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Office of Construction & Facilities Management

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SUSTAINABLE DESIGN MANUAL

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Office of Construction & Facilities Management

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Contact:

James Symanski, Jr., P.E., CEM, LEED AP
Sustainable Design Program Manager
Facilities Standards Service
Office of Facilities Planning
Office of Construction & Facilities Management
james.symanski@va.gov

CONTRIBUTORS

Thomas Basham
Director, Design & Construction
National Cemetery Administration
U.S. Department of Veterans Affairs

Donald Campbell
National Cemetery Administration
U.S. Department of Veterans Affairs

Lucian "Paul" Cherry
Office of Construction & Facilities Management
U.S. Department of Veterans Affairs

Cynthia Córdova
Director, Green Management Program Service
Office of Asset Enterprise Management
U.S. Department of Veterans Affairs

Gary J. Krupa
Veterans Health Administration
U.S. Department of Veterans Affairs

Jatinder "Jeet" Kumar
Office of Construction & Facilities Management
U.S. Department of Veterans Affairs

Glenn Madderom
National Cemetery Administration
U.S. Department of Veterans Affairs

Donald Myers
Director, Facilities Standards Service
Office of Construction & Facilities Management
U.S. Department of Veterans Affairs

Susan Nogas
Office of Asset Enterprise Management
U.S. Department of Veterans Affairs

John K. Park
Office of Asset Enterprise Management
U.S. Department of Veterans Affairs

Douglas D. Pulak
Office of Construction & Facilities Management
U.S. Department of Veterans Affairs

Joseph Sabel
Office of Asset Enterprise Management
U.S. Department of Veterans Affairs

Lloyd H. Siegel
Assoc. Exec. Director, Office of Facilities Planning
Office of Construction & Facilities Management
U.S. Department of Veterans Affairs

Christina Stamper
Office of Asset Enterprise Management
U.S. Department of Veterans Affairs

James Symanski, Jr.
Office of Construction & Facilities Management
U.S. Department of Veterans Affairs

Lam Vu
Office of Construction & Facilities Management
U.S. Department of Veterans Affairs

Amanda Wehner
Office of Construction & Facilities Management
U.S. Department of Veterans Affairs

Mark Wiersma
Office of Construction & Facilities Management
U.S. Department of Veterans Affairs

Have a question, comment, or suggestion?

Contact CFM's Facilities Standards Service via email, TIL@va.gov.

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FOREWORD

The U.S. Department of Veterans Affairs (VA) has a unique mission to provide benefits to Veterans of the United States military. The facilities used to accomplish this important mission have an impact both on the Department's ability to meet the needs of those Veterans, and on the communities in which they are located. Those impacts come in the form of social, economic, and environmental impacts and can be both positive and negative.

Sustainable design requirements, as established in numerous Federal mandates, VA policies, and VA design and construction standards, help to ensure VA's facilities support the VA mission in a manner that is socially, economically, and environmentally sustainable.

This Sustainable Design Manual has been developed by VA's Office of Construction & Facilities Management (CFM) in concert with other elements of VA and strives to cover all of the requirements mandated by various Laws, Executive Orders, Regulations, and VA policies. CFM's intent for this manual is to consolidate the wide range of sustainable design requirements into one easy-to-navigate resource.

Compliance with this manual will help VA improve its ability to serve our nation's Veterans in a high performance sustainable manner, while also ensuring compliance with the Federal mandates and VA policies.

Lloyd H. Siegel, FAIA
Associate Executive Director
Office of Facilities Planning

EXECUTIVE SUMMARY

Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, and Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, require all Federal agencies to implement practices that will result in high performance Federal buildings. These practices include design, construction, operations and management, maintenance, and deconstruction.

Sustainable design plays a critical role in the lifecycle management of high performance buildings, and establishes a foundation upon which the other aspects of high performance building management will depend for their success.

The practice of sustainable design extends across various disciplines within the fields of engineering and architecture. The following areas play a major role in sustainable design:

- Energy Efficiency
- Low-Impact Development
- Materials Selection
- Renewable Energy
- Site Selection
- Transportation
- Water Efficiency

Numerous Federal mandates and VA policies establish sustainable design requirements by which all VA facilities must be designed. The mandates and policies assist VA in accomplishing its mission by encouraging practices which are socially, economically, and environmentally responsible.

This manual strives to capture all mandated requirements into one easy-to-use manual. Compliance with this manual will help to ensure compliance with all sustainable design-related Federal mandates and VA policies.

This manual replaces the VA *Sustainable Design and Energy Reduction Manual*, released in April 2010. Though there have been few major changes to the Federal mandates since April 2010, this new manual clarifies many of the requirements identified in the previous manual.

1. GENERAL

1.1. BACKGROUND

a. Sustainable design is the practice of adapting or creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's lifecycle, including planning, design, construction, operation, maintenance, renovation, and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. Sustainable design serves as a vital foundation for achieving green, high performance buildings.[i]

b. VA places an emphasis on designing and constructing high performance sustainable buildings and continuously improving the sustainability of its existing facilities. By building, operating, and maintaining sustainable facilities, VA enhances its ability to honor and serve America's Veterans.

c. The Federal government has numerous laws, Executive Orders, and regulations that require the implementation of sustainable practices in building siting, design, construction, operation, and maintenance. This manual consolidates the requirements of applicable laws, Executive Orders, and regulations, along with VA policies and goals, to provide a holistic approach to sustainable facility design and construction.

1.1.1. Resource Conservation

a. VA recognizes that many of the resources it relies on to perform its mission are finite and that VA plays an important role in ensuring the continued existence of valuable resources.

b. During the design and construction of its facilities, VA strives to minimize negative impacts on fiscal, environmental, and social resources while maximizing its use of techniques and materials that provide an overall positive benefit to all.

1.1.2. Resource Security

a. VA relies on numerous resources to accomplish its mission. It recognizes that human or natural influences can potentially interrupt the supply of many of those resources. Without those resources, VA would struggle to accomplish its missiong. Power outages, for example, can cause a significant disruption to VA operations.

b. To reduce the negative impacts of resource scarcity on VA operations, projects should strive to minimize dependence on interruptible resources in its facilities. When designs include interruptible resources, such as grid-based power, water, and/or natural gas, include backup supplies or alternate sources of supply, in compliance with applicable design manuals.

1.1.3. Resilience

a. VA recognizes the link between facility resilience and facility sustainability. A facility that can withstand damage caused by natural and human influences can continue to perform its mission. Resilient facilities also conserve resources by avoiding the need to rebuild or find alternate operational space.

b. VA facilities categorized as “mission critical” must remain operational and survive a 4-day or longer power supply disruption, as well as providing an uninterrupted water supply in the event of a natural disaster, pandemic, or bio-chemical attack (see VA *Physical Security Design Manual*). Resiliency and sustainability can be mutually supporting objectives; thus, design teams should explore possible ways to use sustainable practices to accomplish resiliency goals. It is important to merge resiliency goals with sustainability goals at the outset of a project.

1.2. INTENT

1.2.1. CFM’s sustainable design program, and this manual, aim to enhance the services VA facilities provide to the nation’s Veterans. It accomplishes this by improving facility performance, conserving resources, improving occupant health, and more.

