Why LED Roadway Signs Make Sense

By John Vines, Dialight Corporation

Making the switch
Not so long ago I was evangelizing about LED traffic signals. When they hit the market more than a decade ago, their new technology represented a quantum leap forward in performance compared to incumbent technology. Not only did LEDs promise six or seven times the life span of incandescent bulbs, they also gave municipalities an opportunity to dramatically reduce energy consumption with a lower-wattage solution. This combination of maintenance and energy savings added up to a huge win for organizations looking to maximize return on investment for traffic signal upgrades.

With recent improvements in white LED technology, chip manufacturers have almost doubled the lumen output since 2009 allowing fixture manufacturers the capability in designing products capable of replacing traditional HID technology currently installed. These advances now allow for the development of roadway sign lights that provide users with all of the advantages they have been receiving from the conversion of their traffic signals to LED.

Replacing conventional products with today’s more energy efficient LED systems can:
- Dramatically increase fixture life and long-term equipment costs;
- Significantly lower maintenance demand and cost;
- Reduce energy consumption and associated carbon dioxide emissions;
- Improve light uniformity and visibility over a longer time span; and
- Reduce emergency replacement needs.

Aside from these direct benefits, proactively replacing older sign lighting fixtures with more modern, long-life performance technology can also significantly improve public safety for both drivers and pedestrians, and reduce the potential liability associated with the unexpected failure of older technology.

Green and energy efficient
A 70 or 100W LED fixture can typically replace a 250W or higher mercury vapor / metal halide unit while still meeting or exceeding the Roadway Sign Light Specifications, so it delivers immediate energy savings of 60-70% over conventional lights as well as equivalent reductions in CO₂ emissions. And unlike the conventional alternatives, an LED fixture’s efficiency is further enhanced by its instant-on/off ability with no warm up necessary to achieve full illumination which makes it a safer solution as well. With mercury vapor and metal halide both prone to long warm-up and re-strike periods, especially in cold weather, an LED unit offers instant-on capability and performs exceptionally well in any temperature from -40°F to +165°F.

Triggers for change
Under the Federal Energy Policy Act (EPACT 2005) and the Energy Independence and Security Act, conventional mercury vapor lamps and all 150–500 watt metal halide probe start ballasts were mandated to be substituted with more energy efficient alternatives, so DOTs and other agencies must now choose alternative lamp sources. These government mandates have made this the perfect time to change to LED as the replacement for both new construction and retrofit from existing HID metal halide, high-pressure sodium and phased-out mercury vapor fixtures, so here’s a more detailed look at the real benefits of switching to LED roadway sign lights.
In addition, its ‘green’ credentials are assured by the fact that it is 100% mercury free. The Material Safety Data Sheet (MSDS) requirements of the Occupational Safety and Health Administration (OSHA) for chemicals are not applicable to manufactured articles such as LED lamps and LED lighting fixtures as stated in the OSHA Hazard Communication Standard, 29 CFR 1910.1200, so they pose no threat as hazardous waste.

Robust and maintenance free
Ruggedly constructed, solid state LED fixtures are not only an energy efficient alternative, but with a projected service life of ten years (50% on time, 70% lumen maintenance after 100K hours) they also bring other significant benefits. These include the elimination of frequent lamp changes with their associated disruption to traffic and the reduction of overall maintenance cost as well as reducing exposure of the maintenance workers to dangerous highway traffic.

Some units offer a 6KV surge protector an optional 10KV and 10KA surge protector for greater resistance against lightning strikes or high-voltage/high-amperage spikes. Such ruggedized fixtures are highly resistant to shock and vibration up to 3G, withstanding even the heaviest truck traffic on overpasses and bridges with Caltrans QTL specifications pending.

These days vehicle headlights have increasingly sharper cut-offs to control glare, so a highly reflective roadway sign that is clear at road level needs more illumination when mounted overhead on bridges or trusses. As the sign’s reflective material weathers and degrades over time, it may end up being more expensive to take down and replace than the cost of the LED fixture itself which can stay in place for ten years with no need for maintenance.

Ease of Installation
Some manufacturers are extending their LED range with a choice of complete fixture assemblies for new, retrofit or complete replacement applications, even including an LED retrofit cover assembly kit option that will adapt to the most common installed conventional fixture boxes. The retrofit then involves only the removal of the existing fixture’s cover, lamp and reflector which is replaced with the LED cover assembly, leaving most of the existing wiring connections untouched, so the conversion can be simple and easy, saving both time and money. In addition to superior energy efficiency and cost savings, the newest LED roadway sign light editions offer both top- and bottom-mount flexibility with a pivoting head for more precise light placement on the sign.

Superior quality of light
Unlike conventional fixtures that fade over time, new LED roadway sign lights deliver longer-lasting, high-visibility cool white light with more than 70 percent lumen maintenance and a minimum of 20 foot-candles output after 60,000 hours. Their emphasis on light quality is also exemplified with uniformity ratios of 6:1 or better and compared with conventional fixtures, “hot spots”—or islands of light surrounded by darkness—are no longer a problem.

Reducing risk in the procurement process
Any roadway sign light should be designed to meet IEEE RP-19-01, and CSA UL 1598 and CSA 22.250 roadway sign lighting standards and be IP66 rated and UL-1598 compliant for moisture/wet locations. It should also meet the ASTM B117 salt/fog standard, having undergone 3,000 hours of salt spray testing, but how can you be sure it will deliver the performance it claims? When considering LED fixtures there’s a simple way to verify their performance – just have a look at the LM-80 and LM-79 test reports.

An LM-80 report is issued by the LED manufacturer and specifies the lumen output and ability of the LED light source to maintain a required light level over a period of time based on different drive currents and junction temperatures. An LM-79 report is issued by the LED fixture manufacturer or by a third party, accredited independent laboratory and specifies the lumen output and electrical performance of the whole LED fixture.

The LM-79 test encompasses the LED light sources, their performance when coupled with optics, driver circuitry, and thermal heat sinks. The reports certify photometric and electrical measurements including power consumption, color quality (CRI), color temperature (CCT), drive current, power factor, maximum in-situ source temperature and lumen output. This proves the photometric performance of the light fixture and that of the LED light source, so end users know the LED light fixture performs as...
The summit consisted of three days of presentations, panel sessions and smaller break-out groups including an appearance by U.S. Transportation Secretary, Ray LaHood, who spoke of the important role of the Nation’s transportation workforce and the need for coordination across transportation, education and labor. A panel discussion with executives representing the U.S. Department of Labor; U.S. Department of Education; and the U.S. Department of Transportation allowed the agencies to present their priorities, issues and activities for more effective, efficient transportation workforce development.

Conclusion
Workforce development is at the core of IMSA’s mission. Perhaps an IMSA-wide strategy to improve workforce development for the specialties we represent is worth considering. To be successful, the strategy must be a priority for the association—requiring a substantial commitment in time and funding. There is an opportunity to serve our members and our community in this crisis if we are simply willing to accept the responsibility and the cost.

To learn more about:
- The Department of Labor’s Competency Model program: www.CareerOneStop.org/CompetencyModel
- The Department of Labor’s O*NET OnLine program (used to find occupational descriptions—try looking up “Traffic Technicians” Code: 53-6041.00): http://www.onetonline.org/

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The new LED fixtures resolve all those challenges, slashing operating and maintenance costs by nearly 75 percent compared to traditional 100-250W HID sources and freeing up precious manpower for other more important projects. That’s why LED roadway sign lights make sense.

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