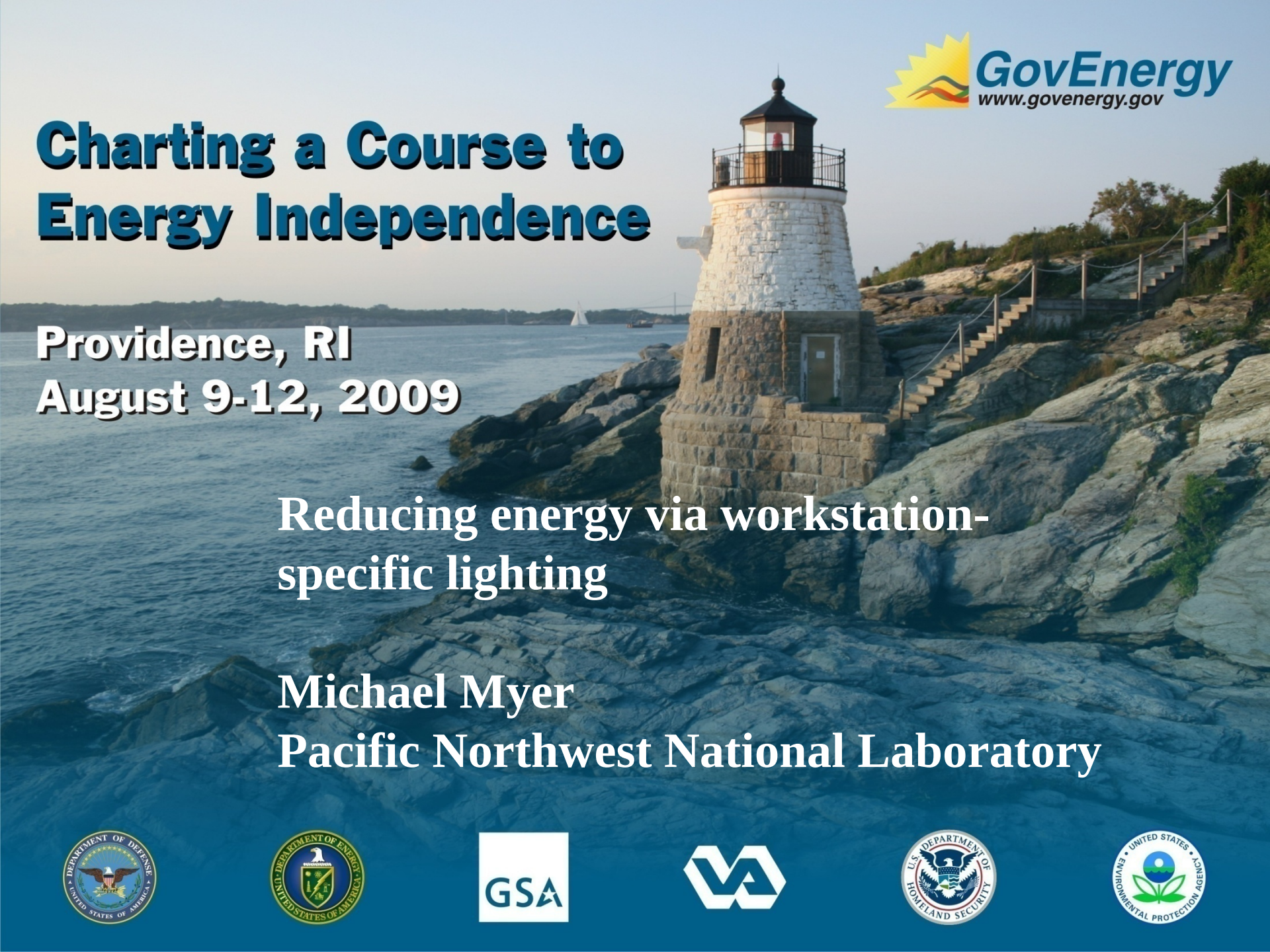

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Charting a Course to Energy Independence

Providence, RI
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Reducing energy via workstation-specific lighting

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Pacific Northwest National Laboratory

Reducing Energy via Workstation-Specific Lighting

- Overview
- Definition
- Ideal Spaces
- Technical Aspects
- Control Aspects
- Energy Savings
- Demonstrations & More Information

