

**LIGHTING  
WASTE,  
INEFFICENCY,  
ETC.**

**STAN WALERCZYK, CLEP, LC  
LIGHTING WIZARDS**

# STAN WALERCZYK'S BIO

- 21 years experience
  - Distribution, maintenance, installer, retrofit contractor, fixture designer, consultant, lighting designer, policy maker, researcher
- 500+ projects
- 30+ published articles
- 500+ seminars
- IESNA Member 1995 - 2008
  - Several committees
- Certified Lighting Energy Professional by AEE
  - CLEP Review Board member
- Lighting Certified by NCQLP
- Project manager for California Lighting Technology Center
- Assisted on DOE spectrally enhanced lighting research
- DOE CALiPER Steering Committee member
- Several IIDA Awards

# STAN WALERCZYK'S BIO

- Army facilities 2008 - 2009 for CERL
  - Fort Benning, GA
  - Schofield, Shafter, Tripler & Wheeler, HI
  - Fort Campbell, TN & KY
  - Zama & Sugami, Japan
  - Fort Leavenworth, KS
  - Natick Soldier Center, MA
  - Fort Hamilton, NY
  - Fort Lee, VA (later this week)

# TO HELP FOCUS ON BEST TOPICS & LEVELS

- Please raise your hand if you heard me in
  - New York City, January 2007
  - and/or
  - Chicago, January 2008

# **RECENT DOCUMENTS ON FOLLOWING TWO SLIDES**

- Hopefully you have or will read them

# Energy and Process Assessment Protocol, ver. 3.6, August 2009 D-1

- D.5.1 Having More Light in Space than Is Necessary To Perform the Task (waste)
- D.5.2 Leaving electric lighting on in daylit spaces during daylight hours (waste)
- D.5.3 Having the Entire Floor of a Building Lit When Only a Few People Are Working (waste)
- D.5.4 Leaving Lights on in Unoccupied Spaces (waste)
- D.5.5 Leaving Outdoor Lighting on during the Daylight Hours (waste)
- D.5.6 Using Outdoor Lighting That Lights up the Sky Instead of Lighting the Streets and Walkways (inefficiency)
- D.5.7 Incandescent lamps (inefficiency)
- D.5.8 Older T-8 Fluorescent Lamps and Electronic Ballasts (inefficiency)
- D.5.9 Using Older Technologies Such as T12 Fluorescent Lamps with Magnetic Ballasts (inefficiency)
- D.5.10 Using Incandescent Lighting for General Lighting Instead of Compact Fluorescent Lighting (inefficiency)
- D.5.11 Warm-Colored Fluorescent Lamps (inefficiency)
- D.5.12 Using High Levels of Ambient Lighting for Illuminating Tasks Rather than Using Task Lighting with Lowered Ambient Lighting (inefficiency)
- D.5.13 Mercury Vapor Lamps and Ballasts (inefficiency)
- D.5.14 Using Non-LED Exit Signs (inefficiency)
- D.5.15 Using High Pressure Sodium Lighting in Indoor Environments (inefficiency)
- D.5.16 Using Poor Performance Lighting Fixtures That Trap More Light than They Distribute to the Task Area (inefficiency)

# **Energy Conservation in Army Buildings, April 2009, Annex 46**

- Retrofitting Lighting Systems to Correct Light Levels
- Replacing Incandescent Lamps with Compact Fluorescents
- Efficient Occupancy Sensor Lighting Control
- Intelligent Lighting Controls: Daylighting
- Lighting Controls: Exterior Lighting Controls

**SO WITH LIMITED TIME,  
LET'S DELVE INTO SOME  
ADDITIONAL INFORMATION  
REGARDING THOSE  
DOCUMENTS**



# OVERLIT SPACES

- This is very well addressed in both D.5.1 and Annex 46 - Retrofitting Lighting Systems to Correct Light Levels
- Often more light is worse than less light, because too much light typically translates into glare on computer screens, etc.
- Many new, remodeled and older buildings in many army facilities are currently overlit
- Bringing light levels down to where they should be, would save so much wattage and KWH
- Often it would be as easy and low cost as just delamping

# OVERLIT SPACES



Hall in a brand new building in Fort Campbell which has over 100 fc on the floor, when only needs 10 - 20. Offices have same 2x4 troffers with 4 T8s, and they are way overlit too.



