ENERGY STAR® Lighting Road Mapping Workshop Update

ENERGY STAR Products Partner Meeting 2014

Scottsdale, Arizona

October 29, 2014

Agenda

- Overview
- Recap of Meetings and Topics Covered
- Overview of Recommending Documents
- Outstanding or new topics
- Next Steps
- Future of lighting roadmapping

Goal

- To increase collaboration between EPA, NEMA, and lighting stakeholders to respond to the rapidly evolving lighting world and facilitating discussions for the near future of the ENERGY STAR lighting program.

Objectives

- Build on 15 years of partnership to foster the future success of the ENERGY STAR program for lighting
- Look ahead creatively to the next 5 years, with the goal of realizing ENERGY STAR requirements that deliver on consumer expectations for lighting quality and efficiency
- Establish pathways to furthering engagement between EPA's ENERGY STAR program, lighting manufacturers, and energy efficiency program sponsors on an ongoing basis

Areas of Interest

- **ENERGY STAR Verification Testing:**
  - Outline key considerations regarding the focus of verification testing for ENERGY STAR lighting products by product type
- **ENERGY STAR Market Trends and Research:**
  - Outline key market trends and areas that merit further research to inform the ENERGY STAR lighting program moving forward
- **ENERGY STAR Product Specifications:**
  - Outline key considerations of relevant ENERGY STAR specification processes for the coming 3-5 years

Topics Discussed

- March 27th – Lamps Verification Testing
- May 29th – Market Trends and Research
- June 26th – Emerging Products and Technology Trends
- July 31st – Lamps Verification Testing
- August 28th – Market Research

NEMA Recommendations

- SSL is a fast-moving technology in constant development
  - Product life cycles are shortening
  - Verification testing takes up to 6 months
  - A shorter, yet effective, process would help keep up with innovation and reduce costs
- Cost is a significant impediment to adoption
  - Can time and cost be reduced without sacrificing integrity?
- Industry has made a proposal via the roadmapping working group to streamline and shorten VT

Topics for today's discussion

- Consumer research effort
- Verification testing for lighting products
  - Review of product failures from up front testing and verification testing to date
- Connected lighting products
- Future of roadmapping

Lighting Verification Testing Results Summary

- **2012**
  - Decorative Light Strings - **2**
- **2013**
  - LED Lamps – **4**
  - Luminaires - **52**
- **2014**
  - Decorative Light Strings – **6**
  - LED Lamps – **67**
  - Luminaires - **147**

Grand Total **278**

Testing Failures

- Overall Notable Results:
  - Highest failure criteria:
    - Efficacy – 5.56%
    - Lumen Maintenance – 5.19%
    - Color Rendering – 3.33%
    - Color Maintenance – 2.96%
    - In-Situ Temperature – 2.59%

