

Title 20 Efficiency Standards Scoping Workshop

Docket No. 11-AAER-1

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Submitted by: Pacific Gas and Electric, San Diego Gas & Electric, Southern California Edison, and the Southern California Gas Company

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IOU Statewide C&S Team Overview

- Codes and Standards work by California Investor Owned Utilities is conducted under the auspices of the California Public Utilities Commission
- Technical team includes ACEEE, Ecos Consulting, Energy Solutions, Heschong Mahone Group, LED Consulting, Lighting Wizards, and McHugh Energy Consultants
- We welcome input from all stakeholders. For information about contributing to ongoing research, please contact:
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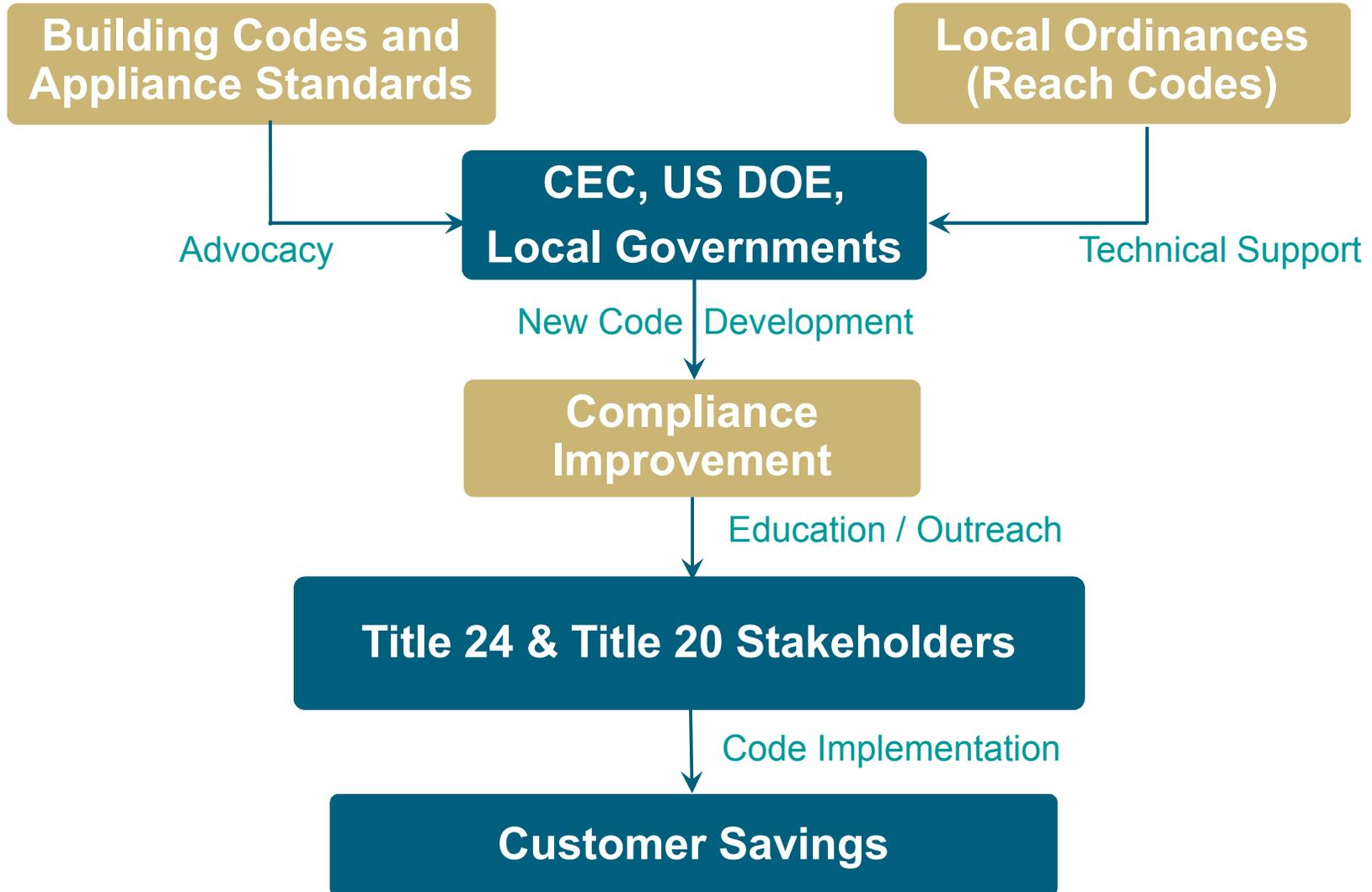
Agenda

- Summary Comments
- Electronics Panel
- Lighting Panel
- Water-using Panel
- Other Products Panel



SUMMARY COMMENTS

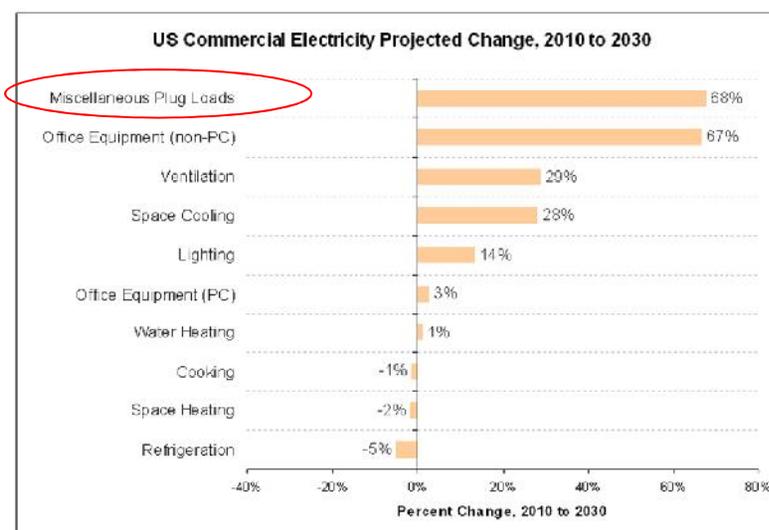
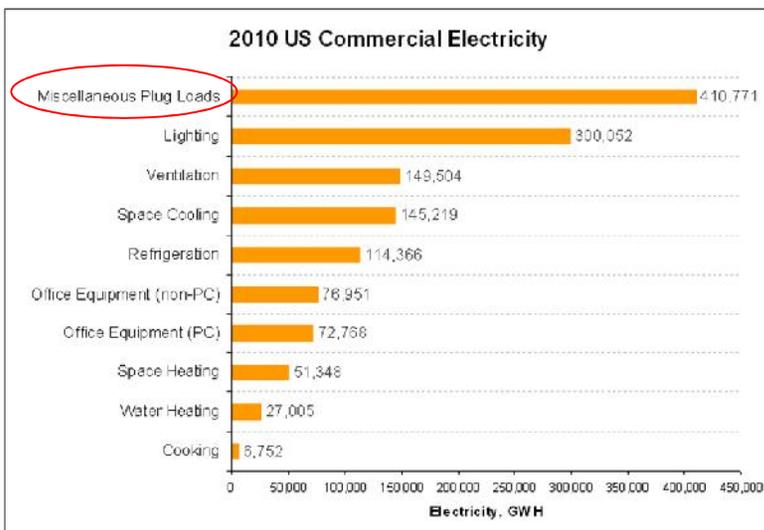
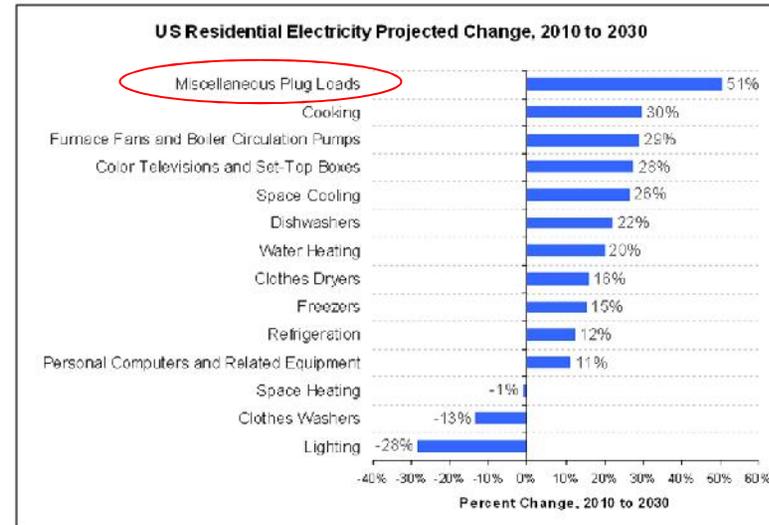
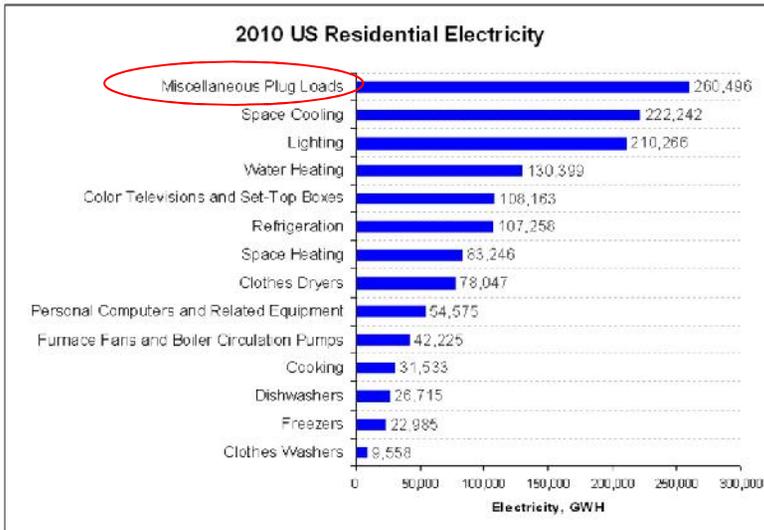
Overview of Statewide Codes & Standards Program



