Lighting, Controls and Energy Savings

How Architectural Engineers Impact Building Energy Use
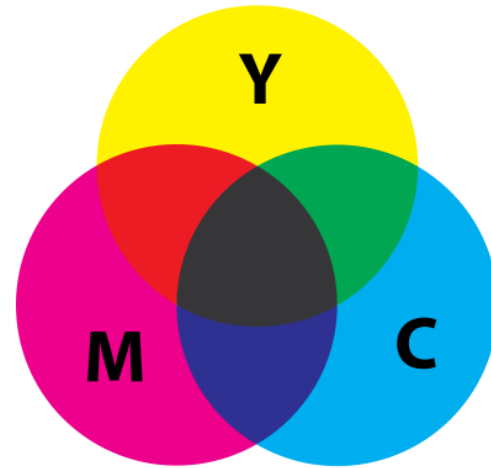
Visible Light

0.01nm   1nm   100nm   1mm   1cm   1m   1km

400nm   700nm
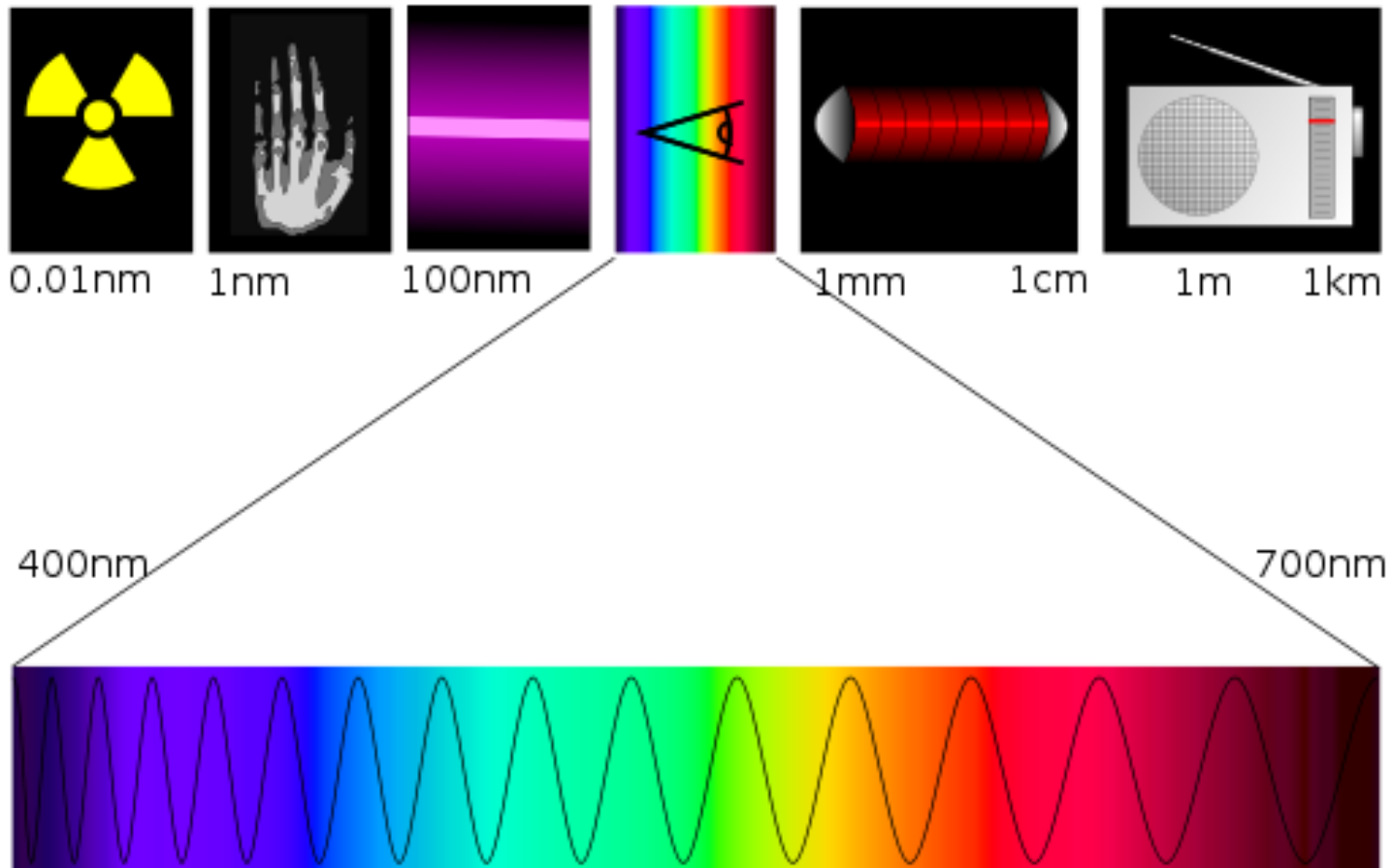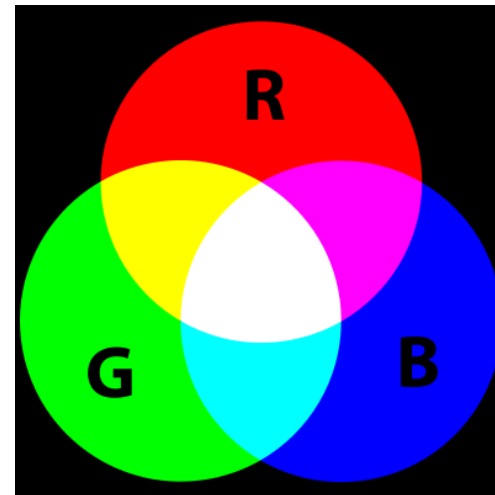
Visible Light

