

Will solar work for your remote stockwell?

Using solar energy to pump water provides a cost-effective way to provide water to livestock and wildlife in remote locations. There are a number of considerations when developing a solar stock pumping application. Some of the first are:

- ☉ How many animals will need to be watered and what are their daily water requirements?
- ☉ Does the sun shine when the animals need water or must some storage element be provided?
- ☉ Will the sun provide enough power to lift the quantity of water required?
- ☉ How much water is available for pumping? (well recharge rate)

Below is some information concerning the water requirements of cattle and sheep.

- ☉ Cow - calf pair or one horse
Summer 15-20 gallons per day (GPD)
Winter 10-12 GPD
- ☉ Yearling

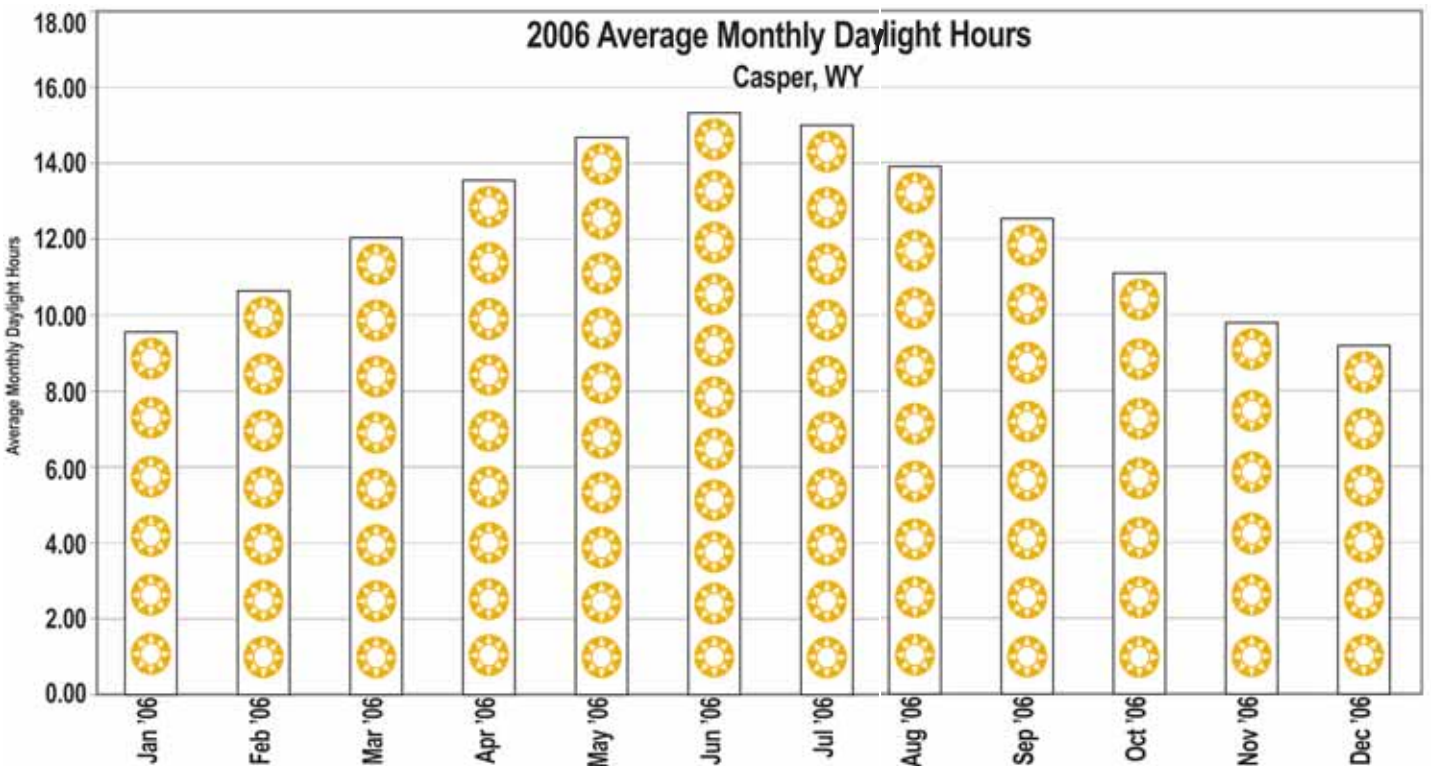
Summer 12-15 GPD
Winter 10-12 GPD

- ☉ Sheep
Summer 2-4 GPD
Winter 1-2 GPD

In the development of a solar pumping installation, the pump will only run when the sun is shining. During the year, the sun shines the most in June with an average of 15 hours a day. This number drops to about nine hours a day in December. (This monthly information is shown in the graph on the previous page.)

