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NEMA Presentation on High-CRI Fluorescent Lamps

The attached presentation provides greater detail and context regarding recent enthusiastic, but deeply misinformed claims that significant energy-savings potential lies in the regulation of high Color Rendering Index linear fluorescent lamps. Sale of these lamps are already very low, and are decreasing noticeably each year. Regulation of these products is not an effective use of time and resources and will not provide significant energy savings.

Additional submitted attachment is included below.

High Color Rendering Index Fluorescent Lamps

Background

- Federal regulations currently exclude *linear fluorescent lamps* from DOE efficiency requirements if they have a Color Rendering Index (CRI) of 87 or greater. (Color Rendering Index is a measure of the lamp's ability to generate a full spectrum of color. It is measured between 0 and 100, with 100 being the best.)
- Having a high CRI makes T12¹ lamps less efficient than other linear fluorescent lamps.
- It is not technically feasible for a high CRI T12 lamp to meet the same DOE efficacy limits as standard CRI T8 or T12 lamps which is why there is a federal exclusion. (Standard linear fluorescent lamps have CRI's ranging from the 60's to the mid-80s.)
 - High CRI lowers efficacy because the phosphor mix needed to produce light across the entire color spectrum reduces lumen output
- The high CRI linear fluorescent market is almost entirely T12 lamps which historically have been used in color critical applications where a lamp is required to produce a full color spectrum of light.
- Regulating high CRI lamps in the State would eliminate an entire product type (4' T12 linear fluorescent tubes) and leave the consumer with few acceptable replacement options.

¹ T12 linear fluorescent lamps are the older traditional fluorescent lamps that have a diameter of 1-1/2" and are commonly found in homes. Newer linear fluorescent lamps called T8 lamps have a 1" diameter are commonly used in commercial businesses because are more efficient and last longer. They are not interchangeable and each requires its own unique "ballast" (electrical transformer) to provide the proper current and voltage.

ASAP research report stated:

*“We are currently not aware of any high CRI fluorescent lamps that meet the recommended standard level. While there is no clear technical barrier that prevents a high CRI T8 lamp from meeting the recommended standard level, there appears to be no market for high-efficiency high CRI lamps, and manufacturers therefore have no incentive to develop them. If the current exemption for high CRI lamps is eliminated by a state standard, **we expect that manufacturers will introduce compliant high CRI lamps**, and consumers will also have a choice of regular CRI fluorescent lamps and linear LED lamps.”[±]*

Fact: Extending this standard to High CRI T12 lamps would effectively ban High CRI T12 linear fluorescent lamps from a state enacting such legislation.

While it may be technically possible to create some types of compliant High CRI T8 Lamps, T8 fluorescent lamps would not work properly in consumer fixtures designed to operate T12 fluorescent lamps.

[±]States Go First: How States Can Save Consumers Money, Reduce Energy and Water Waste, and Protect the Environment with New Appliance Standards -- Joanna Mauer, Andrew deLaski, and Marianne DiMascio -- July 2017 -- Report A1702 p12

Consequences of ban

What would consumers likely do?

1. Buy closest alternative replacement lamp – T8 fluorescent

a. But to work properly, would also require the consumer to hire an electrician (\$\$\$) to replace the ballast (\$) for very little energy savings (and estimated \$1-\$2 a year electrical bill savings.)

2. Buy LED replacement lamp

a. Nearly all of the LED replacement products on the market today are designed to operate on commercial T8 ballasts. A few may also work on a limited number of T12 ballasts.

3. Replace fixture

a. But would require a consumer to hire an electrician (\$\$\$) and buy a new fixture (\$\$\$) for very little energy savings (and estimated \$1-\$2 a year electrical bill savings).