- Subtractive color mixing
  - ➢ Paint or Ink
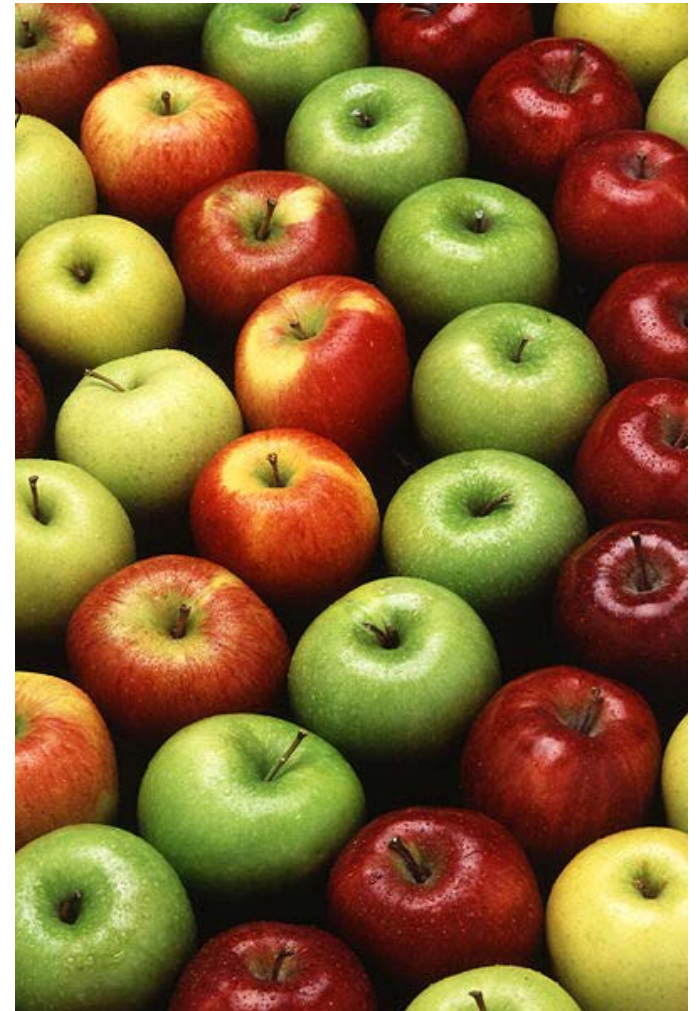
- Additive color mixing
  - ➢ LIGHT!

