Lighting Energy Conservation Plan

2011

The Lighting Energy Conservation plan of 2011 contains recommendations for lighting fixtures. All recommendations are based on the energy savings available compared to the cost of the fixture. All recommendations in this document, when properly applied, should have a pay-back of 7 years or less. A 7 year pay back is typically the minimum return acceptable for energy saving projects at the Florida State University.

Note that this recommendation should not be considered a design standard. The plan will provide guidance for the development of specific campus lighting fixture standards. The information contained within is based on evaluation of current lighting products. While the plan is comprehensive, it is by design brief and to the point.

Outdoor Lighting

LED lighting can be a suitable alternative to HID lighting sources such as metal halide (MH) and high pressure sodium (HPS). Most LED lighting systems utilize a driver that can operate on line voltages ranging from 120-277 VAC.

Many outdoor lighting fixtures with output equivalent to a 250W HPS lamp, ***may*** be good candidates for LED retro-fits. The selection of the appropriate fixture requires a ***significant amount of research*** to determine the best option. Some of the considerations are:

1. Determine the required illumination in foot-candles required for the project. Foot-candles should be measured by a light meter for verification of the vendor's claims.
2. For an outdoor lighting application, one needs to understand the optics of the fixture. Uniform light distribution is desired. The min/max ratio will help you understand how well the light is being evenly distributed.
3. Many LED lights are specified with a 5000K color. Many customers prefer the warmer 4100K LED sources. Both should yield similar efficiencies.
4. An LED can be driven at different mA levels. When selecting a fixture, note that the ***higher the drive mA, the shorter the life of the LED***. For example a LED driven at 750 mA may have ½ the life of a LED driven at 350 mA.

	Current	**Recommended**
1.	Outdoor Fixtures ≥ 250W HPS equivalent	LED
2.	Outdoor Fixtures <75 - 250W HPS	LED, HID or in some cases fluorescent

1. Gull-wing Style Fixtures
   1.1. Gull-Wing fixtures over 250W HPS should be retrofitted with LED lamps with similar photometric properties
   1.2. New Gull-Wing fixtures should be LED and meet the current lighting requirements.

2. Wall Pack Style Fixtures
   2.1. Wall Pack style fixtures should be either high pressure sodium or fluorescent. LED fixtures are nearing the price point to be adequate replacements.

3. Acorn Style Fixtures
   3.1. Retro-fit: Acorn style fixtures should remain high pressure sodium at this time. While there are retrofit options available, the value received is small compared to the cost.
   3.2. New: For new installations, the incremental cost to upgrade to a LED fixture is reasonable when compared to the cost. When considering LED, take into account other acorn lighting in the area to insure that the new lighting will not degrade the aesthetics of the area.

Indoor Lighting

Linear LED lamps are only cost effective in applications that operate over 8000 hours per year for T8 replacement. If a system has magnetic ballasts or a T-12 system, then the LED linear tubes may be cost effective with operating hours as low as 3500 per year. Performance is similar to fluorescent and expected to deliver similar foot-candles/ft^2. Fluorescent lamps have also improved. Average lamp life can often exceed 40,000 hours. Modern fluorescent lamps also have slower lumen depreciation than previous lamps.

	Current	**Recommended**
1.	4’ lamps > 8000 hours per year to replace 28-32W fluorescent lamps	25W fluorescent or 16W LED
2.	4’ lamps < 8000 hours per year to replace 28-32W fluorescent lamps	25W fluorescent
3.	4’ lamps > 3500 hours per year to replace 32W fluorescent lamps.	16W LED

1. 4 ft Fluorescent Lamps
   1.1. 4 ft fluorescent lamps should be 25W GE or Philips lamps
   1.2. 16W Linear LED lamps can be considered when the lamps are operating in a 24/7 environment or when replacing magnetic ballast or T-12 systems.

2. New 2 X 4 Fluorescent Fixtures
   2.1. New 2 X 4 fluorescent fixtures should be equipped with electronic ballasts and 25W lamps.
   2.2. LED fixtures can be considered if the incremental unit cost can be paid for with energy savings in less than 7 years. In most cases, the area would have to operate 24/7 to be cost effective.

3. Can Lights
    3.1. Can lights should use compact fluorescent fixtures sized appropriately for the desired lighting levels

Parking Garage Lighting

Parking Garage lighting ready to be converted to LED technology. Although fluorescent fixtures are still the lowest initial cost system to install, LED systems use less total energy and have a lamp life of 50,000 – 100,000 hours.

	Current	**Recommended**
1.	100W HPS Fixtures	30W LED

1. 100 W HPS Lighting Fixture LED Retro-fit
    1.1. Retro-fit with 30W LED fixtures with similar photometric distribution to existing HPS lamps
2. New Fixtures
    2.1. New fixtures should be 30W LED fixtures

Lighting Controls

Lighting controls are now incorporated into many campus buildings. The selection of a lighting control system is a complex process and is highly dependent upon the following factors:

- Connectivity to existing BAS (BacNET, hardwire, P1, etc)
- Design elements required (daylight harvesting, dimming, bi-level switching, etc)
- Type of system preferred (wireless, mains borne)

Due to the large number of control system options, recommendations are based primarily upon the connectivity to the system.

1. Lighting systems that have their own integral control network should be designed connect to the Apogee system via BacNET or OPC.
2. System controller should have sufficient permissions as to allow the Apogee system to command all control points.