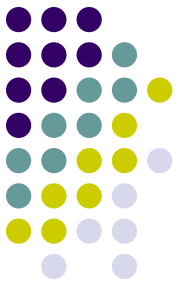




The Push & Pull of Greener Facilities

Jeff McDowell – Energy Specialist / Rexel





Jeff McDowell / Rexel

- | Rexel – largest distributor of electrical supplies in the world, second/third largest in US – www.rexelusa.com
- | Jeff M- Energy Specialist – Focused on lighting, lighting controls, motor/load controls, legislation, incentives. LEED Green Associate, Lighting Certified, Certified Green Building Professional. STUDENT & RESOURCE.
- | Distributors & manufacturers – seek out the experts & problem solvers, websites, training, unlimited resources.
- | Participate in your trade organizations.
- | Go to all of the utility seminars you can.
- | Mr. Google or your favorite search engine.





Seminar Goals

- | What are yours?
- | Discover what opportunities are present in your facility to save money, save energy, and improve the work environment (comfort, safety, control).
- | Learn to make a sound financial case for your facility Master Plan keeping all of the stake-holders interests in mind.
- | Discover simple/short term changes you can make for immediate results & long term plans to maximize budget and ensure systems remain current / efficient.
- | Enable you with tools, resources, motivation & confidence in your plan.

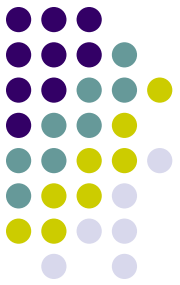


Our Topics Today



- | What are the factors driving the move toward greener buildings?
- | How will these regulations affect the way you run your buildings?
- | Products you should look at replacing today that are going away tomorrow.
- | How legislative and code changes will affect what incentives are offered by state, federal, and utility sources.
- | Replace or retrofit: Which is my most cost effective relight solution?
- | Getting a plan together: What tools **DON'T** you have at your disposal?
- | LED lighting: How to separate the myths from facts and determine if solid state lighting is the correct solution for your needs.
- | Resources, resources, and more resources.

The March of (California) Energy Legislation



- | New CA energy legislation – 1.85M results
- | New CA lighting legislation – 210K results
- | CAL Green – first statewide green building code in the nation for new construction – locals can require more, but not less. (CA Green Building Standards Code, Title 24, Part 11).
- | AB32 – CA Air Resources Board - reducing GHG emissions to 1990 levels by 2020
- | SB2X – 4/13 CA utilities 33% of energy from renewables. How will they do it?
Note: CA business pay up to 50% for energy than U.S. average...will you be pushed, pulled, or go quietly?
- | AB1103 - Commercial Building Energy Use Disclosure Program – January 1, 2012 – Disclosure your Energystar score –Portfolio Manager
- | CA Building Standards Code 2008 – Title 24 tightening down on LPD (Lighting Power Density), requirements for lighting controls, mandatory controls & daylighting. Pull permit = compliance.



According to the California Building Code, no building or structure shall be erected, constructed, enlarged, altered, repaired, moved, improved, removed, converted or demolished unless a separate permit for each building or structure has first been obtained from the building official.

<http://www.cslb.ca.gov/consumers/hireacontractor/BuildingPermitRequirements.asp>

But wait, there's more!!

The growing price & cost of energy

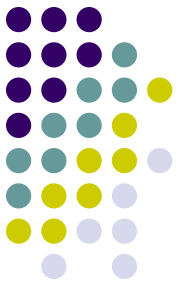


State	Cents/ kWh 2010 All
Connecticut	17.39
New York	16.31
New Hampshire	14.82
New Jersey	14.68
Massachusetts	14.53
Rhode Island	14.05
California	13.81
Vermont	13.24
Maine	12.71
Maryland	12.68
Delaware	11.99
Florida	10.64
Pennsylvania	10.35
Michigan	10.03
U.S. Total	9.88