Hall in a remodeled building in Fort Leavenworth.  
Does anybody have sunscreen?

# HIGH PERFORMANCE T8s & PREMIUM BALLASTS

- D.5.8 states basic grade T8s & generic standard (.88) BF (ballast factor) electronic ballasts should typically be replaced lamp for lamp with high lumen T8s and premium low (.71 - .77) BF ballasts
  - **But you get usually get the most wattage savings by delamping with higher BF ballasts**
    - Plus delamping typically improves fixture efficiency and thermal performance, and with fewer lamps, there are less lamps to buy, install and recycle
- High performance full wattage T8s are also called 3rd generation or super
- Only full wattage T8s and ballasts used in retrofits and new construction should be approved by Consortium for Energy Efficiency, [www.cee1.org](http://www.cee1.org), which many rebate programs across the country are based on

# HIGH PERFORMANCE T8s & PREMIUM BALLASTS

- D.5.8 states 25, 28 and 30W F32T8s can be used, as long as ballasts designed for them are used
  - Although many ESCOs and lighting retrofit contractors push these lamps because they typically want the easy lamp for lamp strategy, these lamps have many disadvantages, including that are **not** good for
    - Delamping
    - Below 60 F
    - Dimming ballasts
    - Hibays
  - **Please do not accept any lighting proposal that is based on any of these reduced wattage T8s**

# HIGH PERFORMANCE T8s & PREMIUM BALLASTS

- With high performance full wattage 5000K T8s & premium ballasts, there is no reason to keep any T12s & magnetic ballasts even in areas with low KWH rates and no rebates
  - For example a fixture with 4 F34T12s & 2 ballasts, which consumes 144W, can often be retrofitted with 2 high performance 5000K T8s, .87 BF premium ballast & maybe white reflector, which would only consume about 55W
    - **64% wattage reduction at relatively low installed cost**

# HIGH PERFORMANCE T8s & PREMIUM BALLASTS

- It is a shame that basic grade 700 series 3500K T8s with .88 BF ballasts, which can be generic, are still specified for new construction and remodels
  - Unified Facilities Guide Specifications, Section Table of Contents, Division 26 - Electrical, Section 26 51 00.00 40, Interior Lighting, November 2008
    - Mark Allen is trying to find a way for me to improve this document
- Please require better lamps and ballast combinations for new construction and remodels

# PARABOLIC TROFFERS

- Parabolics are so common in many army bases, and are still be installed in new buildings, while most good lighting professionals now know how bad these fixtures are, and would not even think of recommending them
  - **Only 65 - 75% fixture efficiency**
  - Insufficient vertical footcandles
  - Excessive contrast ratios
  - Dark ceilings and upper walls, creating 'cave effect'
  - Overhead glare, which can cause eye strain and headaches

# FROM APPENDIX D



## Pre-Retrofit Lighting:

Lamp color temperature is 3500K, CRI 75. This lamp is the most commonly used fluorescent lamp in commercial applications.



## Spectrally Enhanced Lighting:

Lamp color temperature is 5000K, CRI 82. The higher brightness of these lamps offsets the reduced lumen output; the results are equal vision using less energy.



# PARABOLIC TROFFERS

- There are much better ways to to reduce wattage than to turn off middle lamp in 2x4 18 cell parabolic troffers
- There are some very good upgrade kits that eliminate parabolic louvers and allow up to 3 to 1 delamping, even when existing lamps are T8s



- No new buildings should get parabolic troffers, but should get high performance troffers or suspended indirect/direct fixtures instead

