

FIRST CHANGE THE LIGHT BULBS . . . THEN GET A WIND TURBINE

HOW PLANTS SHOULD EXPLORE THE PROGRESSION FROM ENERGY EFFICIENCY TO ON-SITE GENERATION.

Plants are in the business of making widgets. Yet, since the first energy efficiency initiatives began in the 1970s, many plant managers feel like they are in the electricity business. Electricity, for good or bad, is integral to the majority of all manufacturing processes, and the price keeps going up.

In the mid 1970's, California implemented a series of building code modifications targeted at increasing the energy efficiency of buildings to reduce the states growing electrical consumption. Since that time, the energy efficiency conversation has taken place over and over at almost every plant in the country. The last 30 years has seen the conversion to more efficient lighting, better insulation, higher efficiency motors, and more efficient processes. Plants have realized that energy efficiency is smart business.

The problem is: What's next?

At some point, the well run plant reaches the practical limits of energy efficiency. Light bulbs only get so efficient, R values only get so high, and controls can only go so far. Many of the early adopters of energy efficiency have begun to reach a plateau. But plant managers have seen the positive financial results of energy efficiency, and they want more results.

Once your plant has stopped wasting energy and reached the efficiency plateau, you are ready to start a conversation about making your own energy. Generating your own electricity is the next step in energy efficiency.

There are six steps to the on-site generation process:

1. Define goals, expectations and metrics
2. Predict the future
3. Explore what technology fits your plant
4. Pick a partner
5. Realize a project
6. Evaluate

DEFINE GOALS, EXPECTATIONS AND METRICS

A company needs to be able to answer the following questions to properly advance to the next steps:

1. How much are we able to spend on a project?
2. What ROI metrics are we going to use to evaluate the project?
3. How much of our electrical consumption do we want to offset?
4. Why are we looking at this project and what do we really want to get out of it?

The traditional ROI metrics don't lend themselves to on-site generation projects. Most plants look for 1-2 year ROI on operational CAPEX, 2-3 year ROI on energy efficiency CAPEX, and 8-12 year ROI on facility CAPEX. An on-site generation project is none of the above. You do not need on-site generation to make widgets, but it will directly contribute to controlling your long-term costs.

On-site generation projects will cost several million dollars and can have ROI between 3.5 years and 8 years, depending on the specifics of the project.

On-site generation only makes sense if you go big – however going big has a large upfront cost. Any on-site generation project (of any technology) needs to have a nameplate capacity of 1 megawatt or larger to achieve the economies of scale necessary to see an attractive ROI. Only projects of 1 megawatt or larger will make a large enough difference in your electrical consumption profile to justify management’s efforts.

In the Midwest, we would tell a client to only look at a wind project at or above 1.5 megawatts. A 1.5 megawatt wind project would cost roughly 3.5 million installed, and would produce on the order of 4,000,000 kilowatt hours per year. The project would have a payback period of 4-6 years and a 20 year design life.

It is important to understand what the real goals of the project are before you begin. To ensure a successful project, first determine your objectives and then fit the project to meet your goals. Assign a percent number to the following goals and have the conversation before you start looking at potential projects:

1. Have a profitable investment _____%
2. Control long-term electric costs _____%
3. Appear to be green _____%
4. Actually be green _____%
5. Marketing _____%
6. The X factor _____%

When reviewing projects, proposals, contractors and moving forward, it is important to always come back to these percentage weighted metrics. These metrics should be kept internal to the executive team. Contractors should be given the order of priorities, but not the weight. If and when the project is realized, you can highlight the sustainability aspects as much as you would like, however I encourage companies to treat on-site generation as a business decision and have at least 90% in the first two categories.

It is worth noting that there is a difference between having a profitable investment and controlling long-term electric costs. A single 1.5MW on-site wind turbine, for example, would have a return on investment that is fairly close to three of the same turbines. The difference is that the three turbines would provide three times the long-term price protection. With a wind turbine, you can very accurately predict long-term electric costs because the fuel is free, and 95% of the lifetime costs are upfront and fixed.

There is also a big difference between appearing to be green and actually being green. A plant can install a 10 kilowatt turbine that will never provide any significant financial benefits, then purchase open market wind renewable energy credits (RECs) at .1 cents/kWh and can legally state that their plant is 100% powered by wind. That plant is not actually green, but it sure appears to be. If the same plant installed a wind facility that offset 90% of their consumption, then they are actually being green. I will not advocate for either, but it is very important to understand the difference.

Every project has a set of intangibles involved in the final project decision. It is important to identify and recognize any additional X factors such as personal desire, ego, or shareholder pressure, prior to looking at potential projects.

