Note: This proposal is the product of an independent advisory committee to GSA, and as such, may or may not be consistent with current GSA policy.

GSA Green Building Advisory Committee

September 10, 2014

Kevin Kampschroer
Director, Office of Federal High-Performance Green Buildings
U.S. General Services Administration (GSA)

RE: Recommendations for the Adoption of Net Zero Energy Buildings by All Federal Agencies

Dear Mr. Kampschroer:

This document summarizes the recommendations of the Green Building Advisory Committee (GBAC), with the purpose of making recommendations that will strengthen the federal government's net zero energy commitments and align with current legislative and executive mandates and directives. The recommendations described here are strong, and will bring the federal commitment in line with existing policy in California and elsewhere. Adoption of this policy will result in immediate operational cost savings, will be the most fiscally sound long-term strategy for the federal building portfolio, and will help the federal government lead the NZEB movement in the United States.

The overarching goal recommended by the GBAC is **for the federal government to verify at least 50% of their building area to achieve net zero energy (NZE) by 2030**. This goal can be achieved through new construction projects, planned renovation projects, new retrofit projects designed to help meet these NZE goals, or leasing NZEBs. Interim goals are provided to foster the growth of NZEB practices in the federal government as described in Section 3.

This paper describes the goals of the committee and serves as a roadmap for the GSA and other federal agencies to drive their existing building portfolios toward net zero energy.

Section 1: Purpose of the Net Zero Energy Buildings Task Group

The Green Building Advisory Committee (GBAC) established the Net Zero Energy Buildings task group to recommend how the federal government can strengthen its net zero energy commitments for both new construction and existing buildings, and establish interim targets to achieve these commitments. The task group assembled this document to present a set of high-level recommendations to the GSA, which apply to the adoption of NZE for all federal facilities. The recommendations outlined in this document were presented by the task group to the GBAC on September 10, 2014 and approved unanimously by the GBAC.

The NZE task group and the GBAC recommend that the GSA and the federal government take a leadership role in moving the United States toward a carbon neutral, more energy efficient, and resilient future by adopting these NZEB policies for new and existing buildings. The long-term advantages of making building improvements toward NZEB include lower environmental costs, lower operating and

maintenance costs, healthier buildings, better resiliency to power outages and natural disasters, and improved energy security.

Reducing building energy consumption first will have substantial environmental benefits and will often be the most cost effective approach to building or renovating federal buildings. This can be done through various means, including integrative design, energy efficiency retrofits, reduced plug loads, and conservation measures. Reduced energy consumption for new construction or major renovation projects makes it simpler and less expensive to meet the building's energy needs with renewable sources of energy. The federal government's leadership in efficiency and renewables will more rapidly drive down the cost of energy efficiency and renewable energy technologies, signal the industry to the importance of rapidly adopting these strategies into new and existing buildings, and encourage utility companies to use innovative strategies for more rapid and cost effective deployment of renewable energy generation and smart grid technologies.

While this committee can't develop solutions for all impediments to implementing NZE on federal buildings, we recommend a number of strategies that should assist the federal government in overcoming these impediments to implement the recommended policies described in this document.

Section 2: NZE Definitions

The NZE task group reviewed several definitions of NZE, and the following definitions are provisionally accepted:

NZE definitions for individual buildings

> **Net Zero Energy Building (NZEB):** *an energy-efficient building where the **actual source energy** consumption measured at the **site boundary** is balanced by **on-site renewable energy production** on an **annual basis**.*
>
> **Off-site-NZEB:** *an energy-efficient building where the **actual source energy** consumption measured at the **site boundary** is balanced by **on-site renewable energy production** to the maximum extent possible and then utilizes **off-site renewable energy production** to make up the difference on an **annual basis**.*
>
> **REC-NZEB:** *an energy-efficient building where the **actual source energy** consumption measured at the **site boundary** is balanced by **on-site renewable energy production** to the maximum extent possible and then utilizes Renewable Energy Credits (RECs) from certified sources to make up the difference on an **annual basis**.*