1.2.2. Questions regarding project-specific application of the requirements shown in this manual should be directed to CFM’s Consulting Support Service (CSS) by email at cfm-css@va.gov. Questions regarding the content of this manual should be directed to CFM’s Facilities Standards Service (FSS) by email at TIL@va.gov.

1.3. MANDATORY USE

1.3.1. Compliance with this manual is mandatory for all categories of construction[ii], renovation, and non-recurring maintenance projects.

1.3.2. Major New construction and Major Renovation projects must meet all requirements outlined in this manual.

1.3.3. All build-to-suit lease projects shall be treated, and meet the same requirements, as agency-owned new construction projects.

1.3.4. Non-recurring maintenance (NRM) projects must meet the requirements outlined in the following sections of this manual:

a. Chapter 1 (General)
b. Section 2.2 (Life-Cycle Cost Analysis)
c. Section 2.3 (Rebates and Incentives)
d. Section 4.3 (Energy Efficient Products and Equipment)
e. Section 5.2 (Water-Efficient Product and Equipment Requirements)
f. Section 6.5 (Low-Pollutant Emitting Materials)
g. Section 6.7 (Environmental Tobacco Smoke Control)
h. Section 6.8 (Toxic and Hazardous Materials)
i. Chapter 7 (Environmental Impacts of Materials), *except Section 7.4 (Composting)*

1.3.5. Minor Construction projects must meet requirements outlined in the following sections of this manual:[iii]

a. Chapter 1 (General)
b. Section 2.2 (Life-Cycle Cost Analysis)
c. Section 2.3 (Rebates and Incentives)
d. Section 2.5.2 (Validating Compliance, Minor Construction/Renovation Projects)

e. Section 2.7 (Metering) (*Only if project involves a system shown*)
f. Section 3.1.8 (Site Selection, Climate Change Adaptation)
g. Section 4.2 (Renewable Energy) (*Renewable energy projects only*)
h. Section 4.3 (Energy-Efficiency Products and Equipment)
i. Section 5.2 (Water-Efficient Products & Equipment Requirements)
j. Section 6.5 (Low-Pollutant Emitting Materials)
k. Section 6.7 (Environmental Tobacco Smoke Control)
l. Section 6.8 (Toxic and Hazardous Materials)
m. Chapter 7 (Environmental Impacts of Materials), *except Section 7.4 (Composting)*

1.4. MASTER CONSTRUCTION SPECIFICATIONS

1.4.1. All construction specifications shall be prepared using VA's Master Construction Specifications available on CFM's Technical Information Library (TIL), and can be accessed at http://www.cfm.va.gov/til/. Cemetery project specifications shall be prepared using the National Cemetery Administration's NCA Master Construction Specifications.

1.4.2. In addition to the requirements in this manual, designers must incorporate the sustainable design requirements shown in Master Construction Specifications section 01 81 11, *Sustainable Design Requirements*.[iv]

1.5. RELATED DOCUMENTS

1.5.1. This manual supersedes the VA *Sustainable Design & Energy Reduction Manual* (April 2010).

1.5.2. Project managers for projects in design or construction prior to publication of this manual should consider modifying existing contracts to accommodate new requirements.

1.5.3. This manual incorporates and replaces the following Standards Alerts:

a. #003 (Sustainable Design Third-Party Rating of Healthcare Facilities), Apr 2012
b. #004 (Sustainable Design Commissioning), Aug 2012
c. #005 (Minimum Renewable Energy Requirements), Dec 2012
d. #006 (Lifecycle Cost-Effective Renewable Energy), Aug 2013
e. #007 (Energy Efficient Design of Major Renovations), Aug 2013

1.5.4. This manual incorporates and replaces the following Design Alerts:

a. #091 (Energy Efficiency – Topic: Computers, Copiers, and Printers)
b. #125 (Construction Waste Management)
c. #126 (Energy Efficient and Sustainable Design Policy for VA New Construction)
d. #127 (Sustainable Buildings Policy for New and VA Renovation Construction)

1.5.5. Appendix A contains a comprehensive list of documents used in the development of this manual.

1.5.6. CFM strives to synchronize design requirement documents. Project teams are encouraged to notify Facilities Standards Service via email at TIL@va.gov if they find any contradictory requirements.

1.6. MINIMUM REQUIREMENTS

1.6.1. The requirements outlined in this manual are minimum requirements.

1.6.2. Project teams are encouraged to exceed these requirements whenever an analysis indicates an overall benefit to VA. This analysis should consider all costs and benefits, including financial considerations, improvement of services to Veterans, public image, and any other relevant factor.

1.6.3. Project teams shall ensure projects comply with all laws and regulations applicable to their project(s), including state and local laws or codes, and any guidance published by VA or the project's parent administration (i.e. Veterans Health Administration (VHA), Veterans Benefits Administration (VBA), or National Cemetery Administration (NCA)).

1.6.4. In the event an applicable law or policy has a more stringent requirement than this manual, the more stringent requirement will apply.

1.6.5 In the event an applicable law or policy appears to conflict with the requirements of this manual, project teams shall seek to harmonize these requirements in consultation with relevant oversight or regulatory agencies and stakeholders.

2. GENERAL PROJECT REQUIREMENTS

2.1. INTEGRATED DESIGN

2.1.1. Project teams must use a collaborative process that integrates sustainability throughout all stages of project planning and delivery.[v]

2.1.2. Follow the integrated design process outlined in the Whole Building Design Guide's *Engage the Integrated Design Process* document.[vi] The design process must include operations and maintenance staff,[vii] energy manager, and Green Environmental Management System (GEMS) coordinator (VHA projects) or Cemetery Environmental Management System (CEMS) coordinator (for NCA projects), when available. If local-level staff is not available, involve region-level staff.

2.1.3. Project teams must establish performance goals for siting, energy, water, materials, and indoor environmental quality, along with other comprehensive design goals and ensure incorporation of these goals throughout the design and lifecycle of the building.[viii] These goals must be included in the pre-design, or conceptual design, phase submittal and presented during all design review meetings.

2.1.4. Project teams must consider all stages of the building's lifecycle, including deconstruction.[ix]

2.2. LIFE-CYCLE COST ANALYSIS

2.2.1. When developing a Life-Cycle Cost Analysis (LCCA), design teams must use an analysis approach consistent with the requirements of Title 10, CFR 436 or NIST Handbook 135.

2.2.2. To comply with LCCA requirements, design teams must use the current version of the Building Lifecycle Cost (BLCC) program to perform LCCAs. The software is available for download from the U.S. Department of Energy's website. If BLCC is not appropriate, an alternative methodology may be approved by the contracting officer.[x]

2.2.3. When conducting LCCA for an individual system, use the equipment's expected life or a time-period of 40 years, whichever is shorter.[xi] When comparing multiple systems with unequal lifespans, use 40 years for the analysis and include all replacement costs expected to be incurred during that time period.

