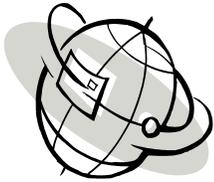


# Energy Issues

## IEP Newsletter



### LED Streetlights – Helpful or Harmful?

By: Thomas D. Mull, PE, PEM, CEM

Over the past five years utilities in the USA have aggressively promoted replacing high pressure sodium street lighting with LED luminaires. The benefits of the conversion include power and energy savings of up to 50%, reduced system maintenance, reduced carbon emission, and improved color rendition. Even though this appears to be a win-win for the utilities, consumers, and environment there are those that have raised concerns over the adoption of LED street lighting.



Figure 1 – Typical LED Streetlight

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#### Concerns:

In June 2016 the American Medical Association (AMA) adopted a policy statement concerning LED street lighting\*. They established guidelines for municipalities on how to minimize the potential harmful effects, specifically on two (2) issues.

1. The high concentration of shortwave blue light in higher color temperature lamps (4,000°K and higher) results in discomfort and glare. Blue light, according to the AMA, scatters more in the eye and "...sufficient levels can damage the retina." (Note: "sufficient levels" is not specifically defined.)
2. There can be an adverse impact on the human circadian rhythm (our 24-hour "biological clock" that controls sleep/wake cycles). The higher color temperature lamps can simulate daylight, thereby making the brain think it is daytime.

In their guidelines, the AMA recommended outdoor lighting, specifically street lighting, should employ color temperature lamps not greater than 3,000°K.

#### US DOE Response:

In response to the AMA concerns, and others who have voiced similar misgivings about LED streetlights, the US Department of Energy issued the: 5 Common Myths about LED Street Lighting. Following is DOE’s position on the concerns.

\*Source: CNN

## *LED Streetlights – Helpful or Harmful? (continued)*

Myth 1: LED streetlights are more harmful to humans and animals than other kinds of streetlights. – LED streetlights are no more harmful to humans and animals than other kinds of streetlights. The concern is not the type of light source, but the amount of emitted light that falls in the short-wavelength band, often referred to as the “blue” part of the spectrum. And, unlike other types of streetlights, LED streetlights actually offer the potential to control the amount of short-wavelength light that they emit.

Myth 2: All short-wavelength light is harmful to humans and animals. – On the contrary, short-wavelength light is a fundamental component of the natural world. It’s present in sunlight and plays an important role in certain physiological processes, such as affecting circadian rhythm. The concern is too much nighttime exposure to short-wavelength light may disrupt sleep patterns and have other undesirable effects.



Figure 2 – LED Streetlighting (Courtesy of Pixabay)

Myth 3: LED lighting emits more short-wavelength light than do other lighting technologies. – It’s true that early LED lighting products tended to have greater levels of short-wavelength content. Tremendous advances since then, however, mean that today’s LEDs can be designed to emit as little, or as much, short-wavelength light as desired, without excessive drop-off in efficiency or other aspects of performance. LEDs also offer much greater control over where the light falls. This means they can often meet the same illumination requirements as conventional streetlights while emitting much less light – thus reducing even further any short-wavelength content.

Myth 4: Street lighting should never emit any short-wavelength light. – Most street lighting situations benefit from having at least some short-wavelength content. Short wavelengths are a key component of the visible light spectrum, with benefits ranging from aesthetics to safety. White light sources that contain short wavelengths, for example, can show the colors of objects more naturally, aid in identification of people and objects, improve the contrast between an object and its background, and enhance peripheral vision at the low levels of illuminance that typically characterize street lighting.

Myth 5: Communities are better off with conventional street lighting. – Most street lighting in the United States over the last several decades has been high-pressure sodium (HPS), which emits orange-yellowish light. HPS street lighting is being replaced by technologies that emit “white” light – primarily LED, due to its higher efficiency and longer life. All white-light technologies – including LED – emit more short-wavelength light than HPS. In addition to lasting longer and being more efficient, LED street lighting offers other potential benefits. For example, LED systems can be adjusted to provide only the level of illumination needed at any given time, and a high degree of control over the direction in which light is emitted. This makes it much easier to reduce glare, light trespass, and up-light.