Light Source Technology

Did you know? Sunlight has all colors of the rainbow and appears **WHITE**
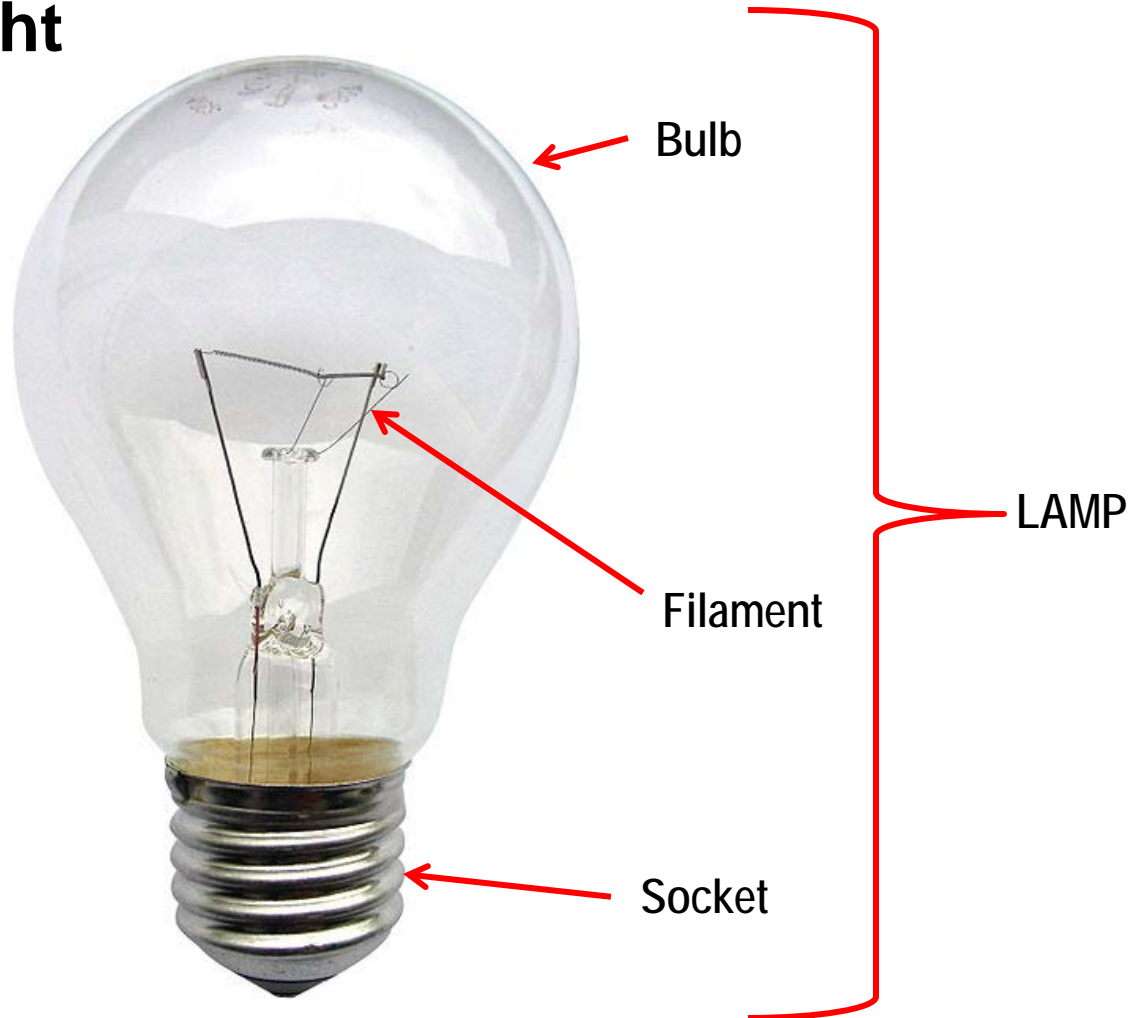
Visible Light