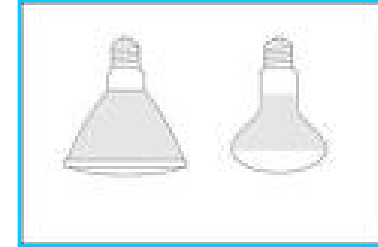
- | CA 7th in U.S. in utility rates – average increase of 6% yearly
- | “The CPUC has utilities to replace conventional customer meters with Smart Meters in order to give consumers detailed information about their energy usage at different times of the day to manage their energy use more proactively.”
- | Demand Response (DR) is a mechanism to manage customer consumption of electricity in response to supply conditions; having electricity customers reduce their consumption at critical times through incentives/disincentives (push & pull)
- | Load Shedding is reducing power in response to a DR request (strategies to be discussed later).
- | **Bottom line: 1) Reduce current load**
- | **2) control current load 3) shift current load.**

Phase Out – Change Out

& Where Did My Incentive Go?



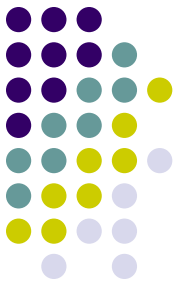
- | New PAR lamp efficiency standards Effective 2012 – The few existing lamps that meet the new standards - more expensive than standard halogen lamps today; new lamps designed to meet the standards will also be more expensive.
- | Majority of T12 (1.5” dia.) lamps will be phased out with in 2012 except for:
 - | T12 dimming ballasts that dim to 50% or less;
 - | Two lamp F96T12HO ballasts designed for outdoor sign applications;
 - | Magnetic ballasts with PF < 0.90 designed & labeled for residential applications.
- | Many 700 series T8 (1”dia.) phase out, lower CRI, 1st generation T8 lamps (common lamp designation 741) for more lumens/watt, higher CRI (color rendition)...higher CRI makes it easier for the eye to define it’s surroundings. Higher standards of efficiency for de-facto ‘quality control’.
- | Traditional A lamps phase out over the next 4 years.
- | No more mfg of 150-500W probe start metal halide lamps
- | More than 10 years – probably time to change



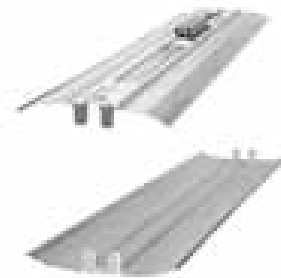
<http://lightingcontrolsassociation.org/new-energy-law-to-phase-out-todays-common-incandescent-lamps-probe-start-metal-halide-magnetic-ballasted-fixtures/>

Lighting Fixtures: Retrofit or Replace?

A matter of health, economics, and appearance.

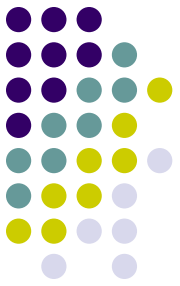


- | The lighting system in the TelUS company's 30-year-old office was inefficient and costly to operate, however, the layout of the lighting layout was still adequate and the lighting fixtures in good condition. One thousand lighting fixtures containing two T12 fluorescent lamps and magnetic ballasts were reconfigured with single T8 lamps, electronic ballasts and reflectors. The result was a \$14,000 first year savings (+6% yearly) and a 50% reduction of installation cost compared to complete fixture replacement. This retrofit shows that a 30-year old lighting system can be economically updated to the same energy performance standard as most new office lighting systems, that is, of 0.9 watts per square foot.
- | Note: Addition of lighting controls could offer additional savings of 40% and a \$.20 per sq. ft. tax deduction in addition to the utility rebates.



Lighting Fixtures: Retrofit or Replace?

A matter of health, economics, and appearance.

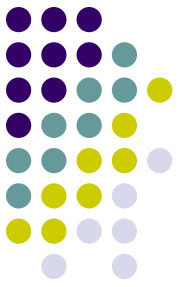


- | Title 24 is triggered if more than 50% of the fixtures in the space are removed or moved; or, (b) when increasing connected watts per sq. ft.
- | With ceiling plenum entry and demolition of installed fixtures, replacement results in more environmental waste and partial loss of workspace use...**ASBESTOS**
- | Consider air quality and cost of clean up when removing, moving or replacing fixtures.