2.2.4. LCCAs must include all life-cycle costs, such as upfront, non-fuel operation and maintenance, replacement (minus salvage value), and energy/water costs.[xii]

2.3. REBATES AND INCENTIVES

2.3.1 Rebates and incentives may be available for sustainable design features, such as renewable energy equipment and the adaptive reuse of existing facilities. Rebates and incentives can come from Federal, state, local, or private sources in the form of price reductions and purchase rebates. Some incentives also come in the form of tax credits and tax deductions for design firms performing services on behalf of tax-exempt organizations such as VA.

2.3.2. While there is no mechanism in place to transfer funds from the design or construction agent to VA for use elsewhere, ensuring design and construction project bidders are aware of available rebates and incentives will help reduce bids and save project funds.

2.3.3. The project design team must thoroughly research which rebates and incentives will be available for use on their project to ensure construction solicitations include such information. For design-build projects, the project development team must identify available rebates and incentives and include them in the project cost estimate.

2.3.4. Rebates and incentives must be considered in all LCC calculations.

2.3.5. If a design or construction contractor's rebate and incentive application(s) will require VA to validate design or construction documents, this requirement should be included in contract language and the additional workload for VA staff should be considered during contract negotiations.

2.4. SUSTAINABLE FACILITY AWARDS

Project teams are encouraged to submit their project for consideration under sustainable facilities awards programs, such as the VA Sustainability Achievement Awards and GreenGov Presidential Awards. VA projects receiving sustainability awards help to promote VA's sustainability efforts and the Department's service to Veterans.

2.5. VALIDATING COMPLIANCE

2.5.1. In accordance with VA's Sustainable Buildings Program guidance, all projects must validate compliance with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* (Guiding Principles).

2.5.2. Minor Construction and Minor Renovation Projects. All minor construction and minor renovation projects must be designed and constructed to meet the credits indicated in the *Guiding Principles* checklists found on the Sustainable Design webpage of the TIL. Project designers will select the checklist most appropriate to their project. Follow all requirements and instructions shown on the checklists.

2.5.3. Major New Construction and Major Renovation Projects. All major new construction and Major Renovation projects must be certified using a green building rating system. Designers may use either the Green Building Initiative's *Green Globes* or the U.S. Green Building Council's *Leadership in Energy and Environmental Design (LEED)* rating systems. Projects must meet the mandatory credits and point levels indicated in the *Guiding Principles* checklists found on the Sustainable Design webpage of the TIL.[xiii] Follow all requirements and instructions shown on the checklists. In addition, projects must achieve a minimum certification of LEED Silver or two Green Globes.

a. While green building certification is required, designers should note that designing only to rating system requirements will not generally satisfy the requirements outlined in this manual. Projects must be designed to meet the requirements of this manual, including the required credits shown in the appropriate *Guiding Principles* checklist.

b. Design teams must provide an updated *Guiding Principles* checklist in every design submission. Project teams must note that these credits and point levels support requirements set forth in Executive Orders 13423 and 13514, thus VA personnel have little authority to grant variances to the requirements.

c. Within 30 days after receipt of LEED or Green Globes certification, the CFM project manager shall submit the following to CFM's Sustainable Design Program by e-mail to SustainableDesign@va.gov: 1) Appropriate Guiding Principles Checklist, completed and signed, and 2) Copy of green building certificate and certification report.

2.6. COMMISSIONING

2.6.1. In accordance with the Federal *High Performance and Sustainable Buildings Guidance* (Dec 2008), employ commissioning practices tailored to the size and complexity of the building and its system components in order to verify performance of building components and systems and help ensure that design requirements have been met.[xiv]

2.6.2. Comply with VA's Whole Building Commissioning Process Manual.[xv]

2.7. METERING

2.7.1. All buildings greater than 5,000 square feet must install building-level advanced utility meters for electricity,[xvi] natural gas[xvii], and/or steam[xviii], if used. In addition, install advanced utility meters for steam condensate, chilled water, hot water, domestic water, and/or non-potable water, if used.[xix]

2.7.2. Install sub-meters for cooling tower makeup water and boiler makeup water.[xx]

2.7.3. Energy-intensive buildings (i.e. laundry facilities and data centers), regardless of size, must be similarly metered.

2.7.4. Advanced meters or metering devices and supporting systems (e.g. transmitters, web connections) must provide data at least once every 15 minutes.[xxi]

2.7.5. In addition to providing data to building operators, building-level meters must transmit meter data directly to the existing data aggregation device in use at the facility. If there is no data aggregation device in use at the facility, one must be installed as part of the project and must be compatible with the VA Advanced Utility Metering System (AUMS).

2.7.6. Projects involving metering or installation of a data aggregation device must follow VA Master Construction Specifications section 25 10 10, *Advanced Utility Metering System*.

3. SITE SELECTION & DEVELOPMENT

3.1. SITE SELECTION

3.1.1. While mission related requirements typically drive site selection, the following considerations should also be considered during the site selection process. Sites which meet all, or some, of the following criteria shall be given preference over sites that do not meet them.

3.1.2. Existing Building Reuse

a. The principles of sustainable development encourage the reuse of existing resources. When selecting a site for a future VA project, project planners must consider reuse of existing buildings, including historic buildings, as potential sites.[xxii]

b. VA may experience significant savings by renovating an existing building to meet its needs rather than building a brand new facility.

3.1.3. Locate Near Diverse Housing Resources

a. Consider sites in areas that are easily accessible to many employees and visitors.

b. Consider sites that will minimize the travel distance required for both employees and Veterans visiting the facility.[xxiii]

3.1.4. Locate in High-Density Zoning Areas

a. The site selection team must consider high-density locations and construct new facilities in high-density areas whenever possible.[xxiv]

b. First consideration must be given to central business districts and rural town centers.[xxv]

c. This consideration does not apply to cemetery projects.

3.1.5. Coordination with Local/Regional Planning Officials

a. Prior to site selection, the project team must engage planning officials at the state, metropolitan, or municipal level to identify ways the project can support community sustainability and align the project with local and regional long-range plans and objectives.

b. National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA) requirements should also be followed during coordination efforts.

c. At a minimum, project teams must discuss potential impacts to transportation infrastructure and traffic patterns with local officials.[xxvi]

3.1.6. Alternative Transportation

a. Project teams must consider, and prefer, locations that provide multiple transportation options (pedestrian, bicycle, rail, bus, and etc.). This includes promoting walk-able and bike-able sites.[xxvii]

b. During project planning and design, coordinate with facility staff and local transportation officials to identify opportunities to bring additional alternative transportation resources to the selected site.

c. Provide appropriate infrastructure to support planned alternative transportation resources.

d. Provide bicycle racks and changing rooms, when appropriate.

e. Provide bus shelters if there are plans to bring bus transportation to the facility, including VA-operated shuttles. Locate bus shelters near major building entrances. Avoid locating shelters near smoking facilities, dumpsters, building exhaust, or any source of pollution that would negatively impact shelter occupants.

f. If alternative transportation infrastructure exists near the facility, provide sidewalks for building users to reach transportation resources.

