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Charting a Course to Energy Independence

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Metering for the Masses: Federal Requirements for Metering

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EPAct 2005/Section 103

- **Metering Requirements Section -** Section 103: Energy Use Management and Accountability
- **Applicability -** All agencies
- **Key Requirements:**
  - All Federal buildings, where “practicable”
  - Meter electricity using “advanced meters”
  - By October 1, 2012
  - Hourly interval data (minimum) collected at least daily

What are “advanced meters”?

- Advanced electric meter:
  - Measure and record interval data (at least hourly for electricity)
  - Automated communication to a remote location
  - Downloaded at least daily

- No specific guidance of what to measure (i.e., kW, KVA, PF, Voltage, etc.)

Which Buildings Apply?

- Guidance says: "Maximum Extent Practicable"
- To determine cost-effectiveness we need to estimate
  - the cost to design, purchase, install, maintain, store data, and operate the meter/metering system, and analyze the data output, and
  - the resulting energy cost savings.

Formula and sample calculation:

$$\frac{\left[\left(\frac{\text{Installed Cost}}{\text{Desired Simple Payback}}\right) + \text{Annual Cost}\right]}{\text{\% Annual Savings}} = \text{Minimum Annual Electric Bill}$$

= [($5,000) ÷ (10 years) + ($25per month) x (12 months per year) ÷ (0.02)] = $40,000

SOURCE: Guidance for Electric Metering in Federal Buildings, DOE/EE-0312

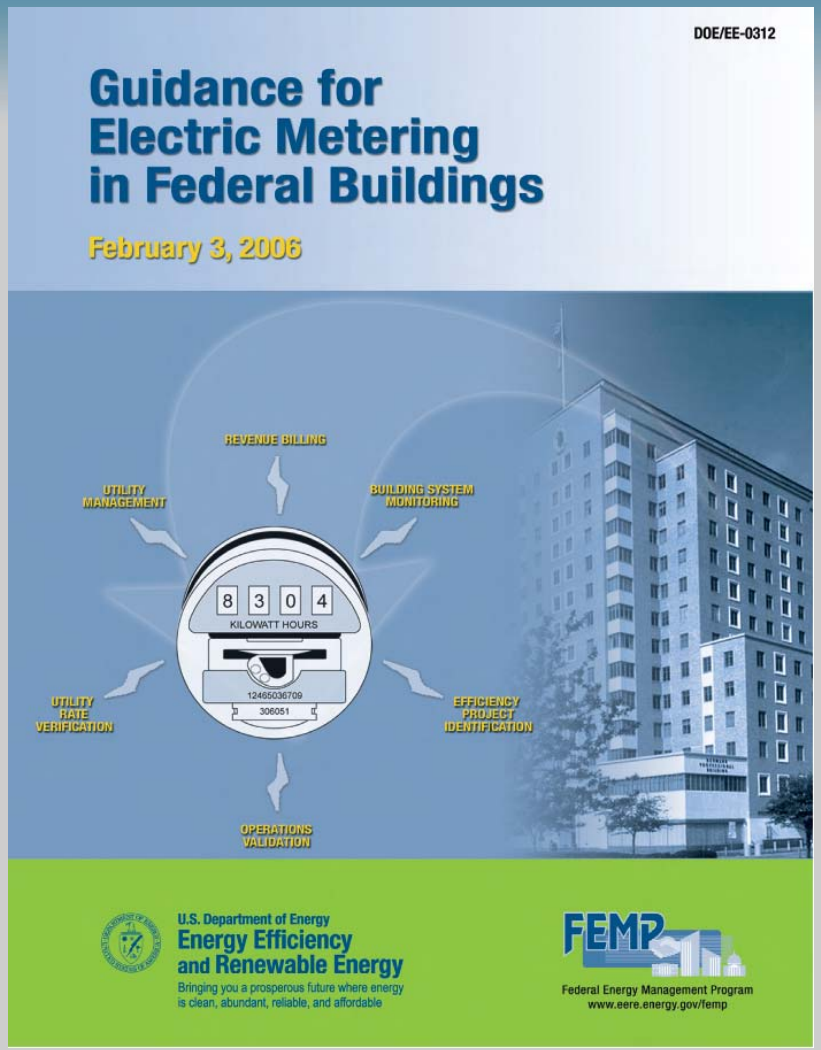
But how do I estimate savings with no metering?

