

SSL Postings

U.S. DEPARTMENT OF ENERGY

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NAS Report Highlights SSL's Progress, Untapped Potential

The impressive gains that have been already achieved in solid-state lighting efficacy occasionally prompt the question as to why DOE continues to fund SSL R&D. After all, it could be argued that the technology is now "good enough," so why push for more?



A recent report by the National Academies of Sciences, Engineering, and Medicine (NAS) spells out the answer loud and clear. A follow-up to the 2013 NAS report, *Assessment of Advanced Solid-State Lighting*, [Assessment of Solid-State Lighting, Phase Two](#) highlights the progress of commercialization and acceptance of SSL, reviews the technical advances and challenges in achieving higher efficacy for LEDs and OLEDs, and discusses recent trends in SSL manufacturing and opportunities for new applications. It also describes the role of [DOE's SSL Program](#), which acts as the lead federal organization driving SSL advances.

Both NAS reports were undertaken at the behest of Congress as guided by the Energy Independence and Security Act (EISA) of 2007. The 2013 report credited DOE with having "done an impressive job in leveraging a relatively small level of funding to play a leading role nationally and internationally in stimulating the development of SSL," and noted that "DOE leadership and support is widely recognized throughout the lighting industry as a driving force for quality as well as energy efficiency."

The 2017 report includes praise for DOE's role in advancing SSL research and development – citing, among other things, the "remarkable success" that's resulted from investments by DOE and the lighting industry in the core LED and

OLED technologies; the "remarkable progress" that scientists, with DOE support, have made in increasing the luminous efficacy of lighting components; and the "critical" nature of DOE investments in R&D priorities for core technologies that address the key technological challenges for high-efficiency SSL.

It also makes a number of recommendations, including many that have already been implemented by DOE's SSL Program. Among other things, the 2017 NAS report (which is available for [download](#)) recommends that DOE:

- Continue to make investments in cost-effective solutions at 200 lm/W at the luminaire level, while also considering reliability and quality of light.
- Continue to invest in leveraging R&D programs that can have a significant impact on increased SSL product availability.
- Continue to invest in SSL core technology improvements and also consider solutions to ultimately allow low-cost implementation and embody risks industry is not likely to take.
- Support LED system lifetime research and encourage the Illuminating Engineering Society to develop a standardized system lifetime test method.
- Consider initiating a broad stakeholder project to develop appropriate energy efficiency metrics for the most important emerging lighting applications, including horticulture and livestock, that are not for illumination of spaces used by people.
- Develop strategies for supporting broader research that enables more-efficient use of light in such a way that the application efficacy is maximized, with attention to both the lighting design process and the design of lighting products.

SSL is only about halfway there in terms of fulfilling its energy-saving potential. There are very compelling reasons to keep working toward the efficacy goals set forth in DOE's annually updated [SSL R&D Plan](#). Achieving those goals – which can be done only if we keep pushing – can benefit the U.S. in five key ways, as explained in a DOE [white paper](#) on the topic:

- Enormous energy savings of 5.1 quads annually by 2035, cutting U.S. electricity bills by \$50 billion and enhancing energy security
- Scientific progress and technological advances in semiconductors, phosphor materials, quantum dots, power supplies, and optical materials, with crossovers into other clean technology
- Better LED products that deliver improved lighting quality, longevity, and reliability, as well as enhanced services
- Lower first costs for LED lighting products, which in turn will encourage change-out of the existing lighting stock to more-efficient devices
- Stronger positioning of domestic LED manufacturers that produce high-value, high-brightness LEDs.

The NAS report notes that despite the remarkable progress to date, "major technological issues remain to improve SSL efficiency, in both LEDs and OLEDs," and that "further investments are needed to consolidate the gains achieved in the first wave and pave the way for new, exciting, and perhaps unpredictable possibilities in the second wave." The NAS folks are independent and impartial and, like umpires in baseball, merely call 'em as they see 'em. And their overarching call with regard to SSL makes it clear that this is no time to let up. So, just as the NAS has done, let's acknowledge the progress that's been made – but let's take the report's advice and keep on pushing.

Best regards,
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As always, if you have questions or comments, you can reach us at postings@akoyaonline.com.