

2010 Department of Energy
Project Management Workshop

March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

CLIMATE CHANGE & GREENHOUSE GAS MANAGEMENT

Peter O'Konski PE, PMP, LEED AP, CEM
Director for Facility Policy & Professional Development
Office of Engineering and Construction Management
March 2010

Topics

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

1. Secretary of Energy on Climate Change
2. Global Warming & Climate Change
3. What Are Greenhouse Gases?
4. What is a Greenhouse Gas Inventory?
5. Introduction to Executive Order 13514
6. Guiding Principles of Sustainability
7. Departmental Compliance with Guiding Principles
8. Conclusions

SPECIAL REPORT GLOBAL WARMING

TIME

**BE WORRIED.
BE **VERY** WORRIED.**

Climate change isn't some vague future problem—it's already damaging the planet at an alarming pace. Here's how it affects you, your kids and their kids as well.

**EARTH AT THE TIPPING POINT
HOW IT THREATENS YOUR HEALTH**

**HOW CHINA & INDIA CAN HELP
SAVE THE WORLD—OR DESTROY IT**

THE CLIMATE CRUSADERS




By far the most terrifying thing you will ever see.

an inconvenient truth
A GLOBAL WARNING

© 2006 Warner Bros. Entertainment Inc. All Rights Reserved. Warner Bros. Entertainment Inc. is the proud presenter of AN INCONVENIENT TRUTH. A Warner Bros. Entertainment Inc. production. AN INCONVENIENT TRUTH is a trademark of Warner Bros. Entertainment Inc. All other trademarks and service marks are the property of their respective owners.



NY Times

3

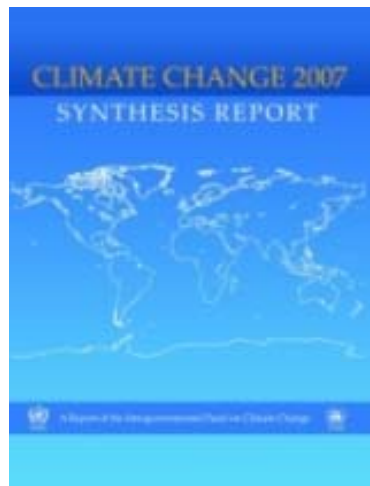
1. The Secretary on Climate Change

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

"We're in the great ship Titanic, the Earth is, and it's going to take a half century to really turn the ship. But that doesn't mean we can't start doing it today, and we must..."



"...I urge everyone to do this: Google the IPCC report. The 100-year trend is unmistakable..."

