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TO: Blacklake Village Street Light District

FROM: Lechowicz & Tseng Municipal Consultants

DATE: March 23, 2022

SUBJECT: Blacklake Village Street Light LED Conversion Analysis

FINAL
TECHNICAL MEMORANDUM

Executive Summary

This memorandum provides an analysis of Blacklake Village's 190 street lights and the opportunity to convert the lamps to light emitting diode (LED). Currently, Blacklake Village's street lights are high pressure sodium vapor (HPSV) which is considered an outdated technology. LEDs last three times longer than HPSVs, produce higher quality lighting, and use approximately 1/2 to 2/3rds less energy than HPSVs.

Pacific Gas & Electric (PG&E) offers several LED conversion options based on the electric rate tariff of the lamps. It is recommended that Blacklake Village participate in PG&E's LS-1 LED Program to convert 85 of its LS-1 lamps owned by PG&E (specifically lamps served on the LS-1A and LS-1C tariffs). Via this program, PG&E will convert LS-1 lamps with no upfront or ongoing costs to the customer. Following conversion, customers gain the benefit of lower energy use and accompanying bill savings. By converting LS-1A and LS-1C lamps, Blacklake Village would save about $4,200 annually based on January 1, 2022 electric rates.

It is not recommended that Blacklake Village convert its 75 LS-1D lamps. Unlike LS-1A and LS-1C lamps, participating LS-1D lamps *are* charged additional ongoing fees following conversion that negate any bill savings from lowered energy use.

Blacklake Village also owns and operates 30 LS-2A lamps. Further analysis should be conducted regarding the conversion of these lamps to LED. Blacklake Village could bid out the conversion to a private contractor and manage the process itself or have PG&E convert the lamps under the LED Turnkey Replacement Program. Regarding the cost of conversion, reserves are not currently available for funding, so financing is needed. Blacklake Village should contact PG&E and independent contractors to determine the cost of conversion and financing options available.

Blacklake Village's LS-2A lamps are likely decorative post top lamps that are higher cost to convert than non-decorative lamps. A high-end estimate for conversion is $700 per lamp. At this unit cost, the conversion could take 18 years or more to payback via energy savings (about $1,200/year for all 30 lamps). 18 years is longer than the 10-year maximum term allowed under PG&E's zero interest On Bill

Financing Program. If the conversion cost was $395 or less per lamp, the LS-2 conversion could be paid back via energy charge savings over 10 years and thus would qualify for PG&E's program. It should be noted that On Bill Financing does not take into account maintenance savings following conversion.

Other sources of financing such as a loan through an energy services corporation or from Nipomo Community Services District would likely allow Blacklake Village to factor maintenance savings into the payback calculation. Maintenance savings nearly double the total savings captured through LED conversion and thus reduce the payback period to about ten years (assuming a $700 per lamp conversion cost).

In summary, Blacklake Village *should* convert its 85 LS-1A and LS-1C lamps via PG&E's LS-1 LED Conversion Program. Blacklake Village *should not* convert its 75 LS-1D lamps. Blacklake Village should further evaluate the conversion cost for its 30 LS-2A lamps. At a conversion cost of $395 per lamp or less, it is recommended that Blacklake Village conduct the conversion and use PG&E's zero interest On-Bill Financing Program. If the conversion cost is higher, Blacklake Village should evaluate other financing options (particularly those that consider maintenance savings) or establish reserves to fund the conversion.

Lamp Inventory

The Blacklake Village Street Light District is comprised of 190 HSPV street lamps. 30 lamps are owned, operated, and maintained by Blacklake Village and billed for electric service by PG&E via the LS-2 tariff. 160 lamps are served under the LS-1 tariff. For these lamps, some or all of the street light facilities are owned by PG&E. Blacklake Village pays PG&E for electric service as well as rental and maintenance of the LS-1 lamps.[1] The LS-1 tariff is further subdivided into LS-1A through LS-1F based on pole type and configuration. A list of street light terms and definitions is provided below as well as an inventory of Blacklake Village's lamps.

