



• August 15-18, 2010 • Dallas, Texas •
• Dallas Convention Center •



Metering 101 – Policy Requirements and EMCS

Peter Hall
Sustainability Practice Leader



- Policy and other metering drivers
 - Policy requirements and mandates; e.g., EAct '05, EO 13514 and EISA 2007
 - Other drivers for better metering
- The role of metering in developing a successful Energy Management Control System
- Developing a successful energy metering program using existing programs such as an Environmental Management System (EMS) framework

Metering Policies

	Energy Policy Act of 2005	Energy Independence and Security Act 2007	DoD Instruction 4170.11	Executive Order 13514
Metering Requirements Section	Section 103: Energy Use Management and Accountability	Section 434(b)	Paragraph 5.2.4.2: Metering	Not required in Executive Order – but is required for successful tracking of EO metrics
Applicability	All agencies	All agencies	DoD facilities	All agencies
Key Requirements	<ul style="list-style-type: none"> -All building -Where practicable -By October 1, 2012 -Meter electricity -Hourly interval data (minimum) collected at least daily 	<ul style="list-style-type: none"> -All buildings -Where practicable -By October 1, 2016 -Meter natural gas and steam 	<ul style="list-style-type: none"> -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 	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	Guidance for Electric Metering in Federal Buildings (DOE/EE-0312)		Department of Defense Energy Managers Handbook, Chapter 10	Implementing Executive Order 13514

Energy Policy Act (EPAAct 2005)

- Annual energy reduction goals (2% per year: FY 2006 – 2015) – BTU per gross square-foot basis
- Renewable Energy purchase goals
- Reauthorizes Energy Savings Performance Contracts - 10/2016
- Requires Federal Procurement of ENERGY STAR or FEMP-designed products
- Emphasis on energy efficiency and sustainable design
- FY 2010-2012: >5% of electricity consumption from renewable sources
- ENERGY STAR Requirements
- Metering (Advanced metering capabilities - hourly measurements of electricity consumption)
- Solar
- Motor Requirements
- Green Building Requirements
- Hydrogen Fleet & energy Systems
- Fuel Cells
- Incentives

EO 13514 Goals (Overlap several EMCS metrics)

E.O. 13514 sets goals for improvements in the following areas:

- greenhouse gas emissions
- energy efficiency
- water use efficiency and management
- pollution prevention and waste elimination
- regional and local integrated planning
- sustainable Federal buildings
- sustainable acquisition
- electronics stewardship
- environmental management

Success = clearly defined projects, metrics, reporting and responsibilities!

Implement sustainable Federal buildings (Legal & Other Requirements)

- Ensure that all new buildings that begin the planning process in 2020 or after are designed to achieve zero-net-energy by 2030
- Ensure that all new agency construction and renovation complies with the Guiding Principles
- Ensure that 15% of existing Federal building inventory of the agency (existing and leased) meet the Guiding Principles by FY2015, and continue towards 100% compliance for all building inventory
- Encourage cost-effective, innovative strategies (cool roofs and green roofs) to reduce energy, water, and material use
- Identify opportunities to dispose and consolidate unused property assets
- Ensure retrofitting and renovation of federally owned historic properties promotes long-term viability

Business Drivers

- The Leadership in Energy and Environmental Design certification for existing buildings, LEED-EB, allows for up to three energy credits for the application of continuous metering on energy-using systems. LEED-EB also requires metering energy output from onsite renewable energy systems.
- Regarding the LEED certification for new construction, LEED-NC, metering may be used in support of the energy credit for measurement and verification.

Energy Conservation/Control Measures

- Standard
 - Lighting opportunities, thermostat replacement or reprogramming, occupancy controls, energy misers, pipe/tank insulation, fuel switching
- Frequent
 - VFD's, air compressor measures, envelope insulation, envelope performance testing, exhaust fan controls
- Innovative
 - Heat recovery, hot water reset, major boiler plant retrofits, combined heat and power plants, recommissioning, treatment plant opportunities, reduce static pressure drop in ductwork/piping
- Renewable energy
 - Solar thermal, solar hot air, photovoltaic, wind, ground source heat pumps
- Deferred Maintenance
 - Roofs, window glazing