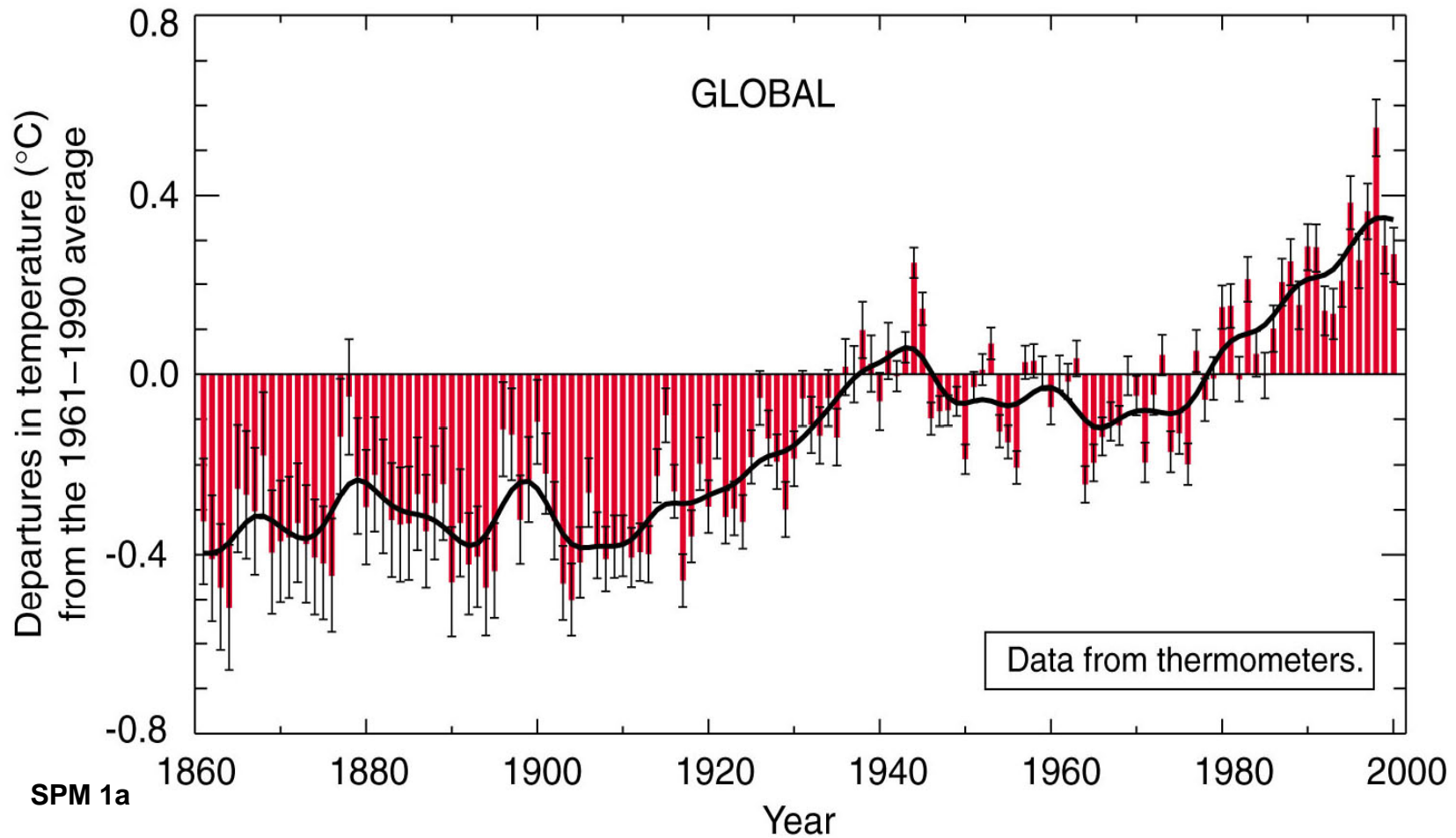
Secretary Chu
Newsweek 4/11/09

Earth's Surface Temperature

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



"Meeting
The
Challenge"



