Twitter Thread by AukeHoekstra

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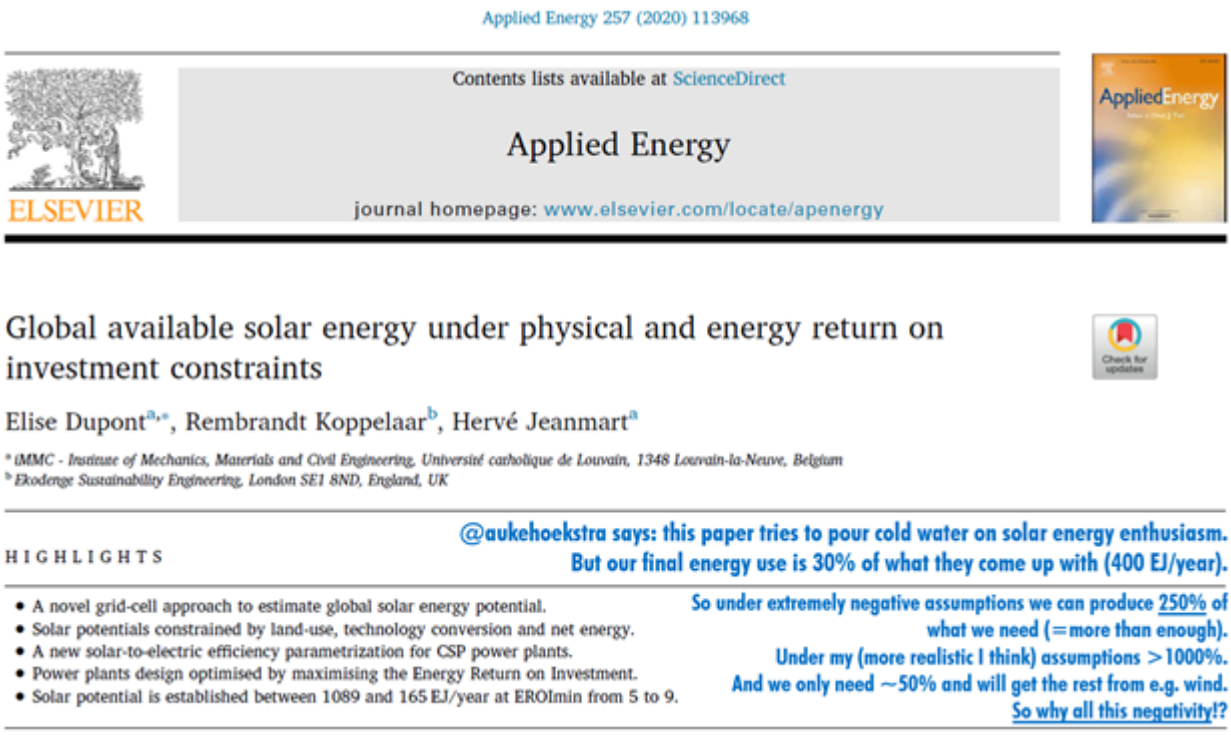
Some people want us to believe there's not enough solar energy available to cover our worldwide energy needs

They often use EROI (Energy Return On Investment) as their metric

This is a rant against these EROI people misinforming the debate, based on a rebuttal of a 2020 paper



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Global available solar energy under physical and energy return on investment constraints

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HIGHLIGHTS

- A novel grid-cell approach to estimate global solar energy potential.
- Solar potentials constrained by land-use, technology conversion and net energy.
- A new solar-to-electric efficiency parametrization for CSP power plants.
- Power plants design optimised by maximising the Energy Return on Investment.
- Solar potential is established between 1089 and 165 EJ/year at EROImin from 5 to 9.

@aukehoekstra says: this paper tries to pour cold water on solar energy enthusiasm. But our final energy use is 30% of what they come up with (400 EJ/year).

So under extremely negative assumptions we can produce 250% of what we need (=more than enough).
Under my (more realistic I think) assumptions >1000%.
And we only need ~50% and will get the rest from e.g. wind.
So why all this negativity!?

In essence the approach of the paper is straightforward:

1) Discard water and 96% of land because it's supposedly unavailable