Street Light Terms

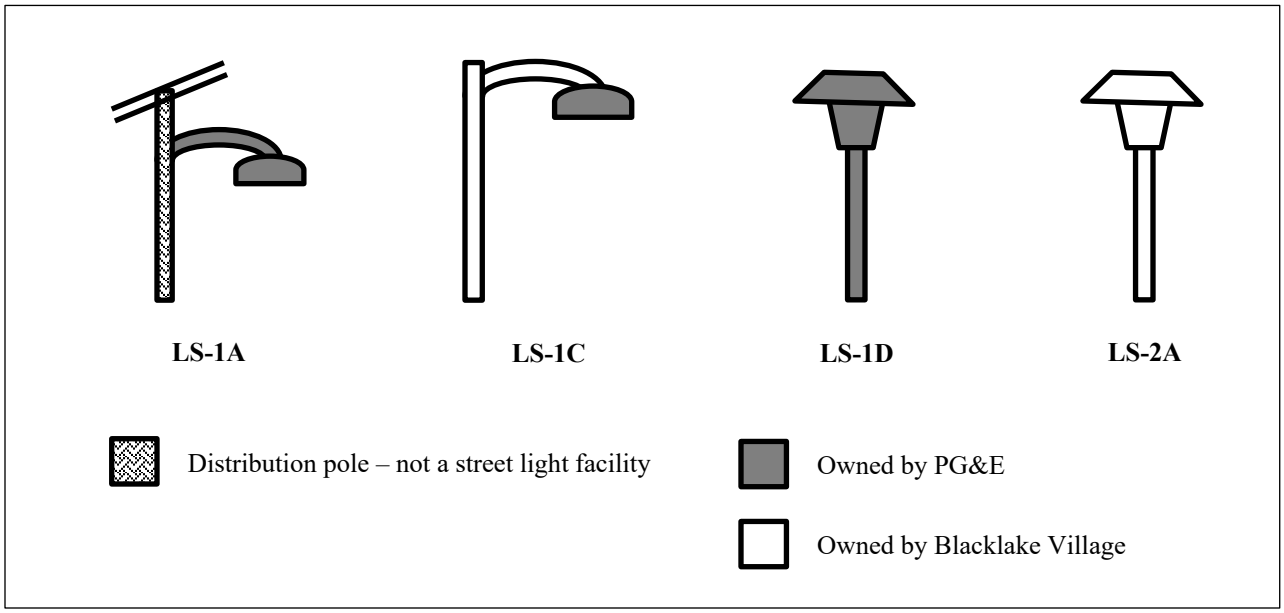
Photo controller: daylight sensor that turns street lights on and off at dusk and dawn
Luminaire: bulb, lighting fixture, and photo controller
Mast arm: bracket or support arm that attaches the luminaire to the pole
Pole: support for the mast arm and luminaire
Post: support for street lights served on tariff LS-1D and Blacklake Village's LS-2A street lights[2]; the luminaire is a post top fixture that is not attached to a mast arm
Shared distribution pole: a pole that supports a street light mast arm as well as other PG&E electric distribution system wiring or other non-street light equipment; LS-1A mast arms are supported by shared distribution poles
Street light only pole: a pole that is only used for street lighting service and does not support other electrical equipment
Street light: total street light facility potentially including a pole or post, mast arm, and luminaire

[1] PG&E's maintenance responsibility varies by LS-1 street light tariff.
[2] LS-2As can be supported by a variety of pole or post types. Blacklake Village's LS-2As are post top lamps

Table 1: Blacklake Village Street Light Inventory

Tariff	Blacklake Village Ownership	PG&E Ownership	Lamp Type	Count
LS-1A	None	Mast arm and luminaire attached to a shared distribution pole	HPSV 120 Volt 100 Watts	1
LS-1C	Mast arm and pole or post	Luminaire	HPSV 120 Volt 70 Watts	83
			HPSV 240 Volt 200 Watts	1
LS-1D	None	Street light only pole, post top lamp	HPSV 120 Volt 70 Watts	70
			HPSV 120 Volt 100 Watts	5
LS-2A	Post and luminaire	None	HPSV 120 Volt 70 Watts	30
			Total	**190**

