings and transportation?

The revenue raised by the carbon pricing policy could be used to fund existing and new incentives to help building owners reduce their energy use and install renewable energy. As noted in the discussion of incentives that could support a minimum energy performance standard, smart incentives could help building owners reduce their carbon footprint and leverage private investment in energy efficiency. For example, the revenue from a carbon pricing policy (or the EERS described above) could be used to fund a "Green Bank" which could leverage private capital to provide low-cost financing for energy efficiency and clean energy projects. The recommended study would include an analysis of the most effective incentives that should be supported.

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investment in renewable energy. However, we also don't want to create a disincentive for the purchase of RECs, or penalize those companies and building owners that have shown leadership in purchasing green power. One option worth exploring is to allow owners to count their REC purchases as a credit against their carbon pricing. How organizations with large Power Purchase Agreements (PPAs) for renewable energy, which does directly lead to new renewable generation, should be handled, is not clear at this point.

Timeline

Project/Plan Schedule		
Fiscal Year	**Event/Action (DDOE)**	**Event/Action (DGS)**
2014	• Conduct carbon pricing study • Continued Stakeholder Engagement • Issue RFA and award grant for further research on recommendations	• Game Change initiative concludes
2015	• Grantee completes research • DDOE publishes findings of grant research • Develop legislation	• *DC 50x32* strategic plan completed • Installation of energy management systems for new buildings and major renovations > 50k sq. ft. • Pilot budget mechanism or fund for sharing the benefits of energy savings.
2016	• Develop implementing regulations for private buildings	• ENERGY STAR certification for eligible buildings >200k sq. ft. • Begin phasing in Building Operator Certification training • Add energy performance as key performance indicator (KPI) for building operators and managers Fund and support occupant engagement and conservation activities
2017	• First MEPS Requirements for Public Sector Buildings	• Connection of Energy Management Systems to centralized Network Operations Center • Sustainability coordinator at each agency • Each agency has a sustainability and energy conservation plan • First MEPS Requirements for Public Sector Buildings
2018	• First MEPS requirements for private sector buildings	• Building Operator Certification for all buildings >50k sq. ft.

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