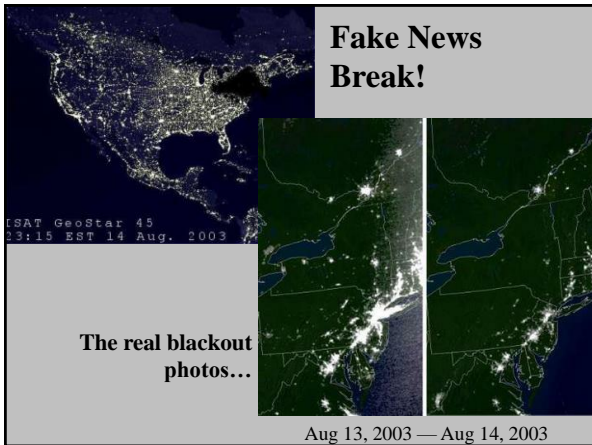


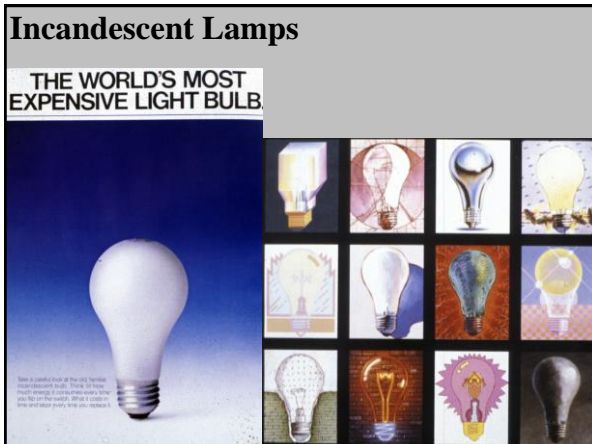
Electric Lighting Sources: From Edison to LEDs



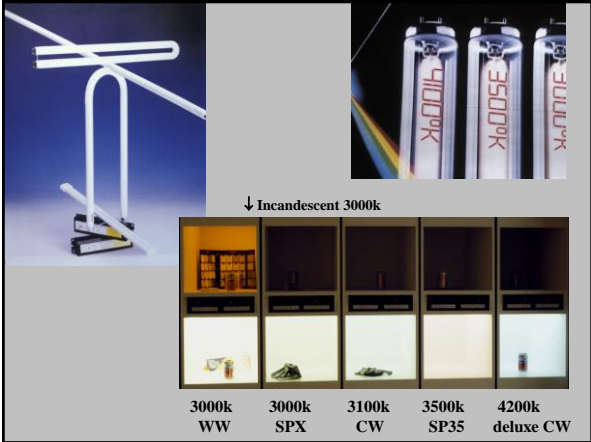
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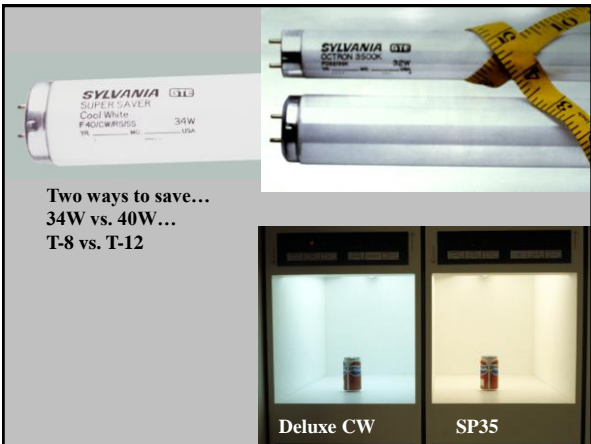
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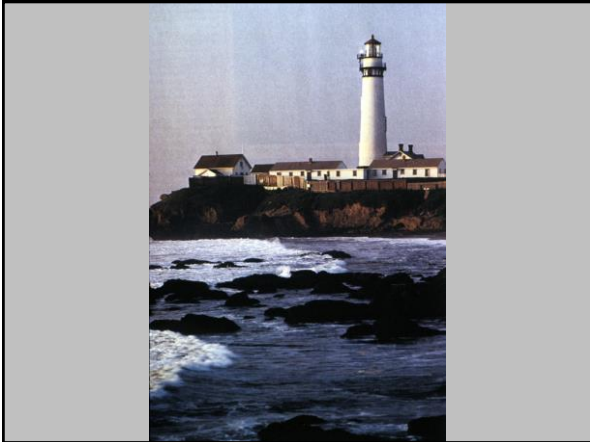
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Light Emitting Diodes

Light Emitting Diodes have many inherent advantages for lighting, and are being used for colored special effects and low level orientation/security.