Figure 1: Ownership of Street Light Facilities by Tariff



HPSV equipment is considered an outdated technology that has been widely replaced by LED. PG&E no longer offers HPSV equipment for installations of new LS-1 street lights, and HPSV replacement parts are increasingly difficult to come by as HPSV manufacturers have exited the supply chain. LED lamps are now considered standard as they use significantly less energy, burnout less often (thus lowering maintenance costs), and produce higher quality light. The following sections offer recommendations regarding LED conversion for a subset of lamps.

LED Conversion of LS-1 (PG&E-Owned) Lamps

PG&E Conversion Program Background

Following implementation of Assembly Bill 719 in 2015, California's investor-owned utilities (including PG&E, Southern California Edison, and San Diego Gas & Electric) are required to offer an option for LS-1 customers to convert lamps to LED with no upfront costs so customers can reduce street light energy use. Under PG&E's LED program, there are no rental fees for LED equipment added to customer bills for LS-1A, LS-1B, LS-1C, LS-1E, and LS-1F lamps. For conversion of LS-1D lamps, there is an added charge called the LED Program Incremental Facility Charge. The incremental charge for LS-1D customers negates any energy bill savings and makes LED conversion uneconomical. Therefore, *it is not* recommended that Blacklake Village pursue LED conversion for its LS-1D lamps. *It is* recommended that Blacklake Village pursue conversion of its LS-1A and LS-1C lamps as conversion would result in bill savings.

Bill Analysis

As described above, LS-1 lamps are comprised of some or all street light equipment that is owned and maintained by PG&E. LS-1 customers pay PG&E energy charges to power the lamps as well as facilities charges, which are rental fees covering maintenance and the eventual replacement of PG&E-owned components at the end of their useful lives. By converting LS-1 lamps (with the exception of LS-1Ds), customers benefit from lower energy charges with no change to facilities charges.

Table 2 provides an analysis showing Blacklake Village's LS-1A and LS-1C street light bills before and after conversion using typical LED wattages. Following conversion of the identified 85 lamps, Blacklake Village will save approximately $4,173.96 annually. This analysis is based on the January 1, 2022 electric rate, typical LED wattages used by PG&E, and facilities charges approved by the California Public Utilities Commission.[3]

Table 3 provides a conversion analysis of Blacklake Village's LS-1D street lights. It is assumed that existing LS-1D HPSVs would be replaced with Contempo fixtures manufactured by American Electric Lighting (see the Attachment). It is not recommended that Blacklake Village request conversion of the LS-1D lamps due to added incremental facilities costs. Converting LS-1D lamps to LED would increase street lighting costs by about $2,520 annually.

[3] Updated facilities charges as filed in the Street Light Settlement Agreement in PG&E's 2020 General Rate Case Phase 2 and approved by the California Public Utilities Commission in Decision 12-11-016. As of the drafting of this report, the facilities charges have not yet been implemented. PG&E was ordered to implement the updated charges "as soon as practicable".

Table 2: LED Conversion of LS-1A and LS-1C Lamps based on the January 1, 2022 Electric Rate

Tariff	**LS-1A**	**LS-1A**	**Monthly Savings per Lamp**		**Annual Savings**
Lamp Type	**HPSV 120 Volt 100 Watts**	**LED 34 Watts**			
Monthly kWh	41	11.1			
Energy Charge	$8.33	$2.25			
Facilities Charge	$7.14	$7.14			
Incremental LED Charge	$0.00	$0.00		x 1 lamp x	
Total PG&E Bill	$15.47	$9.39	$6.08	12 months	$72.96
Tariff	**LS-1C**	**LS-1C**			
Lamp Type	**HPSV 120 Volt 70 Watts**	**LED 29 Watts**			
Monthly kWh	29	9.4			
Energy Charge	$5.89	$1.91			
Facilities Charge	$6.64	$6.64			
Incremental LED Charge	$0.00	$0.00		x 83 lamps x	
Total PG&E Bill	$12.53	$8.55	$3.98	12 months	$3,964.08
Tariff	**LS-1C**	**LS-1C**			
Lamp Type	**HPSV 240 Volt 200 Watts**	**LED 73 Watts**			
Monthly kWh	81	24.8			
Energy Charge	$16.45	$5.04			
Facilities Charge	$6.64	$6.64			
Incremental LED Charge	$0.00	$0.00		x 1 lamp x	
Total PG&E Bill	$23.09	$11.68	$11.41	12 months	$136.92
				Total Annual Savings	**$4,173.96**

