MA ENERGY EFFICIENCY ADVISORY COUNCIL

→ CONSULTANT TEAM

LED STREETLIGHTS OVERVIEW

Update on current technology and progress in Massachusetts

▶ September 21, 2016

www.ma-eeac.org

LED OUTDOOR APPLICATIONS

LED

High Pressure Sodium

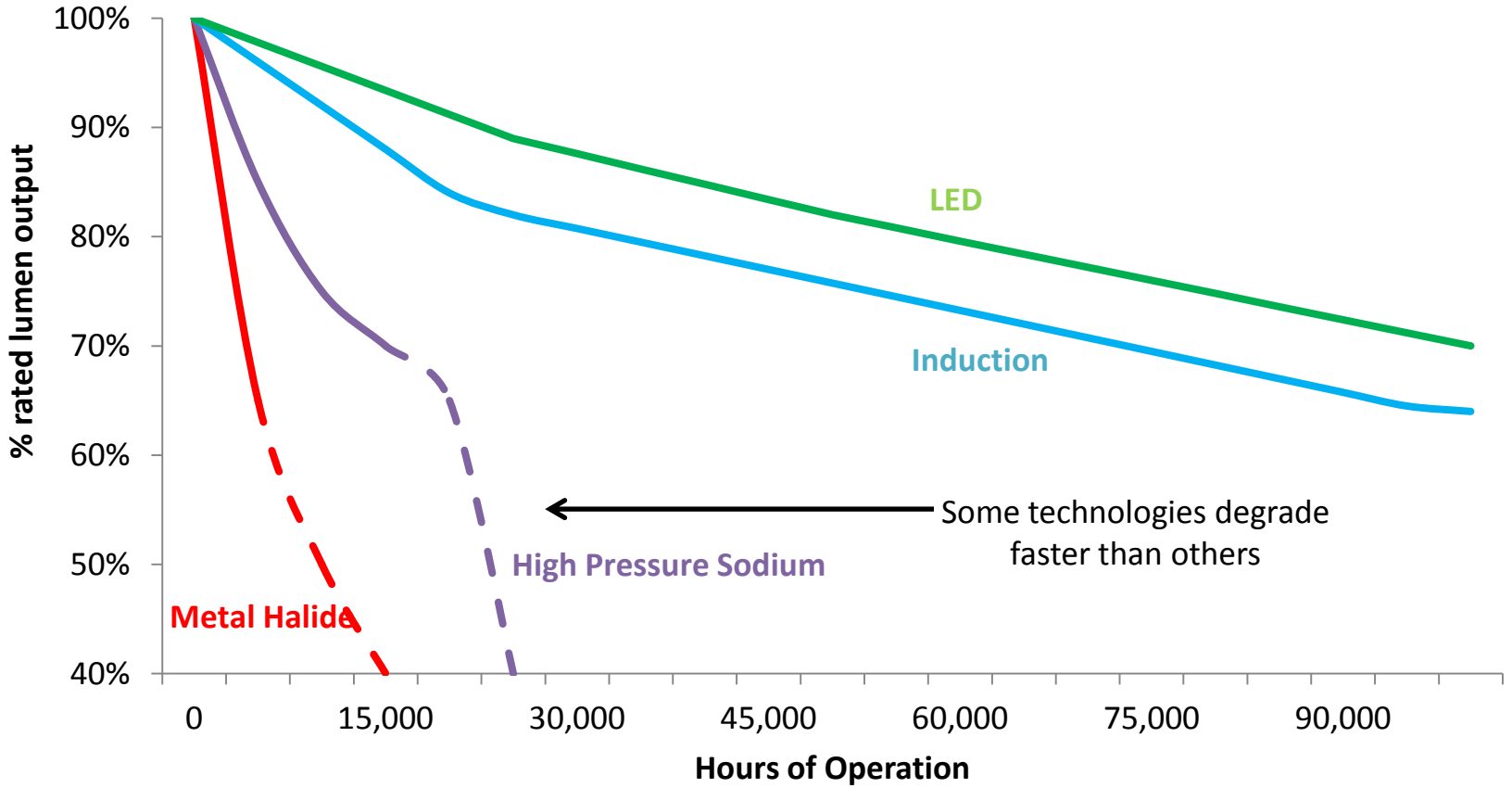
TECHNOLOGY COMPARISON

- LEDs are typically at least 50% more efficient than the technologies they replace

Technology	Average Efficacy (lumens/watt)	Color Temperature Range °K	Color Rendering
LED	120+	2700 - 7500	Excellent
Induction	80	3000 - 6500	Good
High Pressure Sodium	75	2200	Poor
Metal Halide	60	4200	Fair
Mercury Vapor	50	4000	Fair