3.1.7. Site Reuse

a. Project teams must prefer selection of sites that have been previously developed, or which will require minimal site disturbance when compared to other site options, to the extent determined to be cost-effective.

b. At a minimum, the analysis should consider local government incentives and reduced costs resulting from reuse of site utilities and features.[xxviii]

c. Sites that require additional state and local infrastructure investment solely to meet the Federal need should be minimized unless it supports state and local plans.[xxix]

3.1.8. Climate Change Adaptation

a. Climate change continues to cause warmer average temperatures, more frequent and more severe droughts, more frequent and more severe storms, and rising sea levels. More information on the specific effects of climate change can be found at the U.S. Global Change Research Program website.

b. Per VA Directive 0065, *Climate Change Adaptation Planning*, VA recognizes that climate change will impact Department services, operations, programs, and assets and has broad national security implications. [xxx]

c. To reduce the risk of climate change-induced threats to VA facilities, new VA facilities must integrate climate change adaptation concepts into site selection and design.[xxxi]

d. Project teams are encouraged to coordinate with local and regional officials to synchronize project intentions with local and regional plans for climate change adaptation.

3.1.9. Environmental Justice

Identify and address environmental justice concerns during site selection and the schematic design phase, in accordance with the VA Environmental Justice Strategy. [xxxii]

3.2. SITE DEVELOPMENT

3.2.1. Heat Island Effect

a. With ambient temperatures rising as a result of climate change, it is becoming more and more important to reduce the amount of solar energy absorbed on-site and released into the local environment as heat.

b. The “heat island effect” causes higher cooling needs during warmer months, which lead to higher greenhouse gas emissions and higher ambient temperatures.

c. To reduce the impact of this cycle, project teams must implement techniques to reduce the heat island effect on project sites.[xxxiii]

d. At a minimum, design teams must consider the use of cool roof technologies, including vegetative roofing.

e. Design packages must include a summary of measures taken to reduce the heat island effect.

3.2.2. Storm Water Runoff

a. Employ design and construction strategies that reduce storm water runoff and discharges of polluted waters offsite.[xxxiv]

b. Comply with section 438 of the Energy Independence and Security Act of 2007, which states: “The sponsor of any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.” [xxxv] Project documents must show how site planning, design, construction, and maintenance strategies will meet this requirement.

3.2.3. Historic Buildings

a. Historic buildings[1] can present both opportunities and challenges for sustainable design initiatives. Project teams are encouraged to reuse existing buildings, including historic buildings, to achieve sustainable design goals.

b. Project teams are encouraged to utilize best practices and technologies in retrofitting in order to promote the long-term viability of historic buildings.[xxxvi]

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[1] Buildings included in or eligible for the National Register of Historic Places (NRHP) or that contribute to the character of districts included in, or eligible for, the National Register; note that such buildings may or may not be identified in facility master plans and inventories, and may require evaluation for NRHP eligibility during project planning.

c. Project teams must consult and seek agreement with State Historic Preservation Officers and other stakeholders in identifying historic buildings and planning for their reuse or replacement.

4. ENERGY

4.1. ENERGY CONSERVATION

4.1.1. This chapter highlights numerous requirements for the energy efficient design of VA facilities. It is important to note that most of these requirements support one another and should be viewed as a comprehensive approach to energy efficiency. If any requirement exceeds the requirements of another section within this chapter, the more stringent requirement shall prevail.

4.1.2. Baseline Standard – Renovations

a. Major Renovation projects must be designed to reduce energy use by a minimum of 30 percent compared to the baseline building performance rating per ASHRAE 90.1-2007, Appendix G. [xxxvii]

4.1.3. Baseline Standard – New Construction

a. All new buildings and/or additions to existing buildings entering design on or after December 1st, 2008, but before July 9th, 2014, must be designed to meet the minimum requirements of ASHRAE 90.1-2007. In addition, reduce site energy use by 30 percent compared to the baseline building performance rating per ASHRAE 90.1-2007, Appendix G, excluding receptacle and process loads. [xxxviii]

b. All new buildings and/or additions to existing buildings entering design on or after July 9th, 2014, must be designed to meet the minimum requirements of ASHRAE 90.1-2010. In addition, if lifecycle cost-effective, reduce site energy use by 30 percent compared to the baseline building performance rating per AHSRAE 90.1-2010, Appendix G, excluding plug and process loads. If a lifecycle cost effective design cannot be achieved that meets the 30 percent reduction requirement, select the most efficient design that meets or exceeds the minimum requirements and is lifecycle cost-effective. No design shall be less than 30 percent more efficient than ASHRAE 90.1-2007, excluding plug and process loads.[xxxix] Provide energy model results comparing the design to both ASHRAE 90.1-2007 and ASHRAE 90.1-2010.

c. Low-rise residential buildings must be designed to perform 30 percent better than the 2009 version of the International Energy Conservation Code (IECC).[xl] Energy consumption for the purposes of calculating the 30 percent savings shall include space heating, space cooling, and domestic water heating.[xli] This requirement applies to designs beginning on, or after, August 10th, 2012.[xlii]

d. All new medical centers and build-to-suit leases must be certified under the *Designed to Earn the ENERGY STAR* program.

4.1.4. Energy Modeling

a. Project designers must use an energy model to aid in determining the most energy-efficient design of a project and to demonstrate compliance with sections 4.1.2 (Baseline Standard – Renovations) or 4.1.3 (Baseline Standard – New Construction), of this manual, whichever applies.

b. Energy modeling software must be capable of: 1) Interfacing with the Building Information Modeling (BIM) software being used for the project, 2) Providing whole building simulation, and 3) Providing system optimization recommendations.

c. Results of the energy model must be updated in every design phase and included in project deliverables. Documentation must clearly list all parameters and assumptions used in the model.

d. Energy modeling must be performed in accordance with the requirements of ASHRAE 90.1, Appendix G (Performance Rating Method). Projects that involve predominantly laboratory space may use the Labs21 Laboratory Modeling Guidelines.[xliii]

4.1.5. Source Energy Reduction Credit

a. If a project incorporates any technology that increases site energy consumption while decreasing source energy consumption (i.e. cogeneration projects), deduct source energy savings when calculating compliance with energy reduction requirements. To qualify for this credit, the technologies used to pursue the credit must be LCC-effective. [xliv] LCC calculations shall be performed in accordance with section 2.2 (Life-Cycle Cost Analysis) of this manual.

b. In all design phases, clearly identify energy reduction with, and without, source energy reduction credit.

c. Refer to Department of Energy *Section 502(e) Guidance (Providing Credit Toward Energy Efficiency Goals for Cost-Effective Projects Where Source Energy Use Declines But Site Energy Use Increases) (Oct 2004)* for additional guidance.

4.1.6. Documentation of Options Considered

Project documentation shall show: 1) All energy reduction options the team considered, 2) all energy reduction options incorporated, and 3) all energy reduction options the team rejected and reasons why. [xlv] Documentation shall include energy modeling data associated with each option. This documentation shall be updated and included in every design phase submittal package.

4.1.7. Advanced Energy Design Guides

VA encourages the use of ASHRAE's *Advanced Energy Design Guides* (AEDG) to help project teams achieve energy savings equal to, or greater than, VA's minimum performance requirements. All *Advanced Energy Design Guides* can be accessed through the ASHRAE AEDG website.

4.2. RENEWABLE ENERGY

4.2.1. The use of renewable energy improves energy reliability and security, reduces VA's dependence on non-renewable energy sources, reduces VA's greenhouse gas emissions, and reduces energy losses attributed to transmission.