Key considerations: Does the current lighting layout still work for the way the space is used? Is the building less than 20 years old (1989 Asbestos Ban/Phase-out)

Lighting Fixtures: Retrofit or Replace?

A matter of health, economics, and appearance.



Industrial and warehouse applications more frequently call for complete fixture replacement.

- | T12 'fat lamp' industrial fixtures
- | Probe start metal halide
- | Metal halide or incandescent storage or cold storage lighting
- | Incandescent / quartz dock lights
- | If it's more than 10 years old, you could likely be saving 50% in energy and getting 75% of replacement cost in rebates.

Dsire website: Database of State Incentives for Renewables & Efficiency

<http://www.dsireusa.org/incentives/index.cfm?state=CA>



Shifting or controlling lighting loads:

Reducing energy costs and improving occupant comfort



Rule #1: The best energy savings strategy is 'lights off'

Rule #2: There are currently lighting controls to fit every budget & every situation.

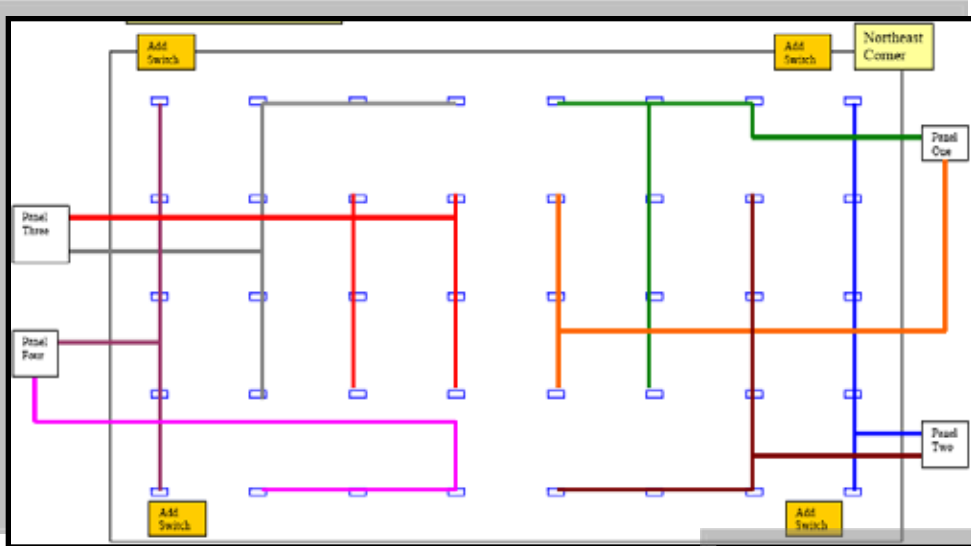
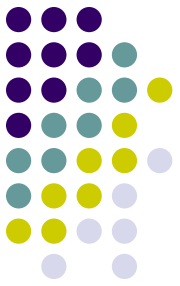
Rule #3: Utilities and the IRS are willing to help you pay for it.

Rule/Fact #4: Properly applied lighting controls will save you 25-75%

Lighting control strategy summary:

