

Small Scale Solar

Learning about,
experimenting with,
building out,
and operating
a small-scale non-grid-tied
solar energy rig.

Mark Kriegsman, May 1st, 2012

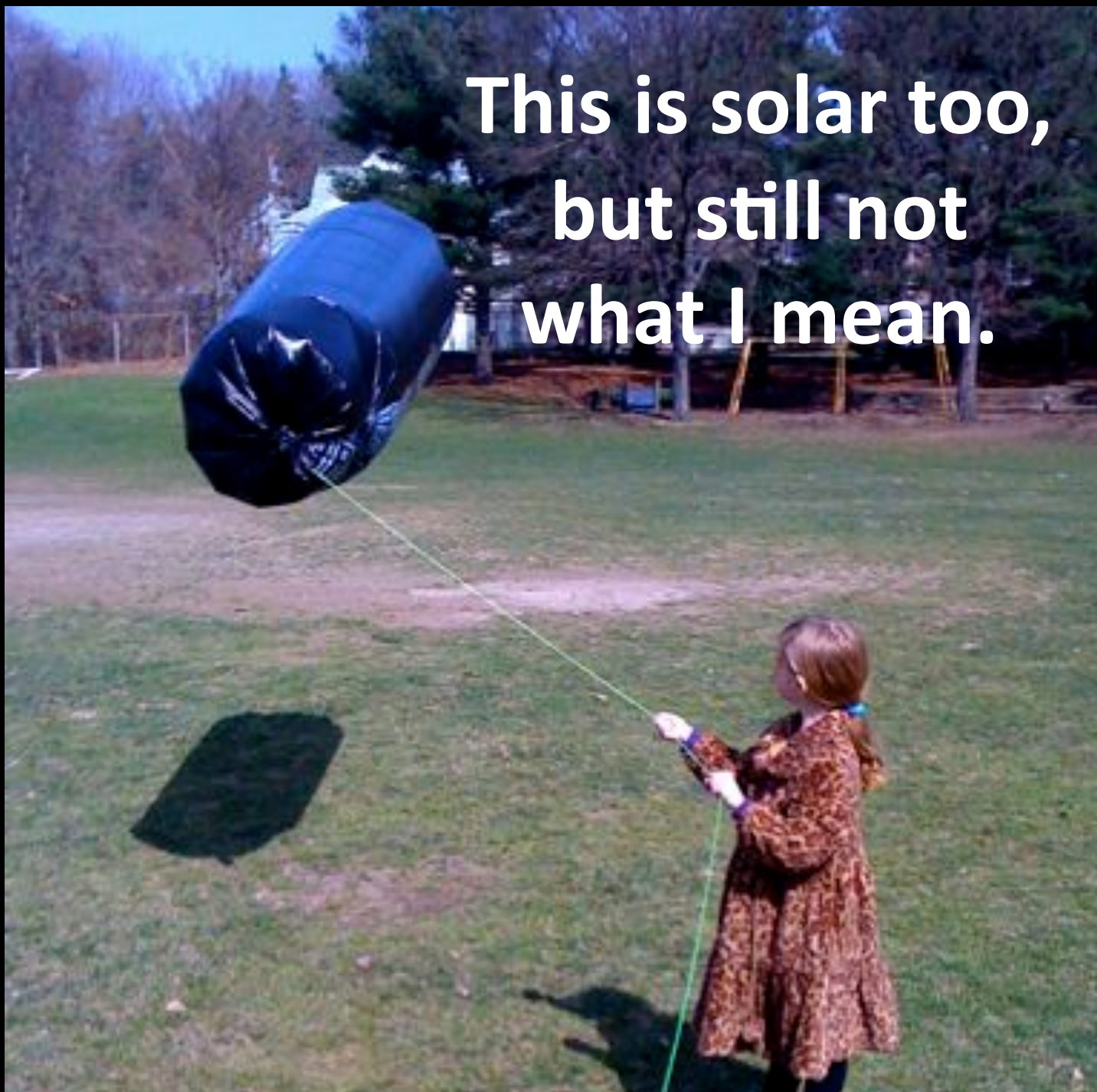
**This is solar,
but not what I mean.**



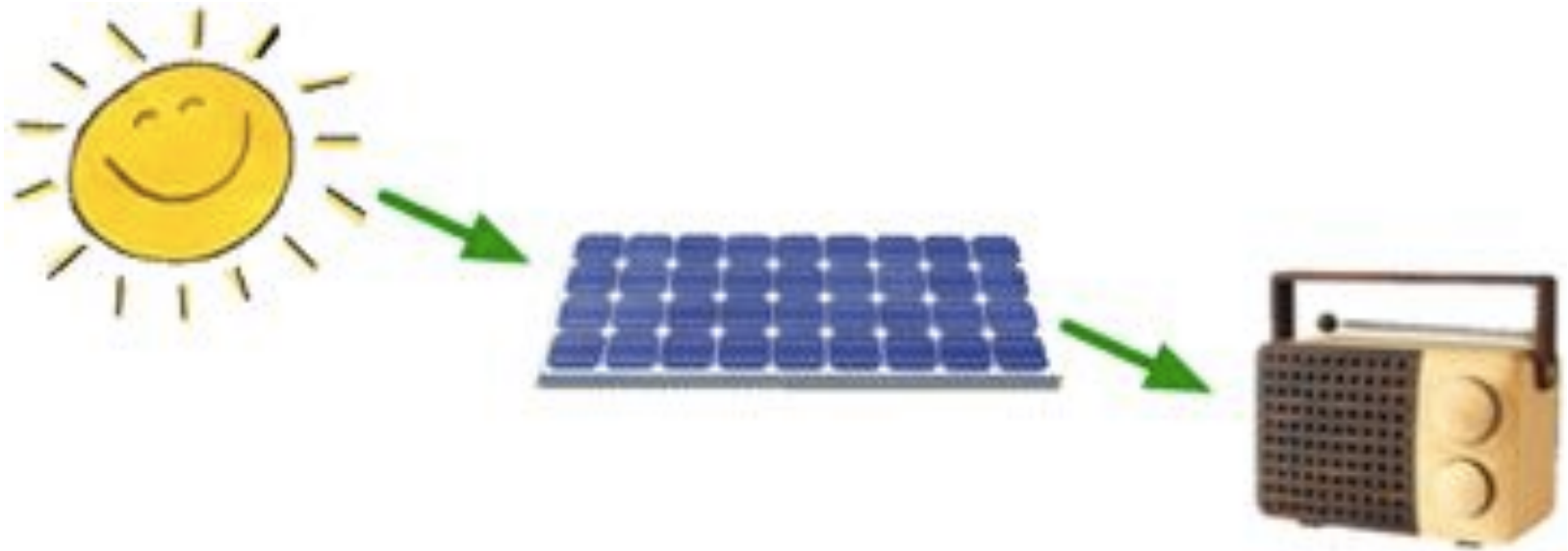
This is also solar,
but also not what I mean.