4.2.2. Focus on energy efficiency first. VA's intent is to maximize energy efficiency in design to ultimately spend less on purchased energy, including renewable energy. The goal in all projects should first be to reduce energy needs and then to meet some, or all, of the remaining energy needs using renewable energy sources.

4.2.3. While in the planning phase:

a. All projects must conduct comprehensive renewable energy feasibility studies for all potential renewable energy technologies at the projected sites.[xlvi] Ensure studies are conducted, and results concluded and agreed upon, prior to requesting funds. If the studies conclude renewable energy will be LCC-effective, include funding in the project application process.[xlvii]

b. Feasibility studies must include consideration of the amount of space required for renewable energy equipment and all costs associated with interconnection to the local utility grid.

c. Planners must consider environmental, historical, and permitting requirements before including renewable energy technologies in a project.

d. Coordinate renewable energy plans with facility master plans and with applicable historic preservation or historic resource management plans, memoranda of agreement, or programmatic agreements.

4.2.4. Renewable Energy Design

a. Install onsite renewable electrical energy technologies sufficient for providing a minimum of 10% of the project's expected annual electricity consumption, to the extent technically and economically feasible.[xlviii]

b. All renewable energy designs must be LCC-effective, unless energy modeling demonstrates that the building design would be less than 30% more efficient than ASHRAE 90.1-2007 without including the renewable energy project..[xlix] With the cost of renewable energy equipment continuing to decline, make every effort to forecast actual equipment costs at the time of equipment purchase.

c. An allowance for renewable energy is included in the cost target for all major projects, where determined technically and economically feasible. These funds can only be used for costs related to the installation of renewable energy technologies, including applicable indirect costs such as permits and interconnection agreements.

d. All determinations that renewable energy will not be technically feasible, economically feasible, or LCC-effective must be documented in each relevant design submission, including all supporting calculations and assumptions used.

e. If renewable energy is determined not to be technically feasible, economically feasible, or LCC-effective, include infrastructure necessary to support the future installation of renewable energy equipment, in accordance with section 7.3.2 of ASHRAE 90.1-2011.

4.2.5. In accordance with EPAct 2005, VA considers 'renewable electrical energy' to be electricity generated from solar, wind, biomass, landfill gas, ocean (including tidal, wave, current, and thermal), geothermal, or municipal solid waste.[l]

4.2.6. A minimum of 30% of hot water demand in new buildings and Major Renovations must be met with solar hot water technologies if deemed to be LCC-effective.[li]

4.2.7. Design documents must clearly show lifecycle cost calculations for renewable energy equipment, including the cost of all supporting infrastructure installed specifically for the purpose of supporting the renewable energy generation equipment.

4.2.8. Utility Interconnection

All distributed generation initiatives, including Combined Heat and Power (CHP), solar, and any other source of energy generated on-site must enter into an interconnection agreement with the local utility provider for that energy type. Begin the interconnection process with the local utility at the beginning of the Design Development phase to ensure the project can meet utility interconnection requirements.

4.3. ENERGY-EFFICIENT PRODUCTS AND EQUIPMENT

4.3.1. Energy Efficient Products and Equipment Requirements

a. All materials, products, and equipment being installed which fall into a category covered by the ENERGY STAR® program must be ENERGY STAR®-labeled. [lii]

b. All materials, products, and equipment being installed which fall into a category covered by the Federal Energy Management Program (FEMP) designated energy efficient products program must be FEMP-designated.[liii]

c. All electronic products and equipment being installed which fall into a category covered by the EPEAT® program must be Electronic Product Environmental Assessment Tool (EPEAT) - registered.[liv]

d. VA's Master Construction Specifications contain additional information on product-specific requirements.

4.3.2. Low Standby Power Requirement

a. All commercially available, off-the-shelf, electronic products and devices being installed must meet FEMP low standby power requirements, unless determined not to be LCC-effective or if the product's utility or performance are compromised as a result.[lv]

b. If such products are not available, purchase products with the lowest standby power available. [lvi] Refer to Table 1 of the Department of Energy's (DOE) Energy Efficiency & Renewable Energy (EERE) Federal Energy Management Program (FEMP) Standby Power Data Center website for a list of covered products and their required standby power levels.

c. VA's Master Construction Specifications contain additional information on product-specific requirements.

4.4. ENERGY-RELATED EQUIPMENT REQUIREMENTS

4.4.1. Combined Heat and Power

a. All new medical centers are required to install a Combined Heat and Power (CHP) system, unless energy modeling demonstrates that the building design is 30% more energy efficient than baseline building standards in ASHRAE 90.1-2007 and the building is designed to earn the ENERGY STAR label, as required in section 4.1.3 of this manual. If the building design meets these two criteria without including a CHP system, then the building is not required to include a CHP system if it is not LCC-effective..[lvii] Any deviation from this requirement must be documented in the official project file. New CHP systems should be integrated into the facility's overall power supply strategy and, to the extent determined to be LCC-effective and technically feasible, should operate using renewably-sourced fuels.

b. Other facilities should also consider the use of CHP if it proves to be more cost effective than other energy sources. Community Living Centers (CLCs), for example, may be good candidates for the use of CHP.[lviii]

4.4.2. Demand Response Programs

a. Some utility companies offer 'demand response programs' as a way to re-distribute peak load to non-peak hours and avoid the need for additional power generation assets to handle peak loads. These programs are typically voluntary and provide financial incentives for participation. In order to evaluate available programs and ensure inclusion of any necessary infrastructure into design, the design team must contact energy providers to determine what, if any, demand response programs are available and applicable. The design team, in coordination with facility stakeholders and CFM, should determine if the facility plans to participate in any of these programs. If so, the design team should adjust the design to accommodate any additional equipment needed for participation in the selected program(s).[lix]

b. Include demand response program-related equipment in design only if analysis indicates enrollment in the program will be LCC-effective.

5. WATER

5.1. MINIMUM WATER EFFICIENCY REQUIREMENTS

5.1.1. Employ strategies that in aggregate use a minimum of 20 percent less potable water than the indoor water use baseline calculated for the building, after meeting the Energy Policy Act of 1992, and the International Plumbing Code 2006 fixture performance requirements.[lx]

5.1.2. As part of the water reduction strategy, identify opportunities for use of alternative water sources, including water recycling, industrial water reuse, water reclamation, and stormwater harvesting. Provide appropriate infrastructure to support selected opportunities. Obtain all necessary permits and ensure use of these resources comply with all applicable Federal, state and/or local laws, regulations, and codes regarding public health and safety. Ensure usage will not violate water rights held by others.[lxi]

5.1.3. Use water efficient landscape and irrigation strategies, such as water reuse, recycling, and the use of harvested rainwater, to reduce outdoor potable water consumption by a minimum of 50 percent over that consumed by conventional means (plant species and plant densities).[lxii]

5.1.4. Install advanced water meters to measure water use for irrigated landscape areas exceeding the minimum thresholds shown in table 6.3.3.B of ASHRAE 189.1-2009.[lxiii]

5.1.5. Install advanced water meters on all water wells installed on VA-owned property for agency use.[lxiv]

5.1.6. Advanced water meters must be capable of providing, at a minimum:[lxv]

a. Remote data access.

b. Interval data capabilities that collect hourly data.

c. Electronic data storage and reporting capability.