LED street lighting can play a critical role in avoiding unintended consequences to humans and wildlife – as long as care is taken to make sure the light is directed only where it is needed, with minimal glare, and that it emits a spectrum that supports visibility, safety, and health.

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## ***LED Streetlights – Helpful or Harmful?*** *(continued)*

### Summary:

With every emerging technology there are frequently concerns about potential adverse impacts. Some concerns are based upon legitimate issues regarding the technology or its application. This typically leads to refinements that enhance the technology minimizing the adverse consequences. Other concerns raised, while based upon technically valid issues, extrapolate impacts based upon unrealistic assumptions to demonstrate an adverse consequence that “could” or “might” or “possibly” occur.

It is the responsibility of the design agent to assure that all such concerns have been addressed. Any new technology employed must be sound, provide the expected benefits and minimize any adverse consequences. With respect to LED street lighting the technology has been refined to address initial concerns. It offers utilities, cities and towns energy and monetary savings, as well as meaningful environmental benefits over other options. One only needs to fly over a major city at night to see the impact LED street lighting has already had. The orange-yellow lighting is rapidly being replaced with crisp clear white light.

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## ***Energy Managers: Break Out of Your Cells***

*By: Adee Feinstein - Chief Operating Officer  
Transdata Solutions, Inc.*

*(Transdata Solutions, Inc. provides modeling software to better manage data, thereby saving time and facilitating determination of appropriate response to issues and questions.)*

New paradigms in Energy Operations and Management have resulted in an exponential increase in the number of data points available for analytical purposes, not to mention the growth in the volume of generated data records and sets. There are few remaining aspects of Energy Management that are not data driven. The old adage “He who masters the information, wins the war” is entirely applicable. The ability to rapidly process and analyze data and arrive at actionable conclusions has never been more crucial to effective and sustainable Energy Management Programs.

Traditionally, the daily “number crunching” needs of Energy Managers were well served by desktop spreadsheets. However, over time more sophisticated requirements arose: Computational collaborations, disparate data sources, number-of-rows in the seven figures (or more...) and, above all, the need to perform complex calculations. Moreover, as spreadsheets grew in scope and size, the time spent debugging and maintaining them became considerable, impacting day-to-day work objectives. According to a study by the International Data Corporation (IDC), approximately US\$60 billion per year in the US is wasted on repeated efforts in spreadsheets. While large organizations may benefit from the presence of skilled data scientists, most projects are not well served by Energy Managers and programmers spending inordinate time working until the requested data set is assembled, cleansed, normalized, and providing actionable knowledge. This back-and-forth is costly, time consuming, and dilutes the domain experts’ (in this case Energy Managers) ability to rapidly resolve pressing questions and issues.

Spreadsheets alone no longer represent an optimal solution for data collection, organization, and computation. While the former two aspects remain well served, it is the latter where spreadsheets fall short, especially in the area of Energy Management.

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## Energy Managers: Break Out of Your Cells *(continued)*

Recently, the market has seen the availability and adoption of the TRANSDATA® Visual Data Modeling solution. A desktop (Windows, macOS, Linux) software application, TRANSDATA separates the computational facets of a spreadsheet, facilitating drag-and-drop creation of graphical data models operating *in conjunction* with spreadsheet data. This eliminates the need to revise the formulas and algorithms in the spreadsheet each time data is updated. What's more, visual data models are powerful devices with which data calculations and flow may be readily communicated to (and understood by) stakeholders. Energy Managers have implemented this solution for a variety of purposes, including:

- Generation Data Analysis
- SCADA Reporting
- Renewable Management
- Transmission Pole Maintenance
- AMI Data Organization

