

Project Information:

Please provide the following information (take as much space as you need to provide details):

Department: Sheriff Address: 115 W. Doty Street, Madison, WI 53703	Total project costs: \$27,097.98 Funding amount in current budget: 0 Funding amount requested: \$27,097.98
Project Title: Lighting Upgrade Based on Human Health Aspects and Energy Savings for Dane County Public Safety Building Jail	
Project Location: Dane County Public Safety Building	
Project Description: Plan Goals • To minimize climate impact, improve the energy savings over the current Dane County strategy of changing 28 watt fluorescent lamps to 18 watt LED lamps. When factoring in the ballast, the current strategy yields an energy savings of 25%. A side benefit of getting light right for humans is 60-70% energy savings. • Eliminate the flicker in the LED lamps being installed to improve the health, safety, and well-being of the staff and the incarcerated population. This flicker is known to be a trigger for autistic and epileptic seizures and more commonly migraine headaches. • Properly set the circadian system. This will be based on color, timing, and intensity of the spectrum of light. Strategy • Reduce energy consumption. Install a recently manufactured lamp that produces the same number of lumens (amount of light), but consumes 12 watts of energy versus 18 watts being installed today (lamps were manufactured in 2015) • Eliminate LED flicker. Install a ballast or driver with the T8LED tubes to lower the rate of flicker to below 2% at 120 Hz • Improve alertness. Install light in the booking area known to suppress melatonin and improve alertness. The melanopic-photopic ratio will be 0.9 or above. This is a recently established metric for the wake cycle in our daily lives. • Improve sleep-wake patterns. Install lighting in the daytime fixtures known to suppress melatonin and encourage cortisol production during the day and install lighting in the night lights known not to suppress melatonin which encourages a deep REM sleep.	

Describe how the proposed project moves the county toward meeting the following Sustainability Principles. (See the guiding questions in the box below.) Responses to this section will be used to determine the relative level of sustainability for each project.

- Reduce and eventually eliminate county government's contribution to fossil fuel dependence and to wasteful use of scarce metals and minerals;
- Reduce and eventually eliminate county government's contribution to dependence upon persistent chemicals and wasteful use of synthetic substances;
- Reduce and eventually eliminate county government's contribution to encroachment upon nature and harm to life-sustaining ecosystems (e.g., land, water, wildlife, forest, soil, ecosystems); and
- Reduce and eventually eliminate county government's contribution to conditions that undermine people's ability to meet their basic human needs.

Include in your description any estimated reductions of GHGs / CO2 equivalent emissions related to your proposal. Please use the following calculator to do this: <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>

New LED technology will reduce energy costs by an estimated \$3,360.19 with an ROI of between 5.7 and 15.2 years. (see chart)

This lighting technology better meets basic human needs than the current lighting by providing light at the correct color temperature and levels to mimic natural daylight and set the human body's circadian clock to promote better production of melatonin to provide a deeper and more restful sleep at night.

The inmate housing areas involved in this project are the initial male and female intake areas on the first floor and Pod 3A on the third floor of the PSB jail. All three areas do not have access to direct natural light and the inmates housed in these locations would benefit from improved light to help inmates have better quality sleep. Eliminating the flicker in the LED lamps being installed will help to improve the health, safety, and well-being of the staff and the incarcerated population. This flicker is known to be a trigger for autistic and epileptic seizures and more commonly migraine headaches.

Cost and Savings Summary

Dane County Jail	52 Person Unit	Booking and Records	Men's Seg	Women's Seg
Current Energy Costs	\$ 1,720.72	\$ 1,571.17	\$ 795.72	\$ 655.19
Projected Energy Costs	\$ 1,051.81	\$ 439.73	\$ 517.17	\$ 384.13
Energy Savings	\$ 668.91	\$ 1,131.44	\$ 278.55	\$ 271.06
Costs of Project	\$ 7,527.52	\$ 7,671.74	\$ 8,841.14	\$ 3,057.58
Incentive Estimate (TBD)	\$ -	\$ -	\$ -	\$ -
Net Cost	\$ 7,527.52	\$ 7,671.74	\$ 8,841.14	\$ 3,057.58
Annual Maintenance Savings	\$ 275.45	\$ 221.64	\$ 301.37	\$ 211.77
Total Annual Savings	\$ 944.36	\$ 1,353.08	\$ 579.92	\$ 482.83
Simple Payback	8.0	5.7	15.2	6.3
Rated Life	25 Years	25 Years	25 Years	25 Years
Warranty	5 Year	5 year	5 year	5 year

****Key Notes***

- All options include all recycling, mobilization, freight, lifts, and/or scaffolding work needed.
- EPL utilized a blended kWh rate of \$0.12

Describe how the proposal furthers implementation of the Dane County Government Sustainable Operations Plan goals, objectives, and strategies in your department and/or countywide. Please identify specific plan goals, objectives, and strategies accomplished.

Plan Goals

- To minimize climate impact, improve the energy savings over the current Dane County strategy of changing 28 watt fluorescent lamps to 18 watt LED lamps. When factoring in the ballast, the current strategy yields an energy savings of 25%. A side benefit of getting light right for humans is 60-70% energy savings.
- Eliminate the flicker in the LED lamps being installed to improve the health, safety, and well-being of the staff and the incarcerated population. This flicker is known to be a trigger for autistic and epileptic seizures and more commonly migraine headaches.
- Properly set the circadian system. This will be based on color, timing, and intensity of the spectrum of light.