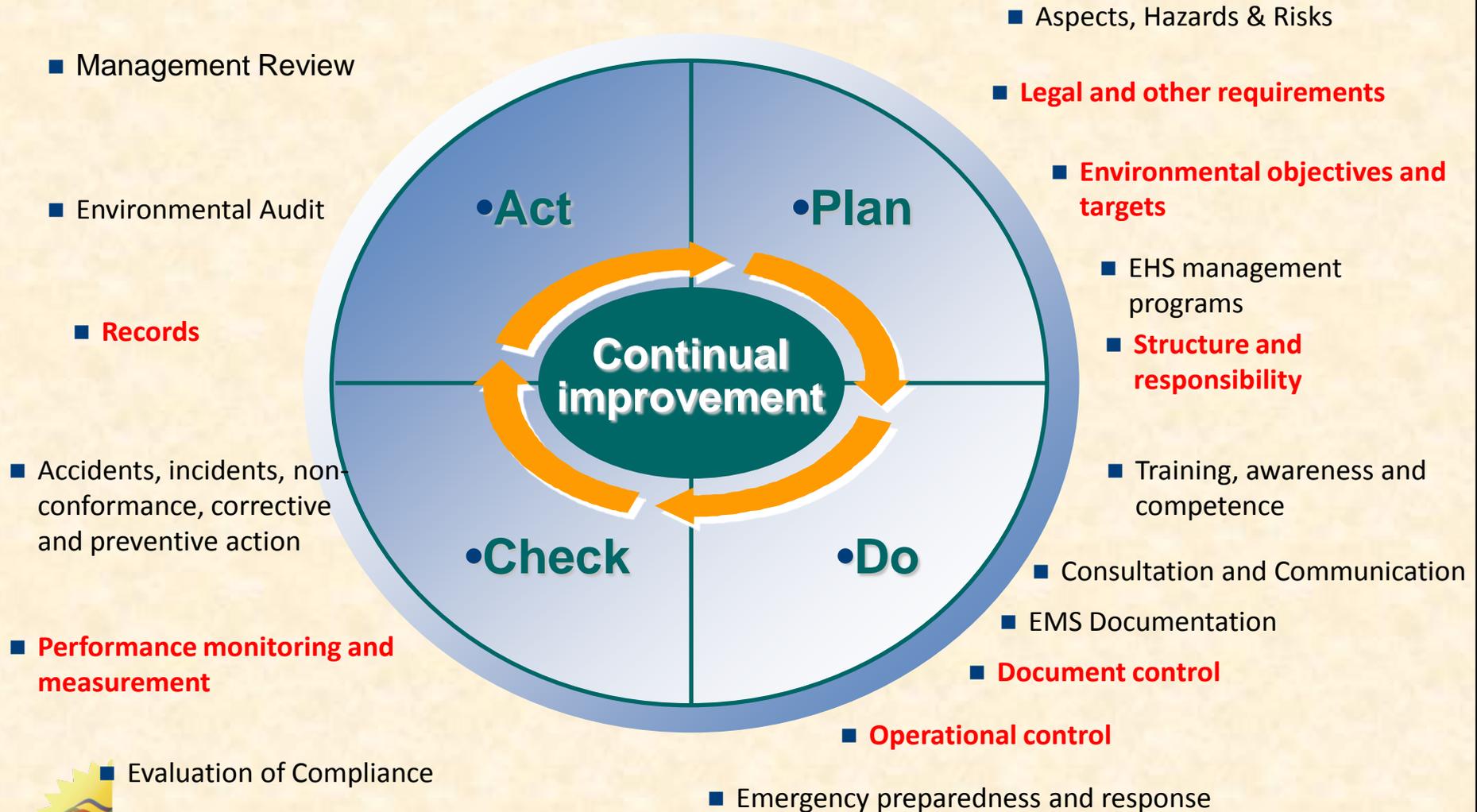


Energy Conservation, Energy Efficiency & Effective Monitoring

- Principle: Use only the energy that is needed
- Measures:
 - Building Envelope – Windows, Roof, Insulation
 - Lighting – Technology, Levels, and Controls
 - HVAC – Technology, Operation, Controls
 - High Efficiency Motors and VFD
 - Boiler Efficiency
 - Ground Source Heat Pumps
 - Heat Recovery and Re-use