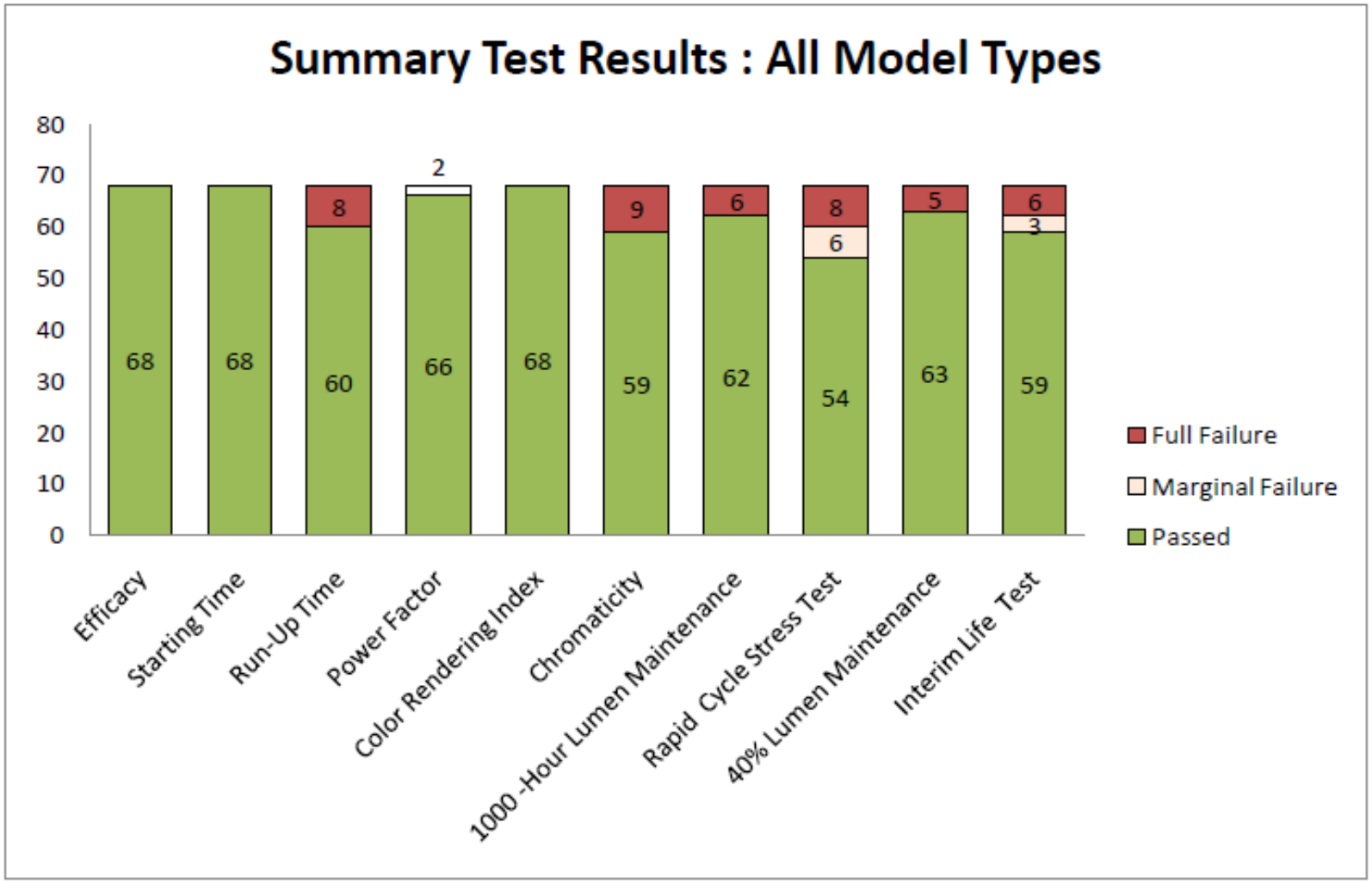
Testing Failures

- LED Lamps
  - Early Certification a challenge
    - 17 LED lamps failed lumen maintenance or life between 3000 and 6000 hours
  - VT still early in the process
    - 1 each Noise, Frequency and Lifetime failure
- Luminaires
  - Longer history
    - Efficacy – 7.54% of Luminaires tested
    - CRI – 4.05 % of Luminaires tested
    - In-Situ – 3.52% of Luminaires tested
    - Source Issues – 3.02% of luminaires tested