Finally, it is important to agree ahead of time who is going to make the final decision on the project. Is it the plant manager, an executive team, the CEO, the Board? It really does not matter who is going to have the authority to decide, what is critical is there is a clear approval process and a designated decision maker.

PREDICT THE FUTURE

On-site generation is usually accomplished under net metering or peak offset tariffs with the electric service provider. Under both of these scenarios, the correct financial answer is always to size the generation to offset your consumption, not to become a net producer, however it is attractive to use a wind turbine that was designed to produce wholesale electricity to offset your retail electric consumption. Anytime you can offset retail costs with wholesale costs, it is attractive. If you become a net producer and try to compete against other wholesalers of electricity, you are then getting into the electricity business.

In order to ensure that you are properly sizing the system, you need to know what your future consumption will look like. Are you expanding? Are you at risk of reducing by 50% in the next 20 years? Do you have other energy efficiency projects still in process that are not reflected in current consumption figures?

You also need to determine what you think the electric market is going to do for the next 20 years. I typically suggest that companies pick a low and high inflation rate and look at all financial projections through both lenses. It is often good to talk to your utility representative about this. Don't tell them you are considering on-site generation yet, just tell them that you are looking at long-term operational cost predictions.

It is very important that before you go on to the next step that you know what numbers you want to use in the models. If you go to contractors with clear specifications, you will get clear results. If you let them pick, then you will spend your time trying to make sure you're comparing apples to apples when reviewing proposals.

EXPLORE WHAT TECHNOLOGY FITS YOUR PLANT

Look at everything. Pay nothing. 90% of the time the answer will be obvious.

Ideally plants should not go into this process with any particular focus based on technology. Talk to solar, wind, digester, and any other companies you can find that promise savings. Talk to several providers of each technology. Tell them you are trying to gain more information about your options and that you have no specific plans. Give them information about your facility, your goals, and the projections you want them to use - then see what they come back to you with.

This is where you find out what technologies make sense for your plant, what companies have what abilities, and most importantly, what company you want to trust to move to the next step with. Challenge assumption in every report you are given. Interview the team members from the most attractive proposals about both the technology they propose and about the abilities of their team.

If anyone gives you exact answers at this point you can rule them out. They don't have enough information to be exact, but they can get close. They should show you a path to getting exact answers and then a plan for actually engineering, procuring and installing the project. They should be able to provide you with honest answers to any questions you ask. They should be able to show you written material to support their assumptions.

Prospective contractors must have ample direct experience with projects exactly like what yours. A small wind contractor who builds 100kW turbines should not tell you that they are going to build you a 2 megawatt machine. A consultant should not tell you what to expect unless they can show you the project team that they would use and who has the actual experience.

Ask what incentives they are using in their proposals and understand the risks associated with all of them.

Clarify exactly what services they will take care of and exactly what they expect you to do.

You should not pay anything during this step, but you will have to invest your time to give the prospective contractors the information they need.

Evaluate the proposals that you trust with the weighted metrics you established earlier. The decision will almost always be obvious.

This step is critical, because the next step has to be based on a level of trust.

REALIZE A PROJECT

Once you have picked partner, you should expect to spend a little bit of money. Typically something between \$10,000 and \$100,000 would be reasonable for the engineering and studies necessary to get the exact answers you want before committing to a multi-million dollar investment.

Every on-site generation technology has its own sequence of steps. Your partner should be able to clearly outline them for you. All of them include the following at a minimum: utility interconnection approval, land permitting, engineering, procurement quotes, final cost development, final ROI modeling.

Each of these steps is unique to the industry and each is complicated. This is not your company's core business and this is not your area of expertise. Do not let yourself get sucked into the trap of becoming the project manager. You are the customer - your partner should be presenting finished work to you for review and approval.

Do not ever hesitate to check their work. We routinely have outside accounting firms and consultants review our work for customers. All work should be provided (under an NDA) in a format that is auditable.

Once the partner has helped you through this process, you are ready to get the final decision from the executive team. It is important to realize that an on-site generation project is not right for every plant. If the project does not meet your original objectives, then you must walk away.

If the project does meet your objectives, then the rest will be relatively easy compared to the path that got you this far. Do not compromise on safety, quality, or formalities just because it is a new technology. Utilize your plants proven process for building a project and expect the same level of professionalism that you would from any other typical large CAPEX project.

EVALUATE

When companies first invested in energy efficiency projects, they were skeptical. It took almost 20 years for industries to gain acceptance, and on-site generation is still in its infancy. After you have completed your project, it is important to track actual results verses expectations. Complete a lessons learned session immediately after the project is installed and operational, and after one full year of operation.

Consider reevaluating your metrics to reflect your lessons learned and then share what you have learned with others at your company who would benefit from the knowledge.