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Dear Prospective Off-Grid Client:

Thank you for your interest in having Miller Solar install your off-grid power system. We have installed over 60 off-grid system since the early 1980s and at least as many grid-tied systems. We have very high standards and we can provide ample references.

As a first step I think it will be handy to introduce myself and describe the services we offer and the process we follow. More information can be found at our web site.

If you have lived off-grid before you are aware of the limitations presented by making your own electricity. You need to be aware of the status of your system and the demands you are placing on it at all times. This soon becomes second nature.

If you live on the grid your payment to your electric utility pays for trained technicians to monitor and maintain the power generating equipment. If you are living off-grid you need to do that for yourself. The requirements are minimal but the consequences for delayed maintenance are power outages and repair and replacement expenses.

If you live on-grid you can pretty much consume as much electricity as you wish, assuming you can pay for it. Off-grid you need to build a system sized to meet your needs on a daily basis across all seasons. We accomplish the sizing process by inventorying your electrical appliances and the amount of time you will use these appliances throughout a typical week. We provide a chart for customers to fill out that lists these appliances, the wattages and the hours of use predicted. Finding the wattage of a given appliance is not always easy but if you can make your best effort to find a rating on a nameplate or make and model we can provide specific or generic information. Instructions are included with our entry form.

Here are a few design philosophies we incorporate.

1. We design a system to be self-sufficient (no generator run required) from the spring equinox through to the fall equinox. During the winter months a properly sized, reliable generator is required. Your off-grid power system needs to be able to get you through each and every day. If we were to install enough solar to survive on dark, overcast winter days, you would have too much solar for the rest of the year. The smart solution is to size your solar and storage as described and rely on a generator to run intermittently during the winter. A well designed system can use the generator to recharge batteries and then shut down the generator until needed again.
2. If you are planning on occasional occupancy, please tell us. This will allow us to downsize equipment in certain categories.
3. A generator is also required in case there is some kind of system failure. The generator can keep your lights on and your food from spoiling until we can make a repair.
4. The system components must be matched. There needs to be enough solar to charge the battery bank and provide power throughout the day. The batteries must have enough capacity to get you through the night. The inverter(s) need to have enough capacity to power all of your appliances and lights (known collectively as loads) and charge the batteries (the inverter will contain the circuit to charge your batteries during generator run). The generator needs to be large enough to power your home and charge the batteries. We have calculators we built that can take your information and tell us what equipment is needed to provide a balanced system.
5. We use the Thanksgiving worse-case scenario to size a system. The scenario assumes you have a house full of guests that may not be schooled in conservation of energy, you have the lights on because it will be dark and maybe rainy and your solar charge will be minimal. You are preparing a big dinner and someone insists on watching football on TV. You don't want the system to shut down just as dinner is not quite finished cooking. I will design a system that will be efficient all year and robust enough to get you through this Thanksgiving stress-test.

Here are our installation philosophies:

1. We maintain well over 100 off-grid power systems as well as an equal number of grid-tied systems. If we perform marginal design or installations our telephone would ring off-the-hook with system failures. This would be untenable for us and undesirable for you. Therefore we insist on doing the highest quality design and installation with tried-and-true components.
2. Electronics: We are experienced with a number of different manufacturers of off-grid power equipment, including Outback, Schneider, Magnum, and Midnite. We

specialize with the Outback product line. We realize Outback is not perfect, but we think it is the best in reliability and interface and we are intimately familiar with it and factory certified.

3. Batteries: We can provide lithium batteries of a variety of chemistries from a variety of manufacturers if needed. However, as of late 2020 we have not sold a single lithium system because of the high initial expense. Lithium batteries are about 5 times as expensive as conventional lead-acid batteries. They are touted as having an extended lifespan which may save money over an extended period of time. If you want a quote with lithium batteries, let us know. For lead acid batteries we can provide sealed models that require no maintenance or flooded models that require half an hour to an hour per month of maintenance. The lead acid batteries, if sized and maintained properly will last up to and sometimes more than 10 years. Do be prepared for the expense of replacing batteries after ten years. We do not install Tesla products as these are not approved for off-grid applications
4. Solar panels: We try to source American made panels if possible. The market is volatile so we cannot know for sure what will be available at a given time but we know what products are good.
5. Tracking solar arrays: Solar panels can be installed on a tracking rack that follows the sun and increases production up to about 20% in some seasons. However we avoid these mechanical assemblies with moving parts as they are a maintenance headache. Solar panels are inexpensive enough that we can add enough to equal a tracking output without the tracking.
6. Wind generators: We have researched wind generators and they are not practical in a vast majority of cases. The wind speed needs to be more than most people realize. Turbulence near ground level is a debilitating factor so a tall tower is needed. Permitting and constructing tall towers is very expensive. In our area solar is your best option for renewable energy.
7. Remote monitoring: If you will have internet at your site, we highly recommend connecting the Outback system to the internet for remote monitoring and control. We think Outback has the best remote interface in the business, the data usage is minimal and there is not cost for the service

First steps:

1. We will provide our entry form to input your loads. This will be provided in Excel or PDF format. If you can fill out an Excel spreadsheet this will save us some time.
2. We charge shop rate to size a system, a process that usually takes about two hours of office time. This is not the same as providing a bid for installation, it is

actual design time. During that process we might communicate back and forth a bit providing cost-saving measures achieved by reducing your loads.

3. Once we have sized the system we can provide a generic equipment and installation estimate based on standard conditions. If the estimate meets your budget we can proceed.
4. We will make a site visit to determine your installation specifics. After the site visit we will create a firm bid.
5. If you accept our bid, we write a contract and start the process.
6. Our bid will include the cost of preparing a permit application. We are not sticklers for permitting minor projects but an off-grid system usually requires a permit. Please be aware the permit requirements are stringent and time consuming. Our bid will not include permit fees as these can vary. Typical permit fees are around \$1,000.00.
7. Once the installation is complete we will schedule at least two training sessions with you. We have created advanced training aids for these systems and I like to think I am good at customer education. Lifetime phone support is free. Our workmanship is warranted for two years and we provide full factory support on all equipment.

Please let us know if you have any questions about this process.

Sincerely,

William Miller