- Reflected light is what we **"SEE"**

- The **RED** apple is red because it absorbs all light except **RED**

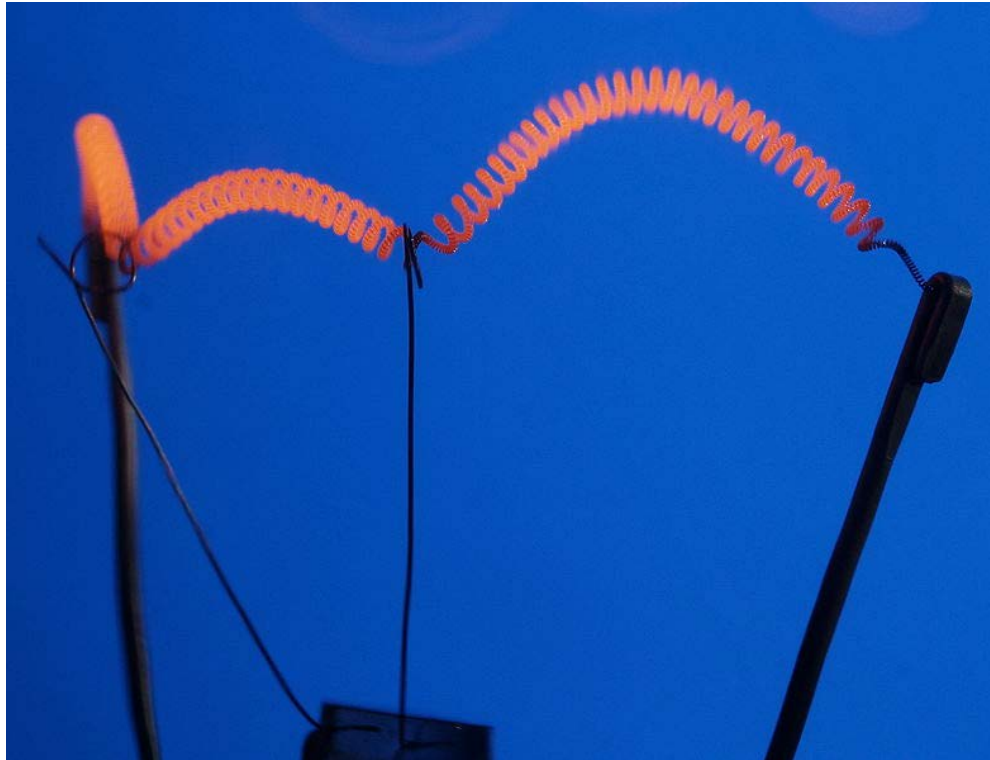- The **GREEN** apple is green because it absorbs all light except **GREEN**