NZE definitions for groups of buildings:

> **NZEB Portfolio:** *a group of buildings on individual sites where the aggregate **actual source energy** consumption measured at the **site portfolio boundary** is balanced by **on-site renewable energy production** on an **annual basis**.*
>
> **NZEB Campus:** *a group of buildings on a contiguous site where the aggregate **actual source energy** consumption measured at the **campus boundary** is balanced by **on-site renewable energy production** on an **annual basis**.*

NOTE: Multi-story buildings occupying entire lots, especially those located in urban areas, may require off-site or REC NZEB strategies since their built-up area may result in commensurate energy requirements that are difficult to meet with on-site renewable energy generation; however, these buildings are not inherently unsustainable. Once travel- and transportation-related energy is factored in, these buildings most often have a lower per-occupant energy footprint than their suburban or rural counterparts. For similar reasons, off-site-NZEB strategies may be necessary in case of urban NZEB portfolios and urban NZEB campuses.

Section 3: Goals and Policy Recommendations for the GSA and other Federal Agencies

The overarching goal proposed by the committee is **for the federal government to verify at least 50% of their building area to achieve NZE by 2030**.

This goal and the other policy recommendations in this section echo policies by California, Massachusetts, and other state/local government entities and are supported heavily by a number of federal legislative mandates, federal executive orders, and existing GSA goals and targets related to NZE for federal buildings (policies listed in Appendix D). To reach the goal of converting half of its building area to NZE by 2030, the GSA and the federal government need to start planning as soon as possible so that expertise and experience can be developed for later large-scale accelerated changes.

The improvement in the performance of federal real property assets will continue to be an economically wise investment and a prudent use of taxpayer resources. The continued development and market diffusion of innovative technologies to cost effectively improve energy efficiency, and the accelerating deployment of renewable energy resources with rapidly falling costs will make this goal and the other recommended policies achievable in the given time frames.

The goals listed in this document can be achieved using a combination of new construction projects, retrofit projects, and NZEB leases on individual buildings, campuses, and portfolios of buildings. The committee recognizes that each federal agency has different building turnover rates, growth rates, and grouping strategies (individual buildings, campuses, and portfolios). Thus, verifying of 50% of federal building area as NZE by 2030 can be achieved using any combination of individual NZEBs, NZE campuses, and NZE portfolios.

Section 3a: Recommended Policy for the Federal Government

The Green Building Advisory Committee recommends the following policies to the GSA:

1. By ***2020***, the federal government should ***verify at least 1% of their total building area to be NZE.*** All federal agencies should start planning for developing NZE retrofits in 2017.
2. By ***2025***, the federal government should ***verify at least 10% of their total building area to be NZE*** AND each federal agency should ***verify at least 1 building to be NZE.*** All federal agencies should continue planning additional NZE projects.
3. By ***2030***, the federal government should ***verify at least 50% of their total building area to be NZE*** AND each federal agency should ***verify at least 25% of their building area to be NZE.*** All federal agencies should continue planning additional NZE projects.

Section 3b: Recommended Policy for the GSA

The Green Building Advisory Committee recommends the following policies to the GSA:

1. By ***2020***, each GSA regional operating division should ***verify at least 1% of their building area to be NZE (a minimum of one building).*** GSA should start planning for developing NZE retrofits in 2017.
2. By ***2025***, each GSA regional operating division should ***verify at least 10% of their building area to be NZE,*** and should continue planning additional NZE projects.
3. By ***2030***, each GSA regional operating division should ***verify at least 50% of their building area to be NZE,*** and should continue planning additional NZE projects.

NOTE: Funding for these upgrades should be available both from capital upgrades and from maintenance, repair and renewal sources. Alternative funding options are available, and several of them are outlined in Section 4. EISA 2007 requires that all leased buildings must have an earned ENERGY STAR label (with specific limited exemptions).

Section 3c: Recommended Policy for New Construction

In addition to the recommendations outlined above, the committee recommends specific policies for NZEB in new construction for all federal agencies (including the GSA). These policies are intended to support the goal of verifying 50% of federal building area as NZE by 2030, as newly constructed NZEBs will count toward this goal.

