



INNOVATION / TECHNOLOGY DEPLOYMENT SUMMARY

Upgrading Maritime Warning Lights Solution

CHALLENGE

Navigable waterway bridge lighting is mandated by the Code of Federal Regulations (CFR). The Corpus Christi District maintains bridges over navigable waterways along and near the Gulf Coast that require this lighting (Figure 1). Warning systems are frequently located in remote, difficult to access areas that have minimal infrastructure. Although solar-powered lighting is a practical solution for these sites, the district has no way to monitor the equipment or operation of these critical systems. District staff are commonly alerted of operational issues by the Coast Guard, which is not ideal because it allows the potential for the system to be in prolonged failure.

SOLUTION

To eliminate safety lighting outages that can put TxDOT infrastructure at risk, this innovation uses a maximum power point (MPPT) solar panel system at remote sites, giving district staff the ability to directly monitor the warning lights. The MPPT system's remote monitoring capability decreases the duration of outages, improves safety and operational reliability, and provides data so that district staff can easily track system performance.

PROACTIVE APPROACH

Prolonged outages and alerts received well after an equipment failure has occurred are a potentially significant safety issue for maritime vessels and motorists on bridges and highways above the waterways. The MPPT system automatically alerts district staff when an issue is detected and provides historical data to facilitate maintenance trip planning and procedures.

BENEFITS

Given the difficulty associated with accessing remote sites — some locations can be accessed only by boat — the MPPT system's remote monitoring capabilities deliver efficiencies and job safety benefits by minimizing in-person maintenance visits. Additionally, the system's charge controller increases photovoltaic energy extraction by 30 percent and its lighter-weight lithium batteries are more portable for boat- and/or ladder-access sites.

TxDOT GOALS



Deliver the right projects



Focus on the customer



Foster stewardship



Optimize system performance



Preserve our assets



Promote safety



Value our employees

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KEY TASKS

- Assess maritime warning lights deployments to identify current concepts, products, and materials.
- Look for enhancements and improvements in all components, such as energy gathering, storage, use, and web- or app-based monitoring (Figure 2).
- Incorporate cost-effective product improvements into the system design.
- Acquire components for a system-enhancing prototype.
- Test the optimized system design in an operational environment.

DATA SOURCES

The MPPT solution is itself a source of system operation and equipment failure data that can be accessed and tracked remotely.



Figure 1. Example of bridge maritime lighting.

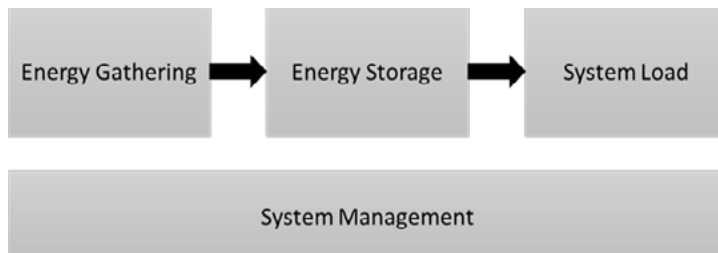


Figure 2. Components of the system to optimize.

Resources

[Corpus Christi District \(txdot.gov\)](https://www.txdot.gov/corpus-christi-district)

[Title 33 - Code of Federal Regulations Part 118: Bridge Lighting and Other Signals \(ecfr.gov\)](https://www.ecfr.gov/title-33)

[Texas maritime ports \(txdot.gov\)](https://www.txdot.gov/texas-maritime-ports)

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