Rectangular Rapid Flashing Beacons (RRFBs) are becoming an important part of the toolkit and a top choice for transportation professionals looking to improve vehicle yield rates, pedestrian service levels, and multi-modal transportation access at uncontrolled, marked crossings. As demand for solar RRFBs continues to grow, it is important to consider the key factors that ensure reliable performance when specifying systems for projects and bids. Solar powered RRFBs offer a cost-effective, easy-to-install solution and provide a number of benefits to AC powered units. However, specifications sometimes focus on certain materials and size, instead of specifying how many pedestrian actuations the system will support each day (referred to as “operating capacity”). When specifying Solar Rectangular Rapid Flashing Beacons, an emphasis needs to be placed on operating capacityFilter instead of prescribing solar panel wattage and battery size. Additionally, site-specific shading needs to be considered.

About RRFBs

Rectangular Rapid Flashing Beacons (RRFBs) are becoming a widely-recognized solution for increasing driver compliance and improving safety on crossings where existing signs and markings are insufficient. Proven performance, as shown through research conducted by state and federal authorities, has these high-intensity crosswalk lights gaining attention. The United States Department of Transportation Federal Highway Administration (FHWA) has proven RRFBs to be an extremely effective device for driver yield compliance (between 72 and 96 percent) at uncontrolled marked crosswalks.1 The Manual on Uniform Traffic Control Devices (MUTCD) interim approval for RRFBs states: “The Office of Transportation Operations has reviewed the available data and considers the RRFB to be highly successful in the applications for which it is used (uncontrolled crosswalks). The RRFB offers significant potential safety and cost benefits because it achieves very high rates of compliance at a very low relative cost in comparison to other more restrictive devices that provide comparable results, such as full midblock signalization.”

Often Rectangular Rapid Flashing Beacons are only considered for mid-block crossings. However, the majority of applications are at intersections with thru-lanes on the major legs. Locations often have four or five lanes and are commonly located at universities and college campuses, school zones, greenways, bicycle boulevards, and trail crossings.

Benefits of Solar RRFBs

Solar powered Rectangular Rapid Flashing Beacons (RRFBs) provide a cost-effective and easy-to-install alternative to AC powered RRFBs. Installing solar powered RRFBs provides several benefits. The absence of a need for an overhead electrical power drop, eliminating electrical grid connections, metering, and electrical bills. Underground checks of every utility prior to installation are no longer necessary, saving time and money. Trenching is avoided because the system sends the activation wirelessly between units. Maintenance cycles and costs are minimal due to the excellent energy management system that prolongs battery life. For solar, it is especially important to consider all performance factors when specifying RRFBs for a location. In very extreme situations, such as locations with high usage, high shading, and low solar insolation,
Solar RRFs — cont. from page 20
AC powered RRFs may be the appropriate choice. However, in typical locations solar RRFs are very reliable.

Key Considerations to Include When Specifying Solar RRFs
Solar RRF specifications sometimes neglect key factors that affect system performance, focusing on solar panel wattage and battery capacity alone. This is a major concern, as systems may not be capable of sustained, year-round operation. An RRF system with a large solar panel and battery capacity does not guarantee reliable performance. Operating capacity needs to be included in the specification to ensure the system can function reliably in a given location. When considering operating capacity, several critical metrics need to be evaluated to ensure optimal performance: the Array-to-Load Ratio, autonomy, shading, and battery life.

Array-to-Load Ratio
Energy balance is crucial to the operation of an RRF. The Array-to-Load Ratio (ALR) compares the energy collected by the system (energy in) to the total system load (energy out). This should be calculated using peak-sun-hours (PSH) for the worst month of the year. The calculated Array-to-Load Ratio must be greater than 1:1 in order to deal with system inefficiencies and often requires a significantly higher ratio to handle extra loads. Typical loads include the number of push button activations and whether the push button has features such as locate tone and voice message and how many times the message repeats. These loads have large energy draws on the system and need to be taken into consideration when specifying RRFs to ensure there is a sufficient energy budget to operate the system reliably. Best practice dictates that an RRF system should have a minimum Array-to-Load Ratio of 1.2:1. If there is shading at the location, the energy in will be lower and subsequently the ALR will be reduced. By considering the ALR for each system location, appropriate products can be selected to meet performance expectations.

Autonomy
System autonomy is defined as the number of days that a solar powered system can continue to operate if all sunlight or insolation is removed. Autonomy is essentially a measure of the system’s ability to operate without any charging. While it is an important metric, it is theoretical because all systems will receive some charging throughout the day, even in very cloudy conditions. System autonomy is calculated by the system’s battery capacity for a given period, divided by the total load on the system for the same period. The total system load must include the number of actuations and the flash duration in the calculation, otherwise the autonomy value will be meaningless.

Battery Capacity (Wh) divided by Total System Load (Wh) = Autonomy (Days)
Wh = Watt hour

In a detailed calculation, all system loads and efficiencies, including temperature effects and the usage model, are used in conjunction with the geographical location to obtain a final value. System autonomy typically considers an average value for no-sun or “black days” as defined by NASA’s meteorology department for a given location. It is very important to note that, no-sun days are based on monthly averages and as such, no-sun days are not considered consecutive events. Solar powered systems are designed to operate as if a number of consecutive no-sun days or a period of complete blackness was to occur. This approach provides an effective baseline for evaluating systems for a given location.

