SSL Postings

One of the *Postings* last month was about a report that we'd just published on the second part of a larger DOE project to assess the life-cycle environmental and resource costs of LED lighting products in relation to comparable traditional lighting technologies. Entitled *Life-Cycle Assessment of Energy and Environmental Impacts of LED Lighting Products: LED Manufacturing and Performance*, this report breaks new ground in our understanding of how lighting affects the environment, so it's not surprising that it's attracted a great deal of interest from many quarters, as well as considerable coverage in the news media. It's also generated a number of thoughtful questions, which we thought we'd answer here in the interest of clarity.

Q: *Your study evaluated CFL and LED alternatives to incandescent A-lamps, as well as incandescent A-lamps themselves. Are the findings also applicable to other lighting technologies and product categories?*

A: These products were chosen not only in order to make apples-to-apples comparisons, but also because they're so commonly encountered in the marketplace. However, the finding that the life-cycle environmental impacts of a given lighting product are dominated by the energy it uses over the course of its service life should also be applicable to other product categories, including luminaires – and perhaps even to other light-source technologies. Rough estimates of a category's environmental impacts could be obtained by normalizing the products on the basis of lumen-hours, as was done in the study, and then scaling their impacts based on energy drawn during the use phase. For more accurate estimates, a

complete life-cycle assessment would need to be performed.

***Q:** Based on the findings of these life-cycle studies, should I replace my incandescent lamps with LED lamps or CFLs?*

A: Both technologies represent viable energy-efficient alternatives to incandescent lamps. However, the replacement product should be one that offers adequate quality and quantity of illumination. For more information, see the DOE fact sheet "Establishing LED Equivalency" at www.ssl.energy.gov/factsheets.html. Although prices for some LED lighting products remain relatively high in comparison to less-efficient incandescent lamps, many of these LED products will pay for themselves over time through the energy they save. What's more, their cost-effectiveness continues to improve with each new generation of products.

***Q:** I'm already using some CFLs. Should I replace them with LED lamps?*

A: If you're satisfied with the quality and quantity of light produced by your CFLs, you may want to wait until they've stopped working before replacing them with LED lamps. Currently available LEDs may be only marginally better than CFLs in terms of life-cycle environmental impacts, so it might be preferable to avoid prematurely adding CFLs to the waste stream by using the ones you already have for as long as possible. In addition, the incremental energy savings that result from switching to LED lamps may not result in an attractive (i.e., short) payback period. However, because the study made conservative assumptions regarding the currently available LED lamp, it may be that some of those on the market outperform CFLs by a wider margin than what was indicated in the report.

***Q:** Would I be exposed to any toxic materials if I accidentally broke an LED lighting product inside my house or office?*

A: Whereas certain precautions are warranted for handling broken CFLs (see http://epa.gov/cfl/cflcleanup.html), there do not appear to be any reliable data suggesting that LED lighting products – whether

broken or intact – merit any special treatment during handling.

***Q:** Will I be able to simply throw LED lighting products in the trash once they've stopped working, or will they require a special means of disposal?*

A: Given that most LED lighting products incorporate electronic components, it would be best to utilize electronic waste (e-waste) recycling services if they're already offered for cell phones, computers, etc. Such recycling may even be required in some jurisdictions. In Part 3 of the ongoing DOE study, a variety of lighting products are being tested to determine whether any of them do in fact contain hazardous metals in concentrations exceeding Federal or California thresholds for landfill waste.

***Q:** Many LED lamps have large aluminum heat sinks for thermal management. Did the study's Part 2 analysis take into consideration the substantial amount of energy required to produce new aluminum? Also, did it assume that the heat sinks would feature recycled content and/or would be recycled at the end of their life?*

A: The study conservatively assumed that the LED products contained a minimal amount of recycled content and had a 20-percent recycling rate at end of their life. However, it should be noted that that the energy used to manufacture the products – including their aluminum heat sinks – was dwarfed by the energy used by the lamps over the course of their service life.

***Q:** The Part 2 report predicts that future LED lamps will have much lower environmental impacts than either CFLs or incandescent lamps. If I want to minimize the environmental impacts of my purchases, shouldn't I just wait a few years to buy better LED lamps?*

A: The analysis concluded that the life-cycle environmental impacts of a given lamp are primarily a function of the energy it uses over the course of its service life. Consequently, the additional energy used by incandescent lamps while waiting for more advanced LED lamps might outweigh any environmental benefit.

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