The Green Building Advisory Committee recommends the following policies to the GSA:

1. **By 2017**, each regional operating division (e.g., GSA regions, NPS regions) shall **initiate at least *20% of new construction project square footage*** to be NZE (a minimum of one NZE pilot project).
    a. This is consistent with current GSA goal to develop NZE experience in each region on various building types
    b. Agencies with larger building portfolios (and often more opportunities for these projects) should lead the effort to implement these recommendations.
2. **By 2020, all new construction initiated shall be designed and constructed to achieve NZE by 2030**.
    a. This is consistent with current executive order requirement.

Section 3d: Clear disclosure of energy use

The GBAC recommends that each federal building listed as NZE, whether leased or owned, be required to publish its annual net energy use, including (but not limited to): annual energy consumption (by fuel source), annual energy production (by type), and annual energy offset via purchases or Renewable Energy Certificates.

Section 4: Implementation Recommendations: Barriers and Solutions

The simplest way to achieve a NZEB is to drastically reduce building energy use through efficiency, and to directly implement renewable energy systems (e.g., solar PV) to balance the building's energy consumption. The technology exists today to cost effectively build new NZE buildings, perform NZE remodels, develop NZE campuses, and even plan NZE communities. However, there are many barriers to effective implementation of energy use reduction and renewable energy installation strategies. These

include: utility regulations that discourage building owners from generating net "positive" energy, the lack of smart grid and storage technologies to allow for a higher percentage of renewable energy to be introduced to the grid, limits on financing, and the availability of abundant low cost energy generated from high carbon emission sources that does not account for the environmental impacts of increased mining, pollution, and global warming.

One common example of a barrier to buildings reaching "net zero energy" or even "net positive energy" is utility net-metering rules. These rules often lead utilities to buy excess renewable energy at retail time-of-use rates from customers until the annual utility bill reaches zero, at which point the customer effectively donates the excess power to the utility. If time-of-use rates are high in the afternoon and low at night, buildings effectively sell their excess PV generated power at high cost and buy back grid power at low cost. The result is that the utility bill reaches net-zero cost well before the building reaches net-zero energy on an annual basis, leading most firms to opt to put in a system that targets net-zero cost rather than net-zero energy. The federal government should work to address this issue by targeting net zero energy in the most economically advantageous manner.

This committee believes that the GSA could use several triggers to determining the most cost-effective and impactful **opportunities** for new NZE projects. Several **tools** can then assist the GSA and other federal agencies in taking advantage of these opportunities and overcoming the potential barriers associated with renewable energy and energy efficiency projects. Executing NZE projects will help the GSA and other federal agencies achieve **compliance** with federal goals and directives and become leaders in the NZE space.

Section 4.1: Opportunities

Opportunities for NZE projects can lower the first cost of NZE projects and help them align better with planned facility improvements. Many of the prime opportunities for NZE projects are presented as triggers that occur over the course of a building's life.

One example of a trigger is demonstrated by the concept of "right-timing" building retrofit projects, so that these projects align with existing plans for invasive and capitally intensive renovation projects. These types of projects could be triggered by renovation plans, equipment nearing the end of its life, or changes to building code. By "right-timing" NZE projects, the incremental costs of building energy upgrades are much less significant than the costs of stand-alone NZE retrofit projects.

Another trigger could be a local constraint or vulnerability in the local energy supply (such as the electricity grid) where local utilities may encourage special efforts towards NZE buildings and campuses that help reduce peak and base loads. For example, the State of Connecticut is supporting the development of microgrids to improve the reliability of the local energy grid. New York and New Jersey have recently established funds to deploy similar approaches across those states, particularly to improve the resilience of critical community facilities.

Other triggers include recent acquisition of property, refinancing, changing utility rates and rate structures, and portfolio planning.

Section 4.2: Tools

Tools to assist the GSA and other federal agencies in executing renewable energy and energy efficiency projects include unique financing options, pre-existing agency tools, and other strategies that the federal government may not have considered.