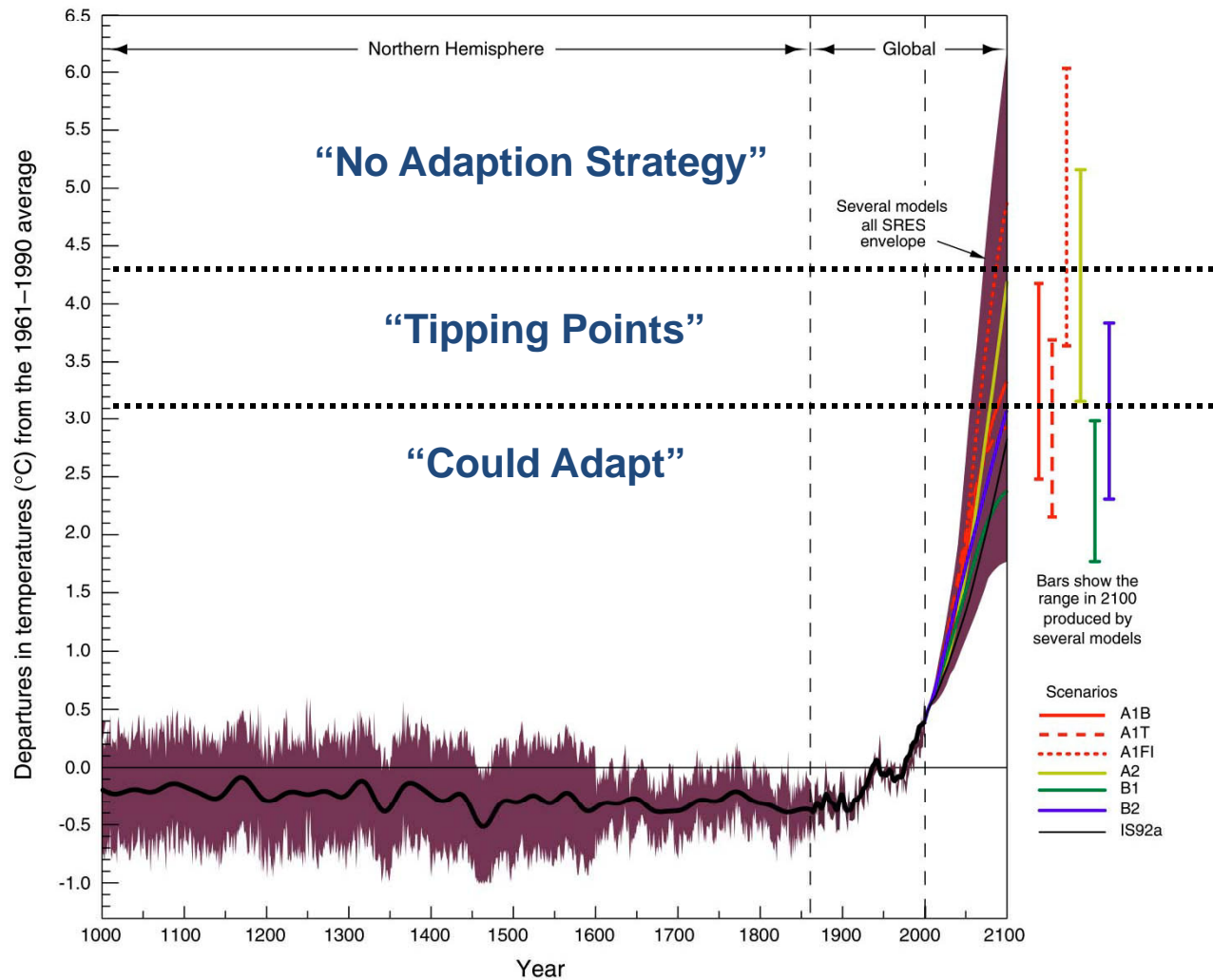
Projections – This Century

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

1000 to 1861, N.Hemisphere, proxy data; 1861 to 2000 Global, instrumental; 2000 to 2100, SRES projections



2. Climate Change & Global Warming

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



"Meeting
The
Challenge"

- “Climate Change” is often used interchangeably with “Global Warming”
 - “Global Warming” is an average increase in lower atmosphere temperature...
- “Climate Change” (preferred) conveys greenhouse gas impacts beyond rising temperatures
 - *“Climate Change” is a significant change in measures of climate (e.g., temperature, precipitation, wind) lasting an extended period (decades or longer)*

3. What are Greenhouse Gases (GHGs)?

- Greenhouse Gases (GHGs):
 - Gases in the Earth's upper atmosphere that trap heat and contribute to Global Warming and Climate Change
- GHG counted in a "Carbon Footprint"
 - Carbon dioxide, CO₂
 - Methane, CH₄
 - Nitrous Oxide, N₂O
 - Hydrofluorocarbons (HFCs) and Chlorofluorocarbons (CFCs) (covers 13 chemicals)
 - Perfluorocarbons, PFCs (covers 7 chemicals)
 - Sulfur Hexafluoride, SF₆



Not all GHGs contain Carbon

Not All GHGs are Equal

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



"Meeting
The
Challenge"

GHG	Global Warming Potential	Example
Carbon dioxide, CO ₂	1	Combustion of Fossil Fuels
Methane, CH ₄	21	Boiler Operations, Land Fills
Nitrous oxide, N ₂ O	310	Sewage Treatment, Boiler Flue Gases
HFC 134a	1300	Refrigeration (Chillers)
Sulfur hexafluoride	23,900	High Voltage Equipment



All GHGs Converted to a CO₂ Equivalent

A Sample GHG Calculation

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

Example Calculation - Converting to CO₂-e

GHG	Emissions (Metric Tons)	Global Warming Potential	Metric Tons CO ₂ -e
Carbon Dioxide	10,000	1	10,000
Methane	500	21	10,500
HFC 134a	1.0	1300	1300
Sulfur hexafluoride	0.06	23,900	1434
Total			23,234