**This is solar too,
but still not
what I mean.**

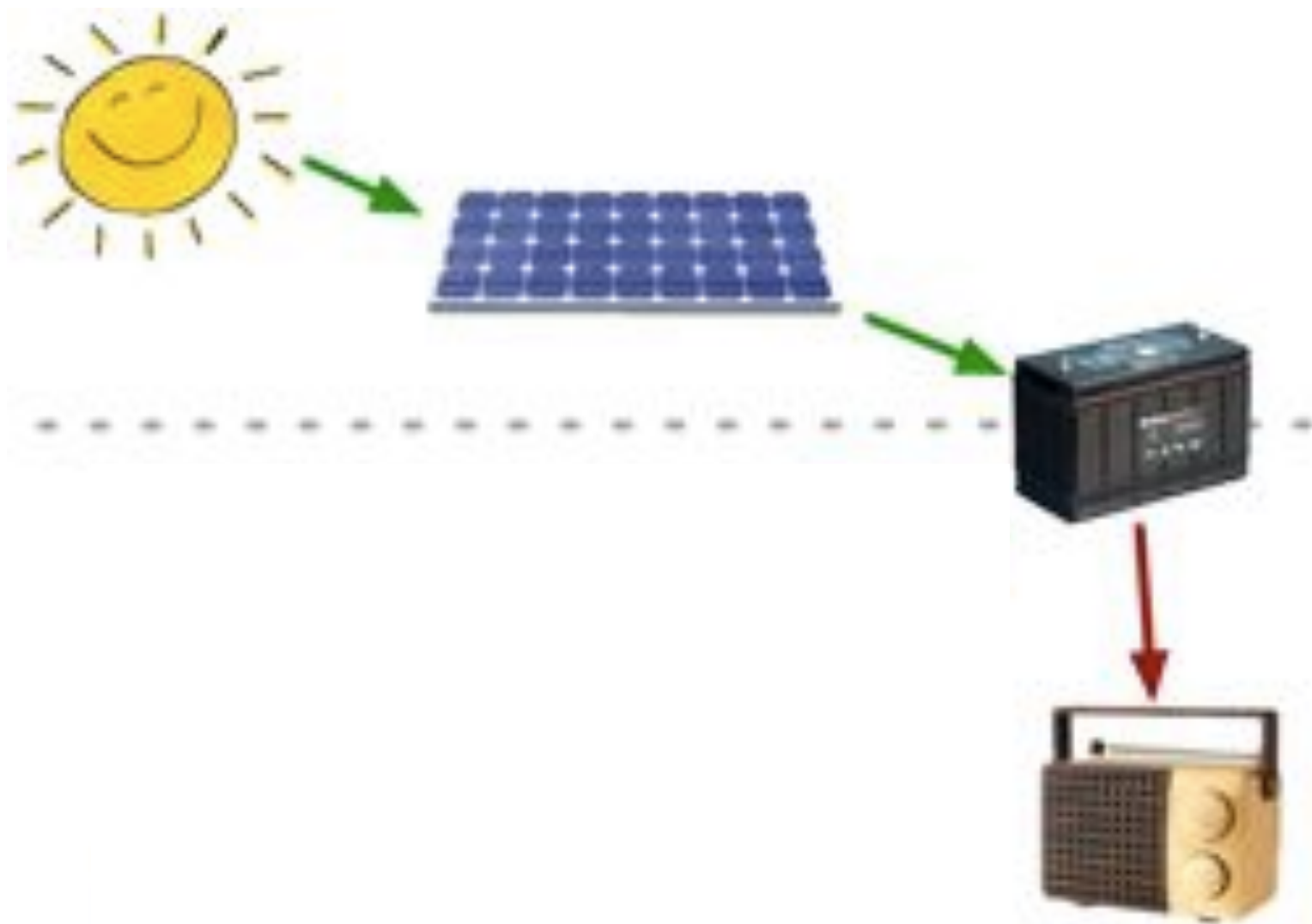


This is what I mean.



Solar–Electric power generation

- “Photovoltaic” (vs. solar hot water, heat or AC)
- **Non-grid-tied:**
 - Generate 12 volt DC power from solar cells
 - Store power in 12 volt batteries
 - Use power as 12 volt DC, or 120 volt AC
 - **No** connection to house AC or power grid





Batteries

- Chemical energy
 - More chemicals, more energy
 - Limits: capacity, working range
- “Deep cycle” vs starting batteries



Charge controllers





Kits

- 10W panel
- small battery
- charge controller
~\$189

(phone/tablet charger)



60W kit \$300 (battery \$150 extra)





Math

- Watt-hours

Input (sun): 10 Watt panel * 5 hrs sun = 50 Watt-hours

Output (use): 50 Wh ÷ 60 Watt bulb = only 50 minutes!

Output (use): 50 Wh ÷ 15 Watt bulb = 3+ hours!

You may have heard of “kilowatt hours”.

Pitfalls and Ugly Details

- Peukert's law
 - The faster you drain a battery, the less power you get overall.
- Ohm's law
 - Long wires (basement to bedroom) use up more power than short ones.
- 42°
 - It's not just the temperature, it's the *latitude*.
- Stuff breaks. Dirt happens.



Maintenance



Awesome

- Learning
- So many awesome lessons for kids
 - Conservation / renewable energy / going green
 - Heightened awareness of home energy *use*
 - Independence / DIY
 - Design / build / break / diagnose / repair
- Blackouts are even *more* fun now!
- Did I mention D.I.Y. and learning?

D.I.Y.





Thank you!

(now let's play... HANDS ON DEMO TIME!)