National Electrical Manufacturers Association

The Association of Electrical Equipment
and Medical Imaging Manufacturers
www.nema.org

November 16, 2021

Mr. Matt Chapman, Director
Waste Management & Prevention Division, Solid Waste Program
Vermont Department of Environmental Conservation
One National Life Drive, Davis 1
Montpelier, VT 05620-3520

RE: 10 V.S.A. §7152(a)(6) Sale of mercury-containing lamps

Dear Director Chapman:

The National Electrical Manufacturers Association (NEMA) represents nearly 325 electrical equipment and medical imaging manufacturers that make safe, reliable, and efficient products and systems. Our combined industries account for 370,000 American jobs in more than 6,100 facilities covering every state. NEMA's Light Source Product Section includes companies that design and supply lamps and lighting systems to produce visible or near-visible radiant energy for general illumination and specialty applications.

This letter represents the collective response by the Light Source Product Section to correspondence received on November 1st concerning compliance with 10 VSA §7152 of the 2012 legislation for the Collection and Disposal of Mercury-containing Lamps. That correspondence cited Subsection 7152(a)(6) of the statute, which addresses the question of whether an "*alternative, non-mercury energy efficient lamp is available that provides the same or better overall performance at a cost equal to or better than the classes of lamps that the manufacturer proposes to sell."*

In short, the answer to this question is while alternative lighting solutions DO exist for a variety of mercury-added lamps currently in use, many are not available at a "*cost equal to or better"* than their mercury counterparts. Moreover, the non-mercury products often ***do not*** constitute direct, 'plug-in' replacements for mercury-containing lamps. The latter consideration means that conversion to non-mercury solutions for some critical applications means installing new fixtures to accommodate non-mercury bulbs, if not replacing the entire lighting system. This can be a costly endeavor that would be forced upon numerous private and public enterprises if the mercury products they rely upon are suddenly rendered unavailable.

Screw Based Compact Fluorescent Lamps (CFL)
In the residential sector efficient, non-mercury alternatives ***are*** readily available for screw-based, compact fluorescent lamps (CFLs), the most common mercury-containing, general purpose household bulb. LED lamps are more efficient than CFLs and they, as well as halogen light bulbs, are comparable in price. Sales of CFLs have declined dramatically in recent years and several large manufacturers have ceased production entirely, so NEMA anticipates CFL sales will reach *de minimis* levels in the near future.

Linear Fluorescent Lamps
The above is NOT true for linear fluorescent lamps (LFLs), which have residential applications but are far more prevalent in commercial and industrial settings. LED replacements are available for T8 LFLs, but there are limitations to the compatibility of the LED lamps installed in LFL luminaires that can inhibit performance, such as excess heat that can damage the fixture or ballast and lead to lamp failure upon initial start-up.

With regard to pricing, even a cursory review of major vendors of commercial and residential lighting products reveals a substantial price differential between LFLs and LED linear lamps. General Purpose LED linear lamps – regardless of length or bulb shape (T5 or T8) – are priced ***2 to 3 times higher*** per unit than General Purpose LFLs, which often provide higher lumen output.[1]

The following excerpts taken from www.Grainger.com for comparative LED and LFL products are indicative of the typical cost differential.

Plug & Play LED General Purpose Linear Light Bulbs (4 ft)

Bulb Shape	Wattage Equiv	Watts	Color Temp.	Lumens	Price
T8	32W LFL	15 W	3,000 K	2,000 lm	$12.56 / each
T8	32W LFL	15 W	3,500 K	2,000 lm	$13.04 / each
T8	32W LFL	15 W	4,000 K	2,100 lm	$12.70 / each

Fluorescent General Purpose Linear Light Bulbs (4 ft)

Bulb Shape	Wattage Equiv	Watts	Color Temp.	Lumens	Price
T8	32W LFL	32 W	3,000 K	2,900 lm	$1.82 / each
T8	32W LFL	32 W	3,500 K	2,915 lm	$6.72 / each
T8	32W LFL	32 W	4,100 K	2,915 lm	$7.14 / each

HID Lamps
Similar data is easily retrievable concerning High Intensity Discharge (HID) lamps such as metal halide, high pressure sodium, mercury vapor, and ceramic metal halide. The web site https://ledglobalsupply.com/, for instance, provides a long list of LED "Corn Bulbs" offered as replacements for metal halide and high-pressure sodium lamps at wattage levels ranging from 200 watts to 1000 watt plus.