4. What is a “Greenhouse Gas (GHG) Inventory”?

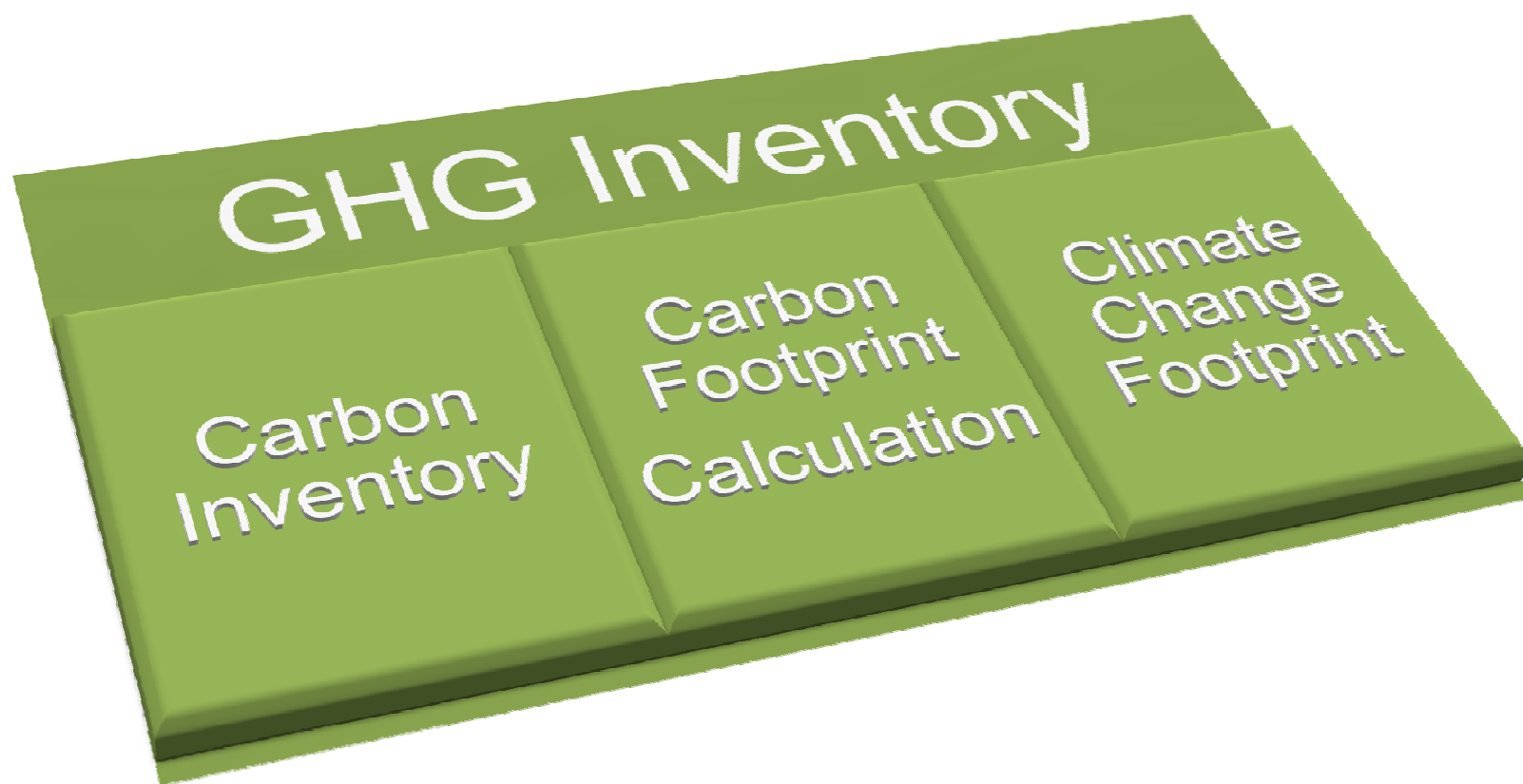
2010 Department of Energy
Project Management Workshop

March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

GHG Inventory has three common aliases



GHG Inventory – 3 Scopes

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



"Meeting
The
Challenge"

GHG Inventory

Scope 1:
Direct
Emissions

Scope 2:
Indirect
Emissions
(Purchased
energy)

Scope 3:
Other Indirect
Emissions



Remember: There are three scopes to a greenhouse gas/carbon footprint calculation

Scope 1: Direct Emissions

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA

"Meeting
The
Challenge"

- Includes: GHG emissions from sources that are owned or controlled by a Federal agency
- Relatively easy:
 - Combustion Sources
 - Site owned vehicles
 - On site electrical generation
 - Fugitive emissions
 - CFC and HFC losses from refrigeration equipment
 - Sulfur hexafluoride losses from high voltage electrical equipment
 - Not a trivial issue for DOE