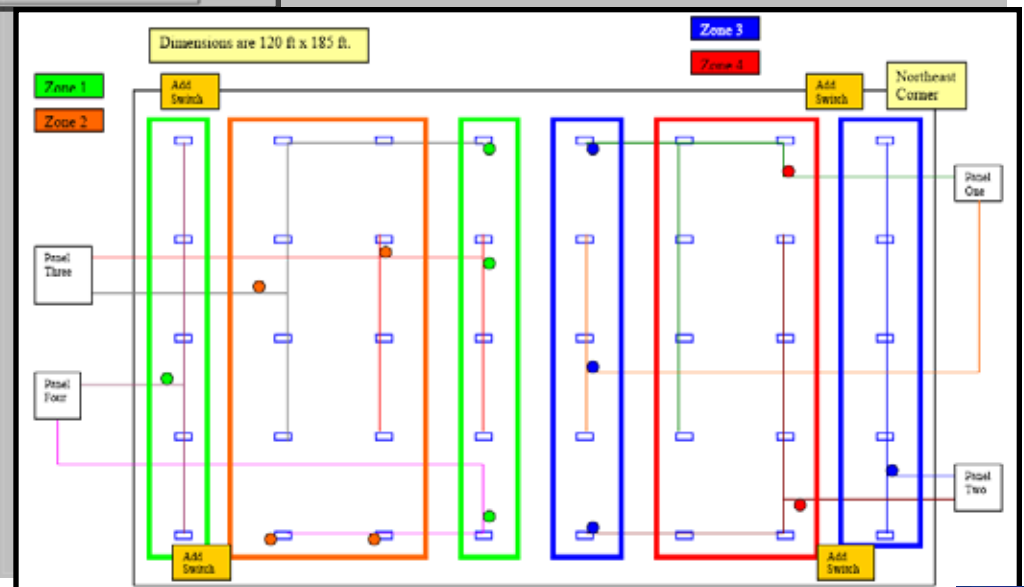
- | Occupancy sensors – reduces or shuts off lighting when no one is present in the space
- | Scheduling controls – astronomical (calendar) clock to control loads by lighting zone.
- | Daylighting controls – switch or dim lighting, control louvers and shades in reaction to ambient light levels.
- | Personal switching, bi-level switching
- | Ballast options: dimming, bi-level, power sensing
- | Digital systems allow control of individual loads from your computer or smart phone.

Happy remedies for haphazard circuits: The joys of wireless controls

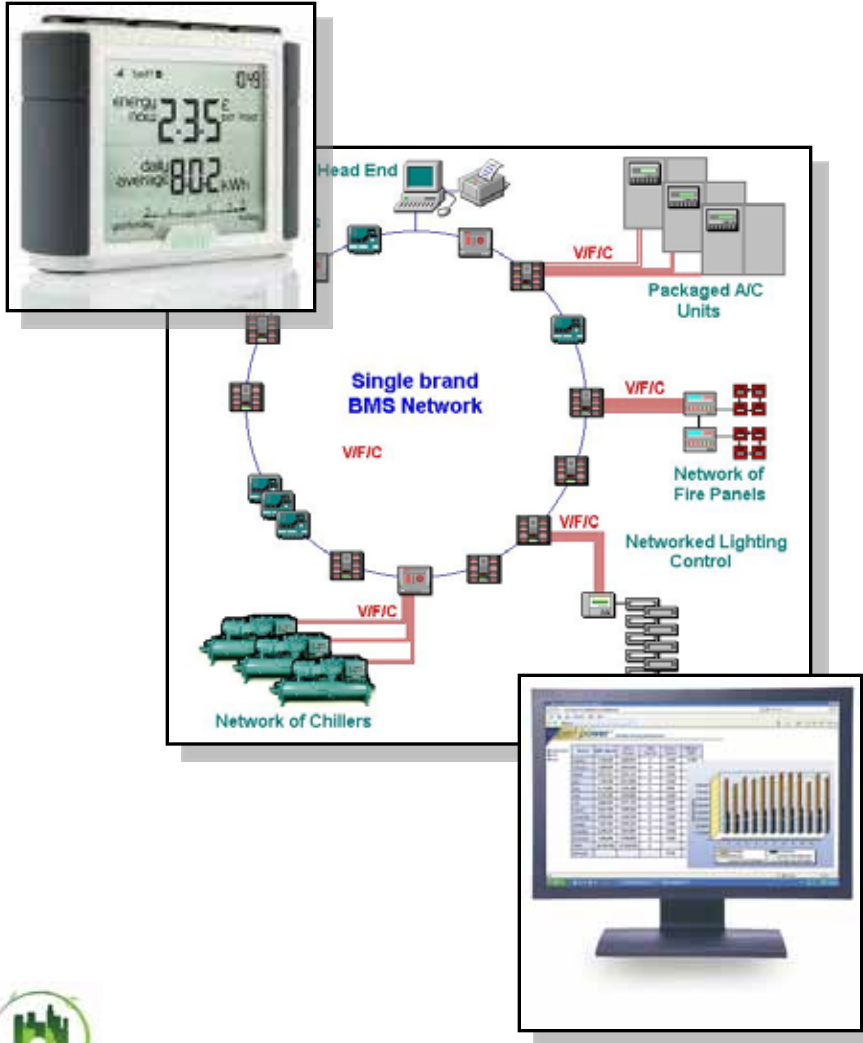
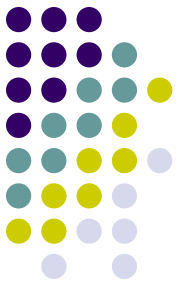