California Long Term Energy Efficiency Strategic Plan: Specific Goals and Strategies

- Continually strengthen and expand building and appliance codes and standards as market experience reveals greater efficiency opportunities and compelling economic benefits.
- Expand Title 20 to cover additional plug loads such as copy machines, printers, battery chargers, televisions

Addressing Plug Load and Other Load Growth is a Critical Pathway



Source: *Annual Energy Outlook 2010*. Energy Information Administration. 2010 to 2030 population growth projected at 20%.

Note: Residential miscellaneous includes small electric devices, video and audio equipment, game consoles, coffee makers, and other uses. Commercial non-PC office equipment includes servers and mainframe computers. Commercial miscellaneous includes video displays, medical equipment, and other equipment.

Residential Electricity and Natural Gas Consumption Impacted by Title 24 (Weighted Consumption from 2009 RASS*)

Electricity End-uses

| End-Use | kWh/yr | |
|----------------------------|--------------|------------|
| Not covered by T-24 | 3,612 | 54% |
| Dryer | 187 | |
| Clothes Washer | 109 | |
| Dish Washer | 73 | |
| First Refrigerator | 707 | |
| Additional Refrigerator | 313 | |
| Freezer | 138 | |
| Range/Oven | 105 | |
| Television | 645 | |
| Microwave | 122 | |
| Home Office Equipment | 17 | |
| Personal Computer | 602 | |
| Well Pump | 28 | |
| Miscellaneous | 568 | |
| T-24 + Preempted | 1,106 | 10% |
| Conv. Space Heating | 37 | |
| Heating | 13 | |
| Aux Space Heating | 0 | |
| Central Air Conditioning | 876 | |
| Room Air Conditioning | 47 | |
| T-24 | 1,927 | 29% |
| Water Heating | 133 | |
| Furnace Fan | 164 | |
| Attic Fan | 14 | |
| Evaporative Cooling | 43 | |
| Solar Water Heating | 0 | |
| Pool Pump | 234 | |
| Spa | 25 | |
| Outdoor Lighting | 284 | |
| Spa Electric Heat | 28 | |
| Lighting | 1,136 | |
| Total | 6,645 | |

Over half of home electricity consumption not covered by T-24

Natural Gas End-uses

| End-Use | Therm/yr | % |
|----------------------------|--------------|------------|
| Not Covered by T-24 | 51.4 | 14% |
| Dryer | 16.2 | |
| Range/Oven | 31.7 | |
| Miscellaneous | 3.5 | |
| T-24+ preempted | 309.0 | 83% |
| Primary Heat | 175.8 | |
| Conv. Gas Water Heat | 133.2 | |
| T-24 | 10.2 | 3% |
| Pool Heat | 5.6 | |
| Spa Heat | 2.9 | |
| Auxiliary Heat | 1.6 | |
| Total | 370.5 | |

Not Covered by T-24

T-24 + Preempted

Covered by T-24

Proposed Topics Overview

We recommend that the Commission conduct three concurrent tracks during the next rulemaking to approach similar topics

