

## The Proven Effective Process: 6 phases and 30 steps to an on-specification, on-time and on-budget energy-efficient-lighting installation

### ABSTRACT

The energy-efficient-lighting-project process utilized by Wasmer is an amalgamation of our extensive engineering expertise and project management experience, combined with our relentless commitment to continuous improvement.

It has been continually refined over nearly a decade. And it has been the roadmap followed

for more than 9,000 successful implementations around the world.

If you believe in standard operating procedures and best practices and are considering undertaking a lighting project, this guide can prove invaluable to ensuring an effective and efficient lighting installation that is done right the first time.



## PHASE 1) INTEL

The first phase is all about gathering the necessary intelligence to document the current state of your facility's lighting and define project expectations. It is also an opportunity to share intel with all major stakeholders, so they understand and appreciate precisely how a lighting project – properly executed – can aid in improving their operational efficiencies.

This phase is critical to the success of an implementation, yet it is also one of the most overlooked.



### Step 1: Discovery Meeting

Meet with the stakeholders to learn about their professional responsibilities. Use the opportunity to convey to each stakeholder how such a project can benefit them and help them meet

their goals. A list of sample questions is included to help prepare stakeholders for the meeting and to help them understand the value of their participation in the meeting.

#### Maintenance:

- > How much of the annual maintenance budget is spent to maintain the current lighting system, compressed air system and other systems?
- > Are you able to keep up with Preventative Maintenance work orders?
- > Do you have time to maintain the facility properly?

#### Plant Manager:

- > Is the plant operating at max efficiency? How do you know?
- > Are the people working at max efficiency? How do you know?
- > Is the equipment running at max production throughput? How is this measured?

#### Safety/Environmental/Security:

- > Are there any safety concerns?
- > Have there been any accidents or near misses?
- > Are there any facility security concerns?

#### Plant Engineer:

- > Are there any facility regulatory requirements such as FDA, NSF or SQF?
- > Are there concerns/challenges with your facility lighting?
- > Are all utility consuming assets identified, recorded, and measured? How is this accomplished?

### Quality:

- > Do you have any customer issues related to quality?
- > Are you happy with your scrap percentage?
- > Are there any ISO audits, 5S, or other continuous improvement processes that have identified issues with the lighting or compressed air systems?

### Marketing:

- > Is there an interest in finding ways to increase company exposure in the market?
- > Do you currently give facility tours to your clients?
- > Are you looking for material/content to create a blog post, or website update?

### Sales:

- > Are there clients that you would like to target, but the facility is holding you back?
- > Do your clients ask you to fill out environmental sustainability forms?
- > Would your sales team appreciate a one-page marketing piece of collateral to promote the good things your company is doing – a reason to stop by and say hello?

### Human Resources:

- > What is the hardest position in the organization to recruit for?
- > What is the reaction of your job candidates when you walk them around the facility?
- > Would it be helpful to get the word out locally and in your larger market to aid staff recruitment?

### Financial:

- > Who is responsible for verifying that the utility bill is accurate?
- > Who is responsible for reducing the utility spend on financial statements?
- > Is there a budget to invest in products or services that will reduce utility expenses?



## PHASE 2) SCOPE

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Once intel has been gathered from all key stakeholders, it is time to define the parameters of the project using SMART Scope language (Specific, Measurable, Attainable, Realistic and Time Bound). This technique clearly formalizes project goals in ways that are consistent with fact-based decision making.

### Step 2: Create a SMART Scope Statement

For example: ABC Manufacturing will embark on an assessment of its entire lighting system in an effort to identify a less expensive mechanism to illuminate their space. This mechanism will reduce glare and shadowing at a light level that

meets the existing light levels or the Illuminating Engineering Society (IES) Standards, whichever is higher. The system will be designed to maximize energy savings and utility incentives, all with the least amount of production disruption.



## PHASE 3) ENGINEER

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After the SMART Scope Statement has been finalized and approved by all stakeholders, the remaining steps need to be performed in order to assure that the project will be completed properly and cost-effectively.

### **Step 3: Analyze Requirements to Meet Site Conditions**

Appropriate due diligence is needed to ensure the proposals you will solicit and receive, will all be returned in such a way as to facilitate side-by-side supplier comparisons. This due diligence includes the measurement of ceiling temperatures, identification of hazards such as dust, radiant heat sources, line voltage noise (transients or harmonics) and measurement of surface reflectance.



Light levels need to be calculated per company activity. All fixtures should be counted and identified by type, wattage, voltage, and power source, per area. Fixtures mounted in the wrong place are to be identified, along with any missing fixtures that may have resulted from a failure to be replaced, or perhaps missing due to plant rearrangement to take advantage of process improvement projects. Fixture grid pattern changes need to be identified area-by-area.

This also is an ideal time to install activity data loggers to determine if motion sensors should be incorporated. Installing the activity data loggers at this point in the process will provide many days or possibly weeks of data to facilitate an informed decision.

