

SECTION 4-11: FACILITIES METERING

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4-11-00 POLICY

Metering is defined as the collection and analysis of electricity, natural gas, water, steam or other fluid data which, when analyzed appropriately, allows real property managers to make strategic decisions on how to most effectively operate mechanical and electrical systems and equipment. These decisions affect energy costs, equipment costs, and overall building performance.

Consistent with current law and regulations, it is HHS policy that on all HHS-owned facilities and facilities where the Operating Divisions (OPDIVs) pay for the utilities directly (utilities that are not included in the rent) OPDIVs must implement individual building electric metering with data provided at least daily and electric consumption measured hourly by the end of FY 2012 and natural gas and steam metering by the end of FY 2016 where life cycle-cost effective. In addition, it is HHS policy that metering of all individual building potable and industrial water use must be completed by the end of FY 2014 where life-cycle cost effective. Life-cycle cost effectiveness will be based on a ten year simple payback assuming at least two percent annual savings.

Current mandates require all Federal agencies to reduce potable water intensity (gallons per square foot per year) by 2% each year through FY 2020 for a total of 26% as compared to the baseline water consumption in FY 2007 and non-potable water use by 2% each year through FY2020 for a total of 20% as compared to the baseline water consumption baseline of FY2010. While water metering is not specifically addressed, the only accurate way to report consumption is to meter all potable and non-potable water resources.

Deviation from the HHS Facility Metering Policy and the Compliance Document by the OPDIVs must be reported to and approved by the HHS Energy Officer. The OPDIV metering plan must inventory buildings based upon whether standard or advanced meters will be installed. The total square footage to be targeted for both standard and advanced meters must be determined. OPDIVs will be required to report on the progress of installation against these total square footage values. This is discussed further in Section 4-11-20-B, Development of OPDIV Metering Plans.

Once determined which meters are life cycle cost effective, OPDIVs should install those meters according to the following schedule:

By the end of FY	Cumulative % of Standard Electric Meters	Cumulative % of Advanced Electric Meters	Cumulative % of Natural Gas Metered	Cumulative % of Steam Metered	Cumulative % of Water Metered
2007	10	5			
2008	20	15			
2009	40	25			
2010	60	60	25	25	75
2011	85	85			
2012	100	100	50	50	85
2013					
2014			75	75	100
2015					
2016			100	100	

OPDIVs are directed to meet the goals and objectives as stated throughout this document.

4-11-10 PROCEDURES

In order to meet metering objectives OPDIVs must develop a metering plan as detailed in this document. The OPDIV metering plan will include the results of a metering infrastructure survey, a life-cycle cost analysis of metering compliance at each OPDIV facility, an inventory of meter types to be installed in each facility, a description of how the metered data will be used and a time line of metering installations. The time line will highlight the priority of installations (buildings with the largest square footage should be metered first). The OPDIV metering report should also outline the financing strategy for the installation of meters.

The OPDIVs must also consider equipment specifications and monitoring the metering systems communication requirements when developing their plans. Annual reporting on the OPDIV metering status is required as outlined in Section 4-11-30- Reporting Requirements.

4-11-20 GUIDANCE AND INFORMATION

A. Metering Objectives

- Priority should be given to buildings identified per OPDIV “Sustainable High Performance Building” goals to ensure all high performance buildings are metered as soon as possible.
- Fully implement advanced and standard electric metering at all HHS facilities wherever life-cycle cost effective by the end of FY 2012, based on a ten-year simple payback assuming at least a two percent annual savings.
- Fully implement steam and natural gas metering at all HHS facilities wherever life-cycle cost effective by the end of FY 2016, based on a ten-year simple payback assuming at least a two percent annual savings.