Electronics Track

Computers

Servers

Game Consoles

Set-top boxes and small network equipment

Displays

Imaging Equipment

Lighting Track

Dimming ballasts

Multifaceted reflector lamps

LED lamps

Outdoor lighting

Lighting accessories

Linear fluorescent fixtures

EISA 2007 exempt lamps

Other Products & Water Track

Plug-in luminous signs

Commercial clothes dryers

Commercial dishwashers

Refrigeration condensing units

Air Filter labeling

Res swimming pool pump update

Irrigation Equipment

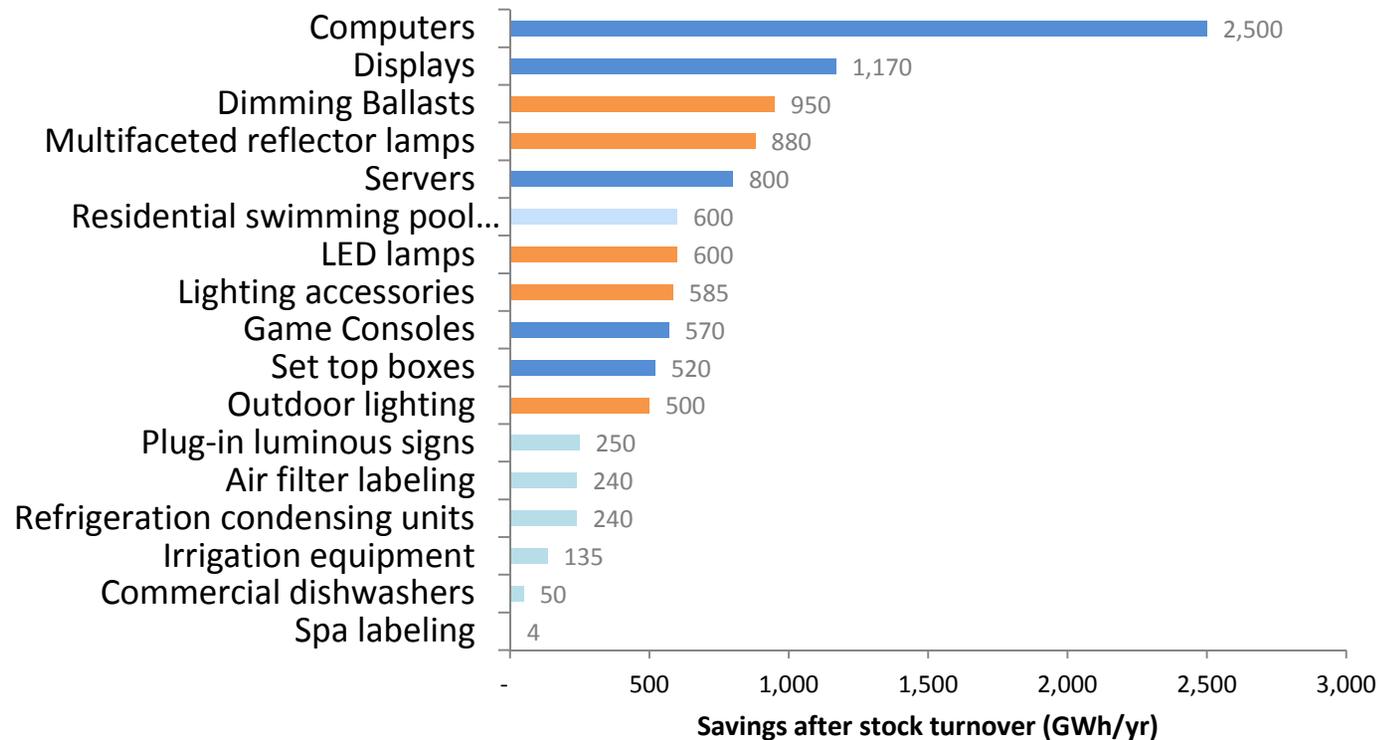
Spa Testing, Listing and Marking

Plumbing Products Total Dynamic Head

Power Factor Interactive Effects

Potential Electricity Savings from Future Title 20 Topics

Potential Electricity Savings for Future Title 20 Topics



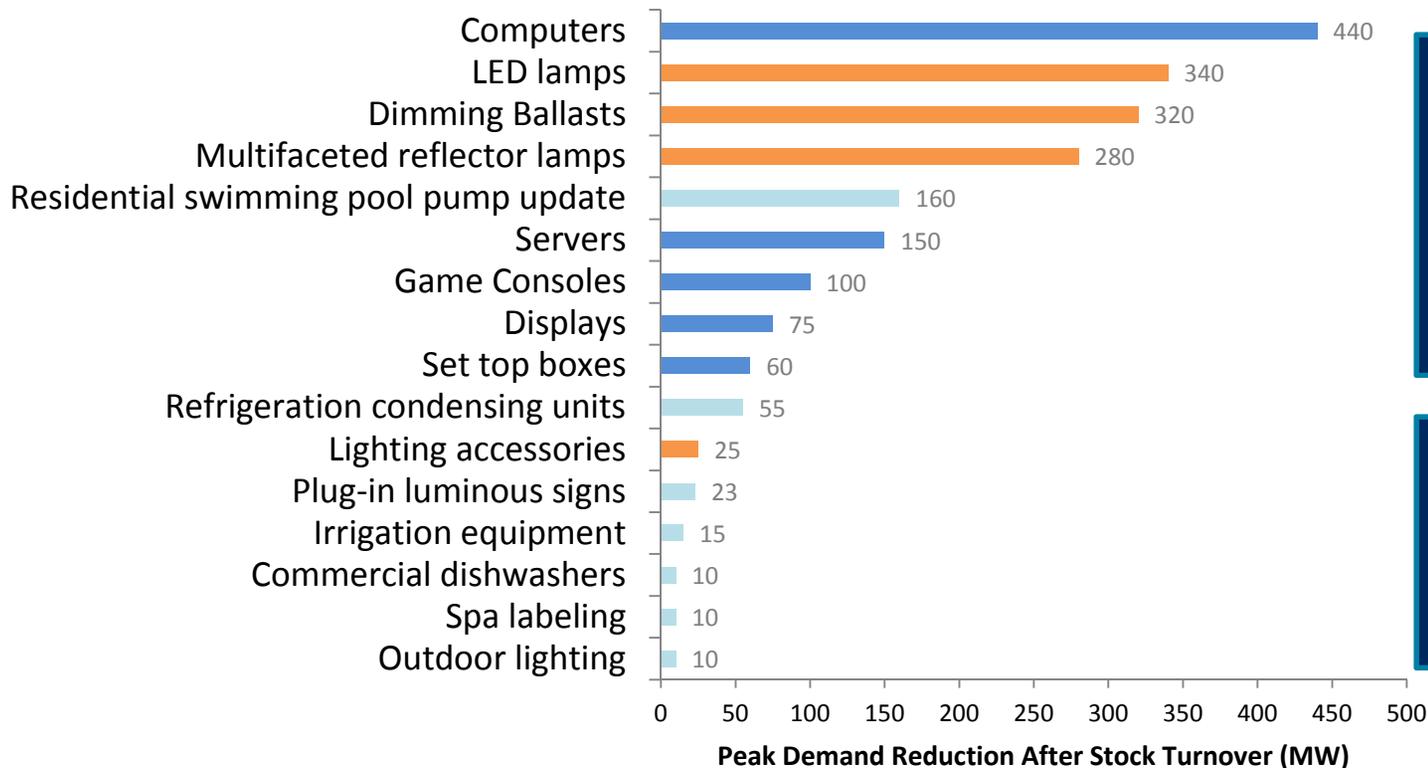
Roughly 10,600 GWh/yr potential savings after stock turnover for all products

About 4% reduction from current California total annual energy consumption

Note: All savings are current estimates and are subject to change upon further standard development research and stakeholder input. Some topics have TBD savings and are not shown in the graph. For topics with a savings range, the highest value is included to show savings potential.

Potential Peak Demand Reduction from Future Title 20 Topics

Potential Peak Demand Reduction for Future Title 20 Topics



Roughly 2,100 MW reduction after stock turnover for all products

Equivalent to more than 4 major power plants or "Rosenfelds"

Note: All savings are current estimates and are subject to change upon further standard development research and stakeholder input. Some topics have TBD savings and are not shown in the graph. For topics with a savings range, the highest value is included to show savings potential.

Gas and Water Savings

| Topic | Gas Savings after stock turnover (million therms/yr) |
|---------------------------|--|
| Commercial clothes dryers | 12.0 |

Equivalent to over half of the annual gas used by the homes in El Dorado county.

| Topic | Water savings after stock turnover (million gallons/yr) |
|------------------------|---|
| Irrigation Equipment | 45,000 |
| Commercial dishwashers | 550 |

Equivalent to the annual water usage of the city of Sacramento.

Note: All savings are current estimates and are subject to change upon further standard development research and stakeholder input.

Potential Benefits from Future Title 20 Topics



Equivalent of 4 major power plants eliminated (~2100MW)



4% reduction from California total annual energy consumption



33% of AB 32 energy efficiency goal



Over \$1.5 billion per year avoided energy costs. Roughly equal to \$120/yr savings per California household.



Job creation potential = 4,000 jobs*

Note: all savings are current estimates and are subject to change upon further standard development research and stakeholder input. All values are for savings after stock turnover after a standard is adopted.

*Calculated based on methodology found in: Max Wei, Shana Patadia, and Daniel M.Kammen. Putting renewables and energy efficiency to work: How many jobs can the clean energy industry generate in the US? Energy Policy 38 (2010) 919–931.

Summary and Recommendations

- We will present topic overview slides during the panel sessions.
- All savings and recommendations are preliminary and subject to change upon further research and stakeholder feedback.
- Proposal Information Templates for selected topics will be submitted prior to the September 30, 2011 comment deadline.
- IOUs will subsequently submit Codes and Standards Enhancement (CASE) reports for topics with Commission interest.
- We welcome input from all stakeholders.
- **We urge the Commission to pursue all cost-effective measures.**