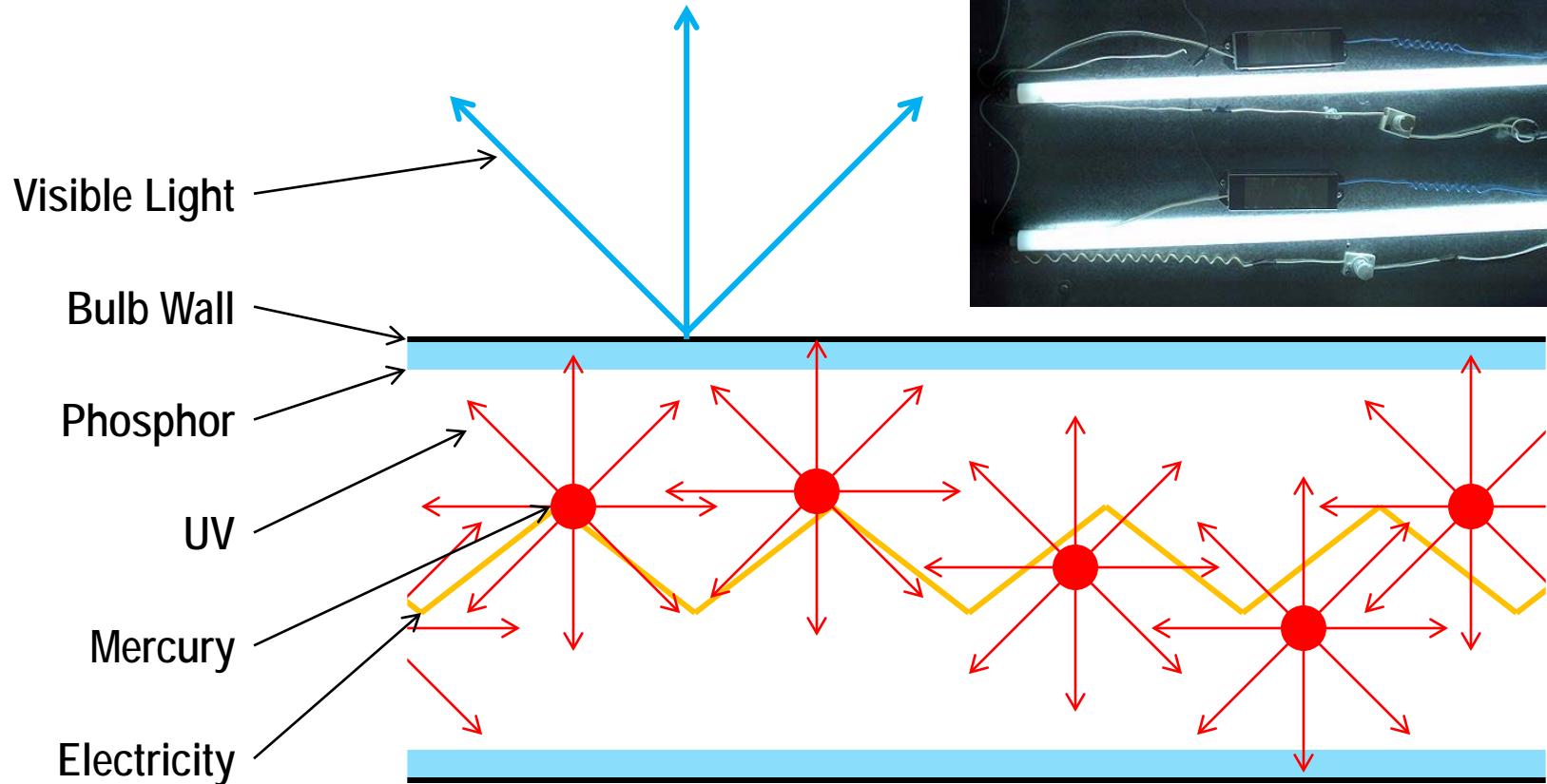# Light Source Technology

Electric Light

Bulb

Filament

Socket

LAMP

Light Source Technology

Incandescent Light