Existing circuits have little relevance for the desired new lighting scheme. Will require extensive rewiring to accomplish space and lighting control goals.

For 30% of the traditional rewiring cost, circuits & fixtures are intercepted with wireless transmitters allowing control of all 'downstream' light fixtures (or individual fixtures) to enable desired lighting zones.



SMART reasons you should know about lighting controls:



- | We're using a utility grid designed 100 yrs ago & last updated 50 yrs ago.
- | SMART grid will send power to where it's most needed.
- | SMART metering will show near real time consumption
- | SMART controllers will adjust loads during peak or crisis events
- | SMART lighting controls will interface with energy management software

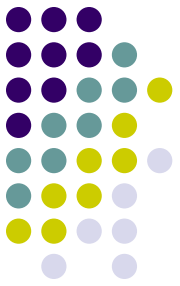


The Lighting/Energy Master Plan



Elements of an Energy (Lighting) Master Plan	
FINISHED DOCUMENTATION OF THE MASTER PLAN	QUESTIONS YOU NEED TO HAVE ANSWERS FOR
Letter from the President	Whose buy-in do we need to move the project forward?
Participants and Contributors	Who needs to be involved on the team? CEO, HR, Marketing, Managers
Purpose and goals of Plan	What do we hope to achieve - give specifics: reduce lighting load by 15%
Planning Process	What is the timeframe we have put on each segment of the process?
Executive Summary (Consolidated results)	What 'executive level' questions do we need to have answers for?
PLANNING CONTEXT	WHERE ARE YOU NOW & DO YOU KNOW WHERE YOU NEED TO GO?
Existing facility lighting hardware	Who will conduct the lighting/energy hardware audit?
Existing space occupancy	Do I have the tools to collect supporting data to justify the project?
Existing space usage	Do I have a schedule of all times/uses of each space in the building?
Outside Agency Considerations	Will I need building permits, contractors, engineers?
Outside Funding Sources	Are there any local, state, federal, utility incentives to help fund project?
Potential Space Needs	Have we considered any future business plans affecting space usage?
Input from Staff	Have you consulted all levels of staff? How? Survey, questionnaire, meetings?
BUILDING MASTER PLAN ELEMENTS	HOW TO PUT TOGETHER THE ACTIONS MATRIX
Summary of Staff Input	What conclusions did you draw from the information gathered?
Hardware considerations	What kinds of products will enable the achievement of project goals?
Training considerations	What kind of training/information will the staff need to maximize the changes?
Training facilitators	Who will provide the training? Who will maintain the 'tribal knowledge' ?
Implementation leaders	Who will own what part of the project? What is the time-line for deliverables?
Operations improvements	What can we improve just by changing our behavior or assigning responsibility?
Phase One - Short Term (12 months) Goals of Project	What can we get done within the existing budget year (include rebates, incentives)?
Phase Two - Medium Term (12-24 months) Goals	What can we propose for future budgets, leveraging our energy savings?
Long Term Development (24+ months)	What will my energy cost/usage be in five years? What is our long range plan?
Project Commissioning	Who will be responsible for ensuring all systems are functioning as designed?
Project Budgeting	Who will be responsible for developing, proposing, approving budgets?
Project Assessment	What did the post project follow-up with the building staff reveal?
Project Validation	Did the project live up to savings, performance expectations?
APPENDIX	DOCUMENTS, DOCUMENTS, DOCUMENTS
List of Exhibits	Have all of the specifications, testing data, reports, surveys been documented?
Cost Guidelines	What was the actual spend vs. what was budgeted for the project?

