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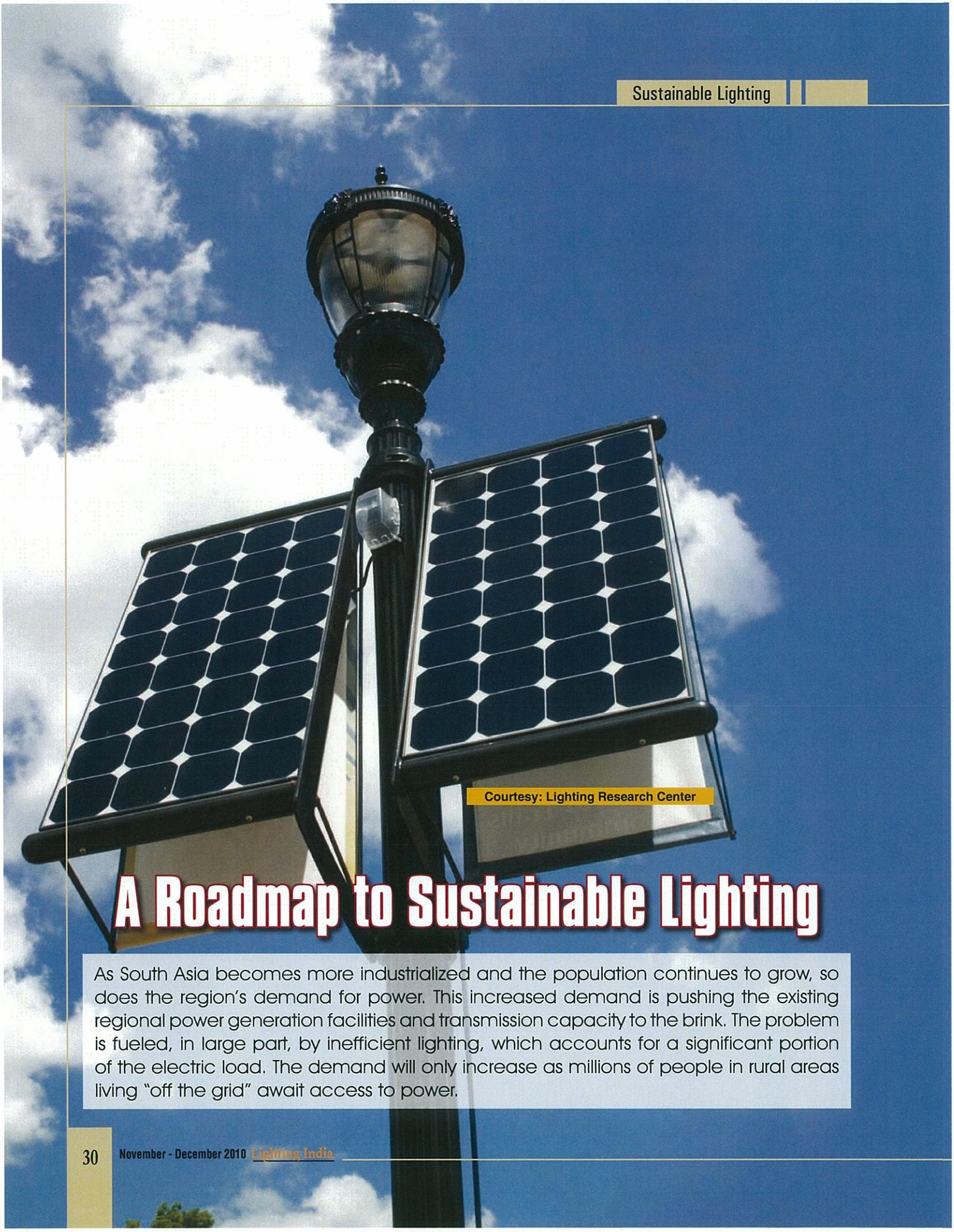
A Roadmap to Sustainable Lighting
- Dr Nadarajah Narendran & Ramani Nissanka

Powering LEDs from Coin Cell Batteries
- Fabien Franc

A Chary Publication



Courtesy: Lighting Research Center

A Roadmap to Sustainable Lighting

As South Asia becomes more industrialized and the population continues to grow, so does the region's demand for power. This increased demand is pushing the existing regional power generation facilities and transmission capacity to the brink. The problem is fueled, in large part, by inefficient lighting, which accounts for a significant portion of the electric load. The demand will only increase as millions of people in rural areas living "off the grid" await access to power.

Interestingly, however, lighting may be the key to lifting the burden on power generation facilities and leading the way to regional transformation, economic growth and energy security.