ELECTRONICS PANEL

Electronics

Electronics

Computers

Displays

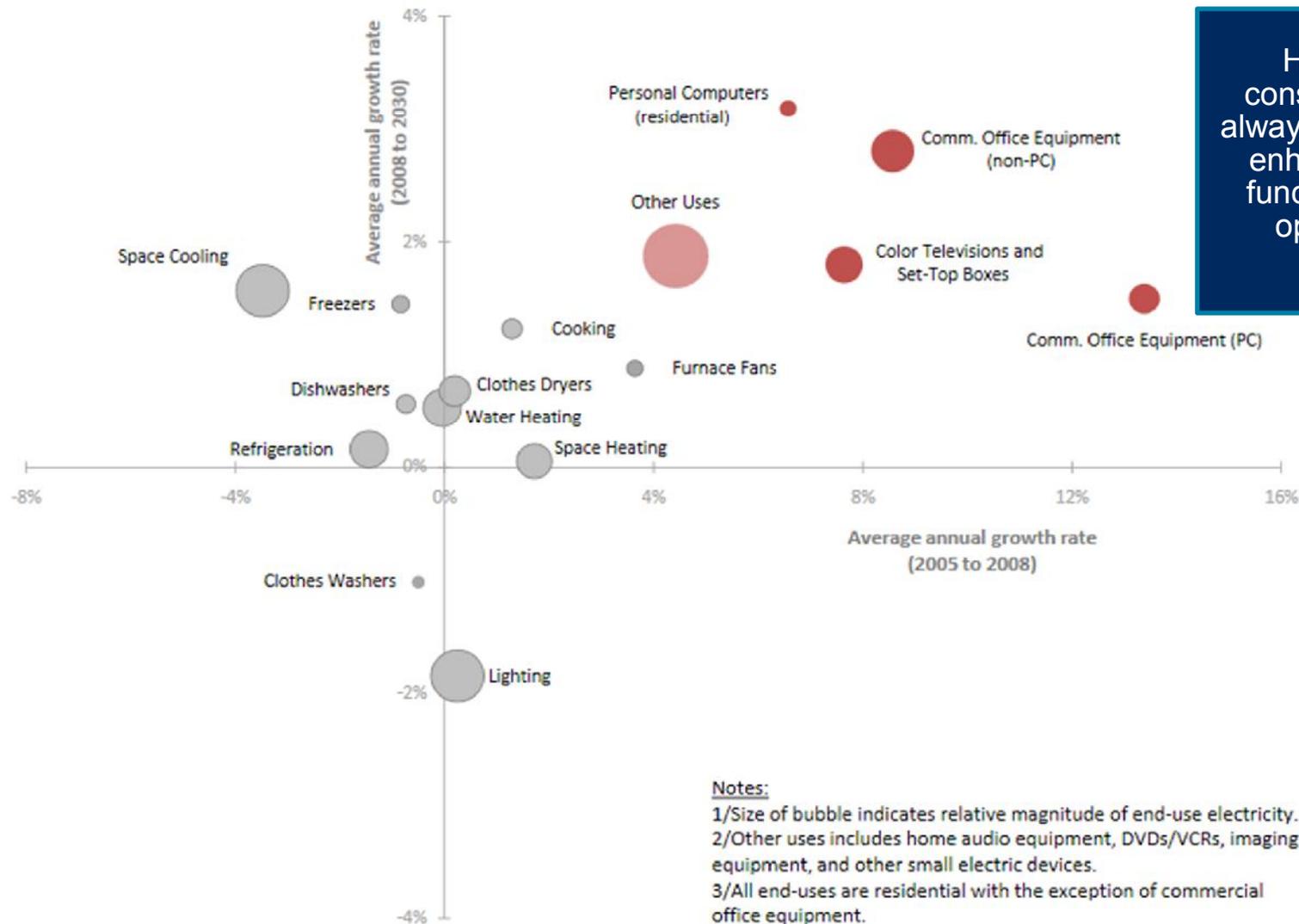
Servers

Game Consoles

Set-top Boxes and Small Network Equipment

Imaging Equipment

Electronics sector is fastest growing electricity end-use category



Higher power consumption is not always correlated with enhanced product functionality—thus opportunity for standards

Source: Analysis of "Year-by-Year Reference Case Tables" in EIA 2008. Includes the estimated impact of H.R. 6, "Energy Independence and Security Act of 2007" that was enacted in late December, 2007.

Computers & Servers

Proposal Description:

- Maximum energy requirements and power management enablement upon shipment for desktops and laptops.
- Minimum power supply unit efficiencies for desktops.
- Minimum power supply unit efficiencies and power proportionality for servers.

California stock and sales

| | Computers | Servers | |
|--------------|-----------|---------|---------|
| Stock | 37 | 2.5 | Million |
| Annual sales | 12 | 0.6 | Million |



Current energy use and peak demand in California

| | | | |
|-------------|--------|-------|--------|
| Energy use | 10,000 | 6,600 | GWh/yr |
| Peak demand | 1,300 | 450 | MW |



Savings and reduction from proposed standard after stock turnover

| | | | |
|-----------------------|-------|-------|--------|
| Energy savings | 2,500 | 1,030 | GWh/yr |
| Peak demand reduction | 440 | 150 | MW |



Cost / Savings

| | | | |
|------------------------------------|----------|-----------|--|
| Incremental cost per unit | TBD | TBD | |
| PV lifetime avoided costs per unit | \$50-100 | \$200-600 | |

| | | | |
|--|-------|-------|---------|
| Annual avoided energy costs after stock turnover | \$395 | \$175 | Million |
|--|-------|-------|---------|

Computers & Servers

| | |
|--|--|
| Preliminary Proposal Details | <ul style="list-style-type: none">• Power supply efficiencies and power proportionality metric would be set at market appropriate levels.• Power management enablement would be a required factory default.• Exploring energy use limits or power limits in different operating modes. |
| Key Considerations | <ul style="list-style-type: none">• Energy savings opportunities exist for more than just one component.• Premium power supply efficiencies are prevalent in market.• Power management has little to no associated cost. |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Feedback regarding power limits by mode• Power management enablement data• Alternative standard approaches |

Set Top Boxes and Small Networking Equipment

Proposal Description:

Energy use limit on new STBs. Develop test and list requirements for small networking equipment.

California stock and sales

| | | |
|--------------|------|---------|
| Stock | 17.8 | Million |
| Annual sales | 3.5 | Million |



Current energy use and peak demand in California

| | | |
|-------------|-------|--------|
| Energy use | 2,870 | GWh/yr |
| Peak Demand | 330 | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----------|--------|
| Energy savings | 170 - 520 | GWh/yr |
| Peak demand reduction | 20 - 60 | MW |



Cost / Savings

| | | |
|--|-----------|--------------|
| Incremental cost per unit | TBD | for hardware |
| PV lifetime avoided costs per unit | \$7 - 21 | |
| Annual avoided energy costs after stock turnover | \$120-360 | Million |

Set Top Boxes and Small Networking Equipment

| | |
|--|---|
| Standard proposal concept (preliminary) | <ul style="list-style-type: none">• Energy use limit on all new equipment purchased by service providers determined by product type (Cable, Satellite, IP).• Energy allowances for advanced device features.• Develop test and list requirements for small networking equipment. |
| Key trends & considerations | <ul style="list-style-type: none">• Consumers have little choice of what box the service provider deploys but the consumer pays the electric bill• Service providers customize STBs for their content and specify design parameters to manufacturers.• Service providers prioritize user experience over energy efficiency.• Key savings opportunities include reducing power level when devices are not in use, shifting to thin clients, and ultimately eliminating the need for thin clients in multi-room solutions. |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Power measurement data on STB models currently in use.• Details on future technology trends. |

Displays: Computer Monitors, Digital Photo Frames and Professional Displays

Proposal Description:

Power limits in different operating modes based on market. Considering luminance and automatic brightness control requirements.

California stock and sales

| | | |
|--------------|----|---------|
| Stock | 26 | Million |
| Annual sales | 6 | Million |



Current energy use and peak demand in California

| | | |
|-------------|-------|--------|
| Energy use | 3,220 | GWh/yr |
| Peak demand | 190 | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-------|--------|
| Energy savings | 1,170 | GWh/yr |
| Peak demand reduction | 75 | MW |

Cost / Savings

| | | |
|--|-------|---------|
| Incremental cost per unit | TBD | |
| PV lifetime avoided costs per unit | \$30 | |
| Annual avoided energy costs after stock turnover | \$180 | Million |



Displays: Computer Monitors, Digital Photo Frames and Professional Displays

| | |
|--|---|
| Preliminary Proposal Details | <ul style="list-style-type: none">• Set maximum wattage levels based on screen area, for active, standby, and off-modes.• Luminance and automatic brightness control requirements. |
| Key Considerations | <ul style="list-style-type: none">• Key savings opportunities include reducing power level due to more efficient backlight options and when equipment is not in use• Growing use of displays in residential and commercial settings• Convergence of technology with televisions |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Functionality vs. power draw relationships• Product data, based on new test procedure |