Scope 2: Indirect Emissions - Purchased

2010 Department of Energy
Project Management Workshop

March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

- Includes: GHG emissions resulting from the generation of electricity, steam, high temperature water purchased by a Federal agency.
- Relatively easy:
 - Typically electricity
 - Could be steam or high temperature hot water
 - Could be negative
(ex: electricity from landfill gas)



Scope 3: Other Indirect Emissions

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

- **Includes: GHG emissions from sources not owned or directly controlled by a Federal agency but related to agency activities.**
- **Can be difficult:**
 - Transportation of purchased material or goods
 - Employee business travel
 - Employee commuting impacts
 - Outsourced work
 - Emissions from finished products
 - Transportation of waste
 - Vegetation & Trees
- **Scope 3 has various challenges**
 - Boundary issues
 - Can be a magnitude higher than Scope 1 and 2
 - Costly value chain analysis




Additional Important Terms

- Carbon Neutral
 - *“emitting no net carbon dioxide into the atmosphere”*
 - *“emitting no carbon dioxide into the atmosphere. Also, employing a technique to absorb carbon dioxide so it is not emitted”*
- Carbon Negative or Carbon Net-Negative
 - *“a process that consumes more carbon dioxide than it emits”*
 - Biomass
- Net-Zero Energy Building
 - *“the amount of energy provided by on-site renewable energy sources is equal to the amount of energy used by the building”*



Biomass Power Plant - Photo credit:
U.S. Department of Energy,
Energy Efficiency & Renewable
Energy Network (EREN)

GHG Management Process

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA
 U.S. DEPARTMENT OF
ENERGY

*"Meeting
The
Challenge"*

- Create the inventory
 - Establish a baseline – typically in metric tons
- Set goals and milestones
- Prepare a management plan
 - Create a comprehensive portfolio of emission reduction activities
- Implement the plan
 - Update GHG Management Plan based on mission changes and incremental findings and results
- Measure success
 - Measure and verify projects to ensure GHG reduction
- Update inventory and plan

Buildings Matter...

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



"Meeting
The
Challenge"

Each year a facility emits on average

25 lbs. of Carbon
SF



March 2010



Keep the real property
portfolio as lean as
possible....

18

5. Executive Order 13514

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA

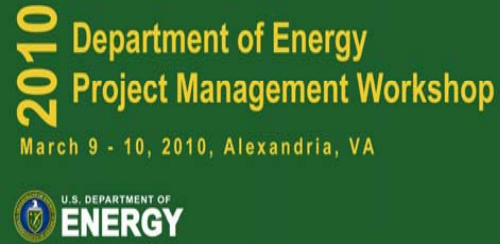


"Meeting
The
Challenge"

On October 5, President Obama Signed Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance.*



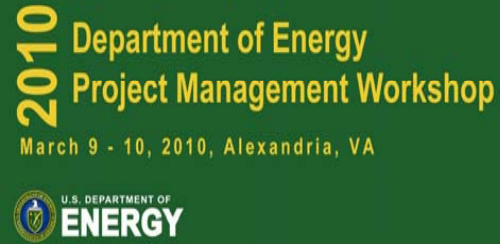
Executive Order 13514



"Meeting
The
Challenge"

- Executive Order 13514 establishes numerous goals for Federal agencies
- EO 13514 represents a transformative shift
 - Establishes GHGs as the integrating metric for tracking progress in Federal sustainability
 - Requires a deliberative planning process
 - Links to budget allocations and OMB scorecards to ensure goal achievement
- E.O. 13423 *Strengthening Federal Environmental, Energy, and Transportation Management* (January 29, 2007) is not revoked by the new E.O.

Executive Order 13514



"Meeting
The
Challenge"

- Achieve 30% reduction in vehicle fleet petroleum use by 2020
- Achieve 26% reduction in potable & 20% reduction in industrial, landscaping, & agricultural water consumption by 2020
- Comply with new EPA storm water management guidance
- Achieve 50% recycling & waste diversion by 2015
- Requires that 95% of all applicable procurement contracts will meet sustainability requirements
- Requires 15% of buildings meet the *Guiding Principles for High Performance and Sustainable Buildings* by 2015
- Design all new Federal buildings which begin the planning process by 2020 to achieve zero-net energy by 2030

Executive Order 13514

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

- New construction and major renovation comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings from [Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding](#)
- Guiding Principles lead to:
 - Reduced total ownership cost of facilities
 - Improved energy efficiency and water conservation
 - Safe, healthy, and productive building environments
 - The promote sustainable environmental stewardship