KEY SYSTEM ELEMENTS TO SUPPORT SUCCESSFUL EMCS/ENERGY PROGRAM



Metering Data

Uses of Metering Data

- Verify utility bills
- Compare utility rates
- Proper allocation of costs or billing of reimbursable tenants
- Demand response or load shedding when purchasing electricity under time-based rates
- Measurement and verification of energy project performance
- Benchmarking energy use
- Identify operational efficiency improvement opportunities and retrofit project opportunities
- Usage reporting and tracking to support establishing and monitoring utility budgets and costs, and to develop annual agency energy reports

Objectives

- Reduce energy use
- Reduce energy costs
- Improve overall building operations
- Improve equipment operations

Data Collection

- Electric and Fuel data
 - Preferably prior to audit
 - At least one year, two years ideal
 - Boiler logs if available
- Record Drawings
 - Preferably prior to audit
 - Often collected during audits
- Onsite interview with facility staff.
 - Interview occupants as necessary

 Your CMP account number: **123-456-7890-012**
 Central Maine Power customer assistance line: **1-800-750-4000**
To report a power outage: 1-800-496-1000

 JANE DOE
123 MAIN ST
ANYWHERE ME
Service location

Billing date: 01/08/02 Read cycle: 05 Page 001 of 003

Meter Number	Read Date	Prior Read Date	Number of Days	Meter Reading	Prior Meter Reading	Total KWH
SA66034318	01/08/02	12/04/01	33	27140	26482	658

Account Summary

Prior balance: Payments received through 01/08/02 - thank you \$0.00+ \$65.46

Balance forward: \$65.46

New charges:

- Electricity Delivery: Central Maine Power (see detail below) \$53.05+
- Electricity Supply: ABCDE Electric (Standard Offer provider, see page 3) \$27.14+
- Total new charges: **\$80.19**

Current Account Balance: \$145.65 Please pay before 02/05/02

Electricity Delivery Central Maine Power Account Detail: Total balance including any past due

Prior balance for Central Maine Power delivery: Payments received - thank you \$0.00+ \$43.30

Balance forward: \$43.30

Current delivery charges:

- Late payment charges 1.040% \$0.48+
- Delivery charges: Residential \$52.56+
- Delivery services: Up to 100 KWH @ \$7.99
- Over 100 KWH @ .079881

Total current delivery charges: \$53.05

Central Maine Power account balance: \$96.35

Messages about your Central Maine Power delivery account

One Bill, Two Companies. Your bill reflects changes from your electricity supplier and from CMP, who delivers that electricity to you.

Total Monthly kWh: 658 KWH important message from CMP

Please see next page for additional information.

	01/02	12/01	11/01	10/01	09/01	08/01	07/01	06/01	05/01	04/01	03/01	02/00	01/00
Daily	20	19	17	21	17	25	22	28	31	32	31	26	23
Monthly	658	642	512	602	547	735	719	793	936	886	1093	770	727

Please return this stub with payment to CMP. If applicable, supply payments are forwarded to the appropriate electricity provider. Do not send cash or coins, and do not return with staples or paper clips. Refer to back to fill in information for mail address changes or to sign up for the Automatic Payment Option plan.