5.1.7. When using potable water to improve a building's energy efficiency, deploy lifecycle cost effective water conservation measures.[lxvi] Summarize all energy conservation measures falling into this category in design documents.

5.1.8. Irrigation professionals must be certified under a WaterSense® labeled certification program.[lxvii]

5.2. WATER-EFFICIENT PRODUCTS AND EQUIPMENT REQUIREMENTS

5.2.1. Ensure that all products and equipment being installed are water-efficient, when available. Ensure use of water-efficient products, equipment, and practices during construction.[lxviii]

5.2.2. All materials, products, and equipment being installed which fall into a category covered by the U.S. Environmental Protection Agency's (EPA) WaterSense® program must be WaterSense®-labeled or meet or exceed WaterSense® program performance requirements, unless disallowed for infection control reasons.[lxix]

5.2.3. VA's Master Construction Specifications contain additional information on product-specific requirements.

6. INDOOR ENVIRONMENTAL QUALITY

6.1. THERMAL COMFORT

Comply with thermal comfort requirements in the VA *HVAC Design Manual*.

6.2. VENTILATION

Comply with ventilation requirements in the VA *HVAC Design Manual*.

6.3. MOISTURE CONTROL

Establish and implement a moisture control strategy for controlling flows and condensation to prevent building damage, minimize mold contamination, and reduce health risks related to moisture.[lxx]

6.4. DAYLIGHTING

6.4.1. Achieve a minimum daylight factor of 2 percent (excluding all direct sunlight penetrations) in 75 percent of all space occupied for critical visual tasks.[lxxi] For additional information on meeting this requirement, visit the Whole Building Design Guide's Daylighting Guidance site.[lxxii] Also provide appropriate glare control.[lxxiii]

6.4.2. Comply with automatic dimming control requirements shown in Chapter 6 of VA's *Electrical Design Manual*.

6.5. LOW POLLUTANT-EMITTING MATERIALS

Specify materials and products with low pollutant emissions, including composite wood products, adhesives, sealants, interior paints and finishes, carpet systems, and furnishings.[lxxiv]

6.6. PROTECT INDOOR AIR QUALITY DURING CONSTRUCTION

6.6.1. Follow the recommended approach of the Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) *Indoor Air Quality Guidelines for Occupied Buildings under Constructio*n, 2007.[lxxv]

6.6.2. After construction and prior to occupancy, conduct a minimum 72-hour flush-out with maximum outdoor air consistent with achieving relative humidity no greater than 60 percent at 60 degrees Fahrenheit.[lxxvi]

6.6.3. After occupancy, continue flush-out as necessary to minimize exposure to contaminants from new building materials.[lxxvii]

6.7. ENVIRONMENTAL TOBACCO SMOKE CONTROL

6.7.1. Locate all smoking shelters more than 25 feet from any building entrance, operable window, or ventilation intake.[lxxviii] In addition, design health care facilities to comply with VHA Directive 2008-052, August 2008.[lxxix]

6.7.2. Post signage indicating that smoking is prohibited within the building and within 25 feet of all building entrances, operable windows, and ventilation intakes.[lxxx] For health care facilities, signs should reflect the distance appropriate to the facility, in compliance with VHA directive 2008-052, August 2008.

6.8. TOXIC AND HAZARDOUS MATERIALS

Minimize use and release of toxic and hazardous chemicals and materials, including toxic chemicals, hazardous substances, ozone-depleting substances, and other pollutants that may result in significant harm to human health or the environment.[lxxxi]

6.9. ACOUSTICS

6.9.1. Design health care facilities to meet the acoustics requirements set forth in PG 18-3, Topic 11, Noise Transmission Control.[lxxxii]

6.9.2. Comply with mechanical equipment acoustics requirements outlined in the *HVAC Design Manual*.

7. ENVIRONMENTAL IMPACTS OF MATERIALS

7.1. RECYCLED CONTENT

7.1.1. Any products being installed or used that are listed on EPA's designated product list must meet or exceed EPA's recycled content recommendations when the products meet VA's performance requirements and are available at a reasonable cost.[lxxxiii] For products not on EPA's designated product list, specify materials and products with recycled content when practicable.

7.1.2. VA's Master Construction Specifications contain additional information on product-specific requirements.

7.1.3. Provide documentation for any products listed on the EPA designated product list but not selected for the project. Provide details on the reason(s) for the decision to not buy the recycled content product (i.e., price, performance, and/or availability).[lxxxiv]

7.1.4. Incorporate coal fly ash, ground granulated blast furnace (GGBF) slag, cenospheres, and/or silica fume, into cement and concrete mixtures.[lxxxv] Ensure cement and concrete mixtures comply with the requirements contained in Division 03 of VA's Master Construction Specifications.[lxxxvi]

7.2. BIOBASED CONTENT

7.2.1. Any materials and equipment being installed or used that are listed on USDA's designated product list must meet or exceed USDA's requirement for biobased content when the materials and equipment meet VA's performance requirements and are available at a reasonable cost.[lxxxvii] For products not on the USDA designated product list, specify biobased products made from rapidly renewable resources and certified sustainable wood products whenever available.[lxxxviii]

7.2.2. VA's Master Construction Specifications contain additional information on product-specific requirements.

7.3. SOLID WASTE DIVERSION

7.3.1. During project planning, identify local recycling and salvage operations that can process site-related construction and demolition (C&D) waste. During construction, recycle and salvage at least 50 percent of non-hazardous construction, demolition, and land clearing materials, excluding soil, where markets or on-site recycling opportunities exist. Renovation projects must maximize materials reuse opportunities to the extent practicable.[lxxxix] Refer to Master Construction Specifications section 01 74 19, *Construction Waste Management*, for detailed requirements.

7.3.2. Construction contractors must submit monthly reports indicating the total weight of C&D solid waste diverted from landfills in compliance with paragraph 7.3.1 above. Reports must include the total weight of C&D waste generated and the total weight of C&D waste diverted. For CFM-managed projects, provide C&D diversion rate reports to the CFM project manager or Contracting Officer's Representative (COR). For projects occurring at an existing VHA facility,

submit a copy of the report to the facility's GEMS coordinator. For NCA projects, submit a copy of the report to the Memorial Service Network (MSN) CEMS coordinator . For projects being constructed without the presence of an existing facility, monthly reports must be kept in the official project record for reporting purposes.