Scenario 1 – T8 lamp replacement

Claimed Expectation

- Lamp will work
- Energy savings

Likely result

- Existing T12 Electromagnetic ballast and T8 lamp configuration are not designed work together and lamp will most likely not start
- If lamp actually starts, will not save any energy and will greatly shorten lamp life by as much as 65%

- If lamp starts and operates, homeowner would need to replace lamps ~2.5 times more frequently increasing lamp replacement costs

Ultimate outcome

- Consumer frustration of newly purchased lamp not starting.
- Added consumer cost to hire an electrician to troubleshoot and to replace ballast.
- Increased lamp replacement costs if lamp starts

Scenario 2 – LED lamp replacement

Claimed Expectation

- Lamp will work
- Lamp will have same performance

Likely result

- Most TLED Lamps won't work properly on most low cost magnetic consumer ballasts
- Lamp will most likely not start or will perform poorly – flickering, low light
- Limited consumer options available requiring just the right ballast/lamp combination to work

Ultimate outcome

- Most TLED lamps won't work leading consumer to replace fixture or replace ballast with one compatible with TLED

- **Electrician required = \$\$\$**
- **Cost of new fixture = \$\$**

Scenario 3 – fixture replacement

Claimed Expectation

- Upgrade to new fixture using T8 lamps or LED light source
- Same or better performance

Ultimate outcome

- Consumer frustration at having to upgrade entire fixture when they only wanted a new lamp

Result

- Increased cost for fixture \$\$\$ and electrician \$\$\$
- Limited Energy savings over T12
- Long payback time for homeowner

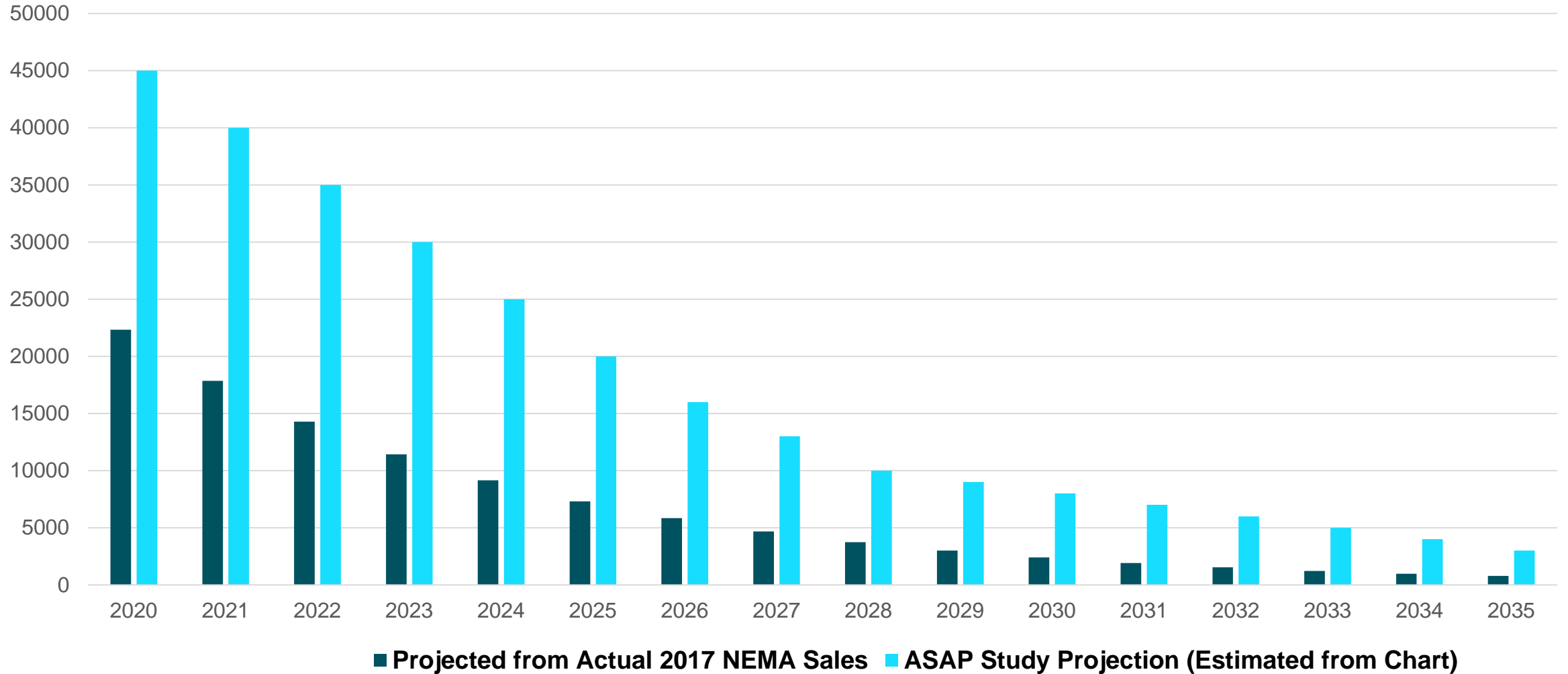
Regulatory Need?