- Fully implement potable water metering (including industrial water, landscaping and agricultural water) at all HHS facilities wherever life-cycle cost effective by the end of FY 2014, based on a ten-year simple payback assuming at least a two percent annual savings.
- Ensure continuous and timely analysis of metered data at all OPDIV sites.
- Employ cost allocation and demand response or time allocation programs where possible.
- Whenever possible meter chilled water (or hot water) from a district or central chilled plant or hot water applications on a building basis.
- Whenever possible meter electrical and cooling system consumption in Data Centers.
- Meter implementation shall coincide with reduction goals required by EISA 2007, E.O. 13423, E.O. 13514 and the HHS Strategic Sustainability Performance Plan.

B. Development of OPDIV Metering Plans

In order to implement the metering goals outlined, OPDIVs shall follow the HHS metering program structure detailed below to develop an OPDIV metering plan. In addition, it is highly recommended that OPDIVs thoroughly review the Department of Energy (DOE), Federal Energy Management Program's (FEMP) *Guidance for Electrical Metering in Federal Buildings and Metering Best Practices, a guide to Achieving Resource Efficiency* for further details and assistance. These documents may be found on the Internet at http://www1.eere.energy.gov/femp/pdfs/adv_metering.pdf and <http://www1.eere.energy.gov/femp/pdfs/mbpg.pdf>.

1) Survey Existing OPDIV Metering Infrastructure.

OPDIVs will need to survey existing meters, metering systems and metering capabilities [e.g., energy management and control system (EMCS) capabilities] in all buildings to the maximum extent practical. Current uses and status of these metering systems must be identified. In addition, current funding allocations for metering should be outlined.

OPDIVs must also assess the requirements for staff and software applications to support on-going metering programs in all phases (i.e., operations, maintenance, and data analysis). Various options for providing support requirements shall be explored (i.e., subscription services, OPDIV centralized metering programs, dedicated on-site staff, etc.). OPDIVs must determine the amount of funding required to support these functions and shall include this in the OPDIV annual budgeting process.

2) Analyze OPDIV Buildings for Cost-Effectiveness of Metering.

OPDIVs shall use the results of the metering infrastructure survey and analyze the cost effectiveness of metering buildings and the level of resource allocation necessary to monitor the data in order to determine which buildings should have standard or advanced meters installed.

To determine cost-effectiveness, OPDIVs need to estimate the cost to design, purchase, install, maintain, store data, operate the meter/metering system, analyze the data output and the resulting energy cost savings. The FEMP electrical metering guidance contains more detail on this type of analysis.

Metering system costs vary widely for a number of reasons: equipment specifications and capabilities existing infrastructure, site-specific design considerations, local cost factors, etc. Therefore, it is not possible for this document to outline a specific dollar value to use as an estimate. OPDIVs are responsible for obtaining industry estimates for their application and locality.

A critical detail to address early in the metering specification phase is the method of data analysis, the extent of data required to complete the analysis and a designated staff position to monitor and manage the data. The data, by itself, isn't of much use without some analysis to determine what it means. This is a central and critical point in developing any successful metering program. There are many tried and true methods of trend analysis and many commercially available software tools that help to make sense out of enormous amounts of data. Often the analysis methodologies chosen and extent of the data requirements dictate what types of metering/monitoring equipment and hardware/software tools are necessary.

To determine the cost savings of the metering in the building, OPDIVs shall use the following table as guidance in lieu of experience or actual findings.

Metering Savings Ranges:

Action	Observed Savings
Installation of meters	0 to 2% (the "Hawthorne effect")
Bill allocation only	2 ½ to 5% (improved awareness)
Building tune-up	5 to 15% (improved awareness, and identification of simple O&M improvements)
Continuous Commissioning	15 to 35 % (improved awareness, identify simple O&M improvements, project accomplishment and continuing management attention)

It is necessary to estimate the annual energy costs in the building to apply the above cost savings ranges. For those buildings where an estimate cannot be made based upon historical consumption data, DOE has developed a database of typical energy usage intensity factors (EUI) (typically given in units of energy use/SF/year). One source of commercial building EUI data is DOE's Buildings Energy Data book available online at <http://buildingsdatabook.eren.doe.gov>. This approach does have its limitations as a building's energy use is driven by many site-specific variables and characteristics that may approach, but not match generalized EUI estimates.

