



ENERGY STAR Criteria for CFLs – Version 4.0

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U.S. Department of Energy

Improving the Quality of ENERGY STAR Qualified Lighting
Session

2:10 PM – 3:00 PM

March 2, 2006

Looking Back



January 2003:

- ENERGY STAR criteria for CFLs – Version 3.0 went into effect and addressed the issues of:
 - Early Failures
 - Poor Lumen Maintenance
 - Improvement of Product Packaging

November 2004:

- Initiation of the ENERGY STAR CFL Mandatory Reflector Testing Initiative to address:
 - poor performance across the CFL product category

August 2005:

- Release of the first draft revision of the ENERGY STAR criteria for CFLs

December 2005:

- Completion of the CFL Mandatory Reflector Testing Initiative
- Release of the second draft revision of the ENERGY STAR criteria for CFLs

ENERGY STAR Reflector Testing Initiative Results



The ENERGY STAR Mandatory CFL Reflector Testing Initiative was completed on December 16, 2005.

Fifty (50) CFL reflector products were disqualified from the program
– 31 of the disqualified products were tested; the remainder were corresponding private labeled products.

RESULTS: Out of the 65 CFL reflector products tested:

Efficacy:	60 out of 65 passed (92%)
Rapid Cycle Stress Test:	59 out of 65 passed (91%)
1,000 Hour Lumen Maintenance:	41 out of 65 passed (63%)
Lumen Maintenance @ 40%:	44 out of 65 passed (68%)

17 products (25%) failed to meet both 1,000 hour lumen maintenance and lumen maintenance at 40% of rated life.



Moving Forward

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In addition to setting efficiency levels and establishing consistent quality attributes, the ENERGY STAR CFL program seeks to encourage and educate the public to the benefits of replacing incandescent products with ENERGY STAR qualified CFLs.

Comments on the second draft of the ENERGY STAR criteria for CFLs – Version 4.0 were submitted in January.

Main discussion points from partners/stakeholders during this comment period are:

- Efficacy Levels
- Requalification of Products
- Elevated Temperature Testing for CFL Reflectors

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Efficacy for Bare Products:

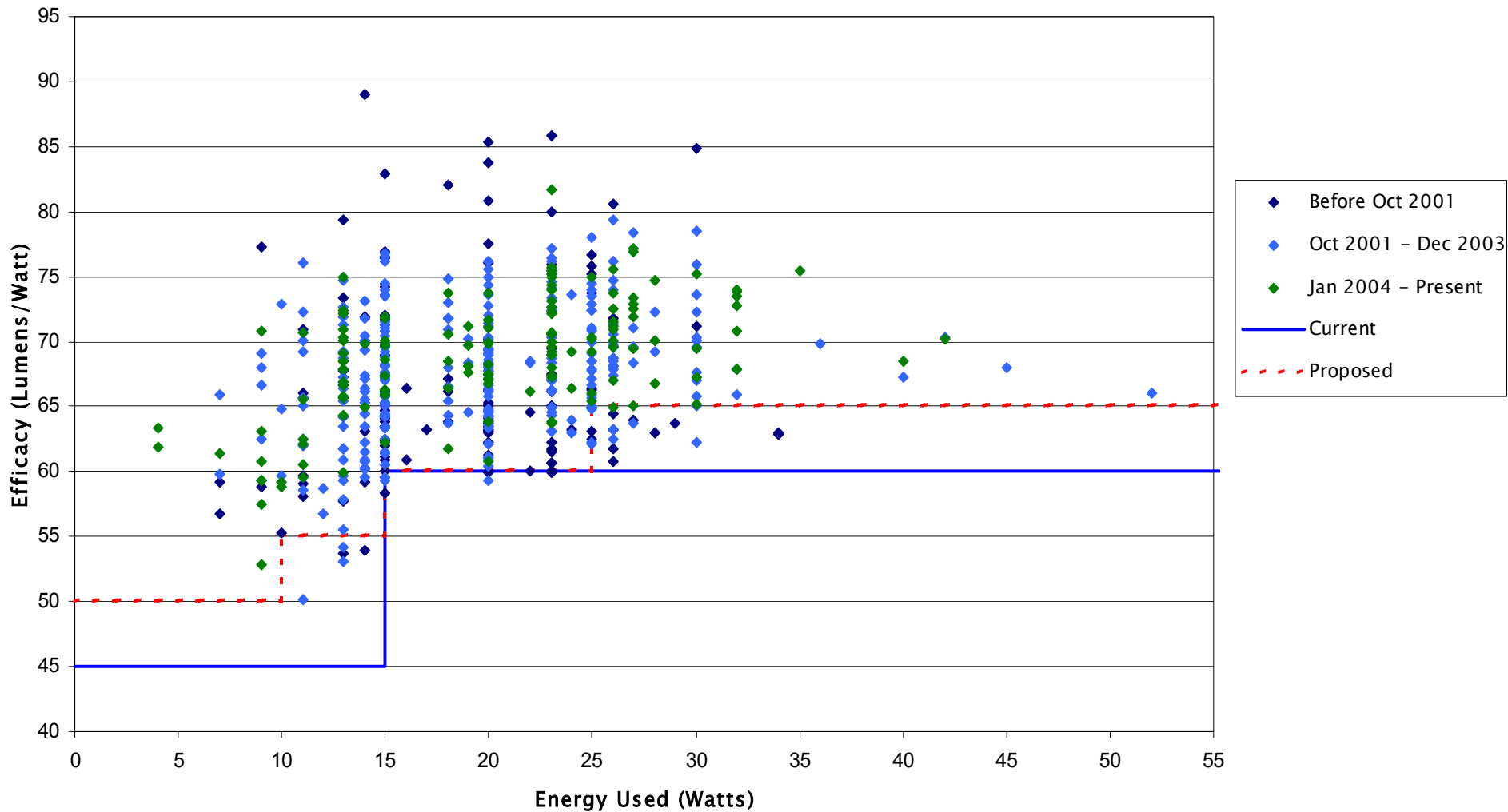
The third draft will contain the following requirements for bare CFL products:

<u>Non-Specialty, Bare lamp:</u>	Minimum Efficacy: Lumens/watt (Based upon initial lumen data)
Lamp power < 10	50.0
$10 \leq$ Lamp power < 15	55.0
$15 \leq$ Lamp power < 25	60.0
Lamp power \geq 25	65.0
<u>Specialty Bare lamp</u> <u>(Dimmable/3-way only):</u>	
Lamp power < 15	50.0
$15 \leq$ lamp power < 25	55.0
Lamp power \geq 25	60.0

Efficacies of ENERGY STAR Qualified Bare CFLs



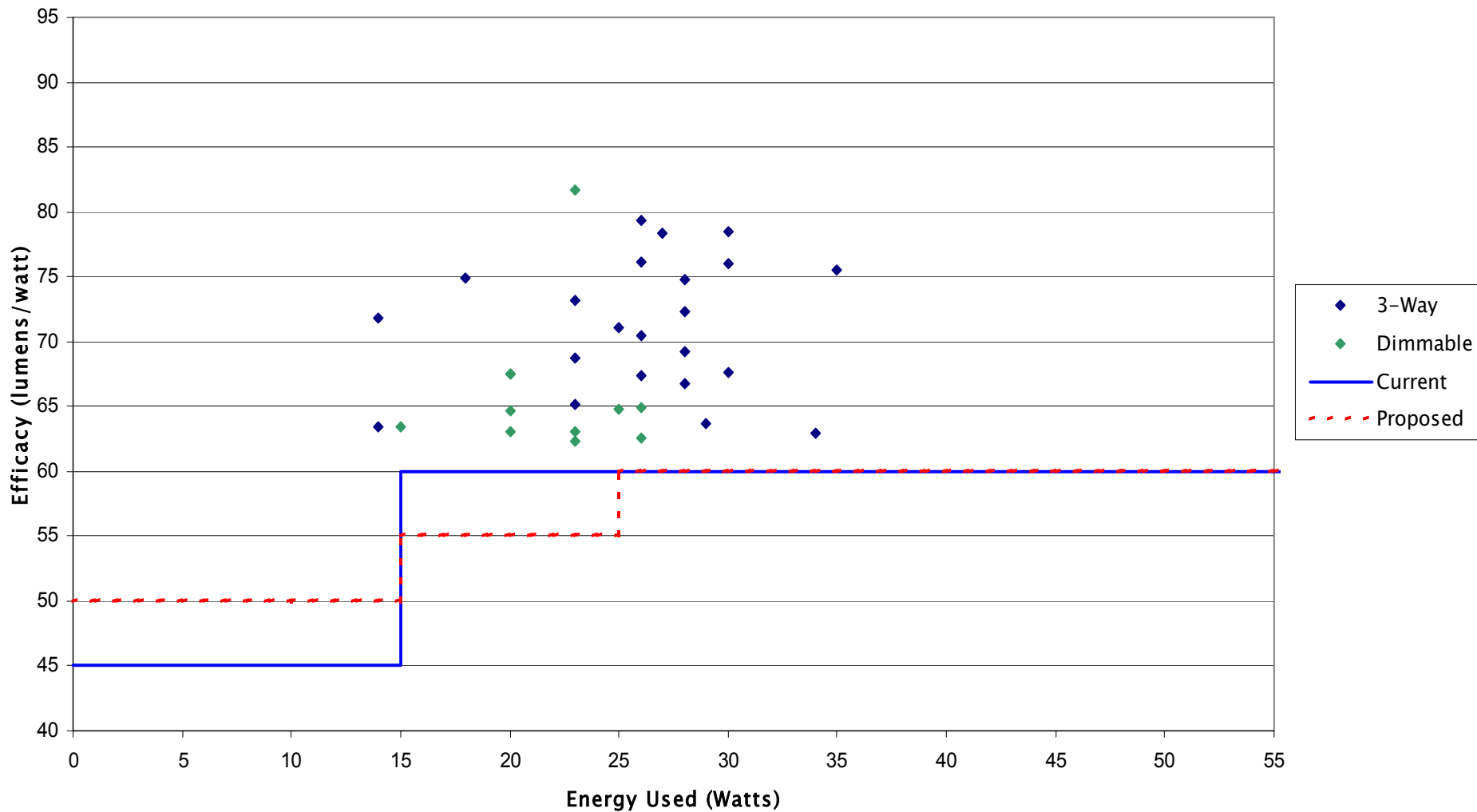
ENERGY STAR Qualified Bare CFLs – All Models



Efficacies of ENERGY STAR Qualified Specialty Bare CFLs



ENERGY STAR Qualified Specialty Bare CFLs



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Efficacy for Covered Products:

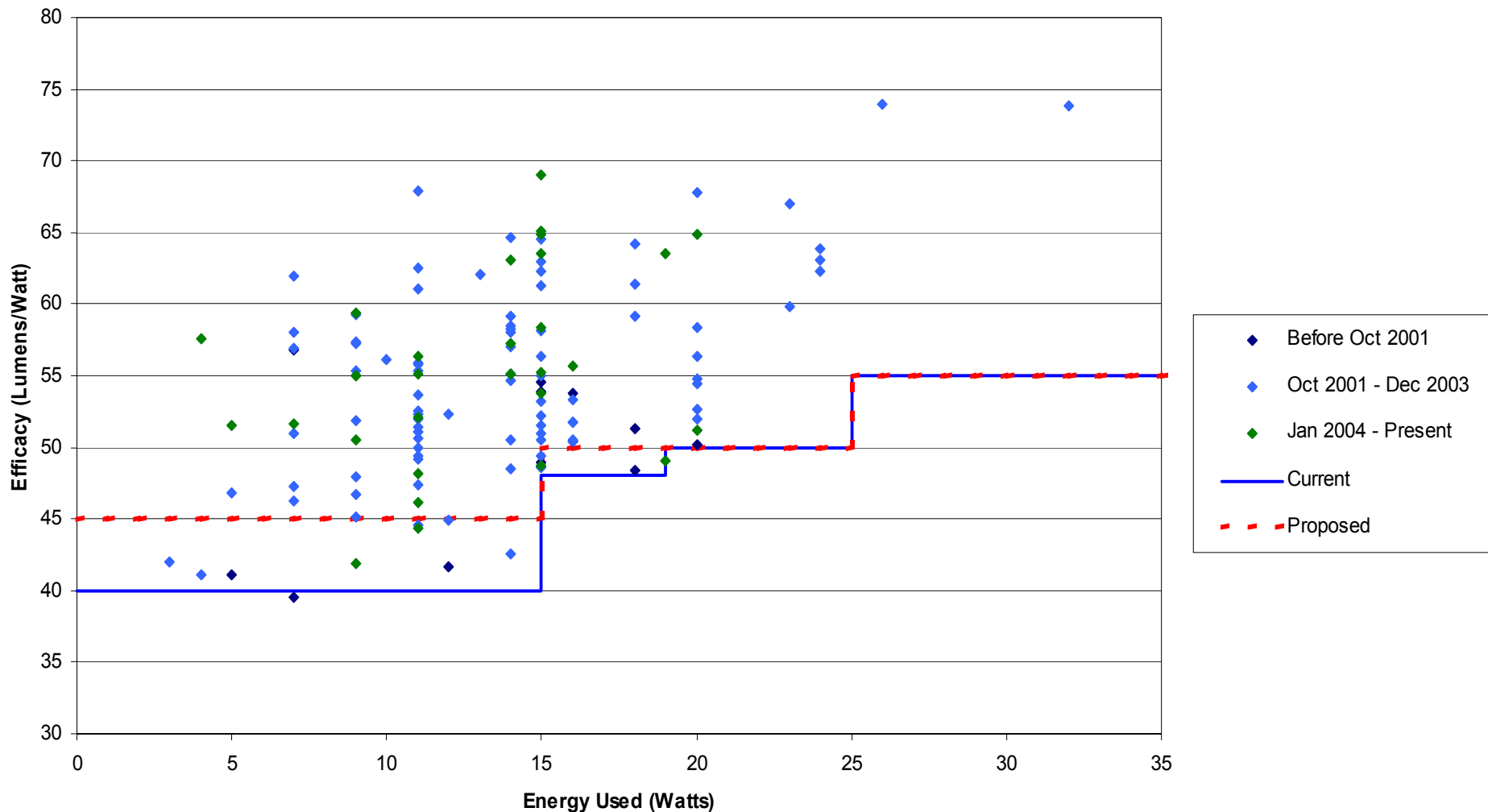
The third draft will contain the following requirements for covered CFL products:

<u>Covered Products:</u>	Minimum Efficacy: Lumens/watt (Based upon initial lumen data)
Lamp power < 15	45.0
$15 \leq$ Lamp power < 25	50.0
Lamp power \geq 25	55.0

Efficacies of ENERGY STAR Qualified Covered CFLs



ENERGY STAR Qualified Covered CFLs - All Models



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Why lower efficacies?

Establishing higher efficacy levels for covered and specialty products will result in:

- Negative impacts to the product design – products will need to be larger to meet the higher levels
 - Thus limiting product features such as compact design, dimmability, etc.
 - Plus consumers want products the same size or smaller than incandescents.....



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Why lower efficacies?

ENERGY STAR CFL criteria should provide high quality products that will meet or exceed consumer expectations:

- Consumers want the option to use dimmable or 3-way CFLs – many complaints stem around use of non-dimmable CFLs on dimmer switches
- Current ENERGY STAR qualified specialty CFL selection is few and far between
 - 50 qualified 3-way products