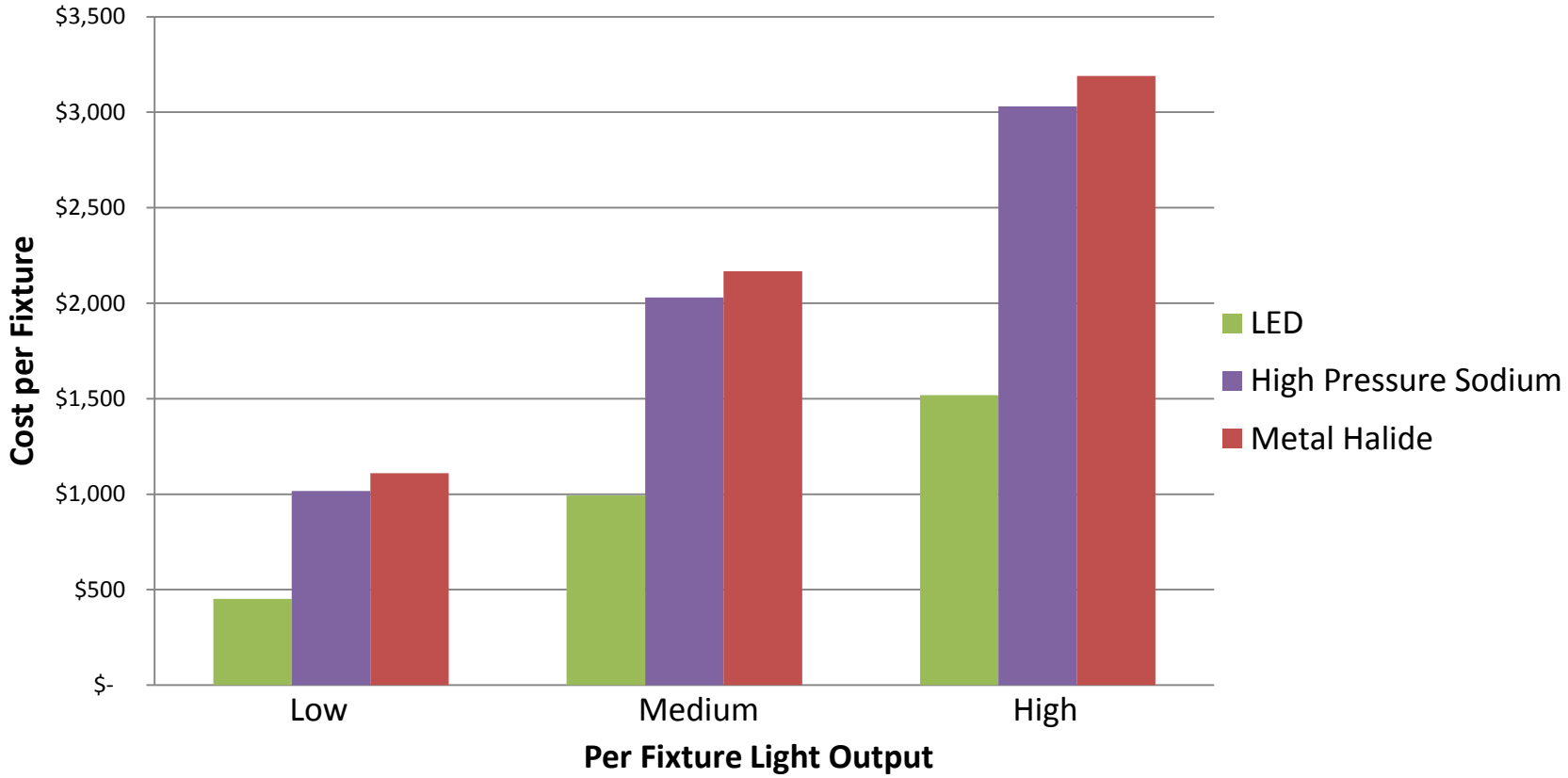
LUMEN MAINTENANCE IS IMPORTANT

- Light output degrades over time – 4175 hrs/yr is typical
- The lamp should be replaced at 65% of initial output



STREETLIGHT 10 YEAR OPERATING COST COMPARISON

- Typical cobra head streetlights
- Includes fixture cost, electricity, and maintenance



IMPROVED CONTROLS

- **Traditional Streetlight Control:**
  - Photocell with lights on from dusk-dawn
    - 4,175 annual full load hours
- **New LED control capability**
  - Scheduled Dimming - after 10 pm in neighborhoods
    - 3,737 annual full load hours
    - Saves ~11% over traditional controls
  - Scheduled Off – during late night hours
    - 2,715 annual full load hours
    - Saves 35% over traditional controls
  - LED controls can be used to account for lumen degradation

