Discussion of Potential Retrofit of City Street Lights to Light-Emitting Diode (LED) Technologies

November 17, 2020 City Council Meeting

Background

- There are approximately 3,059 streetlights in Monrovia.
  - The City owns approximately 1,400 of them
  - Southern California Edison (SCE) owns the remaining 1,659
- SCE charges a monthly fee, known as an **LS-1 tariff**, to provide electricity and maintenance of their lights.
  - This includes lamp replacement, troubleshooting, and replacement following knockdown
  - All of these lights presently use high pressure sodium (HPS) light bulbs, common among outdoor lighting

LED Lighting

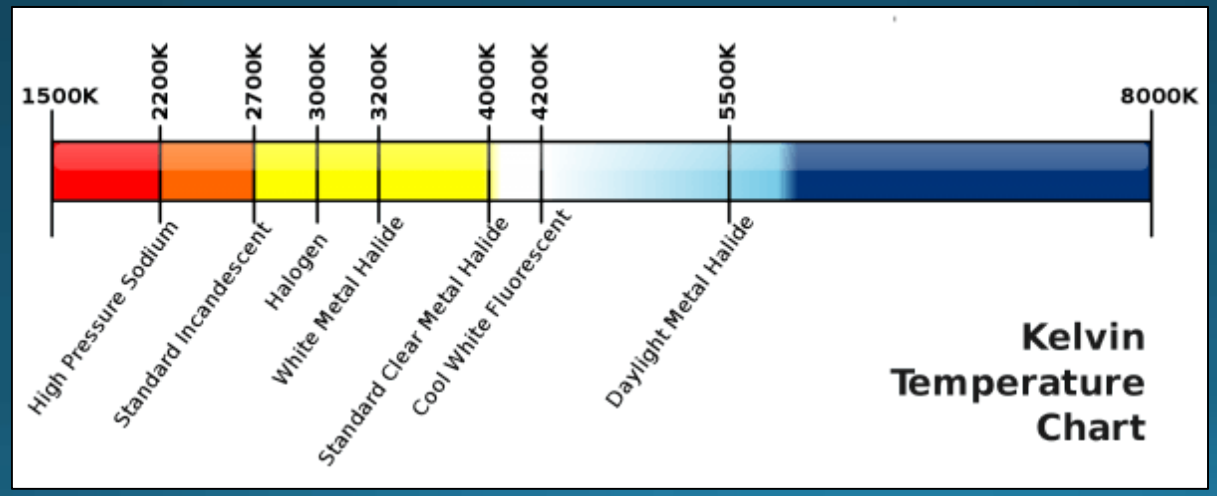
- LED lights produce light by passing an electrical current through a microchip with special diodes that vibrate to produce light
- Benefits of LED include:
  - Produce light more efficiently leading to reduced electricity costs and Greenhouse Gas (GHG) emissions
  - last longer than HPS lights leading to reduced operations and maintenance costs
- LED technology is expanding rapidly in home lighting, automobiles, televisions, and tech products

The Option E Program

- Based on customer demand, SCE began offering the LS-1 Option E tariff program (Option E program) to retrofit the high-pressure sodium streetlights to LED in 2016
- The program is only available to retrofit SCE-owned street lights
- To participate, a customer city would enter into an agreement with SCE, where:
  - SCE funds and oversees the retrofit of their street lights, and
  - The customer city would repay SCE for the cost of replacement over 20 years via an Energy Efficiency Premium Charge (EEPC) on their bill
  - Cost savings on electricity bill typically fund the full EEPC with some additional cost savings

LED Lights Visual Appearance

- LED lighting will impact the visual appearance of the City at night
- LED offers a greater variety of options than current HPS lighting
- Light color, or temperature, is measured in Kelvin (K)
- Under the Option E program, SCE would install LED lamps that produce light with color temperature of either 3,000K or 4,000K



Street Lighting and Human Health

- As communities began to install LED street lighting in the 2000's, researchers began to study the effects of LED street lighting on human health.
- Researchers found that exposure to "brighter" and "bluer" lights can impact individuals' circadian rhythms and sleep cycles.
  - Potential short-term impacts: reduced sleep, nighttime awakening, excessive sleepiness, and obesity
  - Possible correlation between increased exposure to blue light and increased risk of cancer, diabetes and heart disease, but it has not been determined to cause the diseases
  - The direction, intensity, and amount of lighting can help mitigate the risks

AMA Guidance on Street Lighting

In 2016, the American Medical Association issued a report to advise U.S. communities on the effects of LED street lighting on human health. Based on a review available English-language research published between 2005 and 2016, the AMA:

- Supports conversion of outdoor lighting to LED
- Encourages use of street lighting with color temperature of 3,000K or less, "proper shielding" that minimizes glare , and giving consideration to dimming the lighting during off-peak time periods.