Energy Savings Performance Contracts

An energy savings performance contract (ESPC) is a financing mechanism that helps federal agencies finance energy-savings projects through projected cost savings. The benefits are outlined well in the following text from the DOE[1]:

> *"[ESPCs] allow Federal agencies to complete energy-savings projects without up-front capital costs and special Congressional appropriations.*
>
> *An ESPC is a partnership between a Federal agency and an energy service company (ESCO). The ESCO conducts a comprehensive energy audit of Federal facilities and identifies improvements to save energy. In consultation with the Federal agency, the ESCO designs and constructs a project that meets the agency's needs and arranges the necessary funding. The ESCO guarantees that the improvements will generate energy cost savings to pay for the project over the term of the contract (up to 25 years). After the contract ends, all additional cost savings accrue to the agency."*

The government has its own process for procuring ESPCs with a list of ESCOs that have been awarded an indefinite delivery, indefinite quantity (IDIQ) contract that allows them to bid on federal work. The GSA and countless other agencies have been using this methodology to finance large energy-saving projects without seeking additional congressional funds or budgetary funds that exceed their expected operating costs under business-as-usual conditions.

ESPCs can be combined with several of the other solutions listed in this section for increasingly beneficial results. For example, an agency might recognize an upcoming capital improvement project on their agency's schedule (e.g., full building renovation, HVAC replacement, or building envelope upgrades) and align that project with the procurement process for an ESPC. Often, capital improvement projects can be planned to be included as part of the ESPC or to work alongside the ESPC, ensuring that all contractors are working together to devise the best solutions. Agency funding can help fund project components that may not fall under a traditional ESPC or can help to shorten the term of the project.

Power Purchase Agreements

A power purchase agreement (PPA) is a common financing mechanism for renewable energy (RE) projects. Within a PPA structure, a landowner grants an RE system developer permission to install, operate, and maintain an RE system on the landowner's property, and to sell power back to the landowner at an agreed upon price and period of time. Thus, the landowner receives the benefits of using RE without using the upfront capital to purchase the system or the long-term capital to maintain the system. In many cases, the landowner is also able to purchase RE from the system developer at or below grid parity.

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[1] Definition from http://energy.gov/eere/femp/energy-savings-performance-contracts

While PPAs are a common financing solution for solar PV projects, there are several federal policies that make the use of PPAs challenging for civilian agencies. Currently, electricity contracts for these agencies are limited to 10 years or less, with only a few exceptions. This prevents many PPAs from being viable, as their amortization periods are typically longer than 10 years, so system developers would not typically recover their costs in less than 10 years.

Additionally, recent OMB guidance requires that equipment ownership transfer to the government at the end of a PPA. This requirement prevents system developers from claiming RE tax credits, further increasing contract amortization periods and making PPAs less financially attractive.

With these issues and others, federal agencies will have difficulty reaching the federal RE purchasing goals described in the Presidential Memo of December 5, 2013[2], which states that 20% of federal electricity purchases should come from renewable energy by 2020.

In order to help the GSA and other agencies meet these goals, the committee recommends that the federal government allow civilian agencies to sign extended PPA contracts and allow agencies to forfeit ownership of the equipment at the end of PPA contracts. Furthermore, the federal government should be actionable in identifying and resolving any other impediments to using PPAs and other alternative financing mechanisms for federal projects.

Life-Cycle Cost Analysis

The recent report by the National Research Council[3] concluded that "the additional incremental costs to design and construct high-performance or green buildings are relatively small when compared to total life-cycle costs" (p. 6) and recommended "investment approaches that analyze the total cost of ownership, a full range of benefits and costs, and uncertain future conditions as part of the decision-making process" (p. 77). As the cost of energy increases (particularly in specific locations or conditions) and as the cost of energy efficiency and renewable energy alternatives decline, NZE projects will be more likely to be economically efficient.