### **Step 4: Needs Analysis and Target Light Level Determination**

The data collected will then be used in concert with The Lighting Handbook (10th Edition, Illuminating Engineering Society) to create customized light level requirements by area and industry. Next, compare the light level requirements with existing current state conditions. Add your unique requirements (if applicable) and your strategic direction to create a future state of optimized target light level requirements per area or task.

### **Step 5: Draft a Scope of Work by Area or Task**

The Scope of Work will identify the requirements for each area. These requirements will include light levels, voltages and wattages, problems identified with a plan to fix each problem, fixture counts and fixture construction. Industry, and regulatory requirements for the fixtures themselves and their installation should be specified at this time. These specifications will include requirements like glass or no glass, NSF, ISO or other certifications, fixture hanging methodology, fixture safety cable requirements, fixture mounting methods (cables or hard mounts), vibration concerns, equipment required to move product, aerial lift equipment requirements to reach fixtures, safety requirements, hours that work can be performed, access to area for personnel and equipment, and safety routes to evacuate the building if there is a safety risk somewhere else in the building. There will likely be questions that will require direction such as motion sensor viability and manufacturer and model of choice per area or task.



## PHASE 4) PROCURE

Deciding on a manufacturer is particularly important when it comes to LEDs. The reason is that LEDs behave differently than more traditional forms of lighting. Environmental factors such as temperature extremes, dust, vibration, moisture and corrosive atmospheres all can degrade lighting performance significantly. These factors also can lead to premature product failure. So, it pays to consider your options carefully before making final product selection decisions.

### Step 6: Fact-Based Selection

The next step will be a decision on a Manufacturer's product that meets the technical requirements of your facility, area-by-area. Considerations will include a fixture's ability to survive environmental conditions present (e.g., dust, corrosives and ambient and radiant heat).

### Step 7: Evaluate

This step assesses the chosen manufacturer's ability to provide the specified product, including their ability to provide timely post sale support including warranty execution and service, as needed. The assessment also includes analysis of their testing procedures and comparison of published claims of performance vs actual performance results, such as lumen output. Verification of published claims of life vs actual life are measured by LED junction point temperature and LED driver rise temperature. Certifications such as UL/ETL and Design Light Consortium (DLC) will be identified as well as whether the product will qualify for the numerous utility-sponsored energy efficiency rebate/incentive programs.

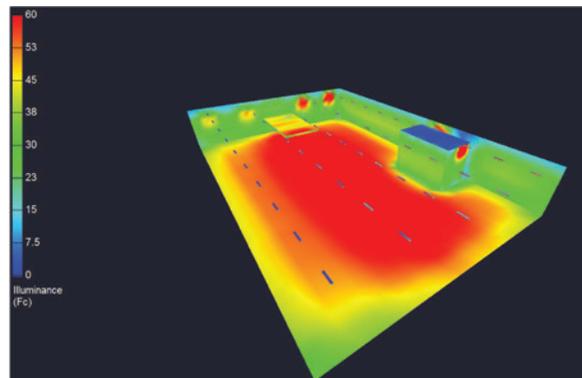
### Step 8: Contact Manufacturer's References

Establish a series of questions to put to as many of the Manufacturer references as possible. Be sure to ask the same questions of each manufacturer you are evaluating and keep a matrix of their answers.

### Step 9: Create 3D Photometric Lighting Layouts

Creating 3D photometric lighting layouts based on the chosen manufacturer or multiple manufacturers can be a complex and time-

consuming undertaking. The most efficient way to complete this critical step is to obtain the IES file(s) from the manufacturer(s) of choice and upload them to Wasmer's Photometric Lighting Software program, so we can layout each room.



We provide "before" and "after" simulations of each space. The "before" layouts are based on existing conditions identified in the due diligence step. Requirements and specs such as reflectances, fixture locations, obstacles, ceiling height and fixture mounting height will be considered. After each computer simulation, you will be able to compare the results to your light level requirements by area (scope of work from step 4). Don't get discouraged as this will be a time-consuming step. There will be many models to choose from. The 3-D layouts will help optimize the lumen output or brightness. They also help you make more informed decisions about the need to move light where you may need it using optics. The goal is to generate the light levels and uniformity to provide all of the stakeholders, prior to approval, the confidence that the project is properly designed. This also helps prevent cost overruns associated with change orders later, or worse, a career-debilitating project.

**Step 10: Present Lighting Layouts to Stakeholders**

This step involves all the stakeholders. It provides a detailed look of the layouts created for the appropriate areas and allows for discussion and adjustments to be made as needed.

**Step 11: Walk through Project with Product Suppliers**

This step involves the prospective suppliers and allows a thorough inspection of the area to ensure proper product is being specified.

**Step 12: Meet with Utility Rebate Administrator**

This step provides a walkthrough of the project with the Utility Rebate Administrator to maximize the utility incentive program.

