Turn Off Equipment when Not in Use (2.6218)

(The analysis below was extracted from one of the assessment reports by the Clemson University Industrial Assessment Center (IAC). This is only an example recommendation and hence, not all the background information and sources for numbers are included here.)

Est. Electric Consumption Savings	= ***5,507 kWh/yr***
Est. Electric Consumption Cost Savings	= ***$385.5/yr***
Est. Implementation Cost	= ***$0***
Simple Payback Period	= ***0 months***

Recommended Action:
It is recommended to power off the hoists when they are not in use.

Background:
The plant is equipped with 8 hoists for material and product handling. 5 hoists are utilized 24/7, 1 is used 4 times a week, and the final are used 3 times a month, while the actual daily use is only 0.5 to 1 hours for the hoists. It is known that many appliances continue to draw a small amount of *stand-by power* when they are not running (switched off or stand-by mode) but still plugged in. These so-called 'phantom loads' occur in most appliances that use electricity and will increase the appliance's energy consumption a few watt-hours. These loads can be avoided by unplugging the appliance or using a power strip and using the switch on the power strip to cut all power to the appliance. Lawrence Berkeley National Laboratory (LBNL) initiated much of the U.S. work on miscellaneous residential energy use, drawing attention to standby power consumption. Its studies in the 1990s and 2000s revealed standby power consumption of various residential products to be a significant portion of energy use in the residential sector [1]. According to available databases for typical home and office appliances the standby power ranges from less than 1 watt to 99 watts [2]. The accurate measurement of standby power requires specific devices and sophisticated test procedures to minimize errors and uncertainties and was out of the scope of our energy audit level. We use approximations based on the available data to estimate the standby power and calculate the anticipated savings due to unplugging the equipment. The plant is charged $0.07/kWh for electric consumption and $8.59/kW for electric demand.

Anticipated Savings:
The plant can achieve some saving in energy consumption by shutting-down the hoists when they are not needed. The exact measurement of standby power requires advance devices and following standard protocols (e.g. International Electrotechnical Commission (IEC) Test Procedure No. 62301 [3]) which is mostly developed for home and office appliances. The Federal Energy Management Program (FEMP) and Energy Star Program provide lists of available low standby power devices for home and office environments. The cranes and batteries used in this facility were not found on these databases and most of utilized equipment was out of the scope of mentioned programs. For example, battery chargers of 42 volts or above are not qualified for Energy Star Program [4]. Previous studies by LBNL estimated an average standby power consumption of approximately 77– 87 watts for plug loads, white goods, and hard-wired infrastructure and controls [3]. With we think it is safe to assume an 82 watts average standby power for hoists utilized in this facility. We consider daily useful usage of 1

hour for hoists.

The estimated annual *electric consumption savings* for hoists, *EES*, is determined by the following relation:

$$EES = \frac{idle\ hours \times number\ of\ cranes \times unit\ standby\ power}{1000\frac{W}{kW}}$$

$$\boldsymbol{EES = \frac{(365 \times 23) \times 8 \times 82W}{1000\frac{W}{kW}} = 5,507\ kWh}$$

The estimated annual *electric consumption cost savings, ECCS,* that results from shutting off the equipment when not in use is determined by the following relation:

$$ECCS = EES \times \frac{\$0.07}{kWh}$$

$$\boldsymbol{ECCS = 5,570.1 \times \frac{\$0.07}{kWh} = \$385.5}$$

Implementation Cost:
This recommendation involves with timely usage and unplugging of the equipment and can be included in operational responsibilities of the current personnel. Therefore, no additional implementation costs are required.

Simple Payback Period:
The simple payback period is immediate since no additional implementation costs are required.

References:

1. Nordman, Bruce, and Jim McMahon. "Developing and testing low power mode measurement methods." PIER Project Final Report Prepared for the California Energy Commission, Report P-500- 04-057. September (2004).

2. Lawrence Berkeley National Laboratory (LBNL), Standby Power Database **http://standby.lbl.gov/standby.html** (*accessed August 2017*).

3. International Electrotechnical Commission, IEC 62301:2011, Household Electrical Appliances – Measurement of Standby Power.

4. ENERGY STAR® Program; Requirements for Battery Charging Systems; https://www.energystar.gov/ia/partners/prod_development/revisions/downloads/battery_charging_sys/prog_reqs_draft_v1.1.pdf?d519-671a (accessed August 2017).