Revolving Green Funds

The Energy Policy Act of 2005 (EPAct 2005) and the Energy Independence and Security Act of 2007 (EISA 2007) include provisions and mechanisms that allow federal agencies to create revolving funds for facility investment projects (renovation, rehabilitation, and new construction) to meet the federal facility performance objectives. The revolving fund for facility improvement or replacement is financed through the cost savings obtained through facility upgrades. The revolving fund can provide significant additional financing for agency projects in addition to annual budget allocations from Congress.

The effective use of revolving funds requires verification, analysis, and documentation of cost savings from facility and portfolio improvements, which can be facilitated with the recent installation of monitoring equipment (as required by legislative mandates, and accomplished

[2] Presidential Memo "Federal Leadership on Energy Management" (December 5, 2014)

[3] National Research Council, Energy-Efficiency Standards and Green Building Certification Systems Used by the Department of Defense for Military Construction and Major Renovations, 2013

across all federal real property assets as of 2012). As noted in a report by the National Research Council[4] (p. 65):

> "Revolving funds …would allow facility program managers to consider the full costs and benefits of proposed actions and to make up-front investments that could have long-term paybacks in operating efficiencies. Revolving funds could be used to reduce the backlog of maintenance and repairs, fund major repairs and replacements, or pay for unfunded legislative requirements."

Renewable Energy Certificates (RECs)

Renewable energy certificates (RECs) provide the government with a strategy to reach NZE without installing renewable energy systems on their property. According to the EPA[5]:

> *"A REC represents the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation. A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source."*

To ensure the validity and reliability of RECs, agencies must use 3rd party REC verification. Verification, in combination with tracking and reporting, will ensure transparency and accountability for meeting NZE targets. In addition to being verified, RECs must be held for a long enough period of time to ensure that the applicable federal building(s) are consistently REC-NZE. If there are any impediments to REC verification or to holding RECs for sufficient periods of time, they must be addressed.

This committee would like to reiterate their recommendation to prioritize NZE strategies that do not require RECs over REC-NZE strategies.

"Freeze the Footprint" Consolidations

GSA and other federal agencies can leverage the "Freeze the Footprint" consolidations of federal real property assets, as required under Presidential Memo 2010 and EO 13589, by strategically divesting of properties that no longer support the mission and performance objectives for each agency. The overall performance of the remaining portfolio will improve as the number of excess and underutilized properties held by each federal agency decreases.

Net Metering Utility Credits

The Public Utility Commissions (PUCs) in some states recognize that the value of on-site renewable energy (such as from NZE buildings and campuses) provides benefits in excess of the commodity value of energy as distributed on the grid. These benefits may include reduced air pollution and water use from fossil fuel-based energy production; new local jobs; economic opportunity from local production, installation, and maintenance; and improved disaster resilience. Minnesota and Austin, TX have established a value-of-solar tariff (VOST) that incorporates these additional benefits, which is currently greater than the retail rate for electricity. Other PUCs (including Nevada, Texas, Hawaii, and Massachusetts) have established net-

[4] National Research Council, Stewardship of Federal Facilities, 1998

[5] Definition from http://www.epa.gov/greenpower/gpmarket/rec.htm

metering policies that provide full credit for on-site renewable energy generation. In some cases and during some seasons, a NZE building or campus may produce more energy than it uses, and may receive either an account credit or a direct payment.

Section 4.3: Compliance

Compliance with executive orders, agency goals, and other federal directives is important to furthering the goals of the GSA and the federal government as a whole. Surpassing these directives and setting new standards for federal building performance can help elevate the GSA and other agencies, not only as leaders in the federal building space, but as leaders in the overall commercial building space.

The details in section 3 above indicate a few of the many ways in which driving toward NZE in GSA buildings will comply with existing executive orders and other goals and directives. Additionally, the "freeze the footprint" consolidations detailed under the Tools section serves the dual purpose of removing energy-consuming buildings from federal portfolios while complying with Executive Order. Outside of those directives, this committee believes that this document can help the GSA and other agencies comply with federal requirements for life-cycle cost analysis of federal capital projects.