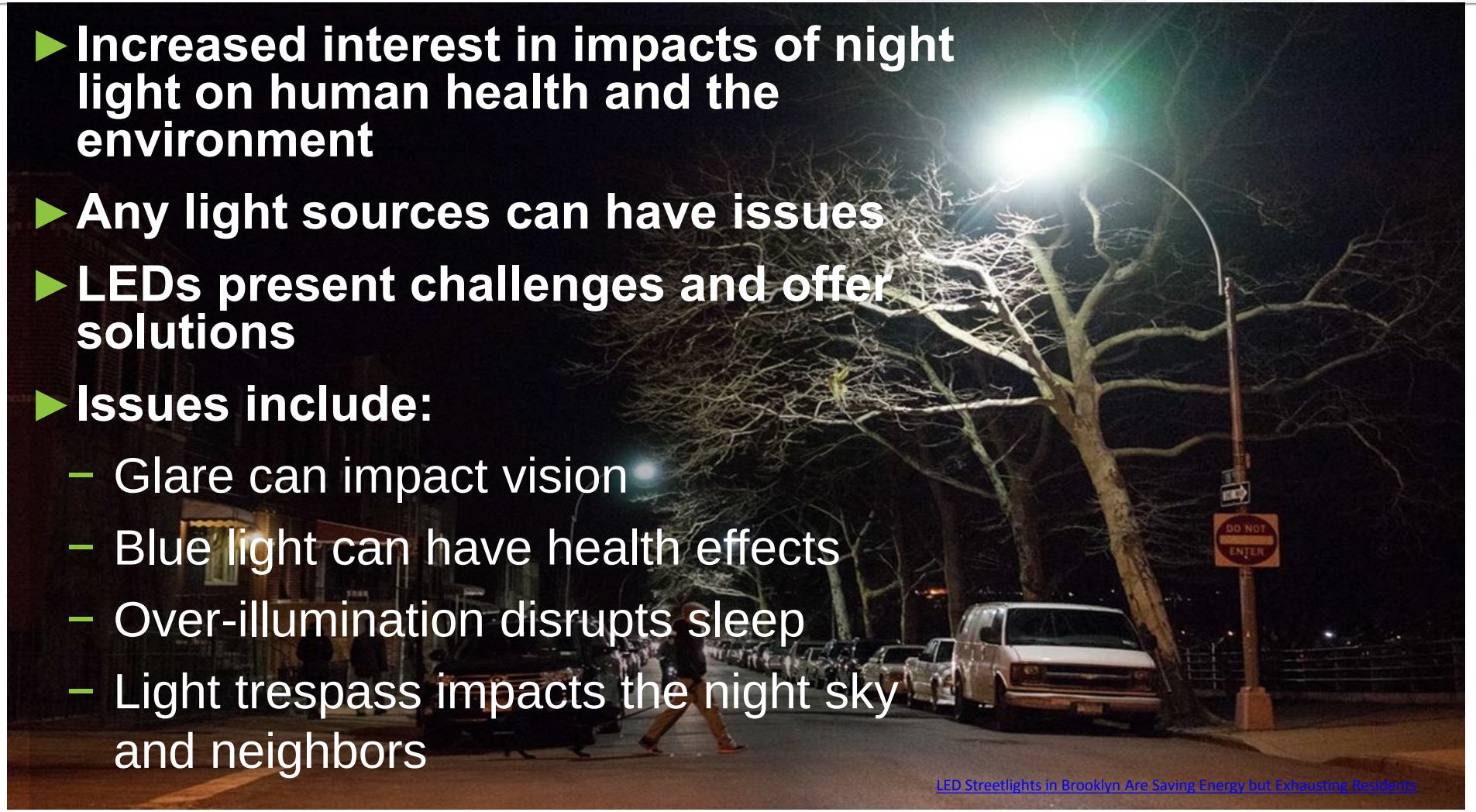
Source: National Grid RI streetlight tariff

ADVANCED FEATURES

- **Networked LED streetlights can:**
  - Self-report maintenance issues
  - Track and report energy use
  - Allow for fixture tuning to meet local needs
    - Cambridge MA programmed light levels by neighborhood through LED dimming controls
- **Additional Options**
  - Extend cellular coverage
  - Detect / triangulate gunshots
  - Identify parking spaces / issue tickets
  - Mark evacuation routes

NIGHTTIME LIGHTS AND HEALTH

- **Increased interest in impacts of night light on human health and the environment**
- **Any light sources can have issues**
- **LEDs present challenges and offer solutions**
- **Issues include:**
  - Glare can impact vision
  - Blue light can have health effects
  - Over-illumination disrupts sleep
  - Light trespass impacts the night sky and neighbors