LIGHTING PANEL

Lighting Products

Dimming ballasts

Multifaceted Reflector Lamps

LED lamps

Outdoor lighting

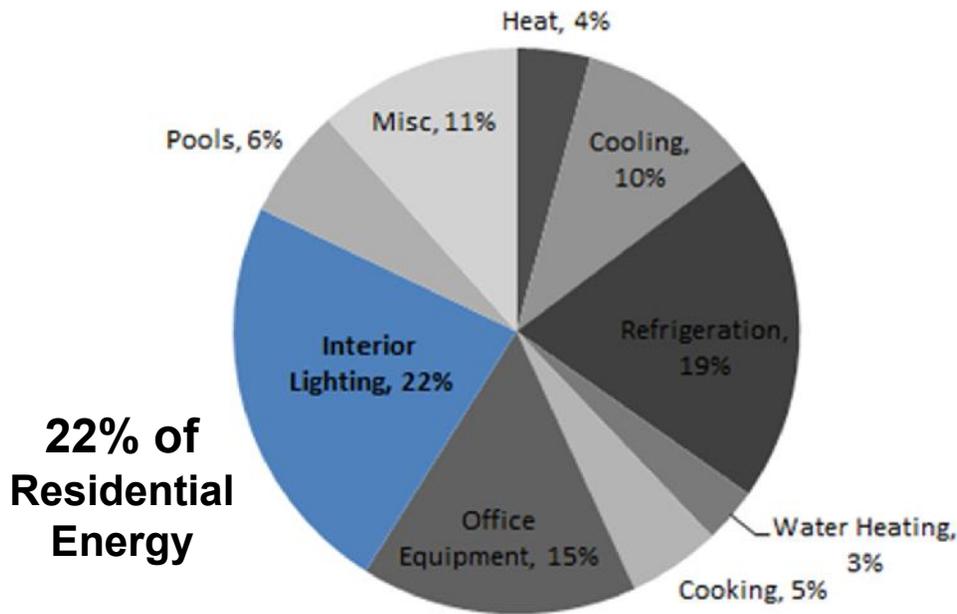
Lighting Accessories

Linear Fluorescent Fixtures

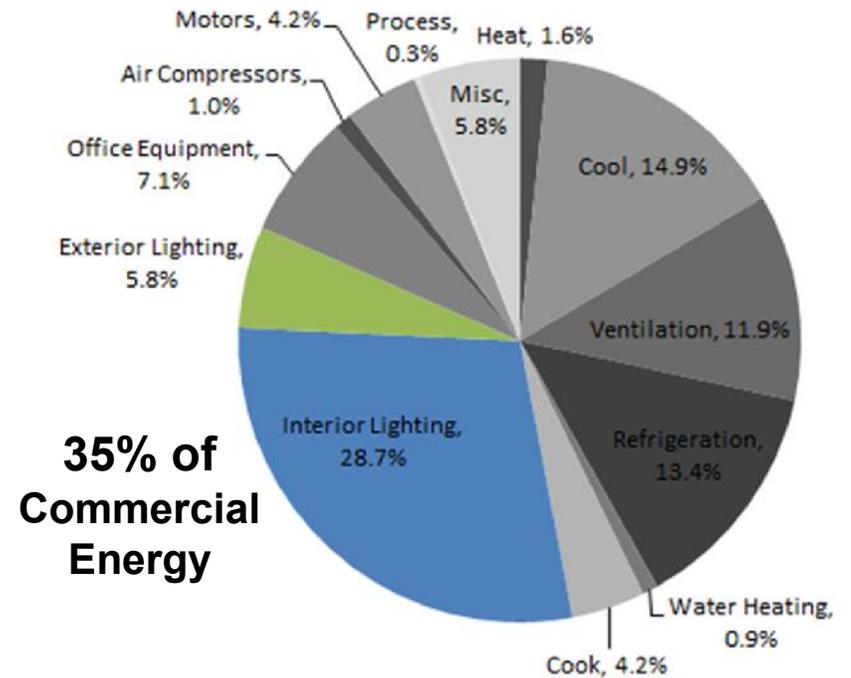
EISA 2007 exempt lamps

Lighting accounts for 20% of the State's electricity demand

Lighting Electricity in Residential Buildings
(Source: RASS)



Lighting Electricity in Commercial Buildings
(Source: CEUS)



AB 1109 (Huffman's 2007 Lighting Efficiency Bill):

- 50% reduction in statewide residential indoor lighting electricity use by 2018
- 25% reduction in statewide commercial and outdoor lighting electricity use by 2018

Dimming Ballasts

Proposal Description:

Minimum efficiency standards for dimming ballasts, and possible limits on standby wattage

California stock and sales (projected to 2014)

| | | |
|--------------|-----|---------|
| Stock | 5.5 | Million |
| Annual sales | 3.8 | Million |

Current energy use and peak demand in California (projected to 2014)

| | | |
|-------------|-----|--------|
| Energy use | 810 | GWh/yr |
| Peak demand | 170 | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----|--------|
| Energy savings | 950 | GWh/yr |
| Peak demand reduction | 320 | MW |

Cost / Savings

| | | |
|--|--------|---------|
| Incremental cost per unit | \$0-10 | |
| PV lifetime avoided costs per unit | \$40 | |
| Annual avoided energy costs after stock turnover | \$220 | Million |



Dimming Ballasts

| | |
|--|---|
| Preliminary Proposal Details | <ul style="list-style-type: none">• Standard would likely use the Relative System Efficacy (RSE) or the Ballast Luminous Efficiency (BLE) metric, with minimum performance requirements at full light output only or at several light levels. |
| Key Considerations | <ul style="list-style-type: none">• Sales are expected to increase dramatically in 2014 as a result of current Title 24 proposal• Incremental cost is minimal• No industry standard test procedure exists |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Preferred test methods• Feasibility concerns• Standby wattage data |

Multifaceted-Reflector Lamps

Proposal Description:

Minimum efficiency standards for multifaceted-reflector lamps.

California stock and sales

| | | |
|--------------|----|---------|
| Stock | 15 | Million |
| Annual sales | 9 | Million |

Current energy use and peak demand in California

| | | |
|-------------|-------|--------|
| Energy use | 1,400 | GWh/yr |
| Peak demand | 580 | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----|--------|
| Energy savings | 880 | GWh/yr |
| Peak demand reduction | 280 | MW |

Cost / Savings

| | | |
|--|-------|---------|
| Incremental cost per unit | \$25 | |
| PV lifetime avoided costs per unit | \$80 | |
| Annual avoided energy costs after stock turnover | \$150 | Million |



Multifaceted-Reflector Lamps

Preliminary Proposal Details

- Product class has been overlooked by Federal and State standards – excellent savings potential
- Standard would drive the market towards high efficiency MR16s
- May also require minimum light quality/lamp performance standards.
- Could consider tiered standards.

Key Considerations

- Researching issues related to high efficiency replacement options now and in the future: lumens, center beam candlepower (CBCP), beam spread, set down transformers, dimming

Requested Input from Stakeholders

- Product development trends and market potential; progress of high efficiency prototype products at different lumen levels
- Feasibility concerns for high efficiency technologies; appropriate applications, retrofit costs, light quality, heat concerns
- Data on MR11 usage

LED Lamps (A-lamps, directional lamps, and/or linear lamps)

Proposal Description:

Standards would require LED lamps to meet minimum performance requirements (e.g. dimming and lamp life), minimum light quality standards (e.g. CRI), and modest efficiency (lpw) requirements.