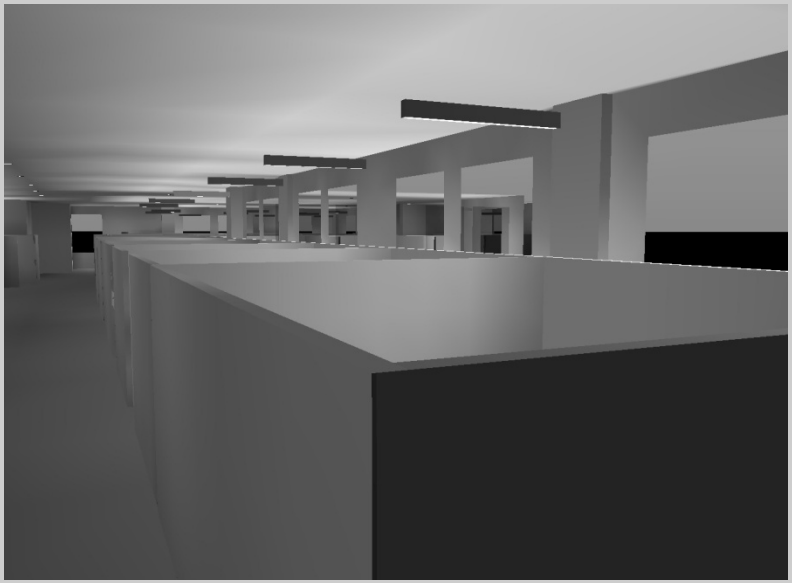
Michael Myer

Overview

- Lighting energy is 20% - 30% of office building usage
- Workstation-specific lighting has saved 20% to 70% energy
  - Effective use of light & power
  - Variable results/savings
- Design is not simple

Definition

- Workstation-specific
  - Individual fixture per cubicle
  - Light only where needed → energy savings
- Sometimes called "intelligent"
  - Layered controls → additional energy savings

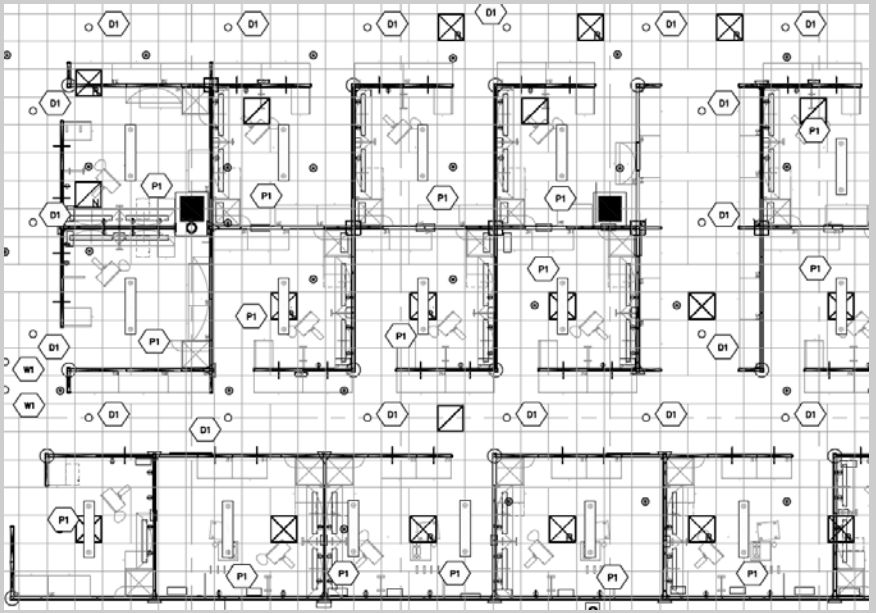


Ideal Spaces

- Typical Characteristics
  - Open Plan layout
  - Ceiling Height ≥ 9’-0”
  - Partition Height ≤ 60”
  - Cubicle layout fixed

Ideal Spaces

- Rule of Thumb:
  - Total area of space / total # of stations > 100 sf / workstation
  - If > 100 sf / ws → LPD < 1.1 W/SF
  - Example:
    - 4,054 sf / 27 ws = 150 sf/ws → 0.80 W/SF



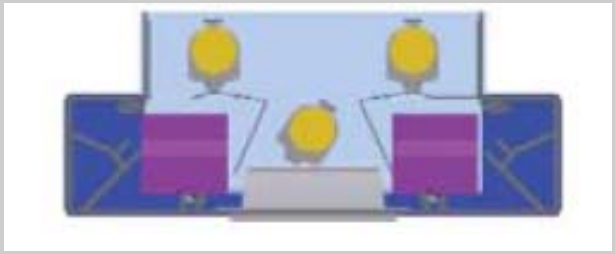
NOT - Ideal Spaces

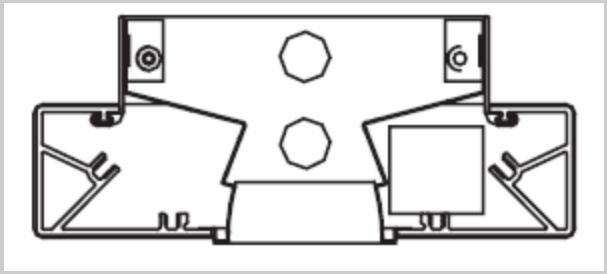
- Space that change
  - As workstation layout changes → light layout changes
  - Costly and time-consuming

NOT - Ideal Spaces

- Space conditions:
  - Low ceiling height
  - Tall partitions

Technology Aspects – Luminaire Selection





- Lamps: T8/T5/T5HO
  - 2 or 3 per fixture
- Separate optics
  - Light going up
  - Light going down