A life-cycle cost (LCC) comparison of various metering options is recommended to determine the best possible metering decision. The FEMP metering guidance contains a good example of an LCC analysis on page 11 of the document (link provided above). For some buildings, advanced meters may not be life-cycle cost effective, but standard meters will be cost effective.

OPDIVs must weigh all of the factors involved with metering beyond the initial cost to purchase and install the meters. This includes the maintenance of the meters and specifically the ability to continuously monitor and analyze the resulting data. Therefore, the associated costs to provide such analysis must be included in the LCC analysis. A meter is completely ineffective and will not save energy if personnel are not reviewing the resulting data and identifying sources of waste.

3) Complete the OPDIV Metering Plan.

OPDIVs shall complete a formal metering plan based upon the results of the metering infrastructure survey, the LCC analysis and the technical research outlined in Section C below within this policy document. Additional guidance on developing the metering plan may be obtained from the FEMP electrical metering guidance document.

Since many OPDIVs consist of campuses and sites that manage their own facilities and operate under different circumstances, an OPDIV may have these campus or sub-OPDIV level organizations develop metering plans that best address their individual needs and modes of operation. If campus specific plans are developed they must be incorporated in the OPDIV metering plan. Otherwise, the campus shall be included in the overall OPDIV metering plan. The information below address specific sections of the plan:

Inventory

The metering plan must inventory buildings based upon whether standard or advanced meters will be installed. The total space to be targeted for standard meters must be determined in addition to the space targeted for advanced meters. OPDIVs will be required to report on the progress of installation against these total square foot values.

Appendix

The metering plan must include, as an appendix, a list of facilities that will not have additional metering installed due to the LCC analysis. Each building listed shall include the site name, location, building square footage, function and a brief description of why it was not cost effective to install meters. Acceptable descriptions include, but are not limited to "cost analysis unfavorable," "building too small," or "consumption too little." This requirement is referencing campuses with buildings that will not be targeted for additional metering. These are the buildings that should be included in the inventory list. Individual buildings, however small, are assumed to have existing standard meters and would not be included on this list.

Financing

The metering plan shall address how campuses and/or sites will finance the design, procurement, and installation of metering system hardware and software. While it will be helpful to have an estimated resource requirement up-front, OPDIVs will likely have to base the financing plan on a general estimate and evaluate the various funding options available.

Data Analysis

The metering plan shall include a description of how the utility metered data will be used and if feasible, an example of reports to be generated.

Time line

The metering plan shall also include a metering implementation time line for each building or campus. The time line should be based on the percent goals of the OPDIV building square footage inventory to be completed and/or percentage of cumulative utility load to be metered across the OPDIV. Consider incorporating the buildings and/or installations into the time line on a priority or greatest payback basis which is most often dictated by largest square footage.

C. Technical Requirements and Considerations

OPDIVs must consider and establish several technical details when developing metering plans. First and foremost, the level of data metering must be established. There are four levels of metering:

- One-time spot measurements (system/sub-system)
- Run-time measurements (system/sub-system)
- Short-term monitoring (system sub-system/whole building)
- Long-term monitoring (system/whole building)

The FEMP metering guidance document discusses these levels in further detail and the level of metering desired will help to establish the technical requirements of the meters required. However within various meter types there are numerous features. OPDIVs are strongly recommended to obtain as much information on metering as possible prior to establishing detailed specifications. Suggested information sources include first-hand research of metering vendors, federal sites or private sector businesses with existing metering programs, FEMP guidance and research, local utilities and industry research.