- Long lifetime for sealed for life applications (50,000–100,000 hrs)
- Shock resistance for reliability
- Range of colors, obviating need for filters in special effect applications
- Low volume and weight for discrete luminaire design
- Low voltage for safe operation
- Instant (re)start flashing possible
- Dimming to 5% for optimum brightness
- No mercury, environmentally sound

Die version:
 Greater than a
 micron in diameter
 the die is made
 in the form of a
 square.
 The voltage, diode
 current and power
 density are
 controlled by
 etching the top
 surface of the die.

In the fast expanding world of LED technology, the new Philips Xitanium™ LED Power Drivers provides a simple promise: one miniaturised driver for all LEDs, current or pulsed, any brand, any type, any size.

26

• Small
• Flexible
• Colors

27

Incandescent wannabes... and fusion lamps (CFL/LED)!

PRODUCTS

NEW OR IMPROVED

ADDITIONAL LED LIGHTS...
 100% ENERGY EFFICIENT
 100% DIMMABLE
 100% ENERGY SAVING
 100% ENVIRONMENTAL FRIENDLY
 100% DURABLE
 100% RELIABLE
 100% SAFE
 100% HEALTHY
 100% GREEN

28

Tired of Changing Light Bulbs?

Switch to the Dynasty® LED S14 lamp today.
 It will last 35 times longer than a standard incandescent light bulb guaranteed.*

35 Incandescent Lamps
(1,000 Hours Lifetime)

5 CFL Lamps
(7,000 Hours Lifetime)

1 Dynasty LED S14 Lamp
(35,000 Hours Lifetime)

Circle 06
www.caogroup.com/ssl
 *Based on a 1,000 hour average incandescent light bulb.

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 West Jordan, UT 84084 801.256.9287 (fax)

CAO GROUP INC.
 Illuminating LED's for Life

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LEDs operate on DC electricity in either a constant-current or constant-voltage circuit

AC POWER SUPPLY FROM BUILDING → 24V DC → DRIVER → LED → LED → LED

CONSTANT-CURRENT CIRCUIT

AC POWER SUPPLY FROM BUILDING → 24V DC → VOLTAGE REGULATOR → DRIVER → LED → LED → LED

CONSTANT-VOLTAGE CIRCUIT

Diagrams illustrating the relationship of the power supply, LED driver, and individual LEDs for a constant-current circuit (top) and a constant-voltage circuit (below).

The drivers create waste heat as AC is converted to DC

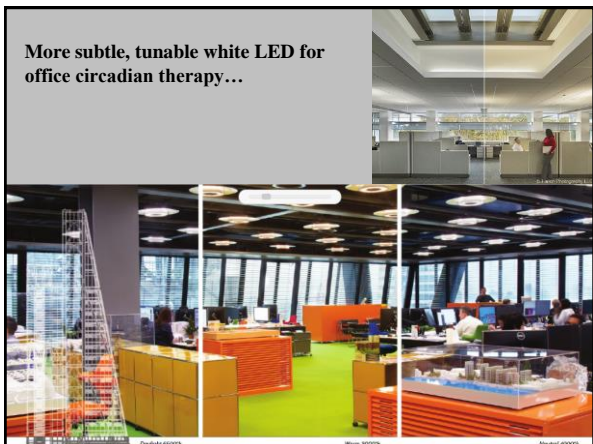
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This Week in Tech: World Trade Center to Get 13,000 New Light Bulbs
 Plus, autonomous floor-cleaning robots at the University of British Columbia, bricks made of human urine, and more design-tech news from this week.

By KATHARINE KEANE

2 Nov 2018



Courtesy Port Authority of New York and New Jersey
 Oculus at the World Trade Center


As part of a \$7.9 million contract with Baltimore-based energy company Constellation, more than 13,000 light fixtures at the World Trade Center in New York will be switched to LED sources in an effort to reduce the structure's carbon footprint by 4,700 metric tons annually—the equivalent of removing 1,000 passenger vehicles from the road. According to a recent release, the Port Authority of New York and New Jersey could save more than \$715,000 in the first year of the decade-long contract, with continued savings over time.

Bottom Line:

- Reduce CO2 by 4700 metric tons/year (1,000 cars)
- Save \$715,000 first year

43

The next evolution: OLEDs
 OLEDs (Organic Light Emitting Diodes) work similarly to LEDs, but they use organic semiconductor material.



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GE Lighting Solutions

Things are looking up
 See why heads are turning, visit www.gelightsolutions.com/up



TYPICAL OLED ARCHITECTURE



Legend

1. Emitted RGB light	5. Organic compounds
2. External light-extraction film	6. Cathode
3. Glass substrate	7. Dielectric
4. Anode	8. Glass cover

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