In April 2009, the US Agency for International Development's (USAID's) South Asia Regional Initiative for Energy (SARI/E) program partnered with the Sri Lanka Sustainable Energy Authority (SLSEA) and Rensselaer Polytechnic Institute's Lighting Research Center of Troy, New York, USA, to create a Regional Center for Lighting (RCL). The RCL's purpose is to advance sustainable lighting and make it affordable in South Asia as a means to improve the well-being of citizens and countries within the region. Headquartered in Colombo, Sri Lanka, the RCL is designed to support collaborative initiatives with Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Sri Lanka and Pakistan. Through these efforts, the RCL hopes to bridge the vital pathways of science and education with manufacturing and quality assurance to create a commercial infrastructure designed to offer energy security and promote economic development throughout the region.

Improving consumer lighting is a priority in South Asia, where a low to middle-income family's highest household expense may be electricity for lighting. In some cases, this expense is passed on to the government, which may provide subsidies or even free electricity to permit families to have access to lighting. And other options, like using kerosene for lighting, are sometimes even more expensive than electricity. Solid-state lighting (SSL) technologies, particularly light-emitting diodes (LEDs), hold promise for alleviating the region's energy problems while also cleanly and efficiently providing lighting to those living "off the grid" without access to electricity. Properly designed LED lighting systems can work fluidly with off-grid or on-site renewable energy power generation systems to meet the region's lighting needs, as well as reduce energy demand and costs from homes and businesses that are connected to the grid.

While SSL technology is a sustainable alternative that has made its way to the marketplace in most parts of the world, South Asia remains an untapped region for this technology. Through the RCL, the region has a champion to help steer the course toward development of a new, vibrant lighting market in South Asia and, ultimately, energy security.

In its first year, the RCL established the necessary building blocks, an outreach education network, testing and demonstration programs on which to construct an improved energy infrastructure and commercial network. The goal is to increase the knowledge of those who can lead the region's transition to sustainable lighting.

Education and Training

In order to establish the necessary building blocks, the RCL works closely with Rensselaer's Lighting Research Center (LRC), which was selected to be RCL's "knowledge partner." In this role, the LRC provides information, technical training, and guidance, and works to bring together public and private enterprises to focus on solutions to increase consumer accessibility to safe and energy-efficient lighting.

Courtesy: Regional Centre for Lighting

The LRC is the leading university based research center devoted to lighting and offers the world's premier post-graduate education in lighting, and provides training programs for government agencies, utilities, contractors, lighting designers, and other lighting professionals. Since 1988, the LRC has built an international reputation as a reliable source for objective information about lighting technologies, applications, and products. LRC programs cover a range of activities, including both laboratory testing of lighting products and real-world demonstration and evaluation of lighting products and designs, while also conducting research into energy efficiency, new products and technologies, lighting design, and human factors issues.

In the last year, the RCL has held regional training sessions in South Asia led by professors from the LRC, including a five-day Sustainable Lighting Institute and a three-day LED Lighting Seminar for Manufacturers. These sessions were held in Sri Lanka with manufacturers, engineers, architects, designers and planners attending from throughout South Asia and beyond. In total, nearly 60 participants from thirteen different countries attended these two sessions and, upon successful completion, earned continuing education units from Rensselaer Polytechnic Institute along with a Continuing Education Certificate from Rensselaer's Lighting Research Center.


Courtesy: Lighting Research Center

During the Sustainable Lighting Institute, LRC professors shared the newest advances in energy-efficient lighting design, technology and measurement. The course provided future problem-solvers and leaders with a comprehensive understanding of the region's energy and lighting issues, and targeted the latest advances in lighting technology best suited to meet those challenges. They learned about systems and applications for lamps, ballasts and luminaires, including the most recent information on LEDs and LED system integration. Participants also received guides and tools to assist in selecting lighting technologies. Course content included information and cutting-edge applications for both residential and outdoor lighting, advanced daylighting design concepts and sustainability techniques, as well as the most recent technology in lighting controls systems. The professors walked through the economic analysis of lighting and taught participants how to evaluate a lighting design and installation, including life cycle cost/benefit analysis, return on investment calculations, and ways to evaluate lighting quality in a space. Participants also reviewed human factors in lighting and learned how people respond and react to light and different lighting schemes.

Recognizing the promise that LED technology holds for the region, the LRC develop a curriculum and worked with the RCL to develop the LED Lighting Seminar for Manufacturers, designed to help regional manufacturers identify the strengths and weaknesses of LED lighting technology and to encourage manufacturers to locally produce high-quality LED lighting systems. Participants in the course learned the basics of LED technology and LED system integration issues involving electrical, optical, and thermal characteristics of LEDs. Attendees were able to measure and evaluate LEDs and LED systems, and compare LED technologies from a variety of manufacturers. The participants also designed, built, and evaluated their own LED fixtures. In addition to technical sessions, those in the class heard from experts who shared information about current developments within the global LED market and insight into possible market opportunities.

Designed to be the lighting education hub in South Asia, the RCL continues to build and plan its course offerings to further support sustainable lighting activities. In addition, the LRC has been assisting the RCL in designing a state-of-the-art education and demonstration facility in Colombo, Sri Lanka.