Light Source Technology

Fluorescent Light

Visible Light

Bulb Wall
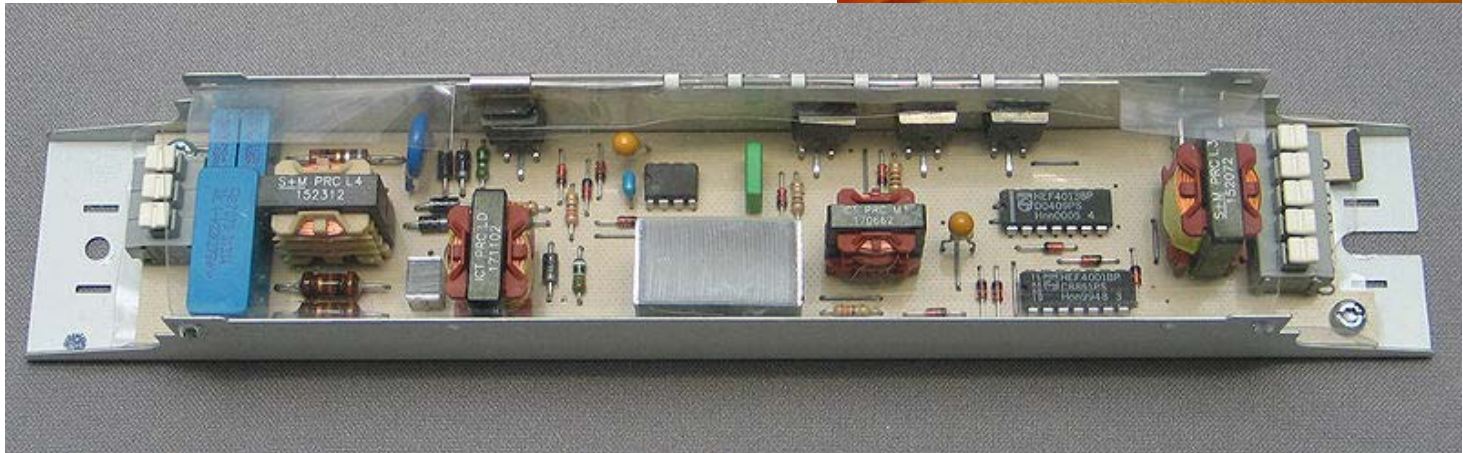
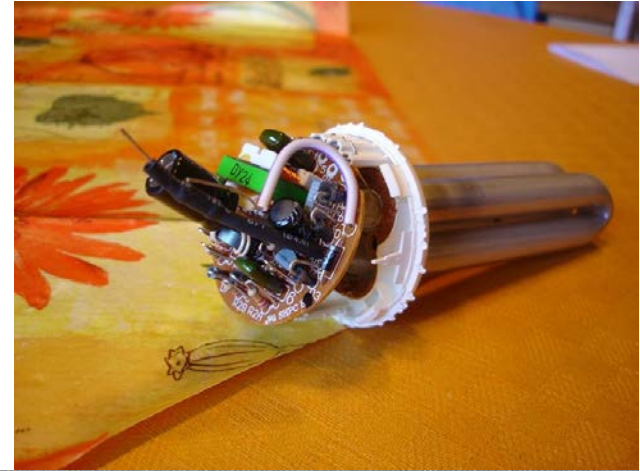Phosphor