 - 12 qualified dimmable products
 - 7 are CFL reflectors
- Need to offer consumers better color of light consistency across products; the new CCT/chromaticity requirement will directly effect efficacy levels

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Soft white 60 watt incandescent replacement

Type	ENERGY STAR criteria	Efficacy (lumens/watt)	lumens	Wattage	Watts Saved
Bare	Version 3.0	45	800	17.8	42.2
Bare	Version 4.02	60	800	13.3	46.7
Bare	Version 4.03	55	800	14.5	45.5
Covered	Version 3.0	40	800	20.0	40.0
Covered	Version 4.02	50	800	16.0	44.0
Covered	Version 4.03	45	800	17.8	42.2

Soft white 100 watt incandescent replacement

Type	ENERGY STAR criteria	Efficacy (lumens/watt)	lumens	Wattage	Watts Saved
Bare	Version 3.0	60	1710	28.5	71.5
Bare	Version 4.02	65	1710	26.3	73.7
Bare	Version 4.03	65	1710	26.3	73.7
Covered	Version 3.0	55	1710	31.1	68.9
Covered	Version 4.02	60	1710	28.5	71.5
Covered	Version 4.03	55	1710	31.1	68.9

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Elevated Temperature Testing for Reflectors:

Since Fall 2005, Pacific Northwest National Laboratory (PNNL) and NEMA have worked together to review the PNNL elevated temperature testing apparatus design and procedure for CFL reflectors.

