Continuing with your design of a stand-alone system for a residence 5 miles off-grid, in a clearing in the woods, in the vicinity of your city:

For the worst month(s) of the typical meteorological year:

Download the data for your location.

Extract out, and save in a spread sheet, the hourly data for the Horizontal flux, watt-hrs/m2, for the month(s) with which you are concerned.

Do the sums to compute daily values of the total horizontal flux.

Compute the mean and the standard deviation of this set of 28, 30, or 31 values.

Choose a value for the total daily load.

Proceed with the analysis in accord with our “Loss of Load” reprint, first computing “delta” Δ, the depth of a single state in battery storage; then choosing a total battery capacity of n*Δ,, where *n* is an integer.

Then compute *p* and *q*, the probabilities of a “good” day (going up a state in battery storage) or of a “bad” day (going down a state in battery storage) respectively.

Solve for the (stationary) probabilities of being in each state of battery storage on any day. In particular, we are interested in the probability of “loss of load” (going down from the lowest state) or of reaching full charge.

Note: try various values of load, keeping p>q.

If you want to go further, and learn to use MatLab, do the matrix multiplication and explore how many days it takes (roughly) to reach stationarity from a state of certainty, i.e, where you know the battery is at some one level of charge with probability = 1.0.