Strategy

- **Reduce energy consumption.** Install a recently manufactured lamp that produces the same number of lumens (amount of light), but consumes 12 watts of energy versus 18 watts being installed today (lamps were manufactured in 2015)
- **Eliminate LED flicker.** Install a ballast or driver with the T8LED tubes to lower the rate of flicker to below 2% at 120 Hz
- **Improve alertness.** Install light in the booking area known to suppress melatonin and improve alertness. The melanopic-photopic ratio will be 0.9 or above. This is a recently established metric for the wake cycle in our daily lives.
- **Improve sleep-wake patterns.** Install lighting in the daytime fixtures known to suppress melatonin and encourage cortisol production during the day and install lighting in the night lights known not to suppress melatonin which encourages a deep REM sleep.

Describe how the county might build upon the outcomes of the proposed project to work toward greater sustainability.

Outcomes for Greater Sustainability

The high flicker rate which is known to be a trigger for autistic and epileptic seizures and migraine headaches is very common in low cost LED lighting. This lighting upgrade will improve the indoor living and work environment for inmates and staff.

Does the proposed project include a strong sustainability education component? If yes, describe the educational component, who it will reach, and how it will be communicated.

Educational Component

There will be an educational component on how light affects the sleep-wake cycle and how it can be used to improve health, productivity, and safety. This will be communicated to staff in the Sheriff's Office and can be shared with other departments in the county. This is especially relevant to people who work indoors and on shift work with limited natural light exposure.

Does the proposed project pilot an innovative new sustainability-advancing technology in county operations and can it be demonstrated by the applicant department to hold promise for additional future applications in county facilities? If yes, describe the elements of the innovative technology being proposed.

Innovative Sustainability

This methodology of lighting indoor spaces has been proven to reduce falls in nursing homes, reduce errors in hospitals, and keep the crew on the international space station on a 24 hour sleep cycle. It improves the health, productivity, and safety of the indoor work environment. A side benefit of getting light right for humans is 60-70% energy savings. Getting light right for the occupant of the space will naturally yield greater energy savings than just changing light bulbs for visual needs.

Describe how your department will track and measure outcomes of the proposed project (i.e., annual cost savings, annual energy savings, resource use reductions, maintenance reductions, etc.). Include a timeline for measurement and reporting outcomes, and the staff member contact who is responsible for conducting the tracking and measurement and reporting back.

Measurement and Verification

The energy savings will be easy to verify by measuring the lighting load before and after the lighting installation.

The human performance measurements will be more difficult. It can be done with surveys for feedback from staff and inmates, but a more accurate method would be to use quantifiable occurrences. This can be accomplished by counting before and after absenteeism, booking errors, inmate behavior in the housing units, etc. Essentially, anything that is tracked today can be compared to after the lighting is upgraded. If this can be accomplished, it would create a very good strategy for any new construction.

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Guiding questions for the project description. Applicants should include a detailed discussion of the work planned and/or the technical approach used that illustrates what the project will achieve and how it will comply with and implement the county's four sustainability principles and the Dane County Government Sustainable Operations Plan. The following questions provide a guideline to help your department frame and describe the project. Please feel free to address additional issues.

- Will this project reduce wasteful dependence upon fossil fuels, underground metals, and minerals?
- Will this project ensure that the smallest possible amount of resources is used?
- Has the proposal included green procurement standards for required goods, materials, and services?
- Will this project lead to a decrease in greenhouse gas emissions?
- Will this project reduce the need for fossil fuel-dependent transport, increase public transit use, or increase walking and bicycling?
- Will this project support businesses that emit less polluting or hazardous substances to air, water, soil and ecosystem services?
- Will this project raise awareness about waste prevention and recycling and will it help reduce the amount of waste going into the landfill?
- Will this project still be relevant when looking at the demographic changes ahead?
- Will this project consider the most up-to-date technology for recycling and waste reduction?
- Will this project use products that are non-polluting or come from an environmentally friendly source that will reduce negative impacts of the project on the environment, e.g., FSC wood, non-toxic, and non bio-accumulative chemicals?
- Will this project avoid the risks of water, air, and soil contamination?
- Will this project support the provision of environmental and social services in a certain area (e.g., flood prevention, water purification, air cleaning)?
- Will this project be beneficial in helping the county to adapt to the effects of climate change (e.g., changes in precipitation, flood and drought risks, heat emergencies, etc.)?
- Is this project avoiding negative impacts on water bodies, wetlands, etc., and is this project supporting the establishment and management of protected areas in water bodies, wetlands, etc.?
- Is this project proposing activities to raise awareness about water scarcity, water conservation, or water recycling and will this lead to an improvement of the water quality of a certain water body?
- Will this project still be beneficial once the funding is used and what, if any, public funding will need to be used for ongoing maintenance?
- Will this project support jobs in the eco-technology field and/or does this project include training for relevant stakeholders in renewable energy and other clean and sustainable technology?
- Has this project developed a strategy for measuring anticipated outcomes of the project?
- Has this project developed a strategy for how to disseminate results or best practices?
- Will this project improve equity outcomes for everyone?
- Will this project improve access to community services and facilities for all people of the community?