There are fundamental differences in how the test should be performed.

NEMA is working on the development of a proposed alternative elevated temperature life test protocol using luminaries (testing began in January).

- This test data will be analyzed and summarized to identify any adjustments that need to be made.
- The draft test protocol is scheduled to be ready sometime by late Summer/Early Fall 2006.

The Department has asked Intertek Testing Services (ITS) to review the PNNL testing process and provide their thoughts and ideas on possible alternatives procedures to perform CFL reflector elevated temperature testing.

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Requalification of Products:

Some confusion with what will be acceptable to meet Version 4.0. Here are the guidelines:

All current qualified CFLs must meet or exceed Version 4.0 after the criteria goes into effect. Partners can demonstrate qualification by one of two ways:

1) Resubmission of Most Current Test Report: Partners that have existing qualified products meeting the future Version 4.0 criteria requirements can submit the most recent qualification test report showing the product meets the additional CCT/chromaticity requirements and any of the consistency criterion changes.

- Applicable to Bare, Bare-Specialty, Covered, and Outdoor Reflectors
- Indoor Reflector products will need to be requalified to the elevated temperature testing requirements

2) New Testing: Existing products that will not meet the future Version 4.0 criteria requirements will need to submit new testing reports to demonstrate the product will meet Version 4.0.

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Mercury (Hg):

Many efficiency and utility partners are requesting Hg considerations for ENERGY STAR qualified CFLs.

Establishment of a CFL Mercury Working Group

This group's focus will be to discuss:

- the benefits and limitations for a Hg limit for medium screw-based CFLs
- Global Hg limits for medium screw-based CFLs
- Development of industry standards and testing protocols

To participate within the CFL Mercury Working Group, please e-mail your contact information to Susan Zartman at sgardner@drintl.com by March 31, 2006.

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CFL Third Party Testing & Verification System:

Consolidated Trend Reports:

- A nominal fee level for purchasing the trend reports has not reached consensus, therefore the program will not offer consolidated trend reports for each testing cycle.

Next Steps:

- April '06: Begin nomination process for Technical & Research Committee. Nominations will be due by May; first committee meeting will be slated for June/July 2006.
- June '06: Begin nomination process for Product Selection Committee. Nomination deadline slated for August 2006.
- Fall '06: Product Nominations process will begin.
- February '07: Start of first testing cycle

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Criteria Next Steps:

- Distribution of the third criteria draft to partners the week of March 7th.
- Partner and stakeholder comments will be due by the end of March 2006 and release a final criteria in April with an effective date of January 1, 2007.
- Elevated temperature testing for CFL reflectors will be added into the final criteria once a testing protocol and standard can be agreed upon. Effective date (1 / 1 / 07) will remain the same.
- In addition, once consensus is reached on the best CFL color communication system, a packaging requirement will also be added into Version 4.0.

Color Consistency



Here is our
problem.....

So, how do we
make it simple
for consumers to
purchase CFLs of
the same color?

Communicating CFL Color



DOE participated in the EPRI Lighting Research Office 6th International Lighting Research Symposium: Light and Color in February.

Much of the conference targeted the technical issues of color rendering (CRI) and correlated color temperature (CCT), but there were intriguing ideas suggested to identify CRI and CCT, such as:

Color Rating System (using the gasoline rating system as a model):