Quality Assurance

Presently, incandescent and CFL lighting technologies are the dominant light sources in South Asian homes. As new LED technologies begin to enter the region, any prevalence of inferior products could spoil the marketplace and hinder widespread acceptance of LEDs. To safeguard the technology from market spoilers, the LRC has been assisting the RCL in establishing a new, first-of-its-kind LED testing laboratory in South Asia. The facility will aid regional manufacturers in developing high-quality LED products and assist government agencies in implementing quality control.

RCL also has plans for large-scale field evaluations of sustainable technologies for both on-grid and off-grid lighting products to assess their feasibility.


Courtesy: Regional Centre for Lighting

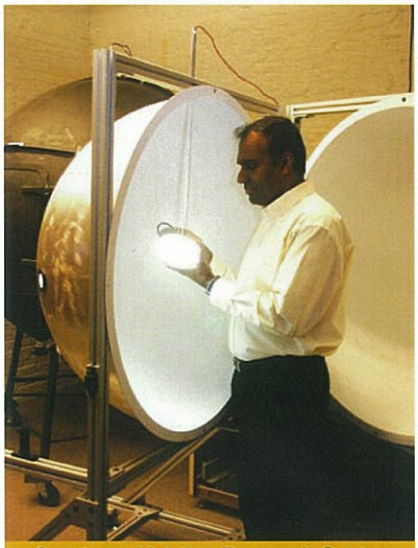
Dynamic Commercial Framework

Achieving and maintaining sustainability throughout the region will involve a three-pronged approach addressing energy, the environment, and the economy. Therefore, the RCL plans to support this dynamic framework through the design of regional manufacturing programs that foster quality-controlled production of lighting products in combination with the development of performance criteria for energy-efficient lighting. Ultimately, these programs will promote accessibility to sustainable lighting products that are affordable.

This effort will require strategic industry collaboration both regionally and globally, so the LRC will leverage its partner alliances to help the RCL develop South Asia's SSL commercial infrastructure.

South Asia Lighting Transformation

SARI/Energy is co-sponsoring the South Asia Lighting Transformation Forum, January 17 to 19, 2011, in Male', Maldives, in cooperation with the RCL and SLSEA, the State Electric Company Ltd of Maldives, and the LRC to shape South Asia's emerging lighting market.


Courtesy: Lighting Research Center

Through the world renowned LRC's Solid-State Lighting (SSL) Program, scientists conduct research, testing and outreach education to enhance LED technology, overcome LED market barriers, and help LED technology to gain acceptance for general illumination purposes. As "knowledge partner," the LRC used its SSL technology and market expertise to help structure the January forum and has drawn on its US and global alliances to bring together key industry stakeholders to participate.

Global leaders in government, industry, finance, and academia have committed to attending and working collectively to craft a lighting technology roadmap, as well as develop recommendations to establish a dynamic commercial framework that benefits the people of South Asia and paves the way to energy security through SSL. The global group of experts gathering at the South Asia Lighting Transformation Forum will discuss the latest in SSL technologies and applications and business models and policies to encourage their adoption. Respected thought leaders will present information on SSL market needs and opportunities, detail ways manufacturers can participate and help transform the region, and outline opportunities for SSL funding and collaboration activities.

Then, through interactive breakout sessions, the group will outline a five-year lighting technology roadmap for transforming South Asia lighting, laying the foundation on which to build a dynamic SSL market.

After the forum, in support of the roadmap initiative, the LRC will continue to guide the RCL in development of research, testing and education programs designed to promote the production and use of high-quality LED systems and technologies throughout the region. In addition, the LRC will continue to spearhead collaborative industry initiatives to help grow and support South Asia's SSL commercial infrastructure.

The South Asia Lighting Transformation Forum and the resulting lighting roadmap will be a defining moment for the region. The RCL, with support and guidance through LRC and a strategic global network of experts, is prepared to see the plans through to fruition.

Please visit www.rclsa.net for more information on the RCL and the upcoming South Asia Lighting Transformation Forum. ■


Dr Nadarajah Narendran

Dr Nadarajah Narendran, PhD, is director of research at the Lighting Research Center and an associate professor in the School of Architecture at Rensselaer Polytechnic Institute, Troy, New York. He is well known in the lighting industry for his pioneering research and educational activities in the field of solid-state lighting. His research focus includes LED lighting performance, packaging, and application. He leads a team of researchers and educators that conduct programs to accelerate the development and market transformation of this technology. He also organizes the ASSIST program, the Alliance for Solid-State Illumination Systems and Technologies. ASSIST is an international organization of researchers, manufacturers, and government agencies working to overcome the technological hurdles facing LED lighting and help speed its market acceptance.


Ramani Nissanka

Ramani Nissanka, MBA, is a chartered electrical engineer. She has over two decades experience in working with utility, private sector and development sector in Sri Lanka and the South Asia Region. Presently, she is the Director of the recently established Regional Centre for Lighting (RCL), hosted within the Sri Lanka Sustainable Energy Authority.