The autonomy value obtained through the system autonomy calculation is compared to the NASA no-sun days for the installation’s geographical location. For a solar RRF system to function effectively, best practice dictates that the calculated number for autonomy must meet or exceed the NASA no-sun days. When sizing or evaluating a solar powered system, it is important to remember that system autonomy is a safety factor and is based on the theoretical condition of a complete removal of insolation.

Shading
Shading is a major factor not currently considered in some specifications, yet it is one of the biggest variables in the operating capacity of an RRF. Proposed installation locations should be carefully analyzed before specifying a system. Site assessments can be easily determined using tools such as Google Street View and capacity calculators, which allow manufacturers to evaluate the

Solar RRFs — cont. on page 31

<table>
<thead>
<tr>
<th>Number of Actuations</th>
<th>Effective Shading</th>
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<tbody>
<tr>
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<tr>
<td>3</td>
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<td>90%</td>
</tr>
<tr>
<td>5</td>
<td>95%</td>
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</table>

BLUE EARTH ENERGY POWER SOLUTIONS (BE EPS)
BE EPS provides lead acid free, energy efficient, intelligent digital battery backup systems designed for signalized traffic intersections with their UltraPower-Steady Battery Backup System (UPStealth™).

Benefits of the UPStealth

Unique Form Factor:
- No external enclosures or piggieback cabinets required
- Living Hinge - Fits between California wall and rack of R1020/70 3344 cubic cabinets
- NEMA battery panel installed in up or underneath NEMA canister shell
- Size - Approx. half the size and weight compared to lead acid

Battery Management Software:
- Maintenance Free - Digital battery performance monitoring and management
- Long Life - Built-in system protection
- Recharge Time - Full charge within 4 hours
- Charge Monitoring - No trickle/float charging required
- Power Conditioning - Holistic power monitoring and conditioning
- Inverter LCD Interface - User manages performance parameters

Nickel Zinc Battery Chemistry:
- Lead Acid Free
- Ideal Temperature Range: -30°F to 110°F (-30°C to 43°C)
- 98% Efficient - Little to no heat generation
- No Corrosion - Liquid free battery
- No Osmosis - No formation of harmful liquids
- 100% Recyclable and RoHS Compliant

BLUE EARTH ENERGY POWER SOLUTIONS - A BATTERY BACKUP AND ENERGY STORAGE SOLUTIONS COMPANY
BE EPS family of UPStealth™ Batteries and Inverter/Controllers are designed to mix and match in either the NEMA or the 170 style traffic cabinets. In other words, the “Living Hinge” and the NEMA style batteries can be connected to the NEMA styler 170 style Inverter/Controllers. Truly allowing customers to mix and match batteries and Inverter/Controllers to fit their traffic cabinet needs.

Phone Number (503) 399-3517 www.blueeartheps.com beeps.info@blueearthinc.com
In the months following a deadly fire in one of New York’s high-rise apartment buildings, the city has seen a spike in improved safety measures. Residents have installed smoke detectors and fire alarms, and the Housing Authority has announced plans to upgrade building systems. However, the response has been uneven, with some buildings taking immediate action and others dragging their feet.

The safety of residents is paramount, and the city is working to ensure that all buildings are up to code. The Housing Authority has set a deadline for all buildings to have fire safety systems installed, and the city is providing resources to help buildings meet these requirements.

In the meantime, residents are urged to take their own safety into their own hands. Smoke detectors and fire alarms are essential, but they are only as effective as the people who use them. Residents are encouraged to test their alarms regularly and to have a plan in place in case of an emergency.

The city is also working on improving communication systems within buildings. In the event of a fire, it is crucial that residents know where to go and what to do. This includes having clear evacuation routes and meeting points.

Overall, the city is making progress in improving fire safety in high-rise buildings. However, there is more work to be done, and residents must remain vigilant to ensure their safety.

Real-World Solutions for Improved Communication in High-Rises

By John M. Stofa

In this article, John M. Stofa discusses the importance of improved communication systems in high-rise buildings in the event of a fire. He notes that current systems are often inadequate, and that new technologies are needed to improve safety.

Stofa highlights the need for better communication between emergency responders and residents. He argues that current systems are often confusing and difficult to use, and that new technologies could greatly improve safety.

Stofa also discusses the importance of social media in emergency communication. He notes that social media can be used to disseminate important information quickly, and that it can be used to coordinate emergency response efforts.

Overall, Stofa’s article provides a comprehensive overview of the challenges facing emergency communication in high-rise buildings, and the steps that can be taken to improve safety.

The issue of fire safety is a complex one, and there are many factors to consider. However, by working together, residents, emergency responders, and local authorities can make significant progress in improving safety in high-rise buildings.

Stofa concludes by emphasizing the importance of continued effort and innovation in the field of emergency communication. He encourages readers to stay informed and to take an active role in improving safety in their communities.

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The article by John M. Stofa provides valuable insights into the challenges of emergency communication in high-rise buildings. By highlighting the need for improved systems and technologies, Stofa helps to raise awareness of this important issue.

The city of New York is making progress in improving fire safety, but there is still much work to be done. Residents must remain vigilant and proactive in ensuring their own safety, while the city and emergency responders continue to work towards a safer future.

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