LED Streetlights in Brooklyn Are Saving Energy but Exhausting Residents

CHOOSE THE RIGHT COLOR FOR THE APPLICATION

- Los Angeles streetlight conversion improved visibility and reduced crime rate

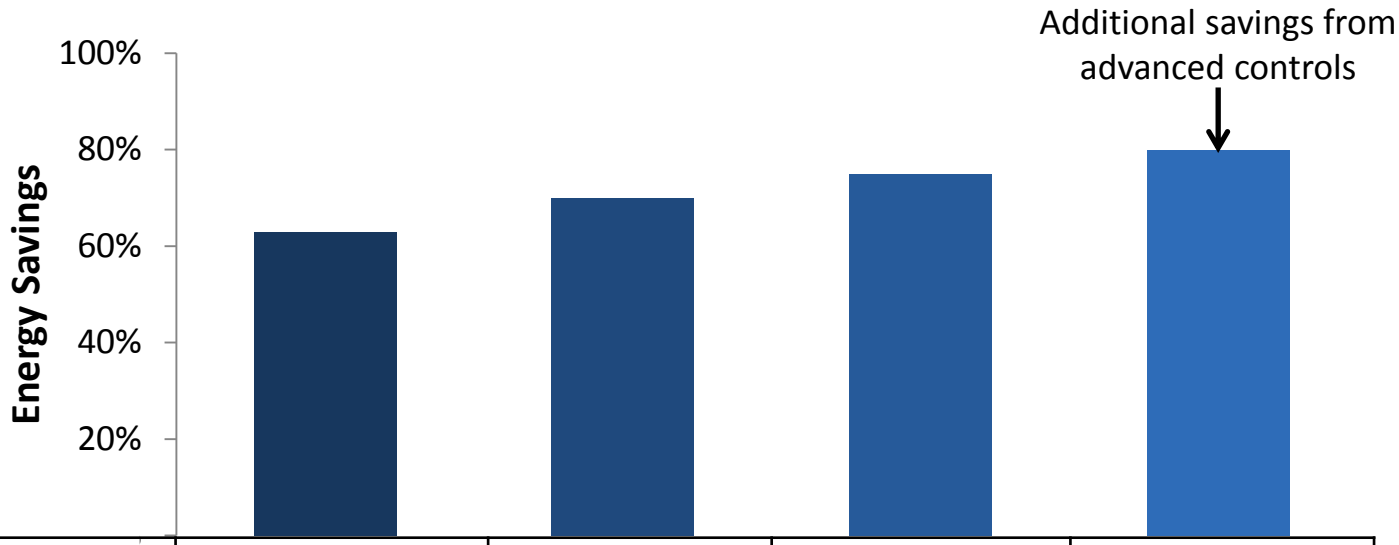
- Lamps with warm color temperatures minimize health impacts and are suitable for residential areas

STREETLIGHT RATES

- **Streetlight energy use is *not metered***
- **Flat rates established by technology and wattage**
  - Different rates for utility vs municipal owned lights due to maintenance costs
    - Maintenance is built into the rate for utility owned
    - For Municipally owned, town/city provides maintenance and pays utility only for energy in flat rate
- **"Typical Rate"**
  - 250 watt nominal high pressure sodium cobra head = $102.31/year*
  - * National Grid, 2010 company owned roadway rate

LED STREETLIGHT RETROFIT RESULTS

- **LED streetlight retrofits deliver 50-80% energy savings**



City	Los Angeles, CA	Boston, MA	Portland, OR	Cambridge, MA
Streetlights Replaced (n)	150,000	38,838	55,100	7,000
Annual Savings	$ 5,300,000	$ 4,250,000	$ 2,000,000	$ 500,000

BARRIERS TO LED CONVERSION

- **New utility owned streetlight tariffs – under development**
- **Issues with transferring ownership from utilities to municipalities**
  - Towns may not have the $$ for purchase
  - Towns may not want maintenance responsibility
- **Citizen concerns about LED technology**

LED STREETLIGHT CONVERSIONS IN MA

- Cape Light Compact and Unitil (Fitchburg) have retrofitted all streetlights to LED
- The City of Boston (Eversource) is working towards replacement of all 64,000 electric lights by 2017
- Big Dig 25,000 tunnel lights are scheduled for replacement with LEDs
- National Grid territory: many municipal owned conversions are happening through ESCOs
- Eversource-WMECO territory: opportunity for upgrades
- Opportunities for company owned streetlights pending rate approval

THANK YOU