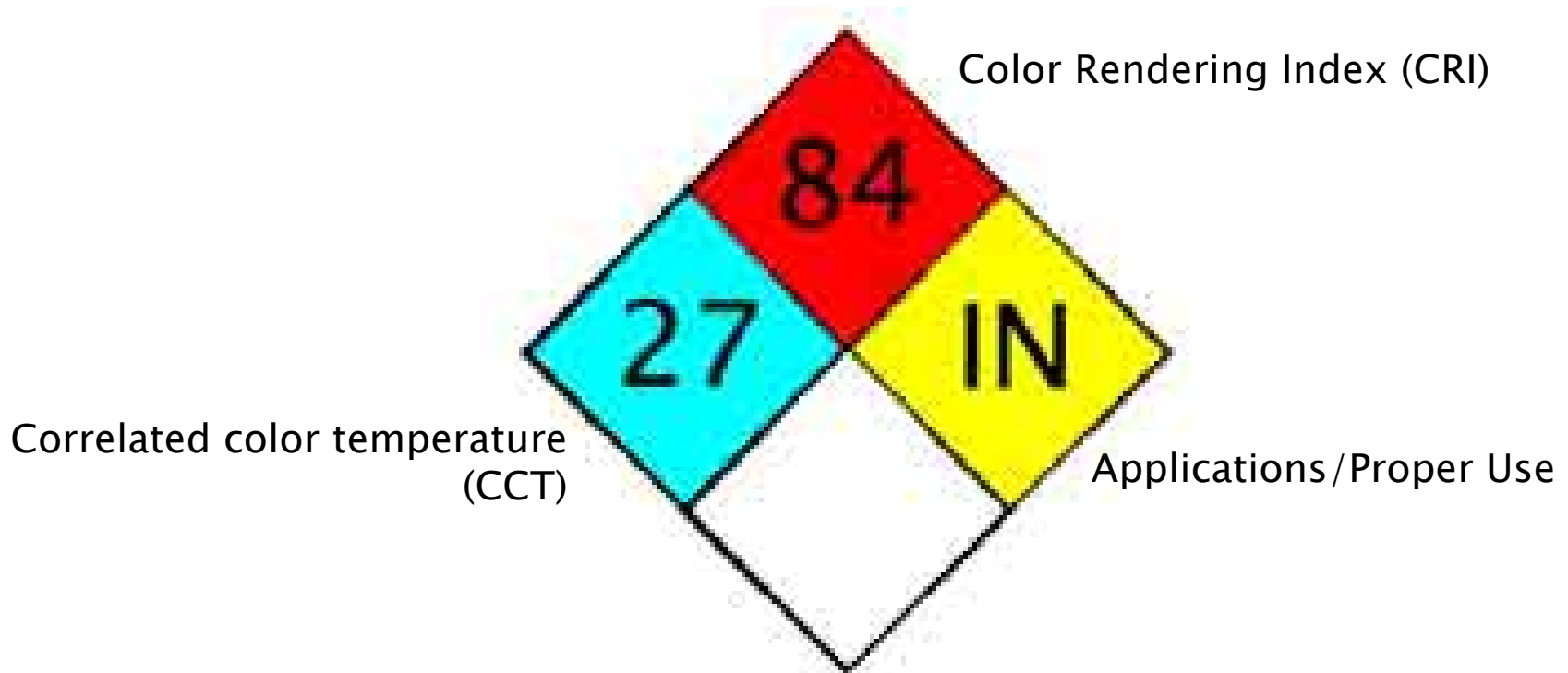
<u>Grade</u>	<u>Limited</u>	<u>Regular</u>	<u>Plus</u>	<u>Super</u>	<u>Ultra</u>
Quality	Low	Middle	High	Hi-fi	Hi-Pref
CRI	< 50	50-69	70-89	90-100	100+



Communicating CFL Color



Another idea was to develop a simple symbol such as the National Fire Protection Association (NFPA) to identify CCT, CRI, and other parameters:

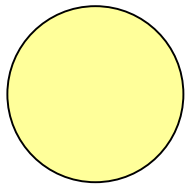


Communicating CFL Color

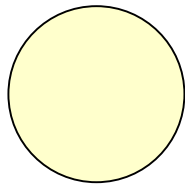


The Department is working with NEMA, EPA, and LRC to develop an easy color communication system for consumers.

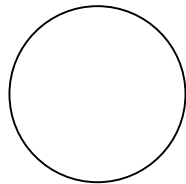
Rebecca Foster from the Consortium for Energy Efficiency (CEE) will now present more details on a proposed new system for communicating color of light sources.



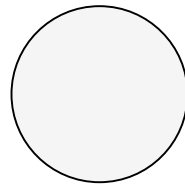
2700K



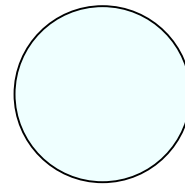
3000K



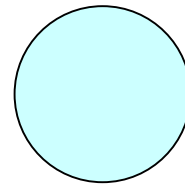
3500K



4100K



5000K



6500K