When sufficient research has been completed, OPDIVs must establish formal metering plans and implement the following mechanisms:

Design Guidance and Equipment Specifications:

OPDIVs shall issue design guidance and equipment specifications for their metering program planning, equipment and hardware and software and tools in support of HHS metering objectives. This guidance will assist OPDIV sites with implementing metering programs and reduce the need for site personnel to reinvent these documents for each solicitation. The design guidance and equipment specification will serve as a template for individual sites and will prevent a conflict between OPDIV level and site-level objectives.

Metering System Communications Requirements:

OPDIVs shall issue plans for their facility managers and information technology staff regarding how to address the metering system's communications requirements. Direction shall be provided on the types of communication tools to be used in various situations such as, energy management control systems (EMCS), networks, cellular devices, telephone/modem connections or wireless components.

Metering Training:

Training of energy and facility personnel on advanced metering is critical to the successful installation and application of metering systems. As the metering planning requirement works its way to the site levels, many individuals not previously exposed to standard or advanced metering will be required to make informed decisions. Training individuals before critical decisions are made will ensure the systems eventually installed will not only satisfy the legislated requirement, but that the metering systems accomplish their desired objectives.

In addition, OPDIVs are encouraged to establish or arrange their own advanced metering training for site level personnel. Resources that may provide training include local utilities, metering vendors and FEMP.

D. Methods of Financing

Financing the metering system installation will be a one of the most difficult aspects of the metering requirement. First, OPDIVs should begin to request funding in their annual budgets for this metering mandate as soon as possible. Beyond appropriated funds a second option for funding and perhaps the most realistic, is the use of alternative financing mechanisms, such as Energy Savings Performance Contracts (ESPC) and Utility Energy Services Contracts (UESC). OPDIV sites may include metering systems in a bundle of energy efficiency measures to be completed through an ESPC or UESC. Other options are available and have been outlined in the following table from the FEMP *Guidance for Electrical Metering in Federal Buildings*.

Summary of Potential Metering/Sub-metering Funding Mechanisms Available to Federal Sites and Agencies

Funding Mechanisms	Description	Advantages	Disadvantages
Agency Appropriations	Fund using agency appropriations. Most likely local funding but funding can be designated at the headquarters level. Metering must compete against other initiatives.	Traditional funding approach, no surprises. Potential use of utility funds may provide some local flexibility.	Funds tend to be very limited.
Retained Energy Savings	Agencies with statutory authority are permitted to retain and reinvest a portion of the savings in additional efficiency initiatives. (Section 102 EPAAct 2005)	Competition limited to other efficiency measures.	Retained energy savings are not widely applied. Check your agency policy.
Energy Savings Performance Contracting (ESPC)	ESPCs may offer several approaches that support or promote the installation of advanced metering systems: - Install as part of measurement and verification (M & V) effort - Install meters as an energy conservation measure - Purchase meters using a portion of the realized project savings - Install as an energy conservation measure with resulting savings realized stipulated	In cases where ESPCs are in place, new delivery orders can be placed and/or savings streams tapped. Advanced metering systems make possible several new energy conservation of measures such as real time purchasing, peak load management and on-going retro-commissioning. Meters provide more rigorous and reliable M & V than other M & V methods.	Meters for M&V may affect cost-effectiveness of measures. Likely reluctance to allow for stipulated savings resulting from installation of meters. More data (case studies) needed. True cost of meters now includes interest payments over the life of the contract.
Utility Energy Services Contracts (UESC)	UESCs have been widely used to install or update new facility mechanical and electrical systems.	UESC approach used widely across the federal sector. investment paid back through utility bills.	Subject to availability on individual utility basis. Site should work to ensure that savings will result so that utility bill does not increase over budgeted amount. True cost of meters now includes interest payments over the life of the contract.

