



LED Street Lighting Conversion Project

Update on how resident complaints are being addressed | November 5,
2020

Background

- September 2019: NC Utilities Commission authorizes new rate schedules making LED conversions financially feasible.
- April 2019: City Council authorized a project to convert 20,914 High Pressure Sodium (HPS) and 103 Mercury Vapor street lights to Light Emitting Diode (LED).
- June 2019: Duke Energy Carolinas (DEC) begins conversion program as requested by the City of Durham.
- Nominal monthly cost difference post LED conversion (less than 1% increase).
- One-time conversions costs of \$895,119.20 (\$40 per standard fixture), plus an additional \$325,434.59 for 184 decorative fixtures in downtown.
- It is estimated this conversion will result in the reduction of 6.25 million kwh of electricity each year which is a savings of 4.4 million tons of carbon dioxide emissions, the equivalent of 10,246 barrels of oil, or 4.8 million pounds of coal, or taking 940 passenger vehicles off the road for a year. The LED lights also provide for improved nighttime visibility and color identification which should result in improved nighttime safety for pedestrians and bicyclists.



LED Fixture Information

- January 2014: NC Utilities Commission authorizes the use of LED lighting for new installations. City of Durham begins utilizing LED's for all new installations. DEC installs over 800 new 4,000 Kelvin LED street lights inside Durham between January 2014 and June 2019.
- May 2014: City of Seattle study finds 4,100 Kelvin LED lights outperformed HPS lighting with greater wattages in providing improved detection distances of objects.
- June 2016: American Medical Association (AMA) releases a reporting recommending 3,000 Kelvin or lower street lighting be utilized. There have been no follow-up or additional research studies on this topic since 2016.
- 2016-2020: The industry standard remains 4,000 Kelvin, however some manufactures have developed 3,000 Kelvin fixtures and they have been installed a few locations. Most of the limited 3,000 Kelvin installations were installed in late 2019 or 2020, and there is currently limited data on their effectiveness.
- All LED fixtures are designed to direct the light downward rather than outward and upward. The fixture housing and mounting style prevents the light from going upward and are generally considered dark sky complaint.



Typical LED Complaints

- As of October 28th, the City has received 211 location specific complaints. During this time, DEC has completed over 20,400 LED conversions. The current ratio of complaints to conversions is 1%.
- Of the complaints received, they typically fall in one of three categories:
 1. Glare (Light is shining into a residential window)
 2. Too Bright (Request to reduce lighting level or wattage)
 3. Color is too harsh (color temperature, concerns about AMA report)
- Most complaints can be addressed and they are being resolved as quickly as possible. The timeline for resolving the complaint varies depending upon type of complaint.

Glare Complaints

- Most complaints about glare (light shining into windows) can be easily addressed via either field adjustments to the light and/or the installation of shields.
- When Transportation receives a complaint related to glare, we contact DEC to investigate the location. DEC reviews the location in the field to first verify the LED light has been installed correctly. Because the lights are directional a misaligned light can cause excessive light to be projected forward or backward rather than downward. Once the installation has been verified, DEC also reviews the location to determine if shield will help prevent unwanted glare into adjacent residential homes. If shield is needed, DEC notifies Transportation and Transportation authorizes DEC to install it.
- The typical timeline to address glare related complaints is about four weeks from complaint to installation of a shield.
- The cost of a shield varies depending on the wattage of the light. The one-time cost to the City for a 50 Watt LED shield is \$89 and the cost for a \$150 Watt LED shield is \$188.

Lighting Level (Wattage) Complaints

- Most complaints about excessive lighting levels (wattage) are along residential streets where the lighting levels were previously increased to address potential crime issues under the City's Brighten Our Streets Program.
- The streets lights cannot be dimmed. Although these technologies exist, it is not currently economically feasible to have these types of devices installed under the current NCUC approved rate schedule.
- The only way to reduce the lighting level is too reduce the wattage of the light. To address these types of complaints, Transportation first contacts the Durham Police Department (DPD) to evaluate the location to determine if DPD can support a reduction in the lighting levels.
- If DPD supports reduction, the City then provides notification to all impacted residents providing them a three-week comment period. If residents are also supportive of the change, Transportation then authorizes DEC to reduce the wattage.
- The timeline to complete a wattage reduction is approximately two months from complaint to installation.
- There is a one-time cost of \$144 per lights to the City to convert a 150 Watt LED light to a 50 Watt LED.



Color (Temperature) Complaints

- Complaints related to color/temperature typically include either that the white light from the LED's is too harsh and/or why are 4,000 Kelvin lights being installed when the AMA recommends 3,000 Kelvin.
- There have been no follow-up or additional research studies on this topic since the AMA report in 2016. The industry standard remains 4,000 Kelvin, however some manufactures have developed 3,000 Kelvin fixtures and they have been installed a few locations. Most of the limited 3,000 Kelvin installations were installed in late 2019 or 2020, and there is currently limited data on their effectiveness.
- The only way to change the color/temperature of the light is to change the fixture.
- DEC has indicated that if the City were to request 3,000 Kelvin lights, the City would be responsible for paying 40% of the cost of the remaining 36-month term for the recently installed 4,000 Kelvin lights. At an average monthly cost of \$10 per LED light, this could be as high as an average of \$144 per light.
- The estimated cost to change all 22,000 LED street lights to 3,000 Kelvin would be approximately \$3,168,000. This cost will decrease proportionally each month over the next 36 months.
- A project to change all 22,000 lights would likely take a minimum of 18 months to complete.

Recommendations

- **Glare Complaints:** Transportation recommends the City continue with current process of evaluating each light/complaint on an individual basis. At the current rate of requests, Transportation has adequate existing funding to cover the installation of shields where they are needed.
- **Brightness (Wattage) Complaints:** The conversion program was designed to match the wattage (lighting levels) of the existing lights to closest available matching fixture. The program was not intended to either increase or decrease these lighting levels. To address these complaints, Transportation recommends we continue with the current process of coordinating with DPD and the residents to determine if the lighting levels can be reduced. In areas where the lighting levels can be reduced, Transportation has adequate funding to cover the costs associated with these changes.
- **Color (Temperature) Complaints:** Based on the limited data available and the potential high cost to convert all 22,000 lights from 4,000 Kelvin to 3,000 Kelvin, Transportation recommends maintaining the existing 4,000 Kelvin LED lights at this time. If additional research becomes available to further justify the use of 3,000 Kelvin lights in the future, this decision can be re-evaluated in the future.

Questions?

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