7.4. COMPOSTING

7.4.1. Consult with facility operations personnel to determine if there is a desire to compost food and/or landscaping-related waste to provide nutrients to plants in lieu of purchasing fertilizer. If an analysis indicates the project is a suitable candidate for composting, the project team must provide space and equipment to accommodate the collection, processing, and storage of compostable materials.[xc]

7.4.2. If compost materials cannot be used on-site, the project team must contact local and regional officials to determine the availability of composting facilities. If composting facilities are available, the project team must provide space and equipment to accommodate the collection and storage of compostable materials.[xci]

7.5. RECYCLING

All projects must provide sufficient space, equipment, and transportation accommodations to support the collection and storage of recyclable materials during regular facility operations. This includes providing recycling receptacles in common areas for use by building occupants.[xcii]

7.6. OZONE DEPLETING SUBSTANCES

7.6.1. Eliminate the use of ozone depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with either the Montreal Protocol and Title VI of the Clean Air Act Amendments of 1990, or equivalent overall air quality benefits that take into account lifecycle impacts.[xciii]

7.6.2. Use only safe alternatives to ozone depleting substances (ODSs), as approved by EPA's Significant New Alternatives Policy (SNAP) program. Eliminate the use of ODSs in new equipment and facilities and phase out ODS applications as the existing equipment using ODSs reaches its expected service life.[xciv]

APPENDIX A - SUSTAINABLE DESIGN REFERENCES

- 10 CFR Part 436, Subpart A (Methodology and Procedures for Life Cycle Cost Analyses)
- DOE Green Building Certification System Review, Mar 2012
- DOE Guidance for Electric Metering in Federal Buildings, Feb 2006
- DOE Reporting Guidance for Federal Agency Annual Report on Energy Management - Attachment 3: Guidance for Receiving Credit on Energy Performance Goals for Projects that Save Source Energy but Increase Site-Delivered Energy, Sep 2013
- Energy Independence & Security Act of 2007 (EISA)
- Energy Policy Act of 2005 (EPAct)
- ENERGY STAR: Find ENERGY STAR Products
- Executive Order 13221 (Energy Efficient Standby Power Devices), Jul 2001
- Executive Order 13423 (Strengthening Federal Environmental, Energy, and Transportation Management), Jan 2007
- Executive Order 13514 (Federal Leadership in Environmental, Energy, and Economic Performance), Oct 2009
- Federal Agency Climate Change Adaptation Planning – Implementing Instructions, Mar 2011
- Federal Energy Management Program: Covered Product Categories
- GSA Green Procurement Compilation
- Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings MOU, Mar 2006
- High Performance and Sustainable Buildings Guidance, Dec 2008
- Implementing Instructions: Federal Agency Implementation of Water Efficiency and Management Provisions of EO 13514, July 2013
- Instructions for Implementing Executive Order 13423, Mar 2007
- Interagency Climate Change Adaptation Task Force Guiding Principles
- National Energy Conservation Policy Act of 1978 (NECPA)
- National Environmental Policy Act of 1969 (NEPA)
- National Historic Preservation Act of 1966 (NHPA)
- Sustainable Locations for Federal Facilities – Implementing Instructions, Sep 2011
- VA Directive 0055 (VA Energy and Water Management Program), Jan 2010
- VA Directive 0056 (VA Sustainable Buildings Program), Oct 2012
- VA Directive 0057 (VA Environmental Management Program), Jan 2010
- VA Directive 0058 (VA Green Purchasing Program), July 2013
- VA Directive 0059 (VA Chemicals Management and Pollution Prevention), May 2012
- VA Directive 0062 (Environmental Compliance Management), Jan 2012
- VA Directive 0063 (Waste Prevention and Recycling Program), Oct 2011
- VA Directive 0064 (VA Environmental Management Systems), Jan 2012
- VA Directive 0065 (VA Climate Change Adaptation Policy), Jun 2012
- VA Directive 0066 (VA Sustainable Locations Program), Jun 2012
- VA Handbook 0056 (VA Sustainable Buildings Program), Oct 2012
- VA Handbook 0058 (VA Green Purchasing Program), July 2013

- VA Handbook 0059 (Chemicals Management and Pollution Prevention), May 2012
- VA Handbook 0062 (Environmental Compliance Management), Jan 2012
- VA Handbook 0063 (Waste Prevention and Recycling Program), Oct 2011
- VA Handbook 0064 (VA Environmental Management Systems), Jan 2012
- VA Green Buildings Action Plan, Mar 2007
- VA Strategic Sustainability Performance Plan, Nov 2012

APPENDIX B - ACRONYMS

AEDG	Advanced Energy Design Guide
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
BLCC	Building Life Cycle Cost
C&D	Construction and Demolition
CEMS	Cemetery Environmental Managements System
CFM	Construction & Facilities Management (also known as 'OCFM')
CHP	Combined Heat and Power
CLC	Community Living Center
COR	Contracting Officer's Representative
DOE	U.S. Department of Energy
EERE	Energy Efficiency and Renewable Energy
EISA	Energy Independence and Security Act of 2007
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 2005
EPEAT	Electronic Product Environmental Assessment Tool
FEMP	Federal Energy Management Program
GBI	Green Building Initiative
GEMS	Green Environmental Management System
HVAC	Heating, Ventilation, and Air Conditioning
LCC	Life-Cycle Cost
LCCA	Life-Cycle Cost Analysis
LEED	Leadership in Energy and Environmental Design
MSN	Memorial Service Network
NCA	National Cemetery Administration
NEPA	National Environmental Policy Act
NRM	Non-Recurring Maintenance
OCFM	Office of Construction & Facilities Management (also known as 'CFM')
TIL	Technical Information Library
USDA	U.S. Department of Agriculture
USGBC	U.S. Green Building Council
VA	U.S. Department of Veterans Affairs
VBA	Veterans Benefits Administration
VHA	Veterans Health Administration

APPENDIX C - NOTES

[i] Modified from EPA definition of Green Building (http://www.epa.gov/greenbuilding/pubs/about.htm)
[ii] VA Handbook 0056, (VA Sustainable Buildings Program) Oct 2012.
[iii] VA Directive 0055, (VA Energy and Water Management Program) Jan 2010. "All NRM construction will be subject to the same standards for energy and water efficiency as major and minor construction projects."
[iv] PG 18-15 A/E Submission Requirements (Construction Document Phase), http://www.cfm.va.gov/contract/ae/aesubmaj/construction_doc.asp
[v] VA Green Buildings Action Plan; High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[vi] VA Green Buildings Action Plan; High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[vii] VA Green Buildings Action Plan, Mar 2007
[viii] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[ix] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[x] "Recommended Edits and Updates to the VA Sustainable Design and Energy Reduction Manual (April 2010)" report generated by HDR on March 9, 2012
[xi] EISA 2007
[xii] 10 CFR, Part 436
[xiii] VA Directive 0056, (VA Sustainable Buildings Program) Oct 2012.
[xiv] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[xv] Standards Alert #002 (Sustainable Design Commissioning Requirements)
[xvi] EPACT 2005, Sect. 103; DOE Guidance for Electric Metering in Federal Buildings
[xvii] EISA 2007, Section 434 (b) (Amends NECPA Section 8253 (e))
[xviii] EISA 2007, Section 434 (b) (Amends NECPA Section 8253 (e))
[xix] EPACT 2005, Sect. 103
[xx] DOE Guidance for Electric Metering in Federal Buildings, 2/3/2006, page 10; OAEM guidance.
[xxi] EPACT 2005, Sect. 103. Intervals adjusted at request of OAEM.
[xxii] VA Directive 0066, (VA Sustainable Locations Program) Jun 2012
[xxiii] VA Directive 0066, (VA Sustainable Locations Program) Jun 2012
[xxiv] VA Green Building Action Plan, Mar 2007
[xxv] VA Directive 0066, (VA Sustainable Locations Program) Jun 2012; E.O. 12072
[xxvi] VA Directive 0066, (VA Sustainable Locations Program) Jun 2012
[xxvii] VA Directive 0066, (VA Sustainable Locations Program) Jun 2012
[xxviii] VA Green Building Action Plan, Mar 2007
[xxix] VA Directive 0066, (VA Sustainable Locations Program) Jun 2012
[xxx] VA Directive 0065, (VA Climate Change Adaptation Policy) Jun 2012
[xxxi] VA Preliminary High-Level Climate Change Vulnerability Analysis (DRAFT), 9/30/11
[xxxii] VA Environmental Strategy, Feb 2012
[xxxiii] VA Green Building Action Plan, 2008
[xxxiv] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[xxxv] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[xxxvi] EO 13514