General Service LED only

California stock and sales (2014)

| | | |
|--------------|------|---------|
| Stock | 14.0 | Million |
| Annual sales | 2.5 | Million |

Current energy use and peak demand in California (2014)

| | | |
|-------------|-----|--------|
| Energy use | 170 | GWh/yr |
| Peak demand | 90 | MW |

“First Order” savings and reduction from proposed standard in 2020

| | | |
|-----------------------|-----|--------|
| Energy savings | 7.0 | GWh/yr |
| Peak demand reduction | 4.0 | MW |

Cost / Savings

| | | |
|--|-----------|---------|
| Incremental cost per unit | \$3 - \$7 | |
| PV Lifetime Energy Savings per unit | \$7 | |
| Annual avoided energy costs after stock turnover | \$45 | Million |



LED Lamps (A-lamps, directional lamps, and/or linear lamps)

| | |
|--|--|
| Preliminary Proposal Details | <ul style="list-style-type: none">• The primary goal of the standard is to ensure LED lamp quality in order to maintain consumer satisfaction in LED's, thus speeding LED adoption when ultra-high efficiencies become more readily available• Majority of benefit would be “second order” savings• Efficiency requirement would be modest (likely near 50/60 lpw) |
| Key Considerations | <ul style="list-style-type: none">• Significant collaboration with manufacturers will help identify optimal lamp performance features and reasonable light quality standards |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Cost forecasts for lamps with various performance features• Feasibility concerns |

LED Lamps (A-lamps, directional lamps, and/or linear lamps)

“Second Order” GSL Savings Potential

Base Case LED Market Share in 2018

Business as Usual 5%

Standards Case LED Market Share and First Year Savings Potential in 2018

| | |
|-------------------------|-----------------|
| Assume 7% market share | 80 GWh savings |
| Assume 12% market share | 270 GWh savings |
| Assume 20% market share | 590 GWh savings |

Directional and Linear LED lamps

Comparable unit savings potential exists for, though fewer shipments forecasted

2014 projected sales (CA)

| | |
|------------------|---------|
| Directional LEDs | 600,000 |
| Linear LEDs | 500,000 |

Outdoor Lighting

Proposal Description:

Sets minimum performance requirements for pole-mounted outdoor lighting, including street, highway, parking, and area fixtures with “controls-ready” requirements in some cases.

California stock and sales

| | | |
|--------------|-----|----------|
| Stock | 3.5 | Million |
| Annual sales | 300 | Thousand |

Current energy use and peak demand in California

| | | |
|-------------|-------|--------|
| Energy use | 3,000 | GWh/yr |
| Peak demand | 60 | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----|--------|
| Energy savings | 500 | GWh/yr |
| Peak demand reduction | 10 | MW |

Cost / Savings

| | | |
|--|-------|---------|
| Incremental cost per unit | \$40 | |
| PV lifetime avoided costs per unit | \$220 | |
| Annual avoided energy costs after stock turnover | \$90 | Million |



Outdoor Lighting

| | |
|--|---|
| Preliminary Proposal Details | <ul style="list-style-type: none">• Minimum Target Efficacy Rating (TER) by BUG Classification• “Controls-ready” requirement – selected fixtures must be at least bi-level dimmable and also easily modifiable to accept controls in the future |
| Key Considerations | <ul style="list-style-type: none">• Potential for significantly reducing outdoor lighting energy use by promoting higher efficiency fixtures• “Controls ready” requirements for selected fixture types will facilitate accelerated deployment of adaptively controlled lighting systems.• Controls offer significant maintenance benefits in addition to energy savings |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Cost/efficiency projections• Natural market adoption estimates• Potential TER levels |

Lighting Accessories

Proposal Description:

Maximum energy use and standby power for nightlights (NL), maximum power/bulb for decorative string lights (DSL), and maximum power for illuminated house numbers (IHN).



NL

DSL

IHN

Total

| | | NL | DSL | IHN | Total | |
|--|------------------------------------|------|------|----------|--------------|---------|
| CA stock & sales | Stock | 13 | 45 | 2.5 | 60.5 | Million |
| | Annual sales | 1.6 | 12.5 | 0.2 | 14.3 | Million |
| Current energy use & peak demand | Energy use | 64 | 600 | 84 | 748 | GWh/yr |
| | Peak demand | 7.4 | 11.3 | 8.5 | 27 | MW |
| Savings & reduction from proposed standard after stock turnover | Energy savings | 42 | 380 | 63 | 485 | GWh/yr |
| | Peak demand reduction | 4.5 | 5.1 | 6.8 | 16.4 | MW |
| Cost / Savings | Incremental cost per unit | None | \$4 | TBD | N/A | |
| | PV lifetime avoided costs per unit | \$9 | \$11 | \$40-100 | N/A | |
| | Annual avoided energy costs | \$6 | \$57 | \$10 | \$73 | Million |

Lighting Accessories

Preliminary Proposal Details

- Nightlights - maximum energy use and standby power requirements. Standby power refers to the power of the “non-night” mode, i.e. the light in the space exceeds the night light luminance.
- Decorative String Lights - maximum power/bulb requirements. Includes rope lights.
- Illuminated House Numbers - maximum power requirement.

Key Considerations

- Some nightlights are used to aid in the navigation of dark spaces; therefore, the proposed standard allows higher light output models to remain available. Some technology reduces maximum energy use and standby power include photosensors, motion sensors and manual on/off switches.
- Illuminated address numbers are mandated by some city and neighborhood codes in CA as a safety precaution to enable ambulances/police to find an address quickly at night.
- Market demonstrating string lights are getting brighter, higher quality, and more affordable with time.

Requested Input from Stakeholders

- Sales data on all topics including share of lighting and control technologies

Light Bulbs Not Covered by T20/EISA

Proposal Description:

Apply existing T20 general purpose light bulb standards to exempt bulb types, including: 3-way, 2,601 – 3,000 lumen, shatter-resistant. candelabra base, intermediate base. All can accommodate halogen capsules for reduced power.



California stock and sales

| | | |
|--------------|-----|---------|
| Stock | TBD | Million |
| Annual sales | ~20 | Million |

Current energy use and peak demand in California

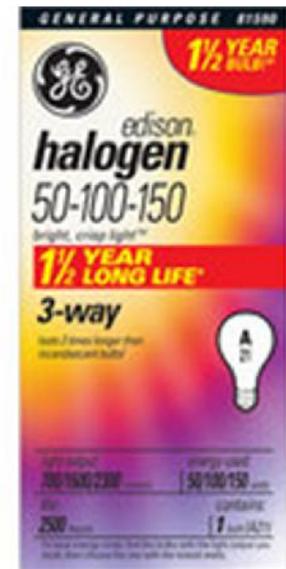
| | | |
|-------------|-----|--------|
| Energy use | TBD | GWh/yr |
| Peak demand | TBD | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----|--------|
| Energy savings | TBD | GWh/yr |
| Peak demand reduction | TBD | MW |

Cost / Savings

| | | |
|--|-----|---------|
| Incremental cost per unit | TBD | |
| PV lifetime avoided costs per unit | TBD | |
| Annual avoided energy costs after stock turnover | TBD | Million |



Light Bulbs Not Covered by T20/EISA

Preliminary Proposal Details

- Consider coverage at similar stringency as non-exempt bulbs (approx. 30% lower power)

Key Considerations

- Federal general purpose light bulb efficiency standards (EISA), and therefore T20, do not apply to candelabra base, intermediate base, 3-way, 2,601 – 3,300 lumen, shatter-resistant, vibration service, and rough service lamps.
- Many of these lamp types can accommodate the same halogen capsules used to make traditional incandescent lamps pass these standards
- EISA/T20-compliant 3-way available today
- >2,601 lumen lamps well-suited for improved efficacy halogen technology

Requested Input from Stakeholders

- Sales data on candelabra and intermediate base lamps

A Type

ECO-Friendly Halogen 3-WAY

▶ *Compliant with EISA 2012 incandescent general service standards



Linear Fluorescent Fixtures

Proposal Description:

Test and list requirement for Target Efficacy Rating (TER). Will provide useful information regarding fixture performance and will result in more appropriate design and installation.