All Federal agencies are required to conduct life-cycle cost analysis for capital projects (under the National Energy Conservation Policy Act (1978), the Federal Energy Management Improvement Act (1988), the Energy Policy Act (2005), and the Energy Independence and Security Act (EISA 2007)) to select economically efficient capital investments. EISA extended the maximum Study Period to 40 years, and further specified that projects may be "bundled" in the LCCA to meet the economically efficient investment threshold. Agencies can therefore use an appropriate long-term Study Period and bundled projects (such as for portfolios or campuses) to assess the economic efficiency of NZE investments.

Section 5: Conclusion

The GSA can lead the federal government and the country as a whole in delivering compliant high performance NZE buildings. Through the use of the strategies recommended within this document and others, the federal government can attain, and even surpass the recommended goal of verifying 50% of federal building area as NZE. The GBAC believes strongly that achieving this goal will decrease agency operating costs, provide a number of immeasurable benefits to building occupants, increase the federal government's energy security, and provide the most economically sound long-term solution for managing the federal building stock.

Thank you for your careful consideration of this document and for the opportunity to recommend these historic policies. On behalf of the Green Building Advisory Committee, I respectfully submit these recommendations for your consideration.

Sincerely,

Bob Fox
Chair, GSA Green Building Advisory Committee

Appendix A: Green Building Advisory Committee (GBAC) Members

Last name	*First name*	*Organization*	*Role*
Fox	*Bob*	*Cook Fox Architects*	*Chair*
Beightel	*Eric*	*U.S. Department of Transportation*	*Member, Federal*
Cordova	*Cynthia*	*Department of Veterans Affairs (VA)*	*Member, Federal*
Garvey	*Will*	*Council on Environmental Quality*	*Member, Federal*
Green	*Bucky*	*U.S. Environmental Protection Agency (EPA)*	*Member, Federal*
Herz	*Jonathan*	*U.S. Department of Health and Human Services*	*Member, Federal*
MacDonald	*Jennifer*	*U.S. Department of Energy*	*Member, Federal*
McNabb	*Nancy*	*National Institute of Standards and Technology (NIST)*	*Member, Federal*
Sullivan	*Maureen*	*U.S. Department of Defense*	*Member, Federal*
Unruh	*Timothy*	*U.S. Department of Energy*	*Member, Federal*
Wadia	*Cyrus*	*Office of Science and Technology Policy*	*Member, Federal*
Costello	*Amy*	*Armstrong World Industries*	Member, Non-Federal
Deane	*Michael*	*Turner Construction Company*	Member, Non-Federal
Dutta	*Projjal*	*New York State Metropolitan Transportation Authority*	Member, Non-Federal
Kaneda	*David*	*Integral Group*	Member, Non-Federal
Kats	*Greg*	*Capital-E*	Member, Non-Federal
Kienzl	*Nico*	*Atelier Ten*	Member, Non-Federal
Olgyay	*Victor*	*Rocky Mountain Institute*	Member, Non-Federal
Owens	*Brendan*	*U.S. Green Building Council*	Member, Non-Federal

Peterson	*Kent*	*P2S Engineering*	Member, Non-Federal
Rohde	*Jane*	*JSR Associates*	Member, Non-Federal
Shane	*Brendan*	*Washington, DC Department of Environment*	Member, Non-Federal
Slaughter	*Sarah*	*Built Environment Coalition*	Member, Non-Federal
Wauters	*Drake*	*Perkins + Will DC*	Member, Non-Federal