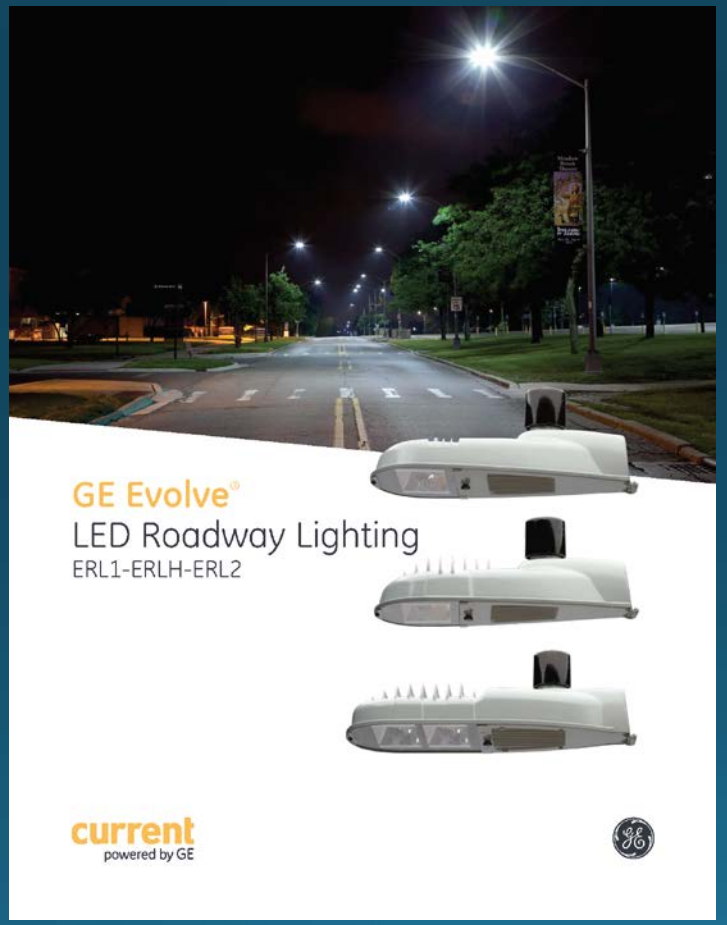
Guidance on Minimizing Environmental Impacts of LED Street Lighting

The International Dark-sky Association (IDA), an advocacy group with the mission of reducing light pollution, maintains a guide for local governments on LED street lighting, that recommends:

- Use of "fully-shielded" light fixtures that emit no light upwards
- Use of "warm-white" LED lights, with color temperature of 3,000K or less

- The IDA also developed a light Fixture Seal of Approval (FSA) to "provide objective, third-party certification for lighting that minimizes glare, reduces light trespass and doesn't pollute the night sky"

SCE's Proposed Street Light – GE Evolve



Do the street lights meet the recommendations?

Org.	Recommendation	Meets the Recommendation?
American Medical Association	Color temperature 3,000K or less	Yes
	"Properly shield" lighting to minimize glare	Some glare is produced
	Consider dimming the lighting during off-peak time periods	SCE is testing remote dimming controllers
International Dark-sky Association	"Fully-shielded" light fixtures that emit no light upwards	Yes
	Color temperature of 3,000K or less	Yes
	Use products that have received Fixture Seal of Approval	Yes, 3,000K lamps have FSA certification

Projected Electricity Savings

- SCE estimates the current HPS street lights consume approximately 797,256 kilowatt hours (kWh) of electricity annually
- Converting the street lights to LED would reduce electricity consumption by nearly 52%, saving an estimated 413,895 kWh per year
- This would reduce the City's carbon emissions by an estimated 293 Metric Tons of CO_2 annually, or as much carbon as is produced by nearly 50 U.S. homes annual electricity usage

Projected Cost vs Cost Savings

- SCE estimates the retrofit of 1,659 street lights would cost $625,400, which would be amortized over 20 years at 0% interest

$$\frac{\$625{,}400}{240\ months} = \$2606\ Monthly\ Energy\ Efficiency\ Premium\ Charge$$

- SCE projects electricity bill savings of $3,748.33 per month

Estimated Monthly Electricity Bill Savings	$ 3,748.33
Monthly EEPC Charge	-$ 2,606.00
Net Monthly Savings	$ 1,143.33