6. Guiding Principles of Sustainability

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

- **Employ integrated design principles**
 - Use a collaborative, integrated planning and design process
 - Incorporate life-cycle cost-effective energy, water, and indoor environmental quality principles thru the building life
 - Employ total building commissioning
- **Optimize energy performance**
 - For new construction, reduce the energy cost budget by at least 30% compared to baseline ASHRAE Standard 90.1-2004
 - For major renovations, reduce the energy cost budget by at least 20% compared to a pre-renovations 2003 baseline
 - Meter at the building level to track and optimize performance
- **Protect and conserve water**
 - Use 20% less potable water than the indoor water use baseline
 - Reduce outdoor potable water consumption by at least 50%; reduce storm water and polluted water runoff

Guiding Principles of Sustainability

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

- **Enhance indoor environmental quality**
 - Meet ASHRAE Standards 55-2004, Thermal Environmental Conditions for Human Occupancy, and 62.1-2004, Ventilation for Acceptable Indoor Air Quality
 - Implement a moisture control strategy to prevent mold contamination
 - Achieve a minimum daylight factor of 2% in 75% of all space
 - Specify materials and products with low or no pollutant emissions
 - Protect indoor air quality during construction and after occupancy
- **Reduce environmental impact of construction materials**
 - Use recycled-content and biobased-content materials and supplies
 - Recycle at least 50% of the construction, demolition, and land clearing waste
 - Eliminate ozone-depleting compounds during and after construction

7. Departmental Compliance

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

- S-1 memo 2-29-08 and DOE O 430.2
 - Achieve U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Gold certification for all new construction and major building renovations in excess of \$5M
 - New lease space; preference for LEED Gold
- OMB A-11, Part 7 (section 300)
 - Report whether "sustainable design principles" have been incorporated into the project

Departmental Compliance

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



"Meeting
The
Challenge"

- CD-1: Document HPBS considerations ... in the conceptual design report and acquisition strategy, as appropriate
- CD-2: Incorporate Preliminary ... HPSB provisions into the preliminary design and design review
- CD-3: Incorporate Final ... HPSB provisions into the final design and the external independent review
- CD-4: Issue a checkout, testing, and commissioning plan that ... ensures that the equipment, systems, and facilities, including HPSB systems, perform as designed and are optimized for greatest energy efficiency, resource conservation, and occupant satisfaction

See DOE G 413.3-6 dtd 6-20-08 for HPSB implementation guidance

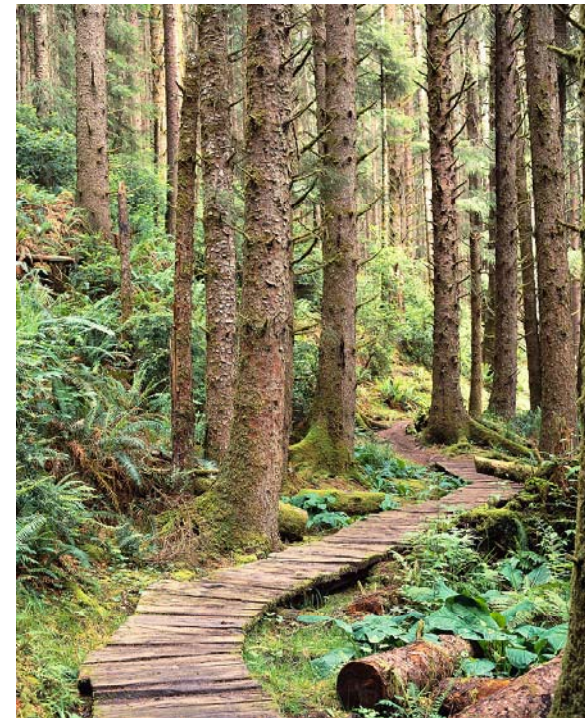
8. Conclusions

2010 Department of Energy
Project Management Workshop
March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

- Greenhouse gas management is part of the mission
- Energy and greenhouse gas considerations need to be included in all phases of the project management process
- Designing to LEED Gold and incorporating the Guiding Principles is not optional



2010 Department of Energy
Project Management Workshop

March 9 - 10, 2010, Alexandria, VA



*"Meeting
The
Challenge"*

Thank you!