- DOE guidance states "In cases where buildings are not metered, electric energy use can be estimated using energy-use intensity (EUI) data appropriate for the building type"
  - http://eber.ed.ornl.gov/benchmark/eui.htm
- For buildings of a particular type, could calculate the floor area that would make metering cost effective
  - For example, Army assumes all Admin buildings over 29,000 sf should be metered

EPACT 2005

Supporting Documents

"Guidance for Electric Metering in Federal Buildings" (DOE/EE-0312)



http://www1.eere.energy.gov/femp/pdfs/adv_metering.pdf

DoD Instruction 4170.11

- **Metering Requirements Section -** Paragraph 5.2.4.2: Metering
- **Applicability - DoD**
- **Key Requirements:**
  - Meter electricity, natural gas, and water in "appropriate facilities" by 2012.
  - Electricity, natural gas, and water meters with interval and remote reading capabilities on all new construction and renovation projects exceeding $200,000.
  - Steam will be metered at plants
- **Supporting Documents -** http://army-energy.hqda.pentagon.mil/policies/4170_11.asp
-

Executive Order 13423

- **Metering Requirements Section -** Not required in Executive Order.
- **Applicability -** All agencies
- **Key Requirements:**
  - The Instructions for Implementation encourage that meters be applied to "measure consumption of potable water, electricity, and thermal energy in Federal buildings and other facilities and grounds."
  - The Instructions also recommend considering the inclusion of meters in alternatively financed projects.
- **Supporting Documents -** www.**ofee.gov**/eo/eo**13423_instructions**.pdf

Energy Independence and Security Act of 2007 (EISA 2007)

- **Energy Reduction Goals for Federal Buildings:** Requires that total energy use be reduced 30 percent by 2015 based on 2003 levels
- **Facility Management/Benchmarking:** Comprehensive energy and water evaluations of 25% per year with tracking system
- **Performance and Standards for New Building and Major Renovations:** Very aggressive performance standards including 100% reduction by 2030
- **High-Performance Buildings:** Green buildings and advanced technologies.
- **Metering**
- **Energy Savings Performance Contracts**
- **Energy-Efficient Product Procurement**
- **Office of Management and Budget Reporting**
- **Reducing Petroleum/Increasing Alternative Fuel Use**

EISA 2007

- **Metering Requirements Section –** Section 434
- **Applicability -** All Federal agencies
- **Key Requirements:**
  - Section 432 establishes a framework for Facility Management / Benchmarking (which requires meters)
  - Requires each agency to provide for equivalent metering of natural gas and steam
- **Supporting Documents -** http://www1.eere.energy.gov/femp/regulations/eisa.html

EISA 2007

Supporting Documents

Metering Best Practices Guide (DOE/EE-0323)

http://eere.pnl.gov/building-technologies/pdf/mbpg_guide_08.pdf

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Assess Your Situation

- Familiarize yourself with legislation and requirements
- Agency policy may dictate how you approach metering
- Should [already] have a metering plan to accomplish complete metering of facilities
- If not, start to plan for your system now
- Get going!

Elements of a Plan

1. Determine legislative and/or agency requirements
   - Plan a path toward compliance
2. Determine how to pay for metering
   - Agency funds, site funds, your utility, ESPC?
3. Stakeholder involvement
   - Identify key personnel and assign responsibility
   - Get feedback from people who will be touching this equipment
   - Get IT people involved early
4. Determine which buildings to meter
   - Which buildings are cost effective (practicable)
   - Any special loads/processes that also should be metered?

Elements of a Plan (cont.)

5. Determine what data is needed
   - More than just a single reading
   - How much “advanced” data do you need?
   - Provide a usable interface to get people access to these data
6. Identify metering technologies and communications
   - Develop a list of requirements to guide your selection process
7. Have meters installed by October 1, 2012
8. Use data for “efficient energy use and cost reduction”
   - Must have someone assigned and accountable for using the system to save energy and dollars
   - Must provide for periodic maintenance on the system.

How do I select the type of meters?

- During the planning process, develop a list of requirements to guide your selection process
- Focus on defining what you want to collect, how you will collect it, and the hardware decisions will take care of themselves
- The type of meter to use is of lesser importance than the communications infrastructure and how to get users access to these data
- Remember much of this will be an IT exercise

Metering System Components

Meters

Data Collection

- *Phone modem or cell phone*
- *Local area network (LAN)*
- *Energy management control system (EMCS)*
- *Radio frequency (wireless)*
- *Power-line carrier*
- *Dedicated fiber network*

Data Storage

Data Access

Metering Costs

- **Hardware:** Hardware refers to the cost of the meters and all materials required to support their installation:
  - Meter purchase cost
  - Ancillary devices
  - Communications infrastructure
  - Miscellaneous supplies
- **Labor:** Meter system planning, installation, inspection, testing, and commissioning.
- **Recurring Costs:** Planned regular costs that support the on-going operation of the meter/ metering system.
  - Monthly communications fees
  - Data collection and storage
  - Data analysis
  - Operation and maintenance

Expected Savings from Metering

Action	**Observed Savings**
Installation of meters	0-2% (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 improvement)
Continuous Commissioning	15 to 45% (improved awareness, ID simple O&M improvements, project accomplishment, and continuing mgmt. attention)

Questions?

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