# EXISTING HPS, MH & MERCURY VAPOR

- D.5.13 & 15 state that all mercury vapor and interior HPS should be replaced, which is very good
  - But standard MH should also be replaced
  - Pulse start MH is not that great
  - High performance T8 systems are usually the best for hibays
    - T8s much better than T5HOs
  - Good LED fixtures often the best for exterior applications
    - Especially when can have high/low occupancy sensors, like in parking lots and storage areas
    - LEDs often better than induction

# DAYLIGHTING

- Annex 46 - Intelligent Controls: Daylighting recommends continuous dimming as one good strategy
  - Daylighting can be very good
  - But dimming systems can often look cost effective to T12 and even junky T8 systems, but if you 'raise the bar' and compare them to low-cost high-performance fixed-output T8 systems, dimming systems are usually a terrible choice
  - The watts per square foot power density can be so low with well designed high performance fixed output T8 systems, that there is not much electricity for a dimming system to save
  - Not only are dimming ballasts expensive, but so are controllers, installation, commissioning, re-commissioning

# OCCUPANCY SENSORS

- These are discussed in both Appendix D and Annex 46
- But after you do a good lighting retrofit, which gets down to very low power densities, occupancy sensors are often cost effective, especially where there are low KWH rates and no rebates

# OCCUPANCY SENSORS

- Education/motivation, maybe with stickers on switches, can often be most cost effective solution to get lights turned off when lights are not needed in 'owned' spaces like individual offices

Check out what is very common in Camp Zama, Japan. And people use them



# OCCUPANCY SENSORS

- As mentioned in Annex 46, sensors can be good in public or 'non-owned' spaces, such as conference, break, copy and rest rooms
- Sensors can also be very good in hibays, because there are usually no easily accessible switches for specific areas

# ALTHOUGH NOT COVERED IN THESE DOCUMENTS...

- There are hordes of sales people across the country pushing LED T8s, because of potential huge volume and making a lot of money
  - But based on DOE testing, none of these very expensive LED T8s are close to being even nearly as good as high performance fluorescent T8 systems
  - [www1.eere.energy.gov/buildings/ssl/benchmark.html](http://www1.eere.energy.gov/buildings/ssl/benchmark.html)
  - There are fluorescent T8s with about the same life as LED T8s, and the fluorescent T8s only cost about \$3

# REFERENCE DOCUMENTS

- Although these white papers are normally sold through my website, I am willing to provide these at no cost to army people
  - Best Practice Report
    - This white paper includes how to get down to .4 - .6 watts per square foot in typical offices including ambient and task lighting, while providing good lighting quality & quantity
    - Also details disadvantages of parabolic troffers, basket troffers, 4-lamp 4' troffers & wraps and T5HOs
  - Fluorescent vs. MH - 10 Rounds in the Hibay Arena
    - Mercury vapor, HPS and standard MH should be replaced with various options
  - Dimming vs. Nondimming - 10 Rounds in the Daylight Harvesting and Peak Load Shedding Arena
    - Although there is so much hype on dimming ballast systems, they do not really save energy cost effectively



# REFERENCE DOCUMENTS

- Here are some more for free
  - Lighting glossary
    - Explains common lighting terms
  - Power Points (used in my half day seminars)
    - Lighting 101
      - For people that are new to lighting
    - How Low Can You Go
      - How to get to very low power densities and other info
    - Are LEDs Ready For Prime Time
      - Yes, there are some and this explains what to look for
    - Fluorescent, LED, Induction and MH - Free for All in the Hibay Arena
      - Updated version of white paper
    - Dimming vs. Nondimming - 10 Rounds in the Daylight Harvesting and Peak Load Shedding Arena
      - Some additional info than what is in white paper
    - Advancements in Exterior Lighting
      - How LEDs compare with other high performance incumbent technologies

# ***THAT'S ALL FOLKS***

- **Could go on and on, but such limited time**
- **Questions now or later**
- **Please fill out review forms**
  - **If there are any**
- **For further information**
  - **Stan Walerczyk**
    - **925-944-9481 (San Francisco area)**
    - **[stan@lightingwizards.com](mailto:stan@lightingwizards.com)**
    - **[www.lightingwizards.com](http://www.lightingwizards.com)**
- **Thanks for being here**