

Demonstration of Solar Water Pumping Systems for New York State Agriculture

Funded by:
New York State Energy Research
and Development Authority

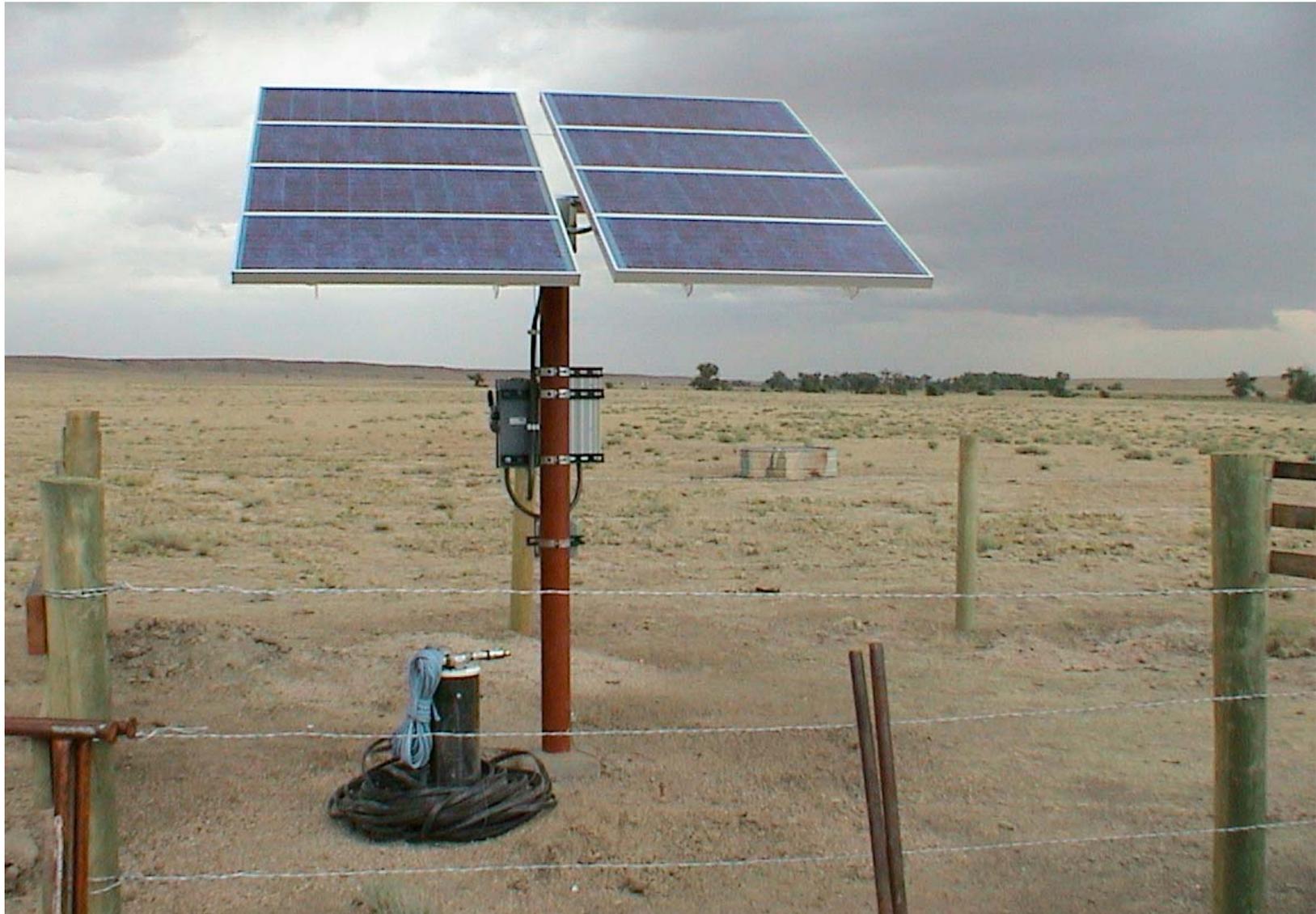
Presenters

- Roy Butler and Denis Oliver – Four Winds Renewable Energy – Arkport, NY
- Chris Sinton – Alfred University - Alfred, NY

Overview

- Introduction to stand-alone, photovoltaic-powered water pumping systems
- PV and pumps
- Application to grazing
- Performance and cost
- System sizing
- Hands-on demonstration
- *GOAL:* Provide New York State farmers with cost-effective and reliable options for watering remotely pastured livestock and small scale irrigation.

Solar Powered Water Pumping



Uses for Solar Water Pumps in New York

Solar pumps are very cost-effective for remote applications (where utility interconnect costs more than \$5000).

- Off-grid homes and cabins
- Livestock watering: pond and stream protection, rotational grazing, remote pasturing
- Aquaculture: aeration, circulation, and de-icing.
- Irrigation: best for small scale applications

Other Remote Watering Options

- Diesel/gas pumps- high fuel, maintenance and labor costs. Potential noise and pollution issues
- Windmill- Very site specific. Does not work as well in the summer due to lower wind speeds
- Gravity feed- very site specific...often impractical. Works well when used with a solar pumping system
- Ram pump- requires moving water for operation
- Hauling water- The lowest cost option. Very labor intensive for livestock watering....frequently replaced by a solar water pumping system!

Pros and Cons of Solar Water Pumping

PROS

- Reliable and long life
- Produces water during sunny weather when it's needed most
- Low labor and maintenance costs
- No fuel costs
- Easy to remove, transport, and store
- Non-polluting

CONS

- Potentially high initial system cost
- Decreased water production in cloudy weather
- Water storage and/ or battery needed for providing full time water
- Must have good sun exposure between 9 am and 3 pm

Introduction to Photovoltaics

- Solar (photovoltaic or PV) modules produce DC electricity directly from sunlight with no moving parts.
- Solar modules have been around for over 50 years and in mass production since 1979.
- The reliability of PV is such that 20 to 25 year power warranties are typical, with life expectancies beyond 30 years.

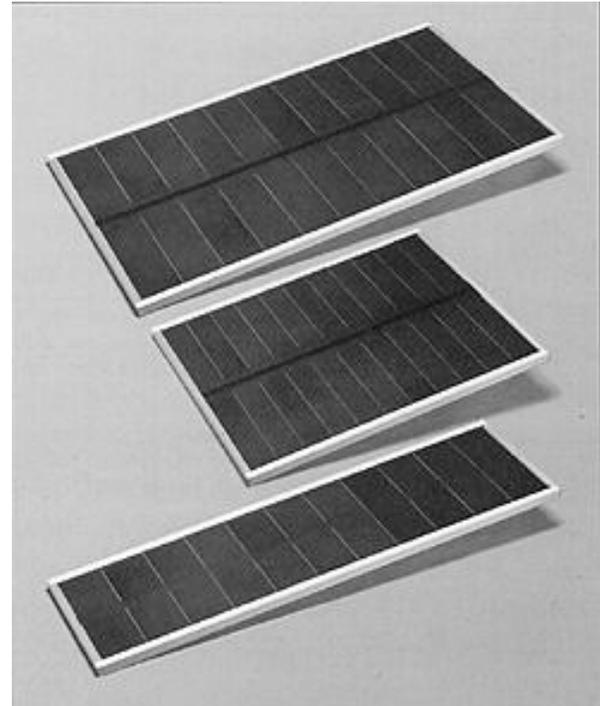
Photovoltaic Panels



Monocrystalline



Polycrystalline



Thin Film
(amorphous)



240 watt solar array on a passive tracker

Located near Ithaca, NY