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Last summer I participated in the "2018 Solar Group Buy " of solar systems organized by Cheq Bay Renewables (CBR) and implemented through Next Energy Solution (NES) of Shell Lake, WI. I would like to share with you a number of the questions that arise in the process and require effective personal decisions to allow the construction and completion of a cost-effective solar system.

My responses relate to the "ready to install" (RTI) system option offered by NES. The decision to adopt this option wasn't the first decision necessary to make, but I want to make it clear that my responses relate to this option and may or may not relate to other application options. I would also make it clear that I will do my best to avoid most, if not all, of the thoughts and considerations involved with my decisions. My purpose here is to indicate and describe many of the issues I believe that need to be addressed in the process of implementing a successful system. Bill Bailey of CBR will assure you that I am more than willing to describe many of the details of decisions I made and could bore you to tears doing that. I don't intend to do that now, but will be available to share my experience in more detail at a later date if anyone is interested. I would also like to assure anyone considering an application, that a considerable information base is available to guide and assist you through the process, including CBR's staff, any and all of the NES staff, as well as many of the early adopters of the group buy or other system implementation options.

I began to consider the prospect of installing a system sometime in the winter of 2018 and was late enough in the group buy process to make me in jeopardy of being excluded from the process and at the bottom of several key construction, delivery certification and commissioning lists.

Here are my key suggestions for anyone considering an RTI system.

1. Decide if a system meets your financial and emotional goals and requirements. Different for everyone, but everyone needs to accomplish that to avoid buyer's remorse.
2. Decide the above in a timely manner to avoid a variety of logistics problems but also to allow collection of a higher percentage of the higher summer season production available.
3. Select a system capacity target based both on financial constraints and effectiveness of the buy sell arrangements from your current utility. NES and CBR are there to help, but I recommend that you actively participate in the process and final decision.
4. Select a location.
    a. Closer to the actual point of utility interface is better but as you explore this you will quickly identify a variety of limitations and compromises that need to be considered, i.e., on a roof, which building, do trees need to be cut, how far away is acceptable for good distribution and line performance? Is the location acceptable to spouse and neighbors? Is the location vulnerable to trees falling? Will closer reduce the line loss a lot or a little?
    b. Select the best location for your system inverter. On the structure? Near the meter? Elsewhere? The location determines the types of cable used and marking and needs to be defined for some operating papers and should be done earlier rather than later.

c. Select and establish the direction of the system. Direct south sound's obvious, but is it the best choice for your system? And how are you going to accomplish the actual direction you believe that you want?

d. Select a panel angle. There are elements of energy use, utility rate that need to be considered to achieve optimum system financial performance. Don't skip over this. There are online calculators as well as NES to assist you.

5. Select a mounting system. The mounting system is highly dependent on the location type described above. The mounting system impacts implementation labor and expense, system longevity, system performance as well as required operator interface and control equipment. These issues are very dependent on your particular applications and a standard application may leave you with less than optimal performance or satisfaction or excess installation labor and or expense.

6. Select a footing/ foundation design. There is no hard and fast code or requirement for the strength and durability for the footings and piers, but I can't believe that anyone will willingly compromise the structural integrity of their system by compromising on the foundation and pier strengths. There are engineering guides available as well as engineers that are experienced in these applications. Don't accept the recommendation of your brother-in-law or neighbor or other interested party whose experience involved building decks or pole buildings. The foundations and piers need to resist any and all wind conditions and from any direction and in most any type of soil and terrain.

7. Decide what you can realistically do yourself or with a little help of your friends.

    a. Don't elect to dig the footing holes if you can't dig them deep or wide enough. Don't elect to hand mix or use premixed concrete if your back and legs aren't up to the task. I chose to do as much of the actual installation as I could but in helping my son build a matching system, I couldn't help but recognize how much faster and easier the construction went with 2, 3, or 4 40-year-olds with a variety of construction skills were on site. Yes, there was more beer involved but the work got done a lot faster and a lot of promotional activity for solar systems occurred as well. It seemed that most of my contemporaries that I may have considered inviting out to help me were either limited by back or leg or heart problems and my wife didn't want to have to explain to their wives why the ambulance or physical therapy was needed following the event.

    b. The electrical work has to meet applicable codes. Select an electrician that is familiar enough with these installations to avoid them training on your system. Also, find out what portions of the work they would accept you doing and what materials you could provide.

8. Coordinate your activities. If all your equipment isn't available simultaneously, work with what is available, i.e. the footings and piers can be done prior to the panels and inverter being available. The electrical cable can be installed independent to the structure or panels. Coordinate your paperwork through NES so that if orders get delayed your incentive application time frames coincide with actual construction. Prepare for delays... What happens if the hole digger can't show up as planned? What happens if it rains 8 inches in the week you meant to pour footings? What if the electrician doesn't answer his phone or respond to messages or the utility decides to send all available service personal elsewhere in response to a storm? Be flexible, move to phase B if phase A gets halted for some reason.

9. Find suppliers for stuff not supplied by NES. For example, pipe or timbers for structure, or wire for incidental wiring. Make sure you can haul or move the materials involved. 23 ft lengths of 3-inch pipe were a problem as well as 90 60-lb bags of ready mix. Also, pipe needs to be threaded and couplings provided.
10. Obtain and read and retread and evaluate everything you need to do in relation to the manual available. You may still have questions but you will save yourself time and anxiety as well as the time of the NES staff by studying the operator's manual.
11. Select a safe secure convenient storage area for the panels and mounting racks. Making the panel delivery truck driver back up and out about 600 ft of my driveway because the recent rains had made everything off the road inaccessible didn't win me any points that day. The panels are pretty tough but each additional handling creates another potential for damage. Two sets of hands are far better than one.
12. Select a center of the horizontal member to mount rack bars. It doesn't have to be precisely centered and your piers are probably not precisely spaced anyway. Find a good compromise and mark a centerline of the lower horizontal member.
13. Determine the span between the rack under a panel. This isn't a precise number but some guidelines are provided. Choose a nice round number and make sure that spacing when applied accross the entire horizontal member puts the end railing at the desired position. Adjust back if desired. Equal spacing isn't really necessary accross the entire length but it may be preferable to eliminate any questions from your friends or relatives with equal spacing.
14. Determine if you want the 2 rails to have the slots face each other or face away from each other. I don't think it makes much difference but I disappointed myself when I found one set different than the other and spent time undoing it.
15. Create a plumb line across the lower end of the racks to create a level starting point for panel applications.

CBR Note: Bob Drevlow is a retired engineer from Xcel Energy and CESA 12. He volunteers his time to help our community responsibly achieve their goals of environmental stewardship through renewable energy. By installing his own RTI system and helping with his son's, he is a valuable resource to tap.