

MEMORANDUM



Public Works Department

Date: October 17, 2016

To: Tempe City Council

From: Isaac Chavira, Transportation Maintenance Manager (350-8349)
Craig Hayton, Parks Manager (350-5234)

Thru: Don Bessler, Public Works Director (350-8205)
Shelly Seyler, Deputy Public Works Director – Transportation (350-8854)
Tony Miano, Deputy Public Works Director – Field Operations (350-8297)

Subject: High Pressure Sodium to LED Street Light and Park Lighting Conversion Program
October 27, 2016 City Manager’s Announcements

PURPOSE

The purpose of this memo is to provide Council with facts and data on the city’s Light Emitting Diode (LED) Street Light and Park Lighting Conversion Program, and to inform Council on the color temperature selection of street light fixtures within the community.

BACKGROUND

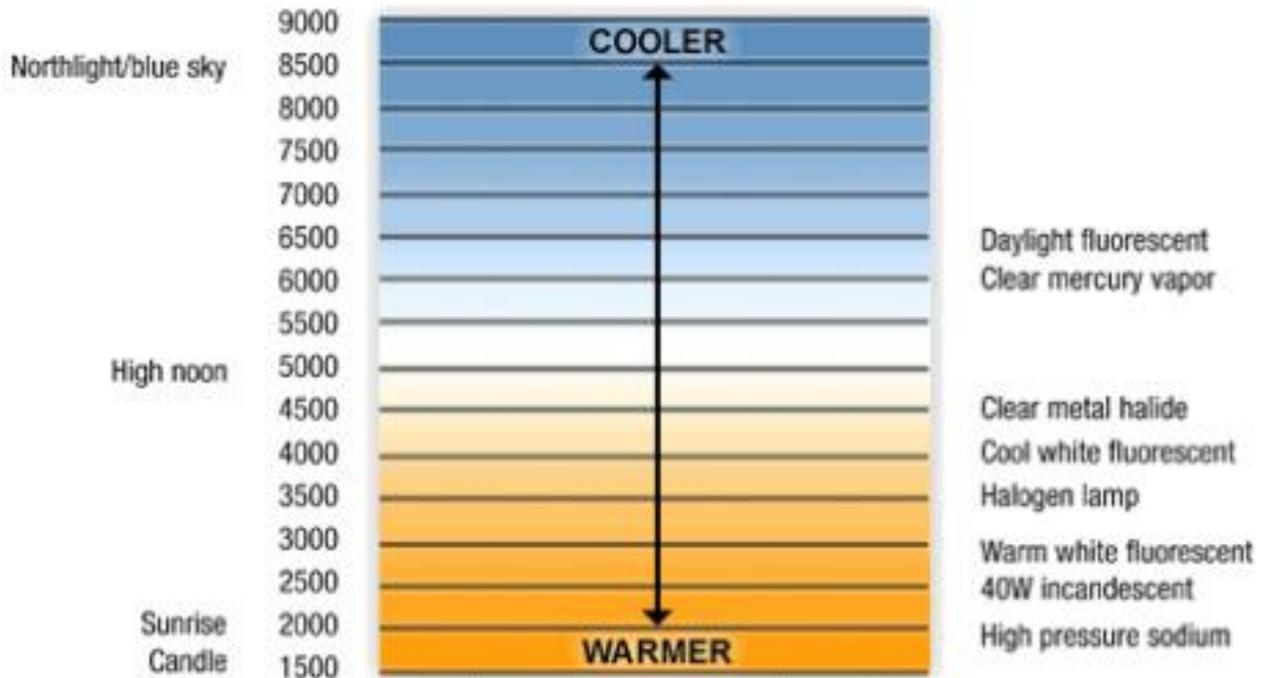
In June 2016, Council approved implementing a four year conversion program of all residential High Pressure Sodium street lights with LED fixtures for its street light system. The conversion program is ready for implementation this fiscal year. In light of the various questions and concerns being addressed by local municipalities revolving around color temperature selection, staff wanted to ensure Council was aware of the current plan.

High Pressure Sodium (HPS) lamps have been the conventional means of providing street lighting. They are distinctive in the yellowish hue of their light output yet still provide better color rendering than earlier street lighting types such as mercury and metal halide lamps. The color temperature of HPS (sometimes associated with Color Rendition), although improved over its predecessors, is considered relatively poor and not adequate enough to discern the colors of road signs or any other objects within the roadway. HPS lamps also require a period of “warm-up” before their full lighting output can be achieved. Little or no potential for product improvement appears to exist; HPS products probably won’t become any less expensive or last any longer than they already do. HPS typically contain xenon gas and mercury to start and operate the lamps.

The Kelvin temperature can be shown by the color temperature, measured in Kelvins. The physical color temperature is simply the degree of the “warmth” or “coolness” of the light source (See Figure 1). HPS has a color temperature of 2200K. This is similar to a warm candlelight environment with candle lights having a temperature of 2000K. The higher degrees Kelvin, the cooler the light appears. As seen in Figure 1, the higher the color temperature, the higher the blue content in each fixture. This is not only a concern for the International Dark Sky Association, but also a concern that every municipality must take into consideration when moving forward with energy efficient LED street light conversions.

Figure 1

Color Temperature Chart



For the past eight years, staff has been researching, evaluating and testing energy efficient street lighting. As part of that research and evaluations, staff took into consideration the color rendition and color temperature for its energy efficiency and light output efficacy. In addition, staff has also taken several pictures of the test areas to demonstrate the difference in color temperature ranges. Please note that manufactures have only designed LED fixtures to a temperature range above 3000K. Included in this memo are pictures demonstrating the difference between a 3000K LED and a 4000K LED. The reason for choosing these two color temperatures is because 3000K is the lowest and closest temperature range to the existing HPS street lights that currently exist in the LED industry and still provides both maintenance savings and energy savings over the HPS. The 3000K temperature is also preferred by the Dark Sky Association.

RECOMMENDATION

Staff recommends using the 3000K temperature lights in residential areas. In four years after completion of all residential street light conversions, staff will then re-evaluate both the return on investment for the street light conversion within arterial roadways, as well as what color temperature best meets the lighting needs within the arterial roadways. Parks staff will test 3000K lights in the parks alongside the 4000K lights and evaluate the results.



Existing 2200 Kelvin HPS



3000 Kelvin



4000 Kelvin