Energy

Sustainable Floridians 2016 Class

Electricity 101

- Electricity, while often difficult to visualize due to its nature, is easy to grasp as it’s very similar to water flowing through a garden hose
  - Voltage (measured in volts) is analogous to water pressure (measured in pounds per square inch)
  - Current (measured in amps) is analogous to the flow of water (measured in gallons per minute)
  - Power (measured in watts) equals volts multiplied by amps
  - Energy is an amount of power for a specified time, so volts x amps = watts, and 1 watt for 1 hour = 1 watt*hour
  - We are billed approximately $0.10-0.12 per kWh, which is 1,000 watts for 1 hour
  - Another way to think of it is 1 watt used 24/7 equals about $1 per year

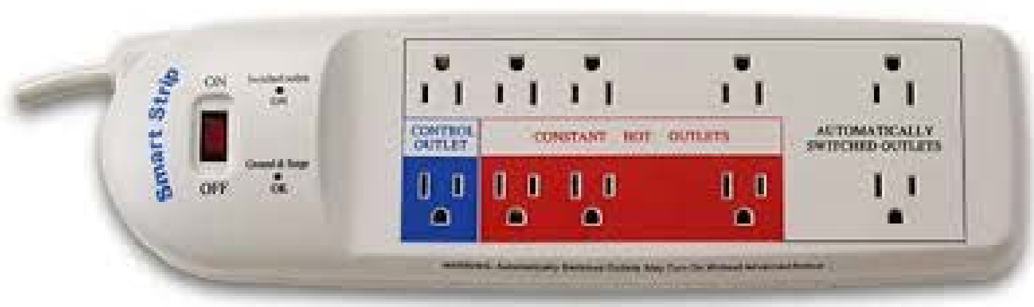
- Cost to run various items
  - A blow dryer may use 1,500 watts on high, running it for 10 minutes one day would cost
    - 1,500/1,000 * 10/60 * 0.11 = <u>$0.03</u>
  - An A/C unit may use 3,000 watts, running it for 4 hours one day would cost
    - 3,000/1,000 * 4 * 0.11 = <u>$1.32</u>
  - A new 50” LED TV may use 50 watts, running it for 4 hours per day over the year would cost
    - 50/1,000 * 3 * 365 * 0.11 = <u>$6.02</u>
  - An 800 lumen light bulb run for 4 hours per day over the year, would cost
    - 60 watt incandescent – 60/1,000 * 4 * 365 * 0.11 = <u>$9.64</u>
    - 13 watt CFL – 13/1,000 * 4 * 365 * 0.11 = <u>$2.09</u>
    - 8 watt LED – 8/1,000 * 4 * 365 * 0.11 = <u>$1.28</u>

Electricity “Vampires”

- Electricity “Vampires,” or vampire voltages, refer to devices that use electricity when sitting idle and not performing their designed function
- Examples
  - TV’s, DVD/Blu-ray players, computers, printers, etc. drawing current while turned off
  - Anything that looks like these
  - Vampires can easily use 1-10 watts each


AC/DC transformer (aka “power supply”)

- Most of us have many of these and the cost adds up fast
  - Remember 1 watt used 24/7 costs about $1 per year
  - Therefore 50 watts of vampires cost about $50 per year
  - It’s likely 5-10% of your monthly electric bill is made up of these
- Unplugging is the least expensive way to save
- The easiest method is using a wall switch or a smart power strip



Lighting

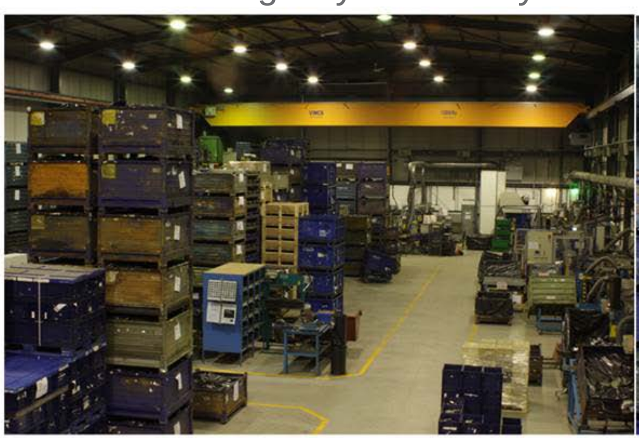
- There are three primary types of lighting technology

  - Original bulb, light emitted from heated wire
  - Very energy inefficient, generates mostly heat, 1-5k hour life

