Indian Institute of Science

Design of Photovoltaic Systems

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NPTEL Online Certification Course

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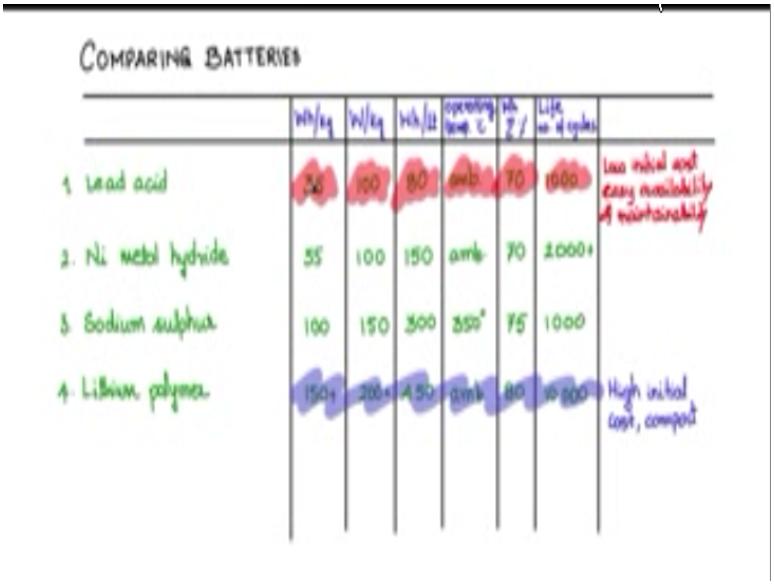

Let us do some comparing of batteries so let P type of one of the parameters combine available watt over per kg the energy density watt per kg power density watt over liter volumetric energy density let us take the operating temperature degree centigrade watt over efficiency literature will also give you ampere power efficiency but almost all manufactures will claim 99% 200%.

But what is crucial and what is important is to take watt over efficiency energy efficiency has we have discussed life of the battery in terms of number of cycles charged discharged cycles and let us list down some of the common batteries lad acid batteries very common nickel metal hydride batteries.

You have the sodium sulphur batteries and lithium polymer batteries there are any other batteries also but these are the common once which you will be familiar with and then we will look at

some of the numbers lead acid batteries the watt over per kg and in specific energy or the energy density gravimetric energy density is 35 the specific power watt kg for lead acid batteries 100.

So you will get around 100 watt for every kg of lead acid battery package the watt over per liter volumetric energy density is 80 the lead acid batteries can operate under ambient temperature conditions it has an efficiency of around 70% and it can go up to 1000 numbers of charge discharged cycles if it is well maintained.

A nickel metal hydride haves a watt energy density gravimetric energy density of 55 specific power of 100 watt over per liter of 150 it can operate under ambient temperature conditions haves a similar watt over efficiency of around 70 and around 2000+numbers of charge discharge cycles sodium sulphur battery quite popular and earlier series haves a 100 watt over per kg.

It is reasonable liquid energy density 150 watt per kg is the power density gravimetric power density 300 watt over per liter volumetric energy density the operating temperature I high it is suppose to be caption inside and over 350^{o} centigrade for it to effectively operate the efficiency is around 75%.

And around 1000 numbers of charge discharge cycles lithium polymer batteries very popular nowadays almost al gadgets use lithium polymer batteries nowadays very compact it has a very high energy density of around 150 watt over per kg probably the highest till now the watt per kg the power density is around 200+ watt over per liter is around 450 it operates and ambient temperature conditions.

It has a watt over efficiency of around 80% and quite high life in terms of number of charged discharged cycles around 10000 so if you see the lithium polymer battery is very popular today because of its very nice numbers that it has so the various parameters and even though it has a high initial cost high capital cost it is compact and has a lot of advantages especially the number of charged discharged cycles the life being high.

And the long run it works out the lead acid battery even though it has very poor numbers here he is the one which is having maximum number of units in the market for a usage and saves it is used in UPS it is used some electric vehicles it is used in a photovoltaic type applications even though it is very large.

It is very low densities it is having low initial cost not only that it is easy to maintain and repair and it is easily available when in rural places and that is why this is so popular so this one reason why the lead acid battery is that too stay even though it has a poor numbers as far as performance parameters are consent.