10 Steps to Performing an Energy Audit

1. Ask customer whether the light level is satisfactory or if they have more or less intensity in some areas so that you can address their needs. Most will say that they are just concerned with the energy savings. If they need increased levels mention to them that any increase in intensity will require more energy consumption. If the light level is acceptable to the end user but below the IES recommended light level (see IESNA Handbook or Ready Reference Guide) let them know this and note it on the proposal.
2. Have customer provide 12 months of utility bills. Take the kilowatt hours (KWH) used on each bill and divide it by the final cost on the bill. Take the resulting numbers from all 12 months, add them together and divide by 12. This is the KWH rate that they have paid for the past year. Do not accept a customer or utility telling you what the rate is. Utility invoices include many additional charges for peak loads, maintenance, new plant construction, etc. These must be factored in to provide a real cost for your audit as they represent what the customer is actually paying.
3. Inquire about the hours that each area is on each week. There are 8760 hours in a year. The amount of hours fixtures are used directly impacts the return on investment. Ask also about holidays and other annual variations. Calculate the annual burning hours for each fixture type and/or area.
4. If you can get a copy of the blueprint of the area it will save time. Kinko's will duplicate it if necessary to get a copy that you can write on. Walk each area of the facility and either measure it or use the blueprint dimensions. Make sure to note the ceiling heights and the mounting and location of existing fixtures. Confirm the wattage and quantity of the existing lamps. (Your audit tool kit includes a distance finder for the ceiling and a 100' tape for large spaces).
5. Use your light meter (in the audit toolbox) to take foot-candle readings in each space. Walk the space holding the meter about 30" off the floor. Note the average level as you walk through. If there is poor uniformity then note the highest and lowest levels. It is normal to have variations of up to 4 to 1 with the brightest reading being about 4X the lowest. Any greater extreme is worth noting.
6. It is ideal to use the existing fixture locations because you will be recommending lower wattage products so no rewiring will be necessary. This will save a significant amount on installation costs. Observe how each fixture type is mounted and photograph each space including a close up of the mounting if possible (camera is in audit kit). These images will serve as reminders and as a part of the presentation to the customer if necessary.

7. Select an energy efficient luminaire that provides a near equal amount of lumens with a similar distribution and lamp color temperature to minimize employee objections that result from obvious changes. Consider the ambient temperature of the space when choosing the fixture and lamps. Fluorescent lamps have peak lumen output at 77 degrees for T8 and 95 degrees for T5. This is the temperature around the operating lamp in the fixture. Any variation above or beyond these will reduce light output. Amalgam lamps are less affected than standard products but this technology cost more to purchase. LED's are also temperature sensitive. High temperatures yield less intensity and can shorten lamp life. LED's thrive in cold temperatures even freezer cases and perform best in cool environments.
8. Use a software program like the Columbia Create Change Calculator (insert hyperlink) or the GE Value-Light program to calculate savings and prepare presentation information. Basic energy calculations do not include savings from reduced lamp maintenance due to longer life lamps, reduced air conditioning costs and other factors that the software includes. The basic formula for energy savings is $\frac{\text{Watts Saved X Hours Used X KWH Rate}}{1000}$

   An example of this would be taking the energy saved by retrofitting 100 metal halide 400 watt fixtures (458 watts including ballast consumption) with 218 watt 6-lamp T8 fluorescent fixtures. The savings is 240 watts per fixture for a total of 24000 (240 X 100 fixtures). If they are on an average of 12 hours a day for 360 days a year the annual burning hours would be 4320. Assuming .10 KWH the calculation would be

   $\frac{\text{24000Watts X 4320Hours X .10 KWH Rate}}{1000}$ = $10,368.00 annual savings

   Software programs can extend this to reflect 5 or 10 years of savings to create an even more impressive long term savings.

9. Consider other ways to reduce energy and/or make the space look brighter without increasing energy consumption. It is likely that simple controls such as occupancy sensors could enhance the savings. Using cooler color temperature lamps or buying lamps with a higher color temperature can increase the perception of brightness without adding any cost. Extended life lamps will reduce maintenance costs and lamp replacement costs.

10. Check with the local utility for any energy saving rebates that may be available for this project. The EPAct 2005 Federal tax deduction may be available for up to 60 cents per square foot of area. If these incentives are included in your proposal it will improve the return on investment by offsetting the initial cost for equipment and/or labor. The website www.dsireusa.org compiles utility rebate and incentive information for the U.S.