- There is no need to regulate High CRI T12 lamps.
- Sales of High CRI Linear fluorescent lamps are decreasing by ~20%/yr over the past few years and this trend is expected to continue.
- High CRI T12 linear fluorescent lamps represent older technology that is quickly being replaced by newer technology:
 - New fixtures use T8 linear fluorescent lamps
 - New fixtures use LED technology
- As market forces reduce product use, very little energy will be saved by eliminating this lamp type.
- Nearly 70% of the T12 lamps sold today are used in older existing homes with low operating hours.
- Due to this trend, potential State energy savings are vastly overstated.
- Significant consumer dissatisfaction, uncertainty and high costs will occur if High CRI T12 fluorescent lamps are eliminated from the State.

Energy Savings Potential of regulating High CRI lamps

- The Energy Savings potential presented supporting the regulation of High CRI T12 lamps has been vastly overstated. The original analysis was based on several apparent inaccurate assumptions about the market for High CRI T12 Linear Fluorescent lamps.
- Inaccurate Assumptions:
 - T12 lamps are used in Commercial Applications with long operating hours.
 - Fact: Nearly 70% of the T12 lamps sold in 2017 (Actual NEMA Sales Data) were sold to consumers for residential applications at very low operating hours (~2 hours per day.) Any significant commercial application with long operating hours converted to T8 lamps many years ago.
 - The wattage use of T12 Lamp systems is based on operation on Commercial ballasts.
 - Fact: Residential ballasts are nearly all low power residential (Shop Lite) ballasts operating the lamp at approximately 65% of rated power.
 - The wattage of Commercial T12 lamps is 40 watts per lamp.
 - Fact: The majority of Commercial T12 linear fluorescent lamps are energy saving 34 watt versions.
 - Sales will decrease slowly without regulation and there is a large number of sales today.
 - Fact: Sales of T12 Linear Fluorescent lamps are much lower than projected by ASAP and decreasing very fast at 20% a year.

Number of T12 Lamps Sold in United States



NEMA represents over 90% of USA T12 Linear Fluorescent sales, most of which are made in the United States

Actual Energy Savings Potential of High CRI T12 Lamp Regulation

California	ASAP Projections based on <i>inaccurate</i> Assumptions	Energy Savings Potential in the State with <i>corrected</i> assumptions ¹
Power Savings in the year 2025	1228.2 GWh	13.1 GWh (~ 1% of ASAP)
Cumulative Power Savings to 2035	12,808 GWh	194 GWh (~ 1.5% of ASAP)
Annual Utility Bill Savings 2025	\$ 219.2 Million per Year	\$ 1.2 Million per year (Less than 1%)
Annual Utility Bill Savings 2035	\$ 76.5 Million per Year	\$ 127K per year (~ 0.2%)
Ranking of among all Products Identified	Highest Potential Savings among all 19 products identified in ASAP study	Lowest Potential Long Term Savings of any product category

¹ NEMA Projections using actual sales data

Summary

- High CRI T12 linear fluorescent lamps cannot meet current efficiency regulations
- Enacting efficiency standards for high CRI lamps are effectively a ban
- Other's energy savings claims for this technology are *greatly* exaggerated and based on *incorrect* assumptions
- Consumers will be adversely affected by the proposed measures
- High CRI linear fluorescent lamps will exit the market naturally *without* regulatory action
- The federal exclusion for high CRI T12 lamps should remain
 - This federal exclusion meets a critical technical need for this lamp type. This exclusion is not a 'loophole' because it is not technically feasible for a high CRI T12 lamp to meet current federal energy efficiency requirements.