California stock and sales

| | | |
|--------------|-----|---------|
| Stock | 170 | Million |
| Annual sales | 7 | Million |

Current energy use and peak demand in California

| | | |
|-------------|--------|--------|
| Energy use | 28,000 | GWh/yr |
| Peak demand | 5,800 | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----|--------|
| Energy savings | TBD | GWh/yr |
| Peak demand reduction | TBD | MW |

Cost / Savings

| | | |
|--|-----|---------|
| Incremental cost per unit | TBD | |
| PV Lifetime Energy Savings per unit | TBD | |
| Annual avoided energy costs after stock turnover | TBD | Million |



Linear Fluorescent Fixtures

| | |
|--|---|
| Preliminary Proposal Details | <ul style="list-style-type: none">• Test and list requirement for Energy Effectiveness Factor (EFF) and listing on product documentation resulting Target Efficacy Rating (TER) values from a combination of lamp lumens and ballast factors. |
| Key Considerations | <ul style="list-style-type: none">• Misinformation about lighting technology can lead to poor design choices and wasted energy. |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Lighting designer feedback regarding having access to this information. |



WATER PANEL

Water

Water-using Products

Commercial Dishwashers

Irrigation equipment

Plumbing Products Total Dynamic
Head

Commercial Dishwashers

Proposal Description:

Set minimum energy efficiency and water efficiency standards for commercial dishwashers based on market.

California stock and sales (2009)

| | | |
|--------------|-----|----------|
| Stock | 50 | Thousand |
| Annual sales | 2.3 | Thousand |

Current energy use and peak demand in California (2009)

| | | |
|----------------------|-------|---------|
| Energy use (Direct) | 500 | GWh/yr |
| Peak demand (Direct) | 60 | MW |
| Water Use | 3,900 | Mgal/yr |

Savings and reduction from proposed standard after stock turnover

| | | |
|--------------------------------|-----|---------|
| Energy savings (Direct) | 50 | GWh/yr |
| Peak demand reduction (Direct) | 15 | MW |
| Water Use | 550 | Mgal/yr |

Cost / Savings

| | |
|--|---------------|
| Incremental cost per unit | TBD |
| PV lifetime avoided costs per unit | \$105 |
| Annual avoided energy costs after stock turnover | \$7.5 Million |



Commercial Dishwashers

| | |
|--|---|
| Preliminary Proposal Details | <ul style="list-style-type: none">• Set maximum Idle Energy Rate by machine type and temperature• Set maximum Water Consumption limit by machine type and temperature |
| Key Considerations | <ul style="list-style-type: none">• Key water and energy savings opportunities include reducing idle power level and active mode water consumption.• Recently updated industry test procedures |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Updated product performance data regarding active mode• Updated usage data by institution type |

Irrigation Equipment

Proposal Description:

Require a rain shut-off device and a test and list for landscape irrigation controllers (and add-on devices) for standby mode power.

California stock and sales (2009)

| | | |
|--------------|-----|---------|
| Stock | 5.0 | Million |
| Annual sales | 0.5 | Million |

Current energy use and peak demand in California (2009)

| | | |
|---------------------------------|---------|---------|
| Energy use (Embedded & Direct) | 1,100 | GWh/yr |
| Peak demand (Embedded & Direct) | 120 | MW |
| Water Use | 340,000 | Mgal/yr |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|--------|---------|
| Energy savings | 135 | GWh/yr |
| Peak demand reduction | 15 | MW |
| Water Use | 45,000 | Mgal/yr |

Cost / Savings

| | | |
|--|------|---------|
| Incremental cost per unit | TBD | |
| PV lifetime avoided costs per unit | \$70 | |
| Annual avoided energy costs after stock turnover | \$20 | Million |



Irrigation Equipment

| | |
|--|--|
| Standard proposal concept (preliminary) | <ul style="list-style-type: none">• Require a rain shut-off device and a test and list for landscape irrigation controllers (and add-on devices) for standby mode power.• Testing should be carried out using the established International Electrotechnical Commission (IEC) test procedure for measuring standby power. |
| Key trends & considerations | <ul style="list-style-type: none">• In 2009, presented proposal at CEC workshop and submitted CASE report, but proceeding was suspended.• ‘Smart’ irrigation controls were considered, but stakeholder feedback resulted in rain shut-off devices as more optimal technology. |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Cost data• Standby wattage data |

Plumbing Products Total Dynamic Head

Proposal Description:

Over 60% of Industrial Motor-System energy consumption involves fluid handling. Plumbing system components are specified as + or – 20% in terms of their resistance to flow, resulting in over design. This proposal would require improved specification of this performance parameter, allowing more efficient system design.

California stock and sales (2014 estimated)

| | | |
|--------------|-----|----------|
| Stock | N/A | Million |
| Annual sales | N/A | Thousand |

Current energy use and peak demand in California

| | | |
|-------------|-----|--------|
| Energy use | N/A | GWh/yr |
| Peak demand | N/A | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----|--------|
| Energy savings | N/A | GWh/yr |
| Peak demand reduction | N/A | MW |

Cost / Savings

| | | |
|--|-------|---------|
| Incremental cost per unit | \$N/A | |
| PV lifetime avoided costs per unit | \$N/A | |
| Annual avoided energy costs after stock turnover | \$N/A | Million |





OTHER PRODUCTS PANEL

Other Products

Other Products

Plug-in luminous signs

Commercial clothes dryers

Refrigeration condensing units

Air filter labeling

Res swimming pool pump update

Spa Testing, Listing and Marking

Power Factor Interactive Effects

Plug In Luminous Signs

Proposal Description:

Maximum W per sq-ft of sign face area and required integral on/off switch (no pull switch). All self-contained sign units that plug into 120V AC building mains power and are intended for indoor use only. Excludes luminous outlines and channel letters.

California stock and sales (2014 estimated)

| | | |
|--------------|------|---------|
| Stock | 3.3 | Million |
| Annual sales | 0.33 | Million |

Current energy use and peak demand in California

| | | |
|-------------|-----|--------|
| Energy use | 770 | GWh/yr |
| Peak demand | 140 | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----|--------|
| Energy savings | 250 | GWh/yr |
| Peak demand reduction | 20 | MW |

Cost / Savings

| | | |
|--|--------|---------|
| Incremental cost per unit | \$8.00 | |
| PV lifetime avoided costs per unit | \$120 | |
| Annual avoided energy costs after stock turnover | \$40 | Million |



Plug In Luminous Signs

| | |
|--|---|
| Preliminary Proposal Details | <ul style="list-style-type: none">• Input power demand: establish a maximum W per sq-ft of sign face area, possibly varying by sign type. W/sf could be harmonized with Title 24.• Controls: require integral on/off switch (remote control permitted). Reason: Field observations show significant number of signs with disabled on/off pull-chains.• Controls: For signs with face area(s) greater than 4 sf, include supplemental control such as a photosensor, timer, or remotely-addressable /programmable timer. |
| Key Considerations | <ul style="list-style-type: none">• Market trend is toward use of high-efficiency signs. For static signs this lowers input power demand, but for dynamic signs, it can increase input power demand.• Initial discussions with industry in 2008-2010 indicated watts/sf as the most appropriate metric for Title 20 standard |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Reported wattage ratings and sq. ft. for various signs• Sales data by sign type |

Commercial Clothes Dryers

Proposal Description: Develop the testing procedure for Energy Factor of commercial clothes dryers and establish a minimum performance requirement

California stock and sales (Commercial Only)

| | | |
|--------------------------------|------------------|-----------------|
| Stock | Multi-Family | 260,000 |
| | Coin-Op | 39,000 |
| | On-Premise | 50,000 ~ 90,000 |
| Annual sales/ Replacement Rate | for all category | 7.3% |



Current energy use and peak demand in California

| | | |
|------------|-------------|------------|
| Energy use | 0.32 GWh/yr | 220 MMT/yr |
|------------|-------------|------------|

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------|-----------|-----------|
| Energy savings* | 14 MWh/yr | 12 MMT/yr |
|-----------------|-----------|-----------|

- only On-Premise units with capacity ≤ 30 lb are included in the proposal

Cost / Savings

| | | |
|---|---------------------------|---|
| Incremental cost and PV Energy Savings per unit | Multi-Family | IMC = \$0; PV Savings = \$ 1,350 |
| | Coin-Op and On-Premise | IMC = \$0; PV Savings = \$ 5,630 |
| Annual avoided energy costs after stock turnover | | \$2.2 m from electricity \$10.7 m from gas |

Commercial Clothes Dryers

| | |
|---------------------------|---|
| Key Considerations | <ul style="list-style-type: none">• Adopt a test standard that is consistent with the new DOE residential clothes dryer test standard• Require manufacturers to submit certified test results• Establish performance standards for gas dryer based on the best performing gas dryers• Drive commercial dryer efficiencies to match with those of residential dryers• Provide performance rating credits to dryers equipped with automatic termination controls and/or automatic cool down |
| Next Steps | <ul style="list-style-type: none">• Conduct stakeholder meeting according to CEC rulemaking schedule |

Refrigeration Condensing Units

Proposal Description:

Develop the test procedure for EER for fixed output refrigeration condensing units and additionally a part load EER for variable output refrigeration condensing units and establish a minimum performance requirement.