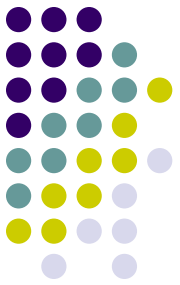
Energy Star: Not just for washing machines anymore.



EPA's no-cost online tool: www.energystar.gov/benchmark

- | Assess the whole building energy use of existing buildings (weather normalized EUI)
- | Receive an energy performance rating (1-100 score) or comparison to national average
- | Track changes in energy and water use over time in single buildings, groups of buildings, or entire portfolios
- | Track CO2 reductions and cost savings
- | Custom reporting and graphing features - for your portfolio
- | Track onsite renewable wind and solar energy use
- | Track Renewable Energy Certificates (RECs) at the building level

Required Information for Benchmarking in Portfolio Manager



- | Building Identifiers: Name, street address
- | Space Type Data (depends on space type) – Office example: Square footage, hours of operation, number of workers on main shift , # of PC's, Percent of gross floor area that is air conditioned, heated
- | Energy Use: Monthly energy use by meter for all fuel used on site

Establish
Baseline

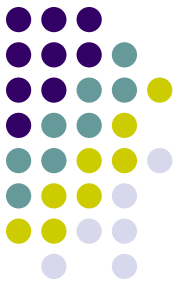
Set Goals

Track & Measure
Overtime

- | Quick list of Energy Star resources for buildings

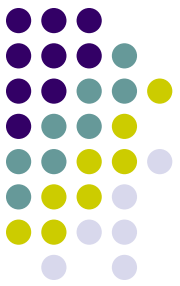
To LED or not LED

That's still the question (of standards)



<http://www1.eere.energy.gov/buildings/ssl/standards.html>

- | The DOE Caliper program provides test results on a variety of solid state (LED) products of many types comparing their performance to existing light sources. Find the reports at DOE website – Solid State Lighting.
- | DOE also hosts the Technical Information Network in which regional energy efficiency organizations, utilities, state and local energy offices, lighting trade groups, and other stakeholders share test results, case studies, etc, including conferences, meetings and webcasts.
- | DOE Municipal SS Street Lighting Consortium – cities, power providers, and others who invest in street/area lighting share field experience and data to accelerate the learning curve for buying and implementing high quality LED lighting.



Facts and Observations about LEDs

- | Fact: LEDs perform best when diode junction temps are lower
- | Fact: White LEDs tend to have the highest junction temps compared to other colors
- | Fact: White LEDs currently have significant color variations across all manufacturers.
- | Fact: LEDs resist shock and suffer minimal degradation from excessive on/off cycling
- | Fact: Static electricity & surge can damage LEDs.

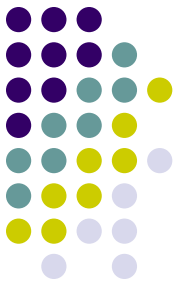
www.lrc.rpi.edu/programs/solidstate/cr_highPowerLEDs.asp

Observations only – yours may vary....

- | Always examine LM79 & LM80 reports of any LED product under consideration.
- | Remember the history of CFLs
- | Quality LED products perform well in cold storage and conditioned spaces
- | LED products designed for the fixture they were designed for generally perform better
- | LEDs are VERY directional
- | LED color rendering can sometimes provide more ‘visible’ light with less wattage

Resources:

Please use the sign-up sheet



- | AB1103 Building Energy Disclosure – Learn more about it.
- | Energy Star Building Portfolio Manager – Learn more about it, various PPT presentations
- | Easy Energy Savings payback calculator
- | Energy Master Plan Template
- | Low Lying Lighting Fruit Matrix
- | Lamp/Ballast Recycling
- | Consolidated resource list of websites, data, free training, and numerous lighting related topics
- | Lamp Regulatory Update
- | Topics of Choice

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(916) 847-1395

THANK YOU!