The maximum benefit from solar pumping will be achieved in the summer months. Since the sun may not be shining when the water is required, a storage element must be added to this watering system. There are two ways storage can be achieved:

- ☉ Batteries can be installed to store excess electrical energy so that the pump can operate when the sun is not shining. However, this



system has some limitations, due to the cost of the batteries and the sensitivity that batteries have to low temperatures. Batteries must be protected from freezing and require the addition of water periodically to maintain their storage characteristics.

- The use of a water storage tank may be a preferred option. By pumping water to a higher storage tank, the water can be released as needed to flow by gravity to the required locations.

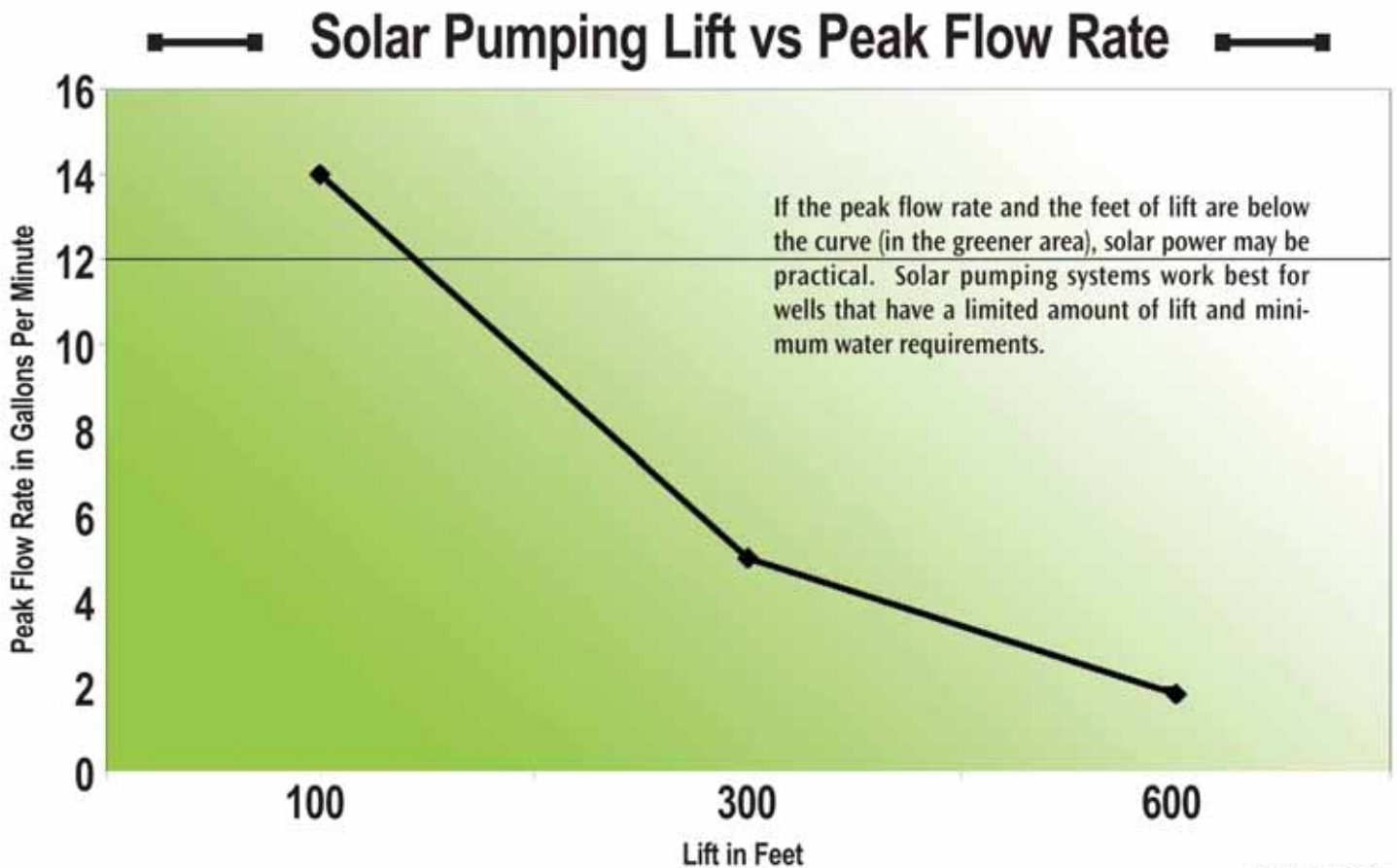
After evaluating water requirements, the remaining question is whether or not a solar installation can provide the required energy. In the graph shown below, if the peak flow rate and the feet of lift are below the curve (in the greener area), the possibility of using solar power may be practical. Solar is

ideal for wells that have a limited amount of lift and minimum water requirements.

Information concerning the well is extremely important to the developer of a solar pumping project. The following information will be needed to determine if the well has the water required to meet the needs of the pumping installation.