Table 3: LED Conversion of LS-1D Lamps based on the January 1, 2022 Electric Rate – NOT RECOMMENDED

Tariff	**LS-1D**	**LS-1D**	**Monthly Savings per Lamp**		**Annual Savings**
Lamp Type	**HPSV 120 Volt 70 Watts**	**LED 38 Watts**			
Monthly kWh	29	12.8			
Energy Charge	$5.89	$2.60			
Facilities Charge	$9.44	$9.44			
Incremental LED Charge	$0.00	$6.23		x 70 lamps x	
Total PG&E Bill	$15.33	$18.27	($2.94)	12 months	($2,469.60)
Tariff	**LS-1D**	**LS-1D**			
Lamp Type	**HPSV 120 Volt 100 Watts**	**LED 44 Watts**			
Monthly kWh	41	14.5			
Energy Charge	$8.33	$2.94			
Facilities Charge	$9.44	$9.44			
Incremental LED Charge	$0.00	$6.23		x 5 lamp x	
Total PG&E Bill	$17.77	$18.61	($0.84)	12 months	($50.40)
				Total Annual Savings	**($2,520.00)**

Note: Facilities charges shown here are the charges approved in the California Public Utilities Commission in Decision 12-11-016 but have not yet been implemented by PG&E.

LED Conversion of LS-2 (Blacklake Village-Owned) Lamps

As shown in Table 1, Blacklake Village owns and operates 30 LS-2 lamps. As the owner of the lamps, Blacklake Village would be the party responsible for converting the lamps to LED. Several options are available. Blacklake Village could hire its own contractor and manage the process or use PG&E's LED Turnkey Replacement Program. Under PG&E's Turnkey Program, PG&E manages the LED conversion process (hiring the contractor, disposing of the HPSV lamps, quality control, etc.) so there is minimal administrative burden for the customer. Alternatively, Blacklake Village could bid out the conversion to independent contractors and manage the process itself. Blacklake Village could fund the conversion via a loan from the Nipomo Community Services District (NCSD), use financing available through an energy services corporation (ESCo), or use On-Bill Financing from PG&E.

Bill Analysis

Blacklake Village has 30 LS-2A 70 Watt HPSV lamps that can be converted to 38 Watt LED lamps with Contempo fixtures. The monthly energy saving per lamp would be $3.29 based on the January 1, 2022 energy rate. The annual energy charge savings would be $1,184.40 for all 30 lamps.

In addition to energy savings, Blacklake Village would save maintenance expenses related to burned out HPSVs following conversion to LED. LED fixtures do not have disposable components requiring regular replacement. A typical HPSV lamp would be expected to burnout three or four times over the life of a typical LED lamp. LEDs occasionally have operational issues upon installation, but such issues are covered by the manufacturer's warranty. A typical HPSV lamp lasts for 72 months before burning out. Nipomo CSD staff estimate the cost to replace a burned-out lamp at about $200 per lamp. This cost amortized over 72 months is $2.78 per lamp per month. For all 30 LS-2A lamps, the total maintenance savings is estimated at $1,000.80. The combined maintenance and energy savings following conversion of LS-2A lamps to LED is $2,185.20 as shown in Table 4.