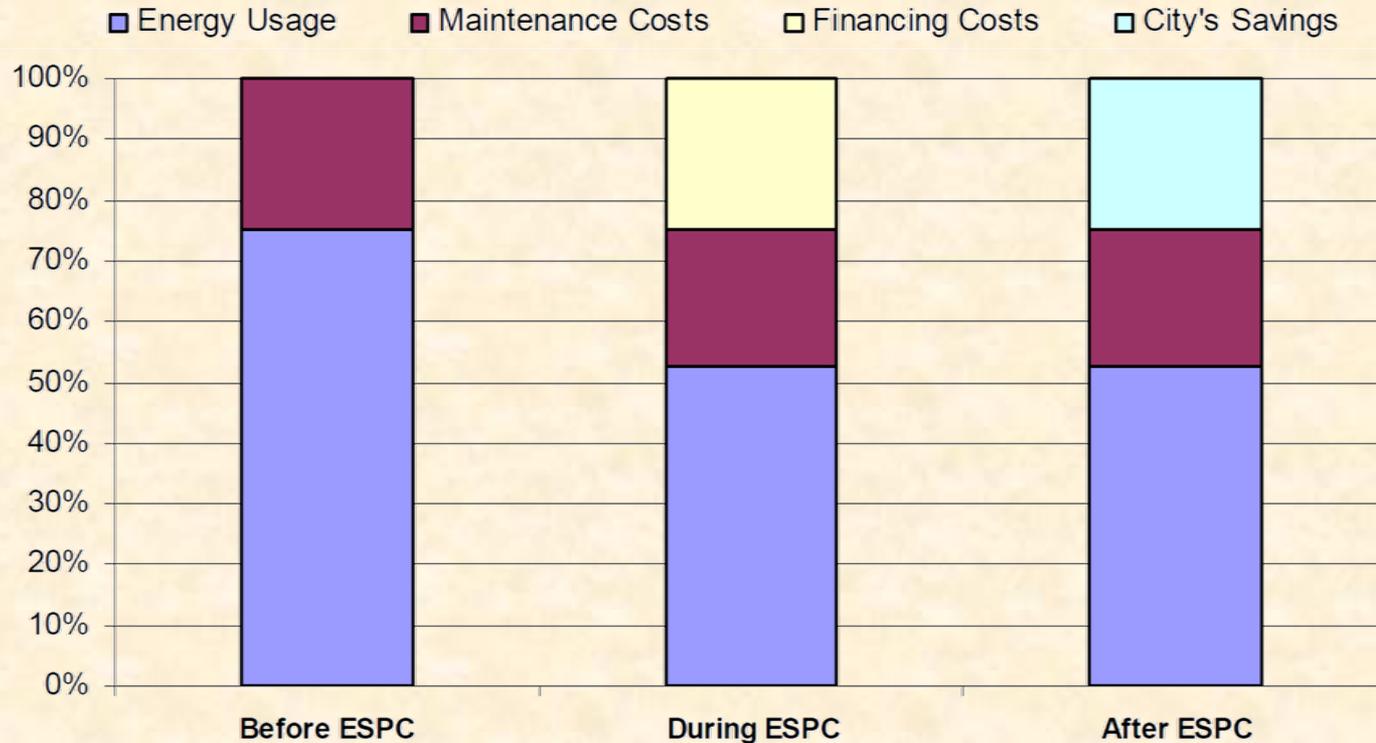
Your CMP account number: **123-456-7890-012**
Total amount due Please pay this amount, before 02/05/02 to avoid late charges. **\$145.65**

Central Maine Power Co.
 PO Box 1084
 Augusta, ME 04332-1084

00010 D
 JANE DOE
 123 MAIN ST
 ANYWHERE ME

Please write amount paid: \$
 Thank you!
 Please do not write below this line

Energy Performance Contracting



- Leverage energy savings to fund energy and capital improvements

Benefits of Integrating Metering Efforts into EMCS & EMS

- Support efforts to attain Energy Star and/or LEED-EB certifications
- Promote tenant satisfaction by providing information that tenants find useful in managing their operations
- Prolong equipment life, reduce capital investment requirements, and improve equipment reliability by verifying the efficient operation of equipment
- Assess the impact of price utility price fluctuations prior to or as they happen, allowing sites/agencies to address budget shortfalls on a proactive basis
- Can directly support EMS objectives & targets linked to EO 13514

Integrated Energy and EHS Management

Energy, Safety, Environmental Impacts and Calibration



How facilities can leverage their EMS program to meet EMCS goals

- Tactical actions that can be taken to fully leverage existing environmental programs to meet federal energy and sustainability goals
- Key Drivers to develop and implement a successful EMSC program
- Overview of how leading federal installations and federal contractors are successfully utilizing EMS programs to support sustainability practices leading to reduced energy consumption, successful energy monitoring and a reduction in their overall carbon footprint.
- EMS programs are ideally suited to address EO 13514 and EMCS/Metering metrics and goals