Summary of Potential Metering/Sub-metering Funding Mechanisms Available to Federal Sites and Agencies

Funding Mechanisms	Description	Advantages	Disadvantages
Utility Company Financing	Under utility area-wide contracts, utilities can offer federal sites a range of services offered to other customers. While service offerings will vary by utility, examples of potential services include: <ul style="list-style-type: none"> - Assistance in designing a metering plan - Utility covers up-front cost to purchase and install meters with repayment included as a fixed facility charge on bill for a set number of years - Subscription services where customer pays a fee for information but does not own, operate, or maintain metering equipment. 	Utility services are frequently offered by utilities to all customers in their service territory. Federal sites should tap into this pool of services when advantageous.	Services may not be offered by the local utility.
Bonneville Power Administration (RPA)	For several years BPA has been working with federal sites to provide low-interest financing in support of energy efficiency measures. Requests for funding are bundled together allowing RPA to shop for the best available interest rates.	Performance guarantees not required in this approach.	Non-traditional funding approach. True cost of meters now includes interest payments over the life of the contract agreement.
Public benefit programs and utility demand response programs ^a	States and/or utility service areas with potential electrical capacity problems may make funding available that allow customers to participate in programs where they can better manage loads.	Funds are “free” when qualifications are satisfied.	Only a limited number of States and utilities currently offer financial incentives to install advanced metering systems. Funding will likely cover only a portion of the purchase cost of the meters so agency funding will still be required.
Require as part of new building and major renovations projects	This approach relies on establishing policy that requires installation of meter and sub-meters as part of major capital projects.	Cost to purchase and install is absorbed as part of the overall construction cost.	ensuring requirement is not "value engineered out."

Summary of Potential Metering/Sub-metering Funding Mechanisms Available to Federal Sites and Agencies

Funding Mechanisms	Description	Advantages	Disadvantages
Mandatory tenant Sub-metering fees	Initiate a policy where tenants are billed the costs to purchase, install and operate a metering/sub-metering system for their assigned facilities.	The approach assigns the cost to the party that can most benefit in terms of accurate billing and more efficient systems operations.	Tenants will protest additional cost, especially if they don't see benefit.
O&M Performance Incentives	Federal Acquisition Regulations (FAR), Subpart 16-304 Fixed Price with Award Fees, allows for contractors to receive a portion of savings realized from actions initiated on their part that are seen as additional to original contract. O&M performance incentives attempt to capitalize on this provision by awarding fees for contractors completing low-cost and no-cost measures not specifically called out in the contract. Contractor fee would be a part of the energy savings realized. Contractor can install advanced meters and use data to optimize buildings to achieve award eligible savings. ^b	Can be a no-cost approach to install meters as contractor may agree to pick-up purchase, installation, and operations costs.	There are no known examples of O&M performance incentives in federal buildings. Agreeing to terms with the O&M contractor may require significant negotiation. Performance incentives awards requires ongoing oversight.
Lease Metering Equipment	Lease advanced meters from GSA Federal Supply Service similar to leasing of other equipment.	Can pay out of utility account so savings can cover lease payments. Less up-front funding needed.	Periodic leasing fees vs. one-time expense when purchasing.

a. Information on state energy efficiency funds and demand response programs is available on the FEMP utility Web site: <http://www1.eere.energy.gov/femp/financing/energyincentiveprograms.html>. Check with your state energy office and servicing utilities to verify information on current program offerings.

b. See Section 3.8.1, Contract Language, of the FEMP O&M Best Practices Guide for more information on O&M performance incentives.

4-11-30 REPORTING REQUIREMENTS

In order to ensure progress toward the goals of the HHS Metering Policy, OPDIVs are required to report on metering installation per the following outline:

A) OPDIV Annual Energy Report: Beginning in FY 2007 and continuing through FY 2016 OPDIVs are required to complete the table on the next page and include in the OPDIV Annual Energy Report. OPDIVs shall report the number of buildings metered, the cumulative square feet metered, and the percentage of OPDIV electricity, natural gas, steam and water consumption represented by those buildings and distinguish between standard meters and advanced meters for each year. The FY 2011 report should include the total number of buildings already being metered. All reporting should be on a cumulative basis.