Technology Aspects - Supplementation

- Provide downlights in central aisles
- Provide downlights near filing areas
- Provide wallwashers along large vertical expanses
- Provide sconces for focal interest

Controls Aspects

- Typical controls
  - Daylight Harvesting
  - Occupancy Sensors
  - Personal Control
  - Demand Response
  - Time-of-use Scheduling

Controls – Daylight Harvesting

- Dims light in response to available daylight
- Easier to apply in the space

Controls – Occupancy Sensors

- Only lights the cubicle when occupied
- Turns off (or dims) downlight component
- More person is gone → more energy is saved
- Not very effective in a call center

Controls – Personal Controls

- Occupant sets desired light level in cubicle
- Increased user satisification
- Typically saves some energy
- Mechanism can wireless or through computer

Controls – Demand Response

- Lighting easiest for DR than other building systems
- Reduce lighting during peak demand
  - 20% reduction over 3 minutes → unnoticed
- Easier to accomplish via networked controls

Controls – Time-of-use Scheduling

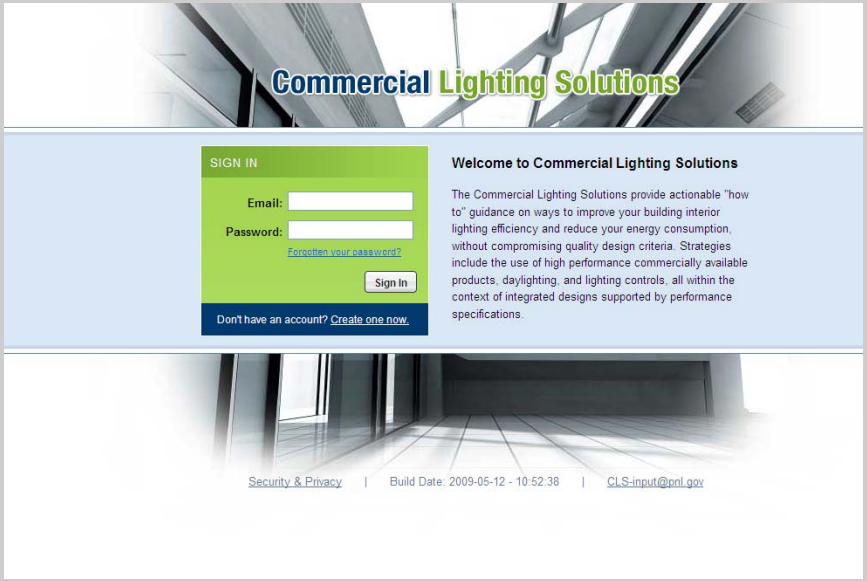
- "Scenes" per time of day
- Turn off certain fixtures after hours
- Cleaners can only have uplight
- No more "all lights on" for one person

Energy Savings

- Study found savings:
  - Occupancy Sensors – 35%
  - Daylight Harvesting – 20%
  - Personal Control – 11%
- Many variables to savings
- As # control strategies ↑ some savings ↓

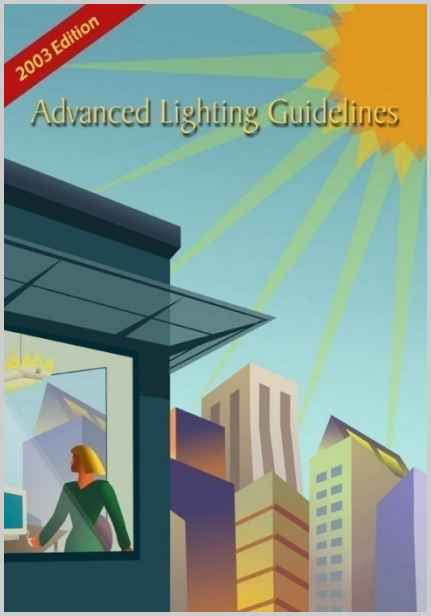
Demonstration & More Information

- Commercial Lighting Solutions
  - DOE webtool
  - Office designs available Fall ‘09
  - Provides designs and energy analysis
  - Working with Advanced Lighting Guidelines



https://www.lighting-solutions.org/comlighting/login.htm

Demonstration & More Information



- Advanced Lighting Guidelines
  - DOE supported
  - Coordinated with CLS
  - WSS to be included as a module

http://www.newbuildings.org/lighting.htm#

Demonstration & More Information

- GSA Relighting
  - DOE developed lighting specifications
  - Workstation-specific and others part of specifications
  - ARRA funding
    - Current projects
  - Existing demo at 450 Golden Gate

GSA U.S. General Services Administration

Demonstration & More Information

- NAVY Tech/Val
  - Naval Base at Ventura County, in Port Hueneme, CA
    - Home of the Seabees
  - Conducting research project
  - Results expected in 2010

Contact Information

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