- Projected annual electricity bill savings of $13,719.96

Potential Budget Impacts

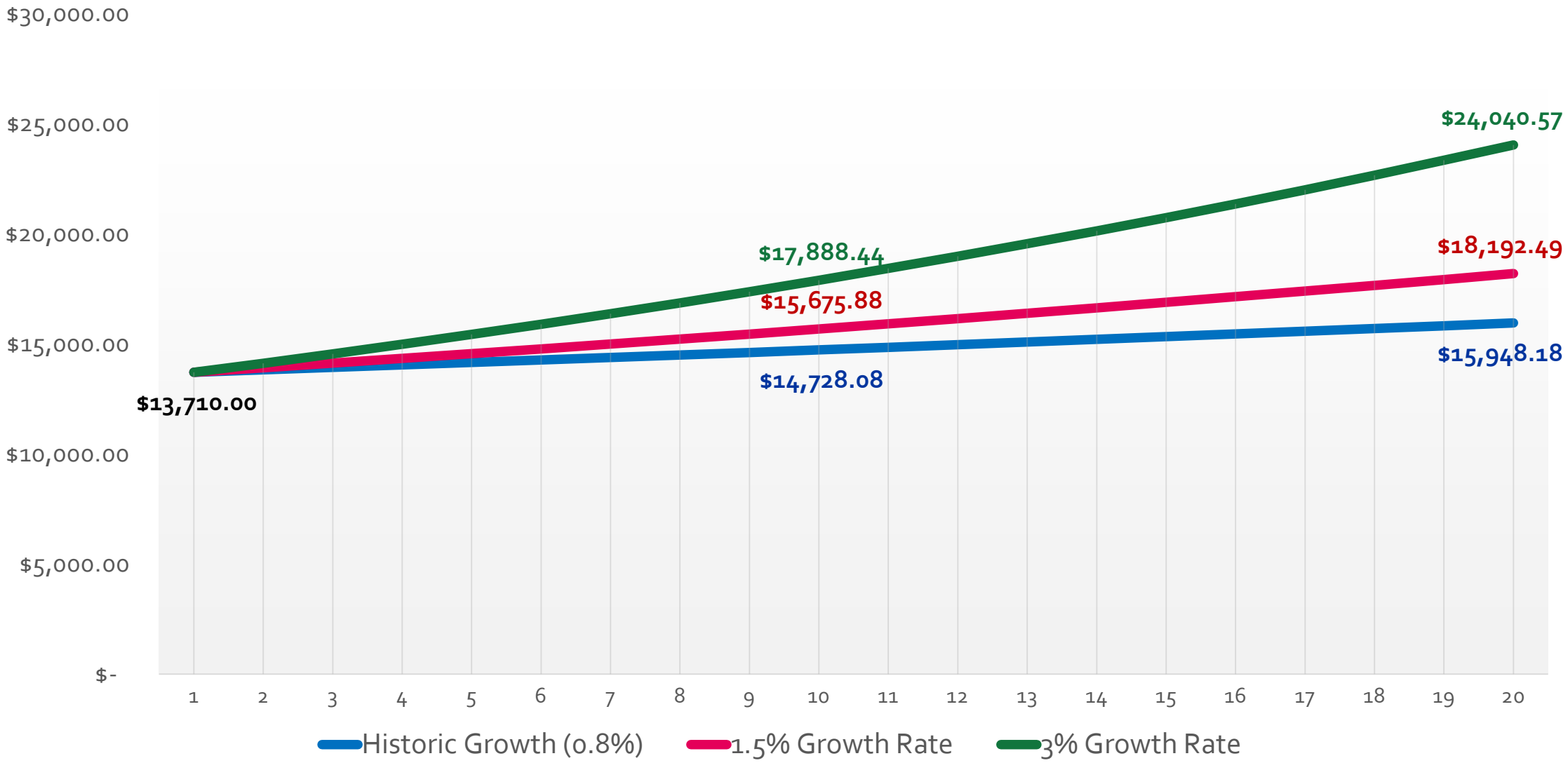
- FY 2020-21 Budget allocates $437,000 to street light electricity charges
  - $251,000 is budgeted for SCE-owned street lights
- $13,719.96 in cost savings would reduce street light electricity charges by a little over 3%

The Impact of Electricity Rate Increases

- As the per unit rate of electricity increases, cost savings would also increase

Cost Savings Comparison

Based on projected growth rate of LS-1 Tariff Assessments



LED Street Light Demonstration

- Staff has set up a sample of LED street lighting along the 400 block of South Ivy Avenue, directly across from City Hall
- Community members can submit feedback to ccastruita@ci.monrovia.ca.us or by going to www.cityofmonrovia.org/streetlights
- Staff will maintain a log of all community feedback for Council's consideration

Timeline to Proceed

- SCE Option E program staff has stated that a retrofit project can typically be completed within 3 to 6 months of a city entering into the program.
  - SCE is about to launch a large Option-E Project with Los Angeles County so the scale of that project may extend the timelines of other projects.

City-owned Streetlights

- Staff is also reviewing opportunities to improve the City-owned street lights.
- City-owned lights are not eligible under the Option E Program
- Staff is developing a project proposal for these lights to be retrofitted, including lamp selection, a work plan, and a budget for future consideration

Requested Action

- Direct staff to prepare an LS-1 Option E agreement with Southern California Edison for consideration at a future Council Meeting