$kWh = kW \times Hours_{kWLevel}$

Where:

kWh = The energy into a pump operating at the given kW level in killowatt hours

kW = The instantaneous power consumption of the pump in killowatts

$Hours_{kWLevel}$ = The number of hours at a given killowatt level.

Note that for a fixed flow, steady state load, the kW level will typically be constant. But for a variable flow load, where all of the parameters behind the pump kW might vary over time, the caculation becomes more complicated.

In theory, to get the perfect answer, we would have to calculate the kW for every different condition that existed, multiply it by the number of hours that it existed, and then add all of those numbers together to obtain the energy consumped for the time period under consideration. For a load where the power consumption varied from minute to minute, we would have to do 525,600 calculations to get the power consumption over the course of a year (8,760 hours per year times 60 minutes per hour).

We generally simplify this by assuming some sort of average power consumption over some typical period of time or typical condition. Since the power consumed by many HVAC systems varies with the weather, if we have hourly weather data, we can assume an average power consumption for each hour and do the math that way. That is still 8,760 calculations, but since the equations are the same for each hour (its only the variables like flow, pressure motor efficiency, etc. that change) it is not too difficult to do in a spreadsheet. And, the smaller the time interval is that you use, the more accurate your results will become (assuming good input data).

But before spreadsheets (and even now, with spreadsheets) we can further simplify the process by using bin weather data, which divides the climate into "bins" that contain the number of hours per year at a given climate condition.