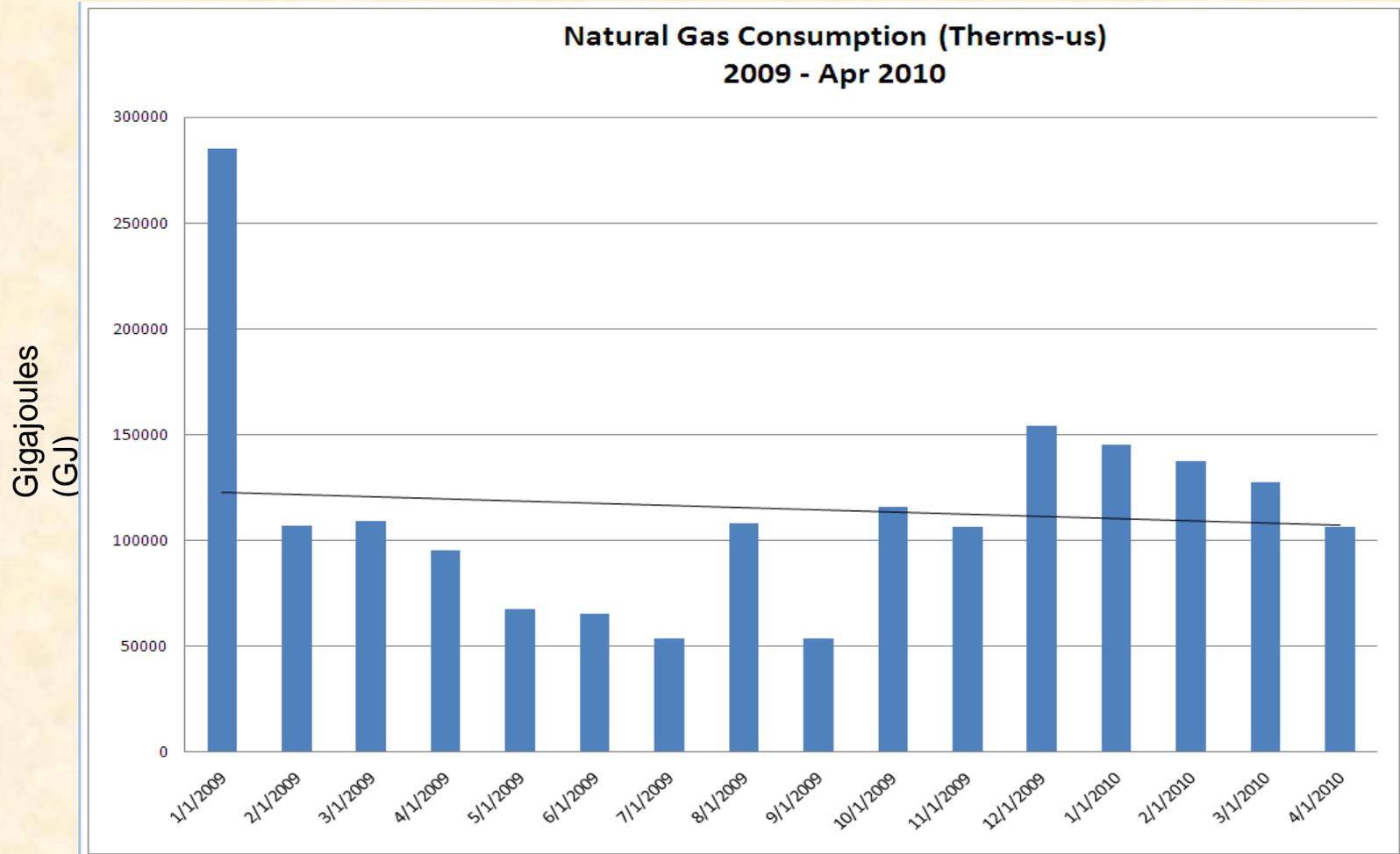
Monitoring and Measurement

Environmental and Energy Audit of Monitoring and Measurement...

- Describe calibration process for instrumentation and equipment and show calibration records for environmental and safety monitoring equipment
- Review maintenance procedures and maintenance logs for equipment related to mitigating or monitoring impacts and energy
- What is procedure for periodically evaluating compliance and energy use/reduction
- How does facility monitor progress in meeting objectives and targets

Natural Gas Usage

Reported for XX sites



Closing

- ❖ Metering programs are essential for meeting federal energy management goals
- ❖ Federal organizations looking to do more with less can benefit from leveraging their existing EMS program elements to support and meet environmental goals and energy management & control system requirements