Solar-powered irrigation: Constraints & opportunities under climate change?

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Diesel pump sales continue to outpace investment in solar irrigation—but the tide might well turn toward solar! Based on a simulation modeling exercise, these factors help:

- Having access to lots of sunlight! In fact, in more than 80% of GW irrigable area of Southern Africa solar is more cost-effective than diesel, also in large parts of Central Africa
- Higher diesel cost turns the tide toward solar, and solar reduces
- Diesel fuel costs increase linearly with irrigation water needs, whereas solar panels are sized to meet peak irrigation demands, solar more profitable for water guzzling crops
- Connecting the pumps with different water-saving field application technologies can reduce solar and diesel pump size
- Also: sales points in rural areas, dedicated financing options, after sales-service, demonstrations, etc. can support uptake

Xie et al. (2021)
Impact of climate change on cost-effectiveness of solar irrigation relative to diesel irrigation is assessed under a recent CMIP6 scenario.

The analysis shows that climate change favors the use of solar over diesel irrigation.

Xie et al. (in prep)
How does agricultural water use behavior change with solar pumps (compared to diesel or other agricultural water management technologies and practices)?

How can women and poorer farmers be reached more effectively with this technology?

How can we develop appropriate institutions for groundwater governance given (likely) more rapid depletion of groundwater with solar pumps?