UV

Mercury

Electricity

Light Source Technology

Compact Fluorescent Lamps (CFLs)

Light Source Technology

Fluorescent Ballast
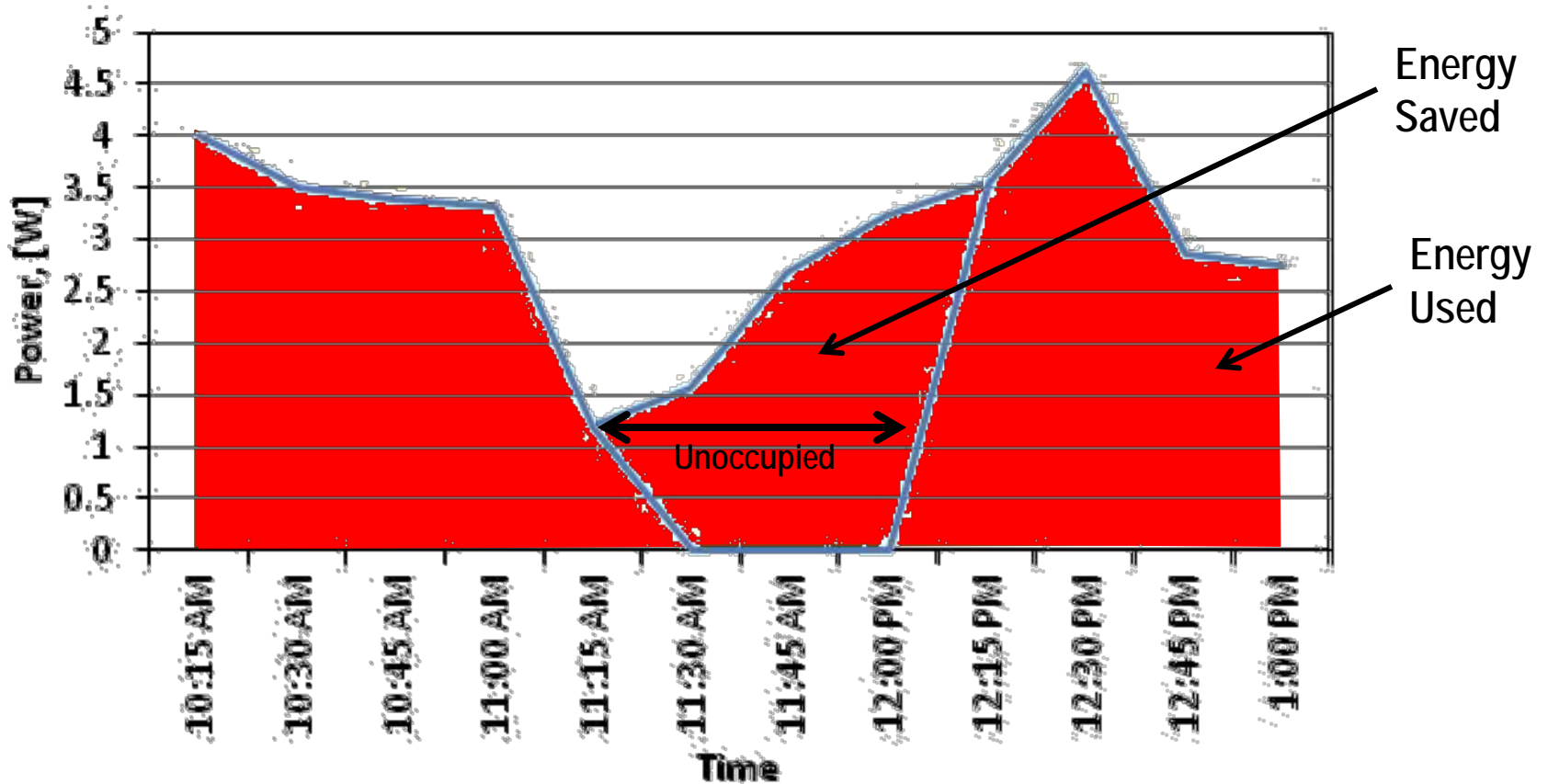
Light Source Technology