California stock and sales (not including preempted walk-ins)

| | |
|--------------|--------|
| Stock | 43,000 |
| Annual sales | 4,300 |

Current energy use and peak demand in California

| | | |
|-------------|-------|--------|
| Energy use | 1,200 | GWh/yr |
| Peak demand | 275 | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----|--------|
| Energy savings | 240 | GWh/yr |
| Peak demand reduction | 55 | MW |

Initial Estimates of Cost / Savings

| | | |
|--|----------|-----------|
| Incremental cost per unit | \$1,000 | \$/unit |
| PV lifetime avoided costs per unit | \$12,000 | PV\$/unit |
| Annual avoided energy costs after stock turnover | \$40 | Million |



Refrigeration Condensing Units

| | |
|--|--|
| Standard proposal concept (preliminary) | <ul style="list-style-type: none">• Cover air cooled and water cooled condensing units.• Develop test method and list in CEC database• Full load EER rating for fixed output systems and also partial load EER for variable flow systems.• Require either floating head control or have floating head control ready features• System able to operate at 70°F or lower minimum condensing temperature (with a few exceptions) |
| Key trends & considerations | <ul style="list-style-type: none">• Condensing units dedicated to walk-ins < 3,000 sf are federally preempted. (EISA 2007)• Small but growing share of market is variable output.• All other condensers are regulated for supermarkets and refrigerated warehouses – closing a loophole |
| Requested Input from Stakeholders | <ul style="list-style-type: none">• Estimates of sales to different major CA end-uses• Test data of equipment performance (lab and filed data)• Cost information for different equipment configurations. |

Air Filter Labeling

Proposal Description:

Require a label for air filters so that consumers and designers can select the appropriate filter for the system. A label is necessary to know whether or not the filter complies with Title 24 requirements.

California stock and sales

| | |
|--------------|------------|
| Stock | 5 million |
| Annual sales | 10 million |

Current energy use and peak demand in California

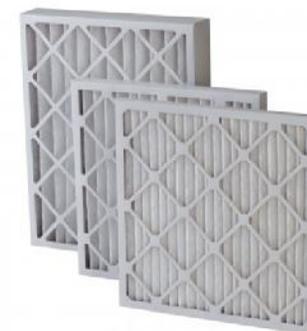
| | |
|-------------|--------------|
| Energy use | 8,000 GWh/yr |
| Peak demand | N/A MW |

Savings and reduction from proposed standard after stock turnover

| | |
|-----------------------|-------------------------|
| Energy savings | 240 GWh/yr ¹ |
| Peak demand reduction | TBD MW |

Initial Estimates of Cost / Savings

| | |
|--|-------------------|
| Incremental cost per unit | .02 |
| PV lifetime avoided costs per unit | \$3-\$4 |
| Annual avoided energy costs after stock turnover | \$30-\$40 Million |



¹Assumes 3% savings from increase in air flow from properly selected filter

Air Filter Labeling

Standard proposal concept

- Develop a consumer version of the existing AHRI 680 label

Table 1. Example of Format for Published Rating

| AHRI 680 Standard Rating | | | | | | |
|--------------------------|--------------------------|--------------------------|-----------------------------|---|--|---|
| Airflow Rate (CFM) | Initial Resistance ("wc) | Final Resistance** ("wc) | Dust Holding Capacity** (g) | Particle Size Efficiency** (0.30 - 1.0 μm)% | Particle Size Efficiency** (1.0 - 3.0 μm)% | Particle Size Efficiency** (3.0 - 10 μm)% |
| 400 | 0.05 | | | | | |
| 800 | 0.10 | | | | | |
| 1200 | 0.17 | | | | | |
| 1600 | 0.25 | | | | | |
| 2000* | 0.32 | | | | | |
| | | 0.50 | 45 | 17 | 53 | 87 |

* Maximum Rated Airflow Rate as published by the manufacturer.
 ** Standard Rating requires that these shall be tested at Maximum Rated Airflow Rate as published by manufacturer.

Key trends & considerations

- Title 24 requires MERV 6 air filters with pressure drop no greater than 0.1 inch wc. MERV (Minimum Efficiency Reporting Value) is an industry standard used to rate media type air filters. A filter with a higher MERV rating is more efficient than one with a lower MERV rating.
- A label with airflow and pressure drop performance information will allow consumers to select air filter replacement products that work properly in their central forced air space conditioning systems.
- Proposal has preliminary support from California Building Industry Association (CBIA)

Requested Input from Stakeholders

- Number of filters sold each year in California, by type
- Input on what adjustments should be made to the AHRI 680 label

Residential Swimming Pool Pump Update

Proposal Description:

Since Residential Swimming Pool Pump and Replacement Motor Regulations were first adopted, equipment has improved. An ANSI/APSP voluntary national efficiency regulation has been adopted. This proposal will work with Industry to update current regulations and add replacement motors and pool heater hydraulic performance.

California stock and sales (2014 estimated)

| | | |
|--------------|------|---------|
| Stock | 1.5 | Million |
| Annual sales | 0.15 | Million |

Current energy use and peak demand in California

| | | |
|-------------|-------|--------|
| Energy use | 4,000 | GWh/yr |
| Peak demand | 1,000 | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----|--------|
| Energy savings | 600 | GWh/yr |
| Peak demand reduction | 160 | MW |

Cost / Savings

| | | |
|--|-------|---------|
| Incremental cost per unit | \$N/A | |
| PV lifetime avoided costs per unit | \$N/A | |
| Annual avoided energy costs after stock turnover | \$N/A | Million |



Spa Testing, Listing, and Marking

Proposal Description:

Appliance energy efficiency performance information is sometimes not readily accessible for a number of California regulated and non-regulated appliances, especially portable electric spas. This proposal will make efficiency performance and compliance information more available and apparent to consumers.

California stock and sales (2014 estimated)

| | | |
|--------------|-----|---------|
| Stock | 5 | Million |
| Annual sales | 0.5 | Million |

Current energy use and peak demand in California

| | | |
|-------------|------|--------|
| Energy use | 12.5 | GWh/yr |
| Peak demand | N/A | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|------|--------|
| Energy savings | 3.75 | GWh/yr |
| Peak demand reduction | N/A | MW |

Cost / Savings

| | | |
|--|-------|---------|
| Incremental cost per unit | \$N/A | |
| PV lifetime avoided costs per unit | \$N/A | |
| Annual avoided energy costs after stock turnover | \$N/A | Million |



Power Factor Interactive Effects

Proposal Description:

Appliance energy efficiency performance is influenced by power factor, such that losses in distribution circuits can be reduced by improving poor power factor. This is currently being studied in PIER research. This proposal would bring PIER findings into code as a consistent policy for appliances where merited.

California stock and sales (2014 estimated)

| | | |
|--------------|-----|----------|
| Stock | N/A | Million |
| Annual sales | N/A | Thousand |

Current energy use and peak demand in California

| | | |
|-------------|-----|--------|
| Energy use | N/A | GWh/yr |
| Peak demand | N/A | MW |

Savings and reduction from proposed standard after stock turnover

| | | |
|-----------------------|-----|--------|
| Energy savings | N/A | GWh/yr |
| Peak demand reduction | N/A | MW |

Cost / Savings

| | | |
|--|-------|---------|
| Incremental cost per unit | \$N/A | |
| PV lifetime avoided costs per unit | \$N/A | |
| Annual avoided energy costs after stock turnover | \$N/A | Million |