Table 4: LED Conversion of LS-2A Lamps based on January 1, 2022 Rates

Tariff	**LS-2A**	**LS-2A**	**Monthly Savings per Lamp**		**Annual Savings**
Lamp Type	**HPSV 120 Volt 70 Watts**	**LED 38 Watts**			
Monthly kWh	29	12.8			
Energy Charge	$5.89	$2.60			
Facilities Charge	$0.20	$0.20			
Incremental LED Charge	$0.00	$0.00		x 30 lamps x	
Total PG&E Bill	$6.09	$2.80	$3.29	12 months	$1,184.40
Maintenance Savings			$2.78	x 30 lamps x 12 months	$1,000.80
Total Savings			**$6.07**		**$2,185.20**

Note: Facilities charges shown here are the charges approved in the California Public Utilities Commission in Decision 12-11-016 but have not yet been implemented by PG&E.

Cost of Conversion (High-end Planning Level Estimate)
Typical costs of conversion including materials and labor range from about $300 to $700 per lamp. It is expected that Blacklake's LS-2A lamps would fall in the higher end of the range as they are decorative lamps on fiberglass poles. Assuming a cost of $700 per lamp, a rough, planning level cost estimate for conversion is $21,000. This amount should be independently verified through actual contractor bids or an analysis by PG&E.

LS-2A Conversion Financing Options
As shown in Blacklake Village's 2022 street light rate study, reserves are not currently available to convert the lamps, so financing should be considered. Financing options include:

Loan from NCSD: Blacklake Village could request a loan from the Nipomo Community Services District to fund conversion. The loan would likely be paid back with interest set at the Local Agency Investment Fund (LAIF) rate.

ESCo Financing: Blacklake Village could solicit bids from energy services corporations for the conversion plus financing. The selected ESCo would fund the upfront cost of conversion and Blacklake Village would use energy and maintenance cost savings to pay back the ESCo over time.

PG&E's On-Bill Financing: Using either an independent contractor or PG&E's Turnkey Program for conversion, Blacklake Village could participate in PG&E's On-Bill Financing (OBF) program. OBF consists of interest free loans of up to ten years for energy efficiency projects. Loans are repaid via energy charge savings on monthly bills and do not factor in maintenance savings.

Payback Period
At a high-end conversion cost of $21,000 and an annual energy savings of approximately $1,200, the conversion cost would be paid back in about 18 years (LEDs have a service life of 20 years). It should be noted that the 18-year payback does not include maintenance savings. If the cost of conversion was $395 per lamp or less, the payback period would be ten years or less and the project would qualify for PG&E's OBF.

If Blacklake Village pursues other financing mechanisms, maintenance savings could likely be included in the payback analysis. At a conversion cost of $21,000 and total annual savings of about $2,200 (energy plus maintenance savings), the payback period falls to ten years.

ATTACHMENT: Potential LED Fixtures

LED Decorative Fixtures

Granville LED (Acorn)
(Holophane)
*Available in Black, Green & Bronze

HPSV	3K & 4K
70 Watt	26 Watt
100 Watt	39 Watt
150 Watt	60 Watt

Contempo (LED)
(American Electric Lighting)
*Available in Gray

HPSV	3K & 4K
70 Watt	38 Watt
100 Watt	44 Watt
150 Watt	71 Watt

Salem Gen II
(General Electric)
*Available in Black

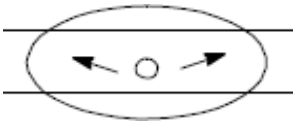
HPSV	3K & 4K
70 Watt	27 Watt
100 Watt	43 Watt
150 Watt	74 Watt

Memphis LED, Pedestrian
(Holophane)
*Available in Black, Green & Bronze

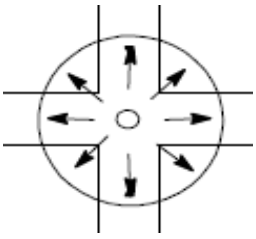
HPSV	3K & 4K
70 Watt	27 Watt
100 Watt	38 Watt
150 Watt	51 Watt

LED Light Pattern

Type 3



Type 5



*Type 5- Not available for Memphis fixture