



City Council Report

Date: April 17, 2017
To: City Council
Through: Kari Kent, Assistant City Manager
From: RJ Zeder, Transportation Director
Gordon Haws, Deputy Transportation Director
Subject: Changes to City Code to Provide for Testing of LED Street Lighting Citywide

Purpose and Recommendation

Staff request that Council approve changes to the City code to allow establishment of a Pilot Study Period from June 1, 2017 through December 31, 2019, during which time Staff will conduct streetlight pilot studies in two areas of the City (Desert Uplands Area and City of Mesa Electric Service Area) to determine such things as appropriate night-time lighting levels and the light color or appearance that should be permitted within various portions of the City. The proposed changes to the City code that would allow such a study to proceed are attached. The Sustainability and Transportation Committee recommended (vote 2-1) forwarding the ordinance to the City Council for consideration.

It is anticipated that Staff will return to Council at the end of the Pilot Study Period with the results of the pilot studies and recommendations for changes to the City code based on the results.

Background

With the recent advent of light emitting diode (LED) streetlights, there has been heightened interest in the color and appearance of light. LED streetlights are generally more white or blue than the high pressure sodium (HPS) streetlights that previously dominated the streetlight fixtures used. Various citizens and interest groups have also expressed interest in the amount of light used to illuminate the roadway, with the stated goal of minimizing night time lighting and maximizing visibility of the nighttime sky.

Additionally, the topics of appropriate lighting levels and color are of great interest to the citizens in the Desert Uplands Area after LED streetlights were installed along McKellips and Ellsworth Roads as part of the Mountain Bridge development. After hearing from citizens at their November 7, 2016 committee meeting, the Sustainability and Transportation (SAT) committee of Council directed Staff to conduct a study of these issues. This current action is in response to that request.

The *color* or appearance of a light is measured using color correlated temperature (CCT), as expressed in degrees kelvin (K). The *amount of light* released by a streetlight fixture is measured in lumens. These two measurements are generally

independent of one another. For example, a light may have a very low kelvin rating (a yellow light) that emits a very intense light (high number of lumens), which would be seen as a very bright yellow light. Similarly, another light may have a very high kelvin rating (a very white light) that emits a very low intensity of light (low number of lumens), which would be seen as a faint white light.

HPS streetlights typically emit light in the 1900-2200 K range, while LED streetlights emit light between 2700 K and 6200 K, depending on the specific fixture selected. Users select a low kelvin LED light when they want a warmer or more yellow light and a high kelvin LED light when they want a cooler or more white light. For comparison, natural daylight is approximately 5500 K – 6500 K. To-date, the City has primarily used 3000K or 4000 K LED fixtures in its streetlight system.

LED lights are more energy efficient than HPS lights and as the price to manufacture LED lights has gone down and energy efficiencies have increased, LED lights have grown in popularity. Many manufacturers are gradually transitioning from making HPS fixtures to making only LED fixtures. HPS fixtures that meet the City's performance requirements are no longer available in certain fixture styles and Staff anticipate this trend will continue.

Discussion

The attached proposed code changes allow City staff to conduct pilot studies using LED streetlights in two areas of the City: one study area in the Desert Uplands Area and a second study area in the City of Mesa's Electric Service Area. The Pilot Study Period will extend from June 1, 2017 through December 31, 2019. While the proposed code amendment authorizes the pilot study through 2019, staff intends to make recommendations for City Council consideration in the summer of 2018.

LED lights have been or will be installed in the two pilot study areas and the City will vary the lighting levels (lumens) in those areas by using dimming systems that will be installed on the streetlight circuits in those two pilot study areas. The pilot study will also involve testing different colors or temperatures of LED lighting, by varying the fixture used. Staff will seek consultant assistance, public input and involvement from our public safety departments to evaluate the results of the pilot studies to recommend the appropriate color and light intensity to require in various areas of the City that share common characteristics.

Council approval is needed to be able to conduct the pilot studies, wherein Staff will use lighting levels below what the City code and City procedures manual currently allow. (The City's procedure manuals references the Illuminating Engineering Society's [IES's] "Roadway Lighting" standards given in the American National Standards Institute [ANSI] and IES joint publication referred to as ANSI/IES RP-8. The RP-8 publication sets forth the standard practice for roadway lighting design used by many municipalities throughout North America.) Staff do not have the flexibility to use lighting levels less than the RP-8 standard without Council approval.

Other municipalities within the State of Arizona that have successfully adopted lighting levels less than the RP-8 standard include Tucson, Sedona, Flagstaff and Scottsdale. The City of Phoenix is also currently undertaking an HPS to LED conversion project.

The proposed City code changes are contained in Sections 9-6-1, 9-6-4(D)10 and 9-6-5 of the City code. The changes to Section 9-6-5(D) for the Desert Uplands Area include additional requirements, aside from the pilot study, requiring future streetlights to be installed behind back of curb (near the sidewalk) even on streets that have medians to minimize light trespass into adjacent lots. There is also a change in Section 9-6-5(D) from a reference to “watts” (which relates to energy consumption) to “lumens” (which relates to light output). “Lumens” provides a better comparison of the light output provided by the two technologies.

The pilot study will involve direct measurements of the energy used by various LED lights to ensure that we have reliable, accurate and verifiable energy consumption data. The City can then use this data to assess cost-of-service and electric utility rate structures. This data will also allow the City to more accurately evaluate the costs and benefits of HPS to LED conversion.

Staff is preparing a Request For Qualifications to seek consultant assistance to conduct a citywide lighting study to evaluate existing inventory and assist staff in determining lighting levels to ensure a cost effective and area appropriate lighting system. In addition, the consultant will review the pilot study results, including evaluating the economic advantages derived from lower energy costs for LED lighting, determining the return on investment from making the conversion to LED lights, and considering the safety implications of varying the minimum required light level to ensure that our roadways are safe for motorists and pedestrians.

Alternatives

Council may elect to not approve the proposed code changes, which would have the effect of leaving existing requirements in place relative to required lighting levels on City streets and would not allow the pilot study to go forward. This is not recommended as it would not respond to citizen concerns expressed at the November 2016 SAT committee meeting.

Council could also request modifications to the proposed code language limiting the area within which pilot studies may be conducted to the Desert Uplands Area – the area from which citizen complaints have primarily come. This is not recommended as Staff would like greater flexibility to study these issues in an urban setting such as the City of Mesa’s Electric Service Area in Downtown Mesa as well.

Fiscal Impact

The City desires to hire a consultant to assist with evaluation of the pilot studies and possible future changes to the City code to incorporate the results. Staff estimate this contract will be approximately \$200,000. Funding for this will come from local street sales tax. The City will also install LED lights and dimming systems in the two pilot study areas, estimated to be approximately \$200,000, using the Transportation Department’s operating budget.

Coordinated With

This report has been coordinated with the Transportation Department, Engineering Department, Mesa Police Department, Mesa Fire and Medical Department, Development Services Department, Environmental Management and Sustainability

Department, Energy Resources Department and the City Attorney's office.