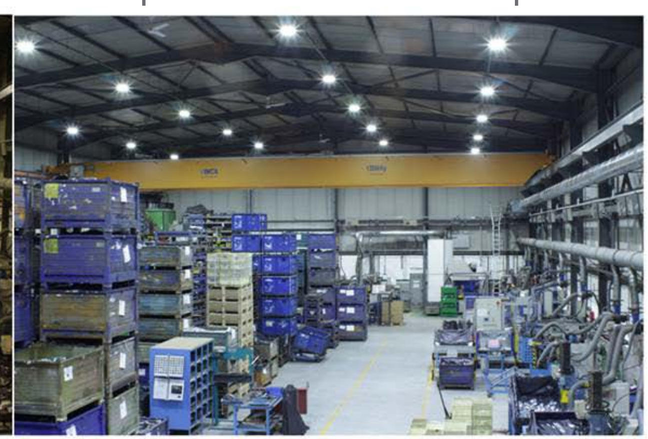
  - Light emitted from vaporized mercury striking phosphor coating, hazardous waste
  - 75% less energy than incandescent, 5-40k hour life

  - Electronic approach to generating light, very little heat, no hazardous waste, better quality of light
  - 90-95% less energy than incandescent, 25-200k hour life, dimmable, instant on, no cycling degradation

- LED has come a long way in recent years and has proven itself as a best practice



Before (400W High Pressure Sodium)



After (150W LED)

HVAC

- Rule of thumb is that every 1 degree you change your thermostat (down when heating and up when cooling) you reduce that portion of your energy bill by 3%
- Most of us are not in our homes 24/7, so significant savings can be had by adjusting the temperature when you're away
- A programmable thermostat makes this easy
  - Doesn't need to be expensive
  - The Nest is great and does offer remote connectivity, but \$30 can buy an effective programmable thermostat that will save you pretty much the same amount as a Nest


- Recognize that the human body is quite adaptable
  - While you may not be ready now to have a 76 degree setting in summer, moving it 1 degree a year will go unnoticed by practically everyone and allow you to head in a good direction

Water

- Saving water is often a win-win situation, because there are savings in the gallons reduced and also savings in electricity and chemicals (e.g. well pumps, water softeners, hot water heaters)

- Two areas are easy to find savings in the home when focusing on energy to heat water
  - Hot water heater temperature setting
    - There are various conflicting reports when it comes to settings (120 or 140 degrees), but the WHO says 90% of Legionella will die within 2 minutes at 140 degrees, in 80-124 minutes at 122 degrees, and survive but don't multiply at 118-122 degrees
    - Additionally, the thermostats in water heaters are not known for their accuracy
    - The suggestion I subscribe to is to set it to deliver 120 degrees at the farthest sink
  - Shower heads
    - Typical shower heads can be 3-5+ gallons per minute
    - Low-flow shower heads can be found today that use 1.5-2.5 gallons per minute
    - The complaints are of earlier models that didn't work well in some lower pressure areas far away from a city water tower, because what makes the most difference in how a shower feels is pressure (psi) not flow (gpm)

- It takes a lot of energy to heat water and, while situations vary, a good ballpark is around $0.02-0.04 per gallon for an electric water heater
  - So, going from a 4 gpm to 2 gpm shower head would save 21,900 gallons of water annually for a family of 3 who each takes 10 minute showers daily, this could be around a $300 savings

Summary

- Residential monthly electricity usage is 903 kWh nationally and 1,081 kWh in Florida
- My house at a glance
  - 1,726 sqft ranch, CBS, single pane windows with blinds always open, asphalt roof, 2 adults, 1 child, and 2 dogs that can’t decide if they want to be inside or outside
  - Oct 15-Nov 15 bill (79 degree mean temp)
    - Had just moved in, house contained incandescent and CFL lighting, fixed temperature thermostat, med-flow shower heads (3.5 gpm), hot water heater 115 degrees at sink
    - 1,235 kWh and $151.76
  - Mar 15-Apr 15 bill (76 degree mean temp)
    - Programmable thermostat, LED lighting, low-flow shower heads (2 gpm), hot water heater set to 120 degrees at sink all implemented in December
    - 894 kWh and $93.73 (kWh reduced by 28%)
  - This is considered low-hanging fruit and $300 should yield about $300 in annual savings
    - Programmable thermostat = $30
    - 20 LED light bulbs = $200
    - 2 low-flow shower heads = $70
    - Adjust hot water heater to 120 degrees at farthest sink = free