**Step 13: Finalize Project Scope with Products of Choice**

In this step, decisions will be taken with regard the final manufacturer, product, facility information and assumptions. For example, the facility information will include things such as fixture counts, fixture wattages and voltages, aerial lifts required and any assumptions. It



also will include things like hours when the installation can occur, whether the contractor is required to provide their own storage during the installation or perhaps you, as the building owner, may be able to spare space throughout the duration of the project.

**Step 14: Estimate Cost of Project**

Estimation of the total project cost is completed in this step and allows the creation of a return on investment analysis and business justification. This documentation will provide leadership the data needed to approve a capital budget line item or an approach to financing the project. These are very Low Risk projects with regard to estimating the utility savings. You typically have a Lower Cost of Capital formula for these projects.



**PHASE 5) INSTALL**

This phase includes all steps required to oversee and physically implement the project, ensuring it is completed as proposed.

**Step 15: Make a Choice**

In this step, a decision needs to be made, whether to self-install the light fixtures or contract with a Turnkey supplier. Consideration must be given to who will handle utility incentives, aerial lift rental and proper disposition of old lighting ballasts and lamps.

**Step 16: Evaluate Multiple Installers**

Here you will determine an installation provider’s legal ability to properly install the product, including their ability to be there after the sale for

future service and their ability to execute on any warranty issues. Included will be an assessment of their liability and workman’s comp insurance coverage; an evaluation of their safety procedures and certifications, such as state licenses and ISNetworld and other safety programs; and finally, secure references from past clients.

**Step 17: Reach Out to Installer References**

Create a list of appropriate installation questions and ask each reference the same questions about every installer you are evaluating.

### **Step 18: Create a Fill-in-the-Blanks Bid and Submittal**

In this step, all of your requirements will be assembled into a request for proposal document. A fill-in-the-blanks approach makes it as easy as possible for suppliers to respond to your questions. It also makes your analysis and side-by-side comparisons of bids, simpler and easier.

### **Step 19: Walk Suppliers through the Facility**

With the bidders identified and the final scope of work and bid request forms completed, you are now ready to walk the prospective suppliers through the facility. These suppliers will either be turnkey providers or individual suppliers such as materials, labor, recycling, utility rebate, aerial lift rental, etc.

### **Step 20: Respond to Questions from Suppliers**

If there are questions from the installers, ensure each supplier is given an addendum to the proposal request with the question asked and the answer given. That way, you once again have the ability to compare suppliers side-by-side.

### **Step 21: Get Utility Incentive Preapproved**

The utility incentive administrator must be notified to secure utility rebate preapproval. The preapproval needs to be in writing with the next steps clearly defined and printed out. Now that the project is close to being an approved project, ask about bonus dollars availability.

### **Step 22: Analyze Bid Documentation Received**

Gather all bid documentation and submittals and make a fact-based decision that gives you and your company the best solution, which meets your specification. This is generally not the most expensive and probably not the cheapest, but rather a solution that solves the majority of the pains you identified in Step 1.

### **Step 23: Preconstruction Meeting**

In this step, you will schedule a preconstruction meeting with approved suppliers to create a timeline and finalize details such as parking, restrooms, lunchrooms, staging of product and equipment, and answer any unanswered questions. In this meeting, signed documentation including safety documents, contractor documents and certificates of insurance and the like will be collected. Stakeholders that should be in attendance include safety, environmental, leadership, maintenance and the project owner.

### **Step 24: Product and Skilled Trades Arrival with Equipment**

The project timeline will include details on staging for product and equipment being delivered. It also will identify space for prepping product and dismantling old light fixtures for proper disposal.



### **Step 25: Project Start-up**

The project manager will provide weekly updates in writing to all stakeholders and conduct weekly safety meetings.



## PHASE 6) VERIFY

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This phase provides a systematic methodology to verify that the project met expectations. It also enables you to determine your return on investment.

### **Step 26: Project Wrap-up**

Discuss completion of project and discrepancy punch list items.

### **Step 27: Measuring Results of Project**

Ensure project statement, goals, and project scope were all met or exceeded.



### **Step 28: Utility Walk Down**

Take utility representative on a tour of the project to ensure the utility incentive is paid quickly.

### **Step 29: Marketing of Project Internally**

Create a culture of continuous improvement and environmental responsibility consistent with the strategic direction of the company. Promote the project externally to your clients and the community to further goodwill and provide a reason for your salespeople to promote the company's reinvestment into the business.

### **Step 30: 6-Month and 12-Month Project Review**

Conduct a final meeting to ensure business justification savings and improvement goals have been met.

## CONCLUSIONS

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Wasmer developed this 6-Phase, 30-step process to help ensure that energy-efficient-lighting projects are delivered as promised. It builds in fact-based accountability to keep projects on time and on budget, while creating solutions that perform as expected. If you have the staff, expertise and resources to see it through from end-to-end, we're glad we could provide you with a proven roadmap. However, if you're overworked and understaffed, we'd be happy to handle the process for you – reducing your workload, expediting the process and helping you get precisely the lighting advantages you need to accelerate your business' velocity.

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