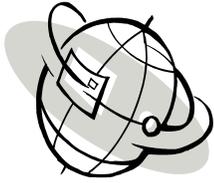


# Energy Issues



## IEP Newsletter –

### Focus on Innovation – Cree Lighting

(Following is the first in a series of articles highlighting companies with a focus on technology and products related to enhanced energy efficiency.)

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Cree CR22 Fixture



Cree Recessed Fixture

Much as Apple has been a driving force in the development of computers, cellular phones and leisure technology, Cree, Inc. has been in the forefront in light emitting diode (LED) lighting. Some may be unfamiliar with their name, but most are certainly familiar with their products. Cree's family of products include LED lamps and fixtures, blue and green LED chips, high-brightness LEDs, lighting-class power LEDs, power-switching and radio frequency (RF) devices.

Formed in 1987 by researchers from North Carolina State University, Cree, Inc. is a multinational market-leading manufacturer of LED and semiconductor products for power and RF applications. With strong emphasis on research and innovation this Durham, NC based company rapidly rose to the top of the LED lighting field, with a decidedly international flavor.

#### International Expansion:

A major international effort was the opening of a subsidiary in Hong Kong (Cree Asia-Pacific Ltd.) in 2005. Two years later Cree acquired Cotco Luminant Device Ltd. Of Hong Kong. In 2009 Cree's international operations expanded with the purchase of a 592,000-square-foot (55,000 m<sup>2</sup>) facility in Huizhou, Guangdong Province, China, their first chip production facility outside of North America. That same year they



New LED Street Lighting Line

announced an expansion of their Durham, NC operation. This was followed by expansions in Europe (Cree-Europe) and Australia (LED-Australia).

#### Product Development:

**LED Lighting** – Cree has become known for its application of innovative materials, such as silicon carbide (SiC), in its products. Over the past 20 years they have continually focused on improving materials and technology to provide higher efficiency and more environmentally friendly alternatives to current sources.

Following are selected LED highlights:

- 1989 – Cree first brought the blue LED to the market.
- 2008 – Product lines expanded into LED lighting applications, such as ceiling fixtures.
- May 2011 – Cree demonstrated efficacy of 231 lumens per watt for white LEDs.
- 2011 – Cree expanded into outdoor lighting by acquiring Ruud Lighting, Inc., a company already recognized as a leader in outdoor LED lighting
- March 2013 – Cree started offering LED light bulbs equivalent to the standard 40 watt and 60 watt incandescent lamps.
- August 2013 – Cree announced a major breakthrough in the area of LED street lighting. Their XSPR™ LED Residential Street Light line provides enhanced color, while requiring over 65% less energy. The 25 watt and 42 watt fixtures

## Focus on Innovation – Cree Lighting (cont.)

are designed to replace up to a 100 watt high pressure sodium fixture at a cost as low as \$99US for common applications. In addition to the low cost, the fixtures are backed by a 10 year warranty. This should be a significant benefit for cities and utilities. Initial indications are that the simple payback for replacements could be less than one year.

**Power and Wireless Devices** – Cree is also a major manufacturer of semi-conductors used in power conversion and wireless communications. Their product

line offers enhanced efficiency and smaller size in applications such as network-server power supplies, solar inverters and industrial motor drives.

High-performance wireless devices developed by Cree offer increased power and new levels of energy efficiency for applications such as cellular and radar signals.

More information on Cree, Inc. and its products can be found at their website [www.cree.com](http://www.cree.com).

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*1989 – Cree first brought the blue LED to the market*

## Cooling Towers: Save Water, Save Money

*“This abridged article previously appeared in the Boone REMC Power Talk newsletter, and is reprinted with permission.”*

Cooling towers are widely used in commercial and industrial facilities in chillers, air-conditioning systems and process cooling equipment. Cooling towers regulate temperature by removing heat from circulating water, primarily through evaporation. By design, cooling towers use a significant amount of water. Proper management of that water can increase the efficiency and life span of the cooling tower and the cooling equipment; reducing your operating and maintenance costs.

Water leaves a cooling tower in four (4) ways:

- **Evaporation** – This is the main function of the tower and the way heat is transferred from the circulating water to the environment.
- **Blowdown** – When water evaporates from the tower, dissolved solids (such as calcium and magnesium) are left behind, causing scaling and corrosion. The buildup of solids is controlled by draining off the water from the system.
- **Drift** – A small quantity of water may be carried from the tower as mist or small droplets. Drift loss is small compared to evaporation and blowdown.

- **Leaks and overflows** – Leaks or overflow from the tower basin or structure can result in significant water loss.

Water losses from evaporation, blowdown, drift and leaks must be replaced by makeup water.

### Reducing water demand

A key measure of cooling tower operation is *cycles of concentration*, which is the ratio of the dissolved solids in the blowdown water compared to the makeup water. Increasing cycles of concentration will reduce blowdown as well as the demand for makeup water; improving overall water efficiency. The following are strategies for increasing cycles of concentration:

1. Install a side-stream softening system to remove solids from makeup water continuously; this allows your system to operate at higher cycles of concentration.
2. Implement a comprehensive air handler coil cleaning and maintenance program. Dirty coils force the chilled water system to work harder to maintain the set temperature, increasing energy and water consumption.



*Induced Draft Cross Flow  
Site-Built Tower*



*Induced Draft Tower*



*Forced Draft Tower*



Institute of Energy Professionals



Natural Draft Cooling Tower

*“In addition to increasing cycles of concentration, you can improve cooling tower water efficiency by using alternative sources for makeup water.”*



Modular Fiberglass Tower

### Cooling Towers: Save Water, Save Money (cont.)

3. Consider alternative water treatment options, such as ozonation or ionization, to reduce water and chemical usage. Be careful to consider the life-cycle cost impact of such systems.
4. Install covers to block sunlight penetration. Reducing the amount of sunlight on tower surfaces can significantly reduce biological growth such as algae.
5. For cooling towers with a capacity of more than 100 tons, install an automated chemical feed system, which controls blowdown by conductivity and then adds chemicals based on makeup water flow. These systems reduce water use while controlling against scale corrosion.
6. Use acid treatment such as sulfuric or ascorbic acid where appropriate. When added to recirculating water, acid can improve the efficiency of a cooling system by controlling scale buildup.

Water Reuse:

In addition to increasing cycles of concentration, you can improve cooling tower water efficiency by using alternative sources for makeup water. Examples of

reuse include collecting condensation from air handlers and then pumping it back to the tower system makeup, or implementing a reverse osmosis system for blowdown.

Proper management is essential to ensure safety and reduce the possibility of damage to the system; make sure workers are fully trained in handling acids.

Condensed water collected from air handlers is a good source of high-quality makeup water because it is relatively pure and will require little additional treatment. These systems are relatively simple to design and are not typically capital intensive to install.

Reverse osmosis (RO) is common in applications with high water purity requirements. The blowdown water is sent into an RO system, which purifies most of the water for reuse and concentrates the dissolved solids into a smaller waste stream. RO systems are complex and expensive to install and operate. They can be a cost-effective option in areas where water resources are limited, or where discharge regulations restrict water blowdown.

### Be a Contributor

The goal of the IEP Newsletter is to provide PEMs with timely useful information to help them better manage energy resources and control utility expenditures. To that end we would like your input. Let us know what type of information, articles or updates you would like to see in future Newsletters. Also, if you would like to contribute an article about a recent project or application of technology, all submittals used *will apply towards PEM renewal accreditation*. For additional information on being a contributor or recommending future topics contact Dan Mull with your suggestions.



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