Light-Emitting Diodes (LEDs)

emitted light

cathode → p-layer

diode → active region

n-layer

substrate

anode

transparent plastic case

terminal pins
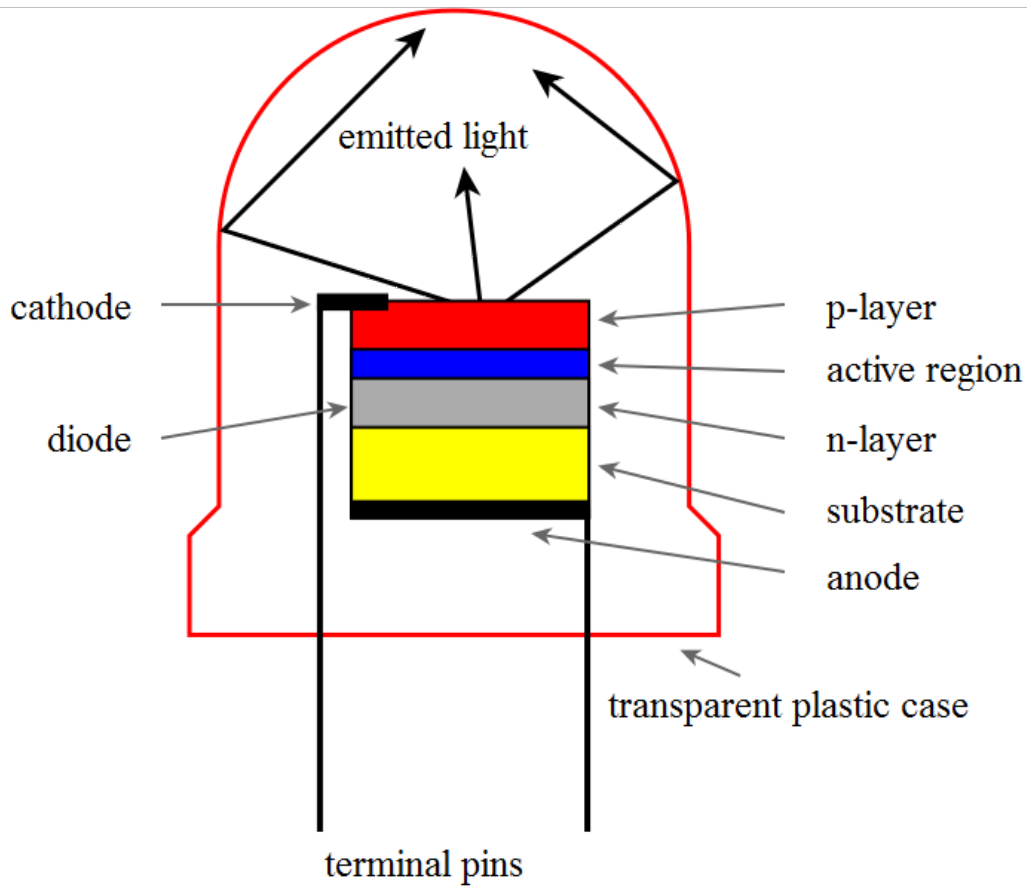
Lighting Controls

Power vs. Energy

Energy Used
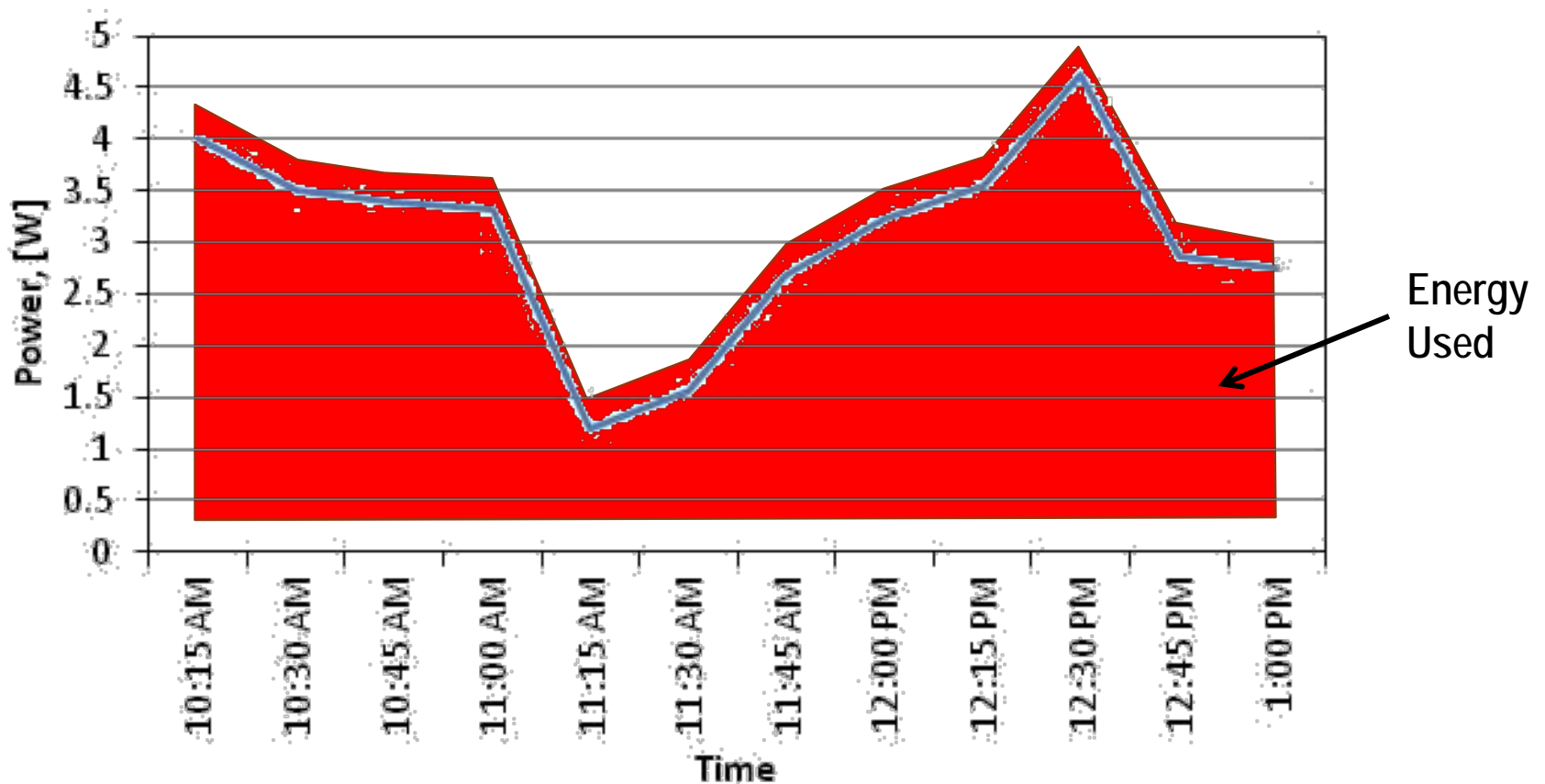
Lighting Controls

Saving Energy through Occupancy Controls

Lighting Controls

Passive Infrared (PIR) Occupancy Sensors

Lighting Controls

Ultrasonic Occupancy Sensors

Lighting Controls

Daylighting

Lighting Controls

Photocell