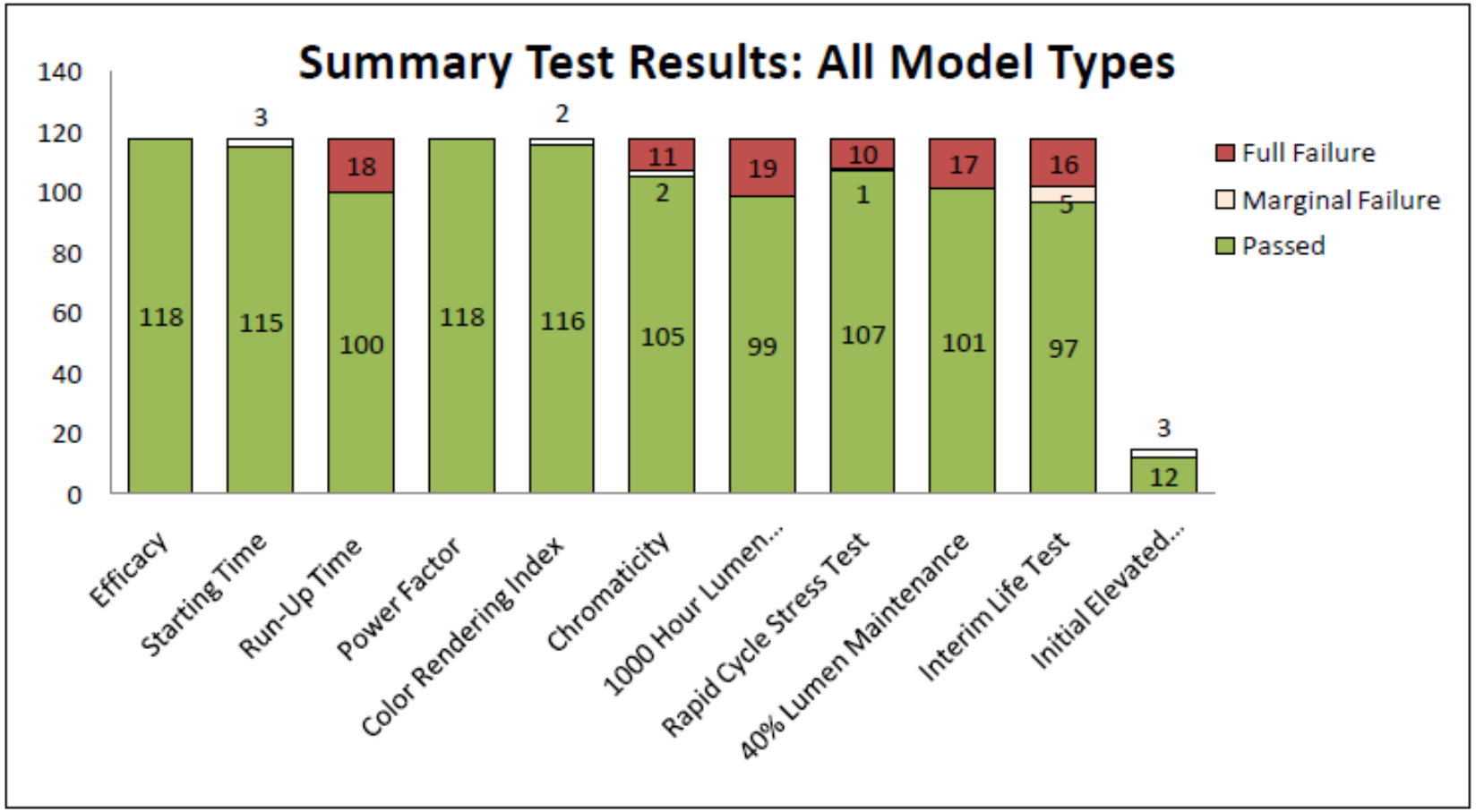
CFL VT Results: Batch 1

		Results		Failures				Passing	
				Full		Marginal			
	Passing Criteria	Mean	Median	Number	Percentage	Number	Percentage	Total	Percentage
Rapid Cycle Stress Test	5/6 survive to half of rated life	5.44	6	4	6%	7	10%	57	84%
Interim Life	9/10 survive to 40% of rated life	9.21	10	5	8%	6	9%	55	83%
40% Life Lumen Maintenance	> 80%	85%	86%	7	11%			59	89%
1,000 Hour Lumen Maintenance	> 90%	93%	94%	7	10%			61	90%
Chromaticity	All coordinates inside ellipse	9.47	10	3	4%	3	4%	62	91%
Run-Up Time	< 60 or <180 seconds	47.8	32.5	4	6%			64	94%
Starting Time	< 1000 milliseconds	360	270	3	4%			65	96%
Power Factor	> 0.5	0.59	0.56	3	4%			65	96%
Efficacy	Varies by type	65.3	67.82	1	1%			67	99%
Color Rendering Index	> 80	82.7	82.4	0	0%			68	100%
Total				21	31%	8	12%	39	57%

CFL VT Results: Batch 2



CFL VT Results: Batch 3



Discussion

- Can a reduced set of tests provide some assurance of a reasonably good product, without performing all the costly and lengthy tests that are done for up front certification?
- Considerations
  - SSL product forecasts of <12 month product lifecycle
  - Reduced cost in any stage of testing helps contribute to improved adoption & satisfaction
  - Verification testing for ENERGY STAR LED lamps just began so little is known on post certification performance, while much is known for CFLs due to 5 years of verification testing
    - 17 LED lamp failures have occurred between 3,000-6,000 hour in up front testing

"Connected" Product Features

- EPA continues to seek ways to further advance products with intelligent features in ways that deliver immediate consumer benefit and support a low-carbon electricity grid over the long term.

- Optional "Connected" criteria in appliance specification are designed to enable:
  - Energy savings
  - Convenience
  - Smart grid interconnection with the option to override when necessary

"Connected" Functionality Status

New Opportunities

- ✓ Demand responsive; today clothes dryers draw about 6kW:
  - Delay start cycle
  - Reduce power draw during cycle by 80%, temporarily
- ✓ Alerts: filter blocked, using the "eco" cycle is saving you 20 percent on your energy.
- ✓ Start the wash cycle an hour before you're home so it can go into the dryer immediately.
- ✓ New possibilities for increasing the efficiencies of paired communicating washer and dryer.

Product Category	Status of Consideration in ENERGY STAR Specification	
	Finalized	**In Dev'l**
Climate Controls		X
Refrigerators, Freezers	X	
Clothes Dryers	X	
Clothes Washers		X
Pool Pumps		X
Room ACs		X
Dishwashers		X

"Connected" Functionality for Lighting

- Introduced for Luminaires 2.0
- Slated for Lamps 2.0

- What does "connected" mean for Lighting products?
  - Features and functionality

Next Steps?