Appendix B: NZE Task Group Members

Last name	*First name*	*Organization*	*Title*
*Burgoyne**	*Dan*	*State of California, Department of General Services*	*Sustainability Manager*
Cordova[o]*	*Cynthia*	*Department of Veterans Affairs (VA)*	*Director, Green Mgmt Program Service*
Green[o]*	*Bucky*	*U.S. Environmental Protection Agency (EPA)*	*Chief, Sustainable Facilities Practices Branch*
Dutta[o]*	*Projjal*	*New York State Metropolitan Transportation Authority*	*Director, Sustainability Initiatives*
Fox[o]*	*Bob*	*Cook Fox Architects*	*Partner*
*Jensen**	*Sarah*	*U.S. Department of Energy*	*Federal Energy Management Program*
Kaneda[o]	*David*	*Integral Group*	*Managing Principal*
Kienzl[o]*	*Nico*	*Atelier Ten*	*Director*
*Maloskey**	*Dennis*	*Pennsylvania Governor's Green Government Council (GGGC)*	*Director of Sustainable Engineering Development*
McNabb[o]	*Nancy*	*National Institute of Standards & Technology (NIST)*	*Manager, Building & Fire Codes & Standards*
*Nadel**	*Barbara*	*Barbara Nadel Architects*	*Principal*
Olgyay[o]	*Victor*	*Rocky Mountain Institute*	*Principal*
Peterson[o]*	*Kent*	*P2S Engineering*	*Chief Engineer*
Shane[o]	*Brendan*	*Washington, DC Department of Environment*	*Chief, Office of Policy and Sustainability*
Slaughter[o]	*Sarah*	*Built Environment Coalition*	*President*
*Stamper**	*Christina*	*Department of Veterans Affairs (VA)*	*Green Management Program Service*
Wauters[o]	*Drake*	*Perkins + Will DC*	*Technical Director, Associate Principal*

**Member of the 2013 Task Group*
[o]Member of the 2014 Task Group

Appendix C: Prioritization of renewable energy sources used to achieve NZE

The NZE task group reviewed various sources of renewable energy and recommended prioritizing renewable energy sources used to achieve NZE as follows: To coordinate with prioritization within the December 5, 2013 Presidential Memo on Federal Leadership on Energy Management, quoted below:

(i) installing agency-funded renewable energy on-site at federal facilities and retain renewable energy certificates;

(ii) contracting for energy that includes the installation of a renewable energy project on-site at a federal facility or off-site from a federal facility and the retention of renewable energy certificates for the term of the contract;

(iii) purchasing electricity and corresponding renewable energy certificates; and

(iv) purchasing renewable energy certificates.

Appendix D: Relevant policy and mandates

The following mandates and directives require that the federal agencies improve the performance of federal real property assets, including the efficient use of energy and water resources (with specific reduction targets by specific dates), reduction in solid and hazardous waste, increases in the use of renewable energy sources, disposal of underutilized or excess properties, and adaptation of facilities for climate change impacts. The related federal mandates include:

- Energy Policy Act of 2005 (EPAct 2005)
- Energy Independence and Security Act of 2007 (EISA 2007)
- Executive Order "Strengthening Federal Environmental, Energy, and Transportation Management" (EO 13423)
- Executive Order "Federal Leadership in Environmental, Energy, and Economic Performance" (EO 13514)
- Presidential Memo "Disposing of Federal Unneeded Real Estate 2010" (June 10, 2010)
- Executive Order "Promoting Efficient Spending" (EO 13589)
- Executive Order "Preparing the United States for the Impacts of Climate Change" (EO 13653)
- Presidential Memo "Federal Leadership on Energy Management" (December 5, 2014)
- Presidential Policy Directive "National Preparedness" (PPD-8)

Appendix E: Other reference documents

2007 California Energy Commission—Integrated Energy Policy Report—Executive Summary (Building goals: net zero energy for 100% of new homes by 2020, net zero energy for 100% 0f new commercial buildings by 2030, page 27).
See: http://www.energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CMF-ES.PDF

2013 California Energy Commission—Integrated Energy Policy Report (state building goals accelerated to 100% of new buildings to be net zero energy by 2025, page 5).
http://www.energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CMF-ES.PDF

CA Energy Efficiency Strategic Plan—January 2011 update (50% of existing buildings to be zero net energy by 2030, section 3, page 29).
http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf

CA Governor Brown's Executive Order B-18-12 (50% of existing state buildings to be zero net energy by 2025).
http://gov.ca.gov/news.php?id=17506