Indian Institute of Science

Design of Photovoltaic Systems

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NPTEL Online Certification Course

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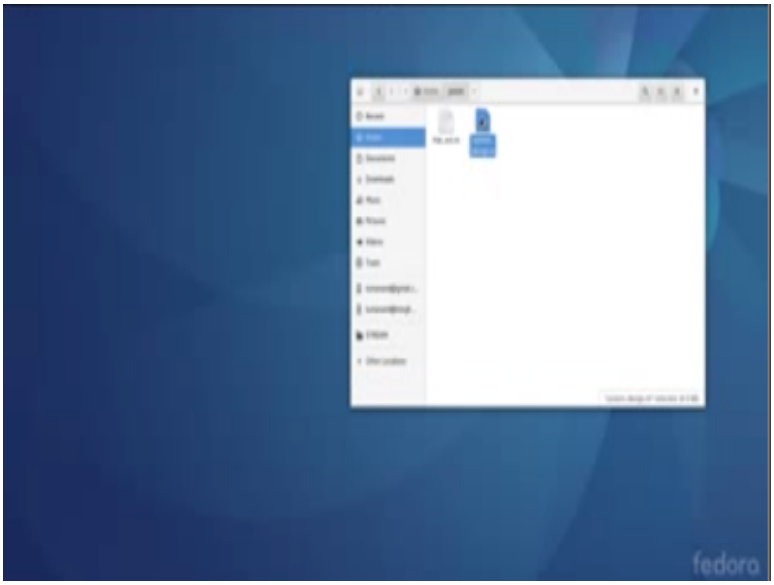

We shall now do some octave scripting to design PV systems I have here in the folder two files one is system design dot here i will discuss about that now and the other one is high estimation dot M this we have discussed earlier in fact I have picked this file from my previous weeks year discussion this gives an estimate of h_{at} the incident energy at a place with atmospheric effects until I only slightly modified this file so that it becomes a function and I can call it into system design dot here so I will now go into system design dartium.

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And here I have written the script file so basically it contains few sections one is the specifications which contain the specs related to low specs related to battery specs are related to DV and insulation then just like we discussed and carry the sizing of the battery, we will try to put in those equations into the script file then how to obtain a chat ahead K_T minimum is basically I use the same script file that we had discussed earlier in an earlier week but only that now it is converted into a function.

And then how we go about sizing the PV so and then finally displaying the results so these are the sections and I have put in the numbers the same number that we had worked out by hand so that you can verify them, so I have herein specs related to load but our Dave at our nine peak load current outage load current the number of days of autonomy number of days of recharge after autonomy specs are late for the battery we back nominal voltage efficiency of the battery D the depth of discharge.

And those related to PV and insulation the efficiency of the PV 16% latitude twelve point nine seven Bango latitude the tilt angle of 10^0C so the battery sizing equation the same equations that we discussed in theory I have included them here and estimating it is hid minimum this one what I have done is I have used the file that we have already worked done before except that I have converted it into a function, function which gives an output as a H_{at} and the name of the function is H_{at} estimation.

And the inputs to the function is Q or file latitude and B β tilt angle so I just made those comments here and then the rest of this is same as the a chart estimate function that we discussed earlier, and finally I am sending out returning this H_{at} minimum which is minimum of H_{at} hurry and this is what is the return back and we use for this system design so this is the H_{at} estimate so that you will find the H_{at} minimum from here in kilowatt hour per meter square per day which we will use this value here to find the weak H_{at}.

So this portion is basically that I want o clamp the an R value to one because I have a division by nR and I cannot actually do a division by zero, so therefore I am limiting NR to one with a new variable nrr just for calculation computation within the script file otherwise all the equations are as we have discussed and then going to the display you will display the specs then you display the battery sizing itself and the TV sides results, so this will give you the entire system design let me now see let us now see how we run this in octave.

And obtain the results so let me start octave so this is octave let me go to the specific folder TV sim so we have these two files here like we discussed let me clear the workspace and I will execute system design soon executing clear everything, so you will see that the display results are displayed oh these are the displayed outputs for the PV system design the first part relates to the specifications it is these are the same numbers as we have inputted specifically related to load spectra later to battery specs.

Or later to period insulation it is good to have all these numbers in one place so that you can always cross-check with the results that you have obtained the second part is the battery sizing the TV sizing but resizing the answer our capacity of the battery 68 each and then you have the see rate with respect to peak load discharge see right, through the average load discharge it is basically the emperor calculator divided by the peak current and a per calculated divided by the average load current divided.

So C / 11 but you can use the nearest 10^{th} value lower than this so it can be C / 10 C by 25-year sense why you can be seen by 20, so this is a spur we have discussed while doing the manual calculations PV sizing you have at minimum 34.58 whatever required for the PV peak re the peak the peak where for the PBR a is for one a intrinsic area $2.6m^2$ and actual real estate area around $3.4m^2$ just as per we have calculated.

But this is just to validate what we have done but you can explore with lot of things here you can include days of autonomy number of days of charge recharge replenishing the battery after the days of autonomy play around with the day and the night load and see what are the output results as with respect to the battery and the TV sizing will give you more insight into the design of the PV systems.