[xxxviii] High Performance and Sustainable Buildings Guidance (Final), 12/1/08 require 30% better than ASHRAE 90.1-2002. 10CFR, Part 433.4, section (2)(b) excludes plug and process loads.
[xxxix] ASHRAE 90.1-2010 is 18.5% more efficient than ASHRAE 90.1-2007. 14.1% better than ASHRAE 90.1-2010 is equivalent to 30% better than ASHRAE 90.1-2007.
[xl] EPAct 2005, section 109.; DOE Final Rule dated Aug 10, 2011 updates standard to IECC 2009
[xli] 10CFR, Part 435.4, section (2)(b)
[xlii] 10CFR, Part 435.4, section (2)
[xliii] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[xliv] DOE Section 502(e) Guidance, Providing Credit Toward Energy Efficiency Goals for Cost-Effective Projects Where Source Energy Use Declines But Site Energy Use Increases (Amended October 1, 2004).

Also see FEMP Reporting Guidance for Federal Agency Annual Report on Energy Management (2012), pages 16-17.
[xlv] VA Directive 0055, (VA Energy and Water Management Program) Jan 2010.
[xlvi] EO 13423, Sec. 2(a)
[xlvii] OAEM Memo "Keeping Our Promises to Veterans through Sustainable Buildings," May 2013.
[xlviii] VA Directive 0055, (VA Energy and Water Management Program) requires every project be evaluated for renewable energy. The President's Climate Action Plan, June 2013 sets a goal of 20% for renewable energy, which assumes VA gets EPACT doubling bonus for on-site production.
[xlix] OAEM Memo "Keeping Our Promises to Veterans through Sustainable Buildings," May 2013.
[l] Energy Policy Act, section 203(b)(2)
[li] EISA 2007, Sect. 523
[lii] EPAct 2005; EO 13423
[liii] EPAct 2005; EO 13423
[liv] Executive Order 13423
[lv] EO 13221 (Energy Efficient Standby Power Devices), Jul 2001.
[lvi] EO 13221 (Energy Efficient Standby Power Devices), Jul 2001.
[lvii] VA Directive 0055, (VA Energy and Water Management Program) Jan 2010, requires CHP systems. EO 13423 requires all energy efficiency investments to be LCC-effective.
[lviii] 2007 CHP Resource Guide for Hospitals states "nursing homes are another segment of the healthcare industry that are good applications for CHP systems."
[lix] VA Handbook 0055, (VA Energy and Water Management Program) Jul 2003
[lx] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxi] Implementing Instructions: Federal Agency Implementation of Water Efficiency and Management Provisions of EO 13514, July 10th, 2013; Section 6.0 (http://www.whitehouse.gov/sites/default/files/water_implementing_instructions.pdf)
[lxii] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxiii] High Performance and Sustainable Buildings Guidance (Final), 12/1/08; Implementing Instructions: Federal Agency Implementation of Water Efficiency and Management Provisions of EO 13514, July 10th, 2013; Appendix B (http://www.whitehouse.gov/sites/default/files/water_implementing_instructions.pdf);
[lxiv] Implementing Instructions: Federal Agency Implementation of Water Efficiency and Management Provisions of EO 13514, July 10th, 2013; Section 5.2 (http://www.whitehouse.gov/sites/default/files/water_implementing_instructions.pdf)
[lxv] ; Implementing Instructions: Federal Agency Implementation of Water Efficiency and Management Provisions of EO 13514, July 10th, 2013; Appendix B (http://www.whitehouse.gov/sites/default/files/water_implementing_instructions.pdf);
[lxvi] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxvii] High Performance and Sustainable Buildings Guidance (Final), 12/1/08, "Recommended Edits and Updates to the VA Sustainable Design and Energy Reduction Manual (April 2010)" report generated by HDR on March 9, 2012.
[lxviii] EO 13423, Section 2(d) "require in agency acquisitions of goods and services.. water-efficient.. products.." VA interprets this to include construction *services*.
[lxix] EO 13423
[lxx] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxi] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxii] http://www.wbdg.org/references/mou_daylight.php; High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxiii] Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings MOU (2006)
[lxxiv] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxv] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxvi] Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings MOU (2006); High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxvii] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxviii] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxix] VHA Directive 2008-052 (Smoke Free Policy for VA Health Care Facilities) (August 2008).

[lxxx] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxxi] Implementing Instruction to EO 13423, Section VIII.A (http://www.whitehouse.gov/sites/default/files/omb/procurement/green/eo13423_instructions.pdf)
[lxxxii] Authority comes from Foreword of PG 18-3 (http://www.cfm.va.gov/TIL/cpro/cpForeword.doc)
[lxxxiii] EO 13423 (http://www.gpo.gov/fdsys/pkg/FR-2007-01-26/pdf/07-374.pdf); Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings MOU (2006); High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxxiv] Per "FAR Subpart 23.405(b)(2)," “When an exemption is used for an EPA-designated item or the procurement of a product containing recovered material does not meet or exceed the EPA recovered material content guidelines, the contracting officer shall place a written justification in the contract file.”
[lxxxv] EPA Comprehensive Procurement Guidelines (http://www.epa.gov/epawaste/conserve/tools/cpg/products/construction.htm#cement)
[lxxxvi] VA Design Alert # 136 (Sustainable High Performance Concrete Structures)
[lxxxvii] EO 13423 (http://www.gpo.gov/fdsys/pkg/FR-2007-01-26/pdf/07-374.pdf); Presidential Memo dated 2/21/12. (http://www.whitehouse.gov/the-press-office/2012/02/21/presidential-memorandum-driving-innovation-and-creating-jobs-rural-ameri); Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings MOU (2006)
[lxxxviii] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[lxxxix] Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings MOU (2006); High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[xc] EO 13514.
[xci] EO 13514.
[xcii] VA Directive 0063, (Waste Prevention and Recycling Program) Oct 2011; High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[xciii] High Performance and Sustainable Buildings Guidance (Final), 12/1/08
[xciv] EO 13423 Implementing Instructions, page 20 (http://www.epa.gov/oaintrnt/documents/eo13423_instructions_508.pdf); EO13514, Sec.2.h. (http://www.whitehouse.gov/assets/documents/2009fedleader_eo_rel.pdf)