B) Review of OPDIV Metering Plans: OPDIVs shall review metering plans annually to reflect changing electric rates, screening assumptions, lessons learned, design, financing or procurement changes with the OPDIV or at a specific site. Sites that were at one time identified as not practical for metering installation may some year be deemed life-cycle cost effective for metering technology. OPDIV metering plans shall be reviewed and updated by the beginning of August each year.

Metering Plan Progress Reporting Chart

By the end of FY	Cumulative % of Standard Electric Meters		Cumulative % of Advanced Electric Meters		Cumulative % of Natural Gas Metered Planned		Cumulative % of Steam Metered Planned		Cumulative % of Water Metered Planned	
	Requirement	Actual	Requirement	Actual	Requirement	Actual	Requirement	Actual	Requirement	Actual
2007	10		5							
2008	20		15							
2009	40		25							
2010	60		60		(1)		(1)		(1)	
2011	85		85							
2012	100		100		(1)		(1)		(1)	
2013										
2014					(1)		(1)		100	
2015										
2016					100		100			

(1) Insert planned percentages as indicated in the OPDIV Metering Plan timeline percentage goals of building square footage to be completed.

Note: Where other metering such as; central plant chilled or hot water, industrial or landscaping water or independent building water use is cost effective and is implemented, add the information to the reporting chart.

OPDIVs must determine which buildings will have standard meters installed and which will employ advanced metering and develop an inventory baseline. These baselines will provide the basis to determine the percentages in the above table.

Appendix A – Amended Metering Provisions of NECPA

Included below are the pertinent sections of National Energy Conservation Policy Act (NECPA) (42 USC § 8251-8262k) as amended by EPACK 2005.

(e) Metering of energy use

(1) Deadline By October 1, 2012, in accordance with guidelines established by the Secretary under paragraph (2), all Federal buildings shall, for the purposes of efficient use of energy and reduction in the cost of electricity used in such buildings, be metered. Each agency shall use, to the maximum extent practicable, advanced meters or advanced metering devices that provide data at least daily and that measure at least hourly consumption of electricity in the Federal buildings of the agency. Not later than October 1, 2016, each agency shall provide for equivalent metering of natural gas and steam, in accordance with guidelines established by the Secretary under paragraph (2). Such data shall be incorporated into existing Federal energy tracking systems and made available to Federal facility managers.

(2) Guidelines:

(A) In general not later than 180 days after August 8, 2005, the Secretary, in consultation with the Department of Defense, the General Services Administration, representatives from the metering industry, utility industry, energy services industry, energy efficiency industry, energy efficiency advocacy organizations, national laboratories, universities, and Federal facility managers, shall establish guidelines for agencies to carry out paragraph (1).

(B) Requirements for guidelines

(I) the cost of metering and the reduced cost of operation and maintenance expected to result from metering;

(II) the extent to which metering is expected to result in increased potential for energy management, increased potential for energy savings and energy efficiency improvement, and cost and energy savings due to utility contract aggregation; and

(III) the measurement and verification protocols of the Department of Energy;

(ii) include recommendations concerning the amount of funds and the number of trained personnel necessary to gather and use the metering information to track and reduce energy use;

(iii) establish priorities for types and locations of buildings to be metered based on cost-effectiveness and a schedule of one or more dates, not later than 1 year after the date of issuance of the guidelines, on which the requirements specified in paragraph (1) shall take effect; and

(iv) establish exclusions from the requirements specified in paragraph (1) based on the de minimis quantity of energy use of a Federal building, industrial process, or structure.

(3) Plan:

Not later than 6 months after the date guidelines are established under paragraph (2), in a report submitted by the agency under section 8258(a) of this title, each agency shall submit to the Secretary a plan describing how the agency will implement the requirements of paragraph (1), including (A) how the agency will designate personnel primarily responsible for achieving the requirements and (B) demonstration by the agency, complete with documentation, of any finding that advanced meters or advanced metering devices, as defined in paragraph (1), are not practicable.