Re: Sourcing energy storage capacitors in the UK

Source: http://sci.tech−archive.net/Archive/sci.electronics.design/2004−06/4043.html

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From: John Beardmore (*wookie_at_wookie.demon.co.uk*)
Date: 06/26/04

Date: Sat, 26 Jun 2004 04:57:42 +0100

In message <40c70b61$0$551$ed2619ec@ptn−nntp−reader02.plus.net>, Ian
Stirling <root@mauve.demon.co.uk> writes
>John Beardmore <wookie@wookie.demon.co.uk> wrote:
>> In message <40c522f4$0$551$ed2619ec@ptn−nntp−reader02.plus.net>, Ian
>> Stirling <root@mauve.demon.co.uk> writes
>>>John Beardmore <wookie@wookie.demon.co.uk> wrote:
>>>> In message <40c4e1e5$0$551$ed2619ec@ptn−nntp−reader02.plus.net>, Ian
>>>> Stirling <root@mauve.demon.co.uk> writes
>>>>>John Beardmore <wookie@wookie.demon.co.uk> wrote:
>>>>>> In message <10c9adjsalv87ab@corp.supernews.com>, Tim Wescott
>>>>>> <tim@wescottnospamdesign.com> writes
>>>>>>>John Beardmore wrote:

Thanks for the pointers. I've quit this n.g. now due to time
pressure...

>>>20 tons a day, let's say it's running for 5 hours, so that's
>>>4 tons an hour, or about a liter a second. (this implies fairly good
>>>insolation and a fixed panel, or a slightly less good panel with a tracker.
>>>
>>>Ok...
>>>You later say the head is 4m, so that's 40W of 100% efficiant pump.
>>>160W would probably be a reasonable worst−case guesstimate for the 'right'
>>>AC centrifugal pump.
>>
>> Yes. Provisionally I'm assuming perhaps 320W of PV, a 357W single phase
>> 250V pump and a 500W sine wave inverter.
><snip>
>>>You have looked at the various solar FAQs, and got the information for
>>>your location as to expected solar gain?
>>
>> Didn't know there were any FAQs on this in general. Then again, it's
>> been a long time since I looked, and usually I'm writing them not
>> reading them.
>
>alt.solar.photovoltaic.
>There are sites where you can look up the location, and it'll give
>you the optimal tilt, and average power output for the correctly tilted

>panel, and average power for a tracker, taking into account weather
>conditions.

Thanks ! Will have a look !

>>>I'd want to keep the battery over 75% charge, so you want to size the
>>>battery so that a really bright day can charge it up to 100%, and then
>>>it'll keep going a bit during the night until the voltage drops below
>>>a threshold
>>
>> This is OK up to a point, but our assumption is that batteries will
>> start to sulphate when discharged by as little as 10%.
>
>The idea is to be able to use all the energy the solar panel provides,
>and one way of ensuring this is to (probably better to discharge just
>before the morning) discharge enought that you can store the excess
>that may build up over an especially good day.

I think our plan is to use the power to do useful pumping ASAP rather
than cycling batteries more deeply than we need to.

>> We thus aim to charge up to 100%, then discharge to 90%.
>>
>> 100% charge can be determined by terminal voltage under charge, and 90%
>> discharge assumed after running a known load for a know time, though
>> perhaps with a low voltage cut off just in case.
>
>Batteries do have a temperature coefficiant, which you probably need
>to look at if you haven't already, it alters the set−points a bit.

Good point as this will be running at out door ambient temperature plus
a bit. In the UK I guess that's potentially a −15 to +30 range.

>> I'm assuming we can always use more energy that we generate.
>
>Hmm, I see where you'r going.
>This would need a significantly smaller battery, but has the problem that
>a significant proportion of your energy is going to go into and out of
>the battery, incurring losses (some 30−40% IIRC) along the way.

Yes, if the pump routinely uses more than the panels generate.

>You'r also going to be charging and discharging the battery quite hard,
>something which is not good for life.

OK, though it could be made relatively large, charged less 'hard' and
cycled less deeply..

>> This way, the battery will only have to hold its charge for a few
>> minutes, and will never be left over night at less than 90% charge.
>>

>>
>>> (lead−acid will have best cycle life if kept partially charged,
>>>75% may be conservative.)
>>
>> As I understand it, % discharge without sulphation is a bit of marketing
>> issue. 10% seems to be accepted in the academic community, do for
>> example you can safely take 10AH out of a 100AH battery.
>>
>> Sometimes however, a say 200AH battery might get marketed as 100AH, but
>> able to accept 20% discharge without sulphation.
>
>>> (read the sci.chem.battery.electrochem FAQ)
>>
>> Thanks ! Didn't know there was one !
>
>Probably an idea to ask about charge philosophies there too.

OK.

>> Yes, though the far that we'll be up a 15 meter mast with an existing
>> yaw bearing makes it more appealing than it might be !
>
>Is this mast partially underwater, or is the pump at the base?

Pump at base, base above canal.

>>>Yes it might allow you to shave a few hundred dollars off the solar panel
>>>price, but it's not going to be free.
>>
>> No, though it could be as simple as
><snip>
>It could be, but can you ensure that it can take several thousand cycles
>when exposed to wind/rain/...

With all the snipping I'm not sure what had to take it. Battery I guess
?

>>> something
>>>to cut out the pump when the battery voltage gets too low
><snip>
>> Possibly, and many inverters will shut down if the input voltage is too
>> low.
>
>You certainly don't want to take the battery down to the non−changable
>cut−off points of many inverters. (10.6V is common)

Indeed.

Capacitors by the way proved to be a non starter for this. 120F @ say
60V wildly expensive ! No magic wand there !

Cheers, J/.

--
John Beardmore