Prices for these products, however, are orders of magnitude higher than for their mercury-containing counterparts. A 200-watt, 24,000 lumen LED bulb, described on the site as "*the perfect retrofit for metal halide and high-pressure sodium lamps," is priced at $179.90.*

High wattage HID bulbs, by contrast, typically are in the $20 to $50 range when purchased individually and lower still when bought in quantity. A range of 1000 watt HID products at those price points can be viewed at the following web site:

[1] See https://www.grainger.com/search/lighting/light-bulbs-lamps/linear-light-bulbs-lamps/general-purpose-linear-light-bulbs?sst=4&ts_optout=true&searchQuery=linear+fluorescent+lamp&categoryIndex=1, and

https://www.amazon.com/s/ref=nb_sb_noss?url=search-alias%3Daps&field-keywords=1000+watt+metal+halide+lamps&rh=i%3Aaps%2Ck%3A1000+watt+metal+halide+lamps

Furthermore, the lumen levels produced by the 200-watt Corn Bulb are less than 25% of the 110,000 (or more) lumens produced by a 1000-watt metal halide bulb, far short of the performance standard needed for the commercial and industrial applications for which it is advertised. The price of another lamp presented on the web site above at 270 watts jumps to $356 and is still well below the lumens required to replace a 1000-watt lamp.

Other LED lamps advertised on the internet are touted as alternatives to 1000-watt metal halide lamps and priced at $100 or less, but because they come nowhere close to providing equivalent light output they cannot be viewed as acceptable replacements.

Moreover – as with linear fluorescent technology – substituting non-mercury HID lamps for lamps containing mercury can be technically challenging due to incompatibilities of shape, color, expected life, electrical characteristics, and excessive heat, or because their increased energy consumption may violate energy codes.

HID light sources have several unique performance characteristics that cannot be matched by currently emerging, alternative technologies. For example, HID lamps have very little variance in light output when exposed to temperature extremes (hot or cold), which makes them the most reliable, energy efficient sources for industrial facilities with high temperature conditions, outdoor lighting, damp and wet areas, corrosive environments, and other stressful operating situations.

Solid state, LED lamps and LED luminaires, however, are not suitable for hot, industrial applications because the electronic components do not survive long in high temperature operating environments that often exist in industrial plants. In outdoor applications – where HID lamps are typically mounted on high poles – thermal conditions and space limitations within the fixtures prevent LED replacements from generating more than 100,000 lumens from a single lamp, which is insufficient for large areas.

In addition, high wattage metal halide fixtures used outdoors must be enclosed to provide protection against weather conditions. This can produce extremely high operating temperatures within the fixture, which can damage the electronic components of LED lamps. Thus, LED replacement lamps commonly advertised as energy saving alternatives to HID lamps must operate at much lower wattages to reduce heat, and therefore produce far fewer lumens. The reduced light output that results could compromise public safety and security.

Germicidal UV Lamps and Luminaires

Finally, mercury-added lamps remain the primary choice for lighting used for disinfection, UV curing, photochemistry, and other specialized industrial processes. There are no feasible non-mercury alternatives available for these applications and no value to be accrued by rendering these critical lamp products unavailable in Vermont.

Yet despite the price differentials and potential performance challenges, the sale of mercury containing products will continue its steady decline as non-mercury alternatives become increasingly available. This trend will continue with or without government intervention, driven

by a desire to reduce environmental impact, decrease operational costs and improve energy efficiency. The ongoing conversion from mercury containing products is beneficial to and supported by NEMA lighting manufacturers, but it is a ***transition*** that relies on mercury-added lamps remaining available as commercial, industrial, and institutional enterprises gradually upgrade their lighting systems.

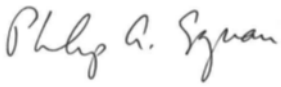
Conclusion

In summary, the only general purpose, mercury-added lighting product for which an "*alternative, non-mercury energy efficient lamp is available that provides the same or better overall performance at a cost equal to or better"* than the mercury-added product is screw-based compact fluorescent lamps. Non-mercury alternatives for all other general purpose (as well as specialty) mercury-added lamps are either unavailable, cost substantially more per unit, or present performance challenges.

Converting to LED lighting solutions, therefore, requires more than a simple lamp replacement. In many scenarios, eliminating mercury means replacing the entire lighting system through considerable time, labor, and financial investment. To a varying extent, this remains the case for offices, factories, warehouses, sports stadiums, police stations, fire houses, court houses, publicly owned buildings, indoor arenas, gymnasiums, retail stores and malls, restaurants, hospitals, health care facilities, nursing homes, schools, universities, hotels/motels, outdoor and indoor parking lots outdoor sports fields, single homes, apartment buildings, and many miles of lighted roadways.

If you have questions or require additional information, feel free to reach out to me at 703-841-3274 or philip.squair@nema.org at your convenience.

Sincerely,



Philip A. Squair
Vice President – Government Relations

Cc Karen Knaebel, DEC