- Static water level
- Drawdown water level and flow rate used to reach the drawdown water level
- Well-casing size
- Depth of well

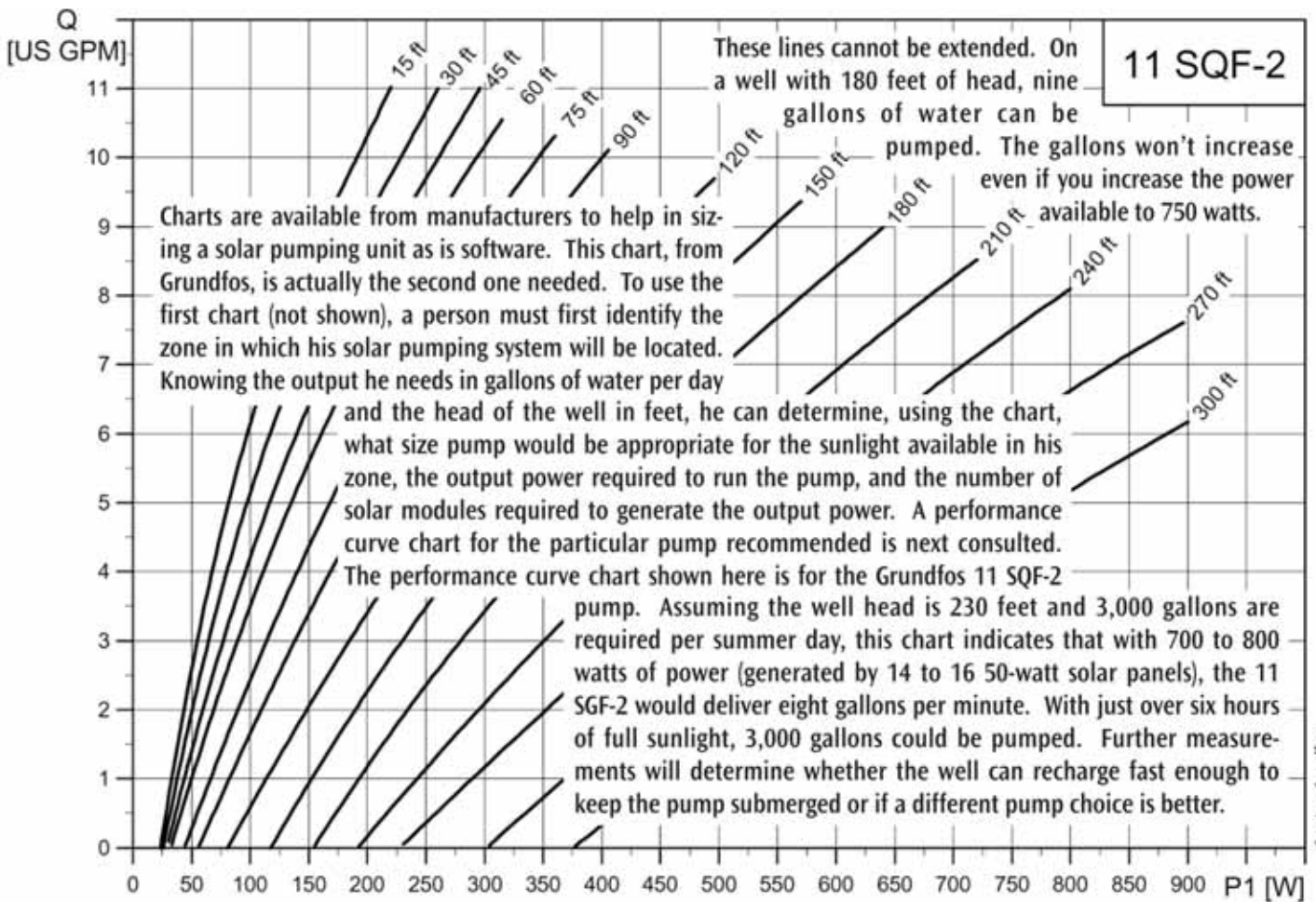
Having considered the above steps, the actual specification and funding sources are the next items to be explored. With the water requirement and the well specifications, many solar panel equipment suppliers can develop a design. The



Courtesy Jim Kirsch

University of Wyoming, Department of Electrical Engineering, has developed expertise in the design of these projects and will evaluate multiple suppliers as part of their design. The University, electric cooperatives, and local conservation districts have access to sources of grant funds for these projects.

For more sizing information, contact UW's Electric Motor Training & Testing Center, Dept. 3295, 101 E. University Ave., Laramie, Wyo., 82071, or 307-766-5149.



Jim Kirsch is a former electric cooperative manager and operations manager in Wyoming. This article was initially published in the May, 2006 edition of the WREN magazine. It is reprinted here with permission.