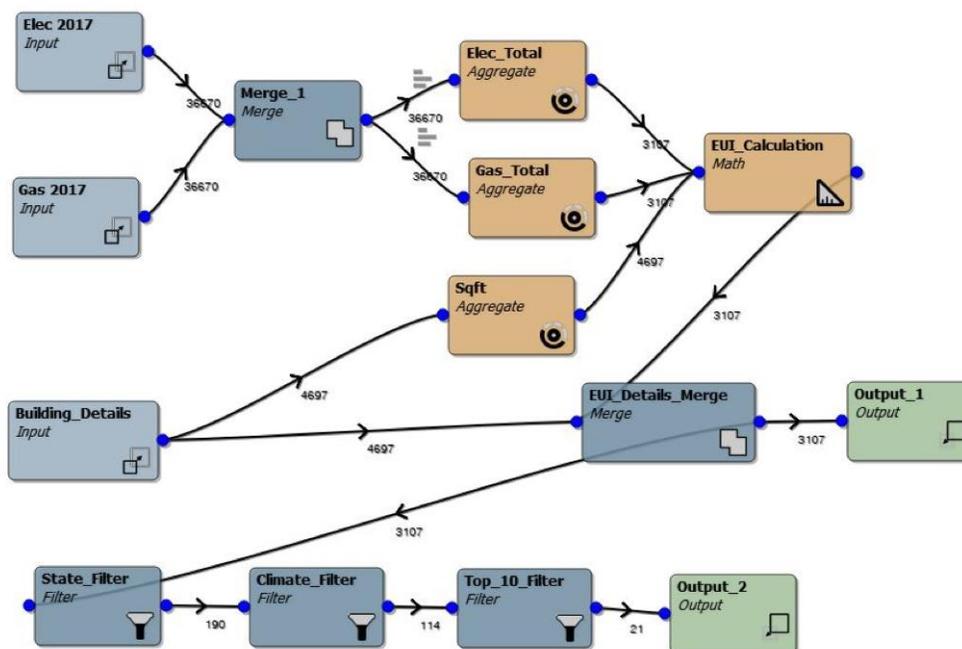


Figure – Transdata Model

In a recent project conducted by the Energy Production and Infrastructure Center (EPIC) at the University of North Carolina Charlotte, on behalf of the Sustainability Integrated Buildings and Sites (SIBS) cooperative, the energy use of over six thousand commercial buildings was analyzed using TRANSDATA, achieving the objective of stratifying and identifying the worst performers, based on their individual Energy Use Intensity (EUI) metric. This provided the necessary information on which the customer could then develop a sustainable Energy Management strategy.

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## *IEP Management Transition*

*By: IEP Staff Writer*

By the end of June IEP will undergo management transition. Thomas D. “Dan” Mull, PE, PEM, CEM, who has served as Executive Director/President since IEP’s formation in 2009, will be retiring from the daily IEP activities. Walter “Wally” A. Bright II, PE, PEM will be assuming management responsibilities. Wally brings a wealth of experience from both the academic (NCSU) and private sectors to IEP.

There will a transition period where Dan will continue to provide coordination and facilitation services, as well as limited instruction. The transition should be seamless without interruption of training or other services. The new management will build upon the successes of IEP, while aggressively promoting Professional Energy Manager training and certification, as well as continually supporting IEP membership.

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## *Drone Technology - It’s Impact on Utilities*

*By: Staff Writer*

One of the hottest retail sales items during the past holidays was drones. From micro drones no larger than a deck of cards costing less than US\$25, to sophisticate models the size of desk calendars (US\$500 to \$32,000), these unmanned aerial vehicles (UAVs) have provided a variety of functions including search and rescue, surveillance, exploration, delivery of products, as well as being an offensive weapon, or just plain fun. The utilization of drones has been forecasted to triple in the near term.

The electric utility industry has employed this technology for several years to improve productivity and identify system problems. Areas of utilization include assessing storm damage, line/equipment inspections, economic development, monitoring construction projects, and in 3D modeling.



*Figure – Drone (Courtesy of Pixabay)*

One such utility is Duke Energy, an investor owned utility headquartered in Charlotte, North Carolina with a 58,200 megawatt peak load. Since implementing drones in their renewables program, thermal imaging of solar arrays has minimized electrical testing and assisted in the detection of faulty equipment. According a company representative, this application of drones has saved in excess of 260 work hours since 2017.

Drones have become an essential tool for many companies. But they are subject to increasing regulation. The U.S. Federal Aviation Administration (FAA) has become involved specifying guidelines for their operation. This is an effort to standardize operating requirements and limit drones in areas where they may interfere with other aviation. To date, FAA requirements have not adversely impact meaningful commercial operation of what is undoubtedly a highly effective and productive tool for utilities.

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