Solar Pump Sizing Worksheet

Worked example: Cathy

1. Daily use

From your Chapter 2 water budget.

_____ gallons per day

Cathy: 16 (2 people x 8 gallons, the lean tier)

2. Peak sun hours

Pick a conservative number for the season you will use it. NMSU advises designing for winter.

_____ hours per day

Cathy: 4.5 (Mississippi State's example)

3. Size the pump: flow and head

Flow in gallons per minute = daily use ÷ peak sun hours ÷ 60

Daily use (step 1)		Sun hours (step 2)		Flow (gpm)
_____	÷	_____	÷ 60 =	_____

Cathy: 16 ÷ 4.5 ÷ 60 = about 0.06 gpm. A minimum, not a shopping target.

Head in feet = (water to pump + pump to tank) × 1.1 for friction

Water to pump (ft)		Pump to tank (ft)		Vertical lift (ft)		Head (ft)
_____	+	_____	=	_____	× 1.1 =	_____

Cathy: 3 + 20 = 23 feet. 23 × 1.1 = about 25 feet.

Surface-mounted solar pumps have a typical lift of only 10 to 20 feet (Colorado State). If your water is deeper, as in a well, you need a submersible pump.

4. Size the panels

Take your flow and head to the maker's pump chart and pick the smallest pump that exceeds both. Then read its watts and voltage off the chart.

Pump watts		Panel watts (about)	Pump voltage
_____	× 1.25 =	_____	_____

A 40 watt pump needs about 50 watts of panels. (A hypothetical for the arithmetic; your pump will have its own number.)

Check that the pump's voltage matches your panels. Panels face due south.

Keep them clear of buildings, trees and anything that will grow.

5. Size the tank for storage days

Daily use (step 1)		Storage days		Tank (gallons)
_____	×	_____	=	_____

Cathy: 16 × 3 days = 48 gallons. The chapter uses three days of storage.

Use a pump and controller made by the same company. Mixing brands can void the warranty. Hire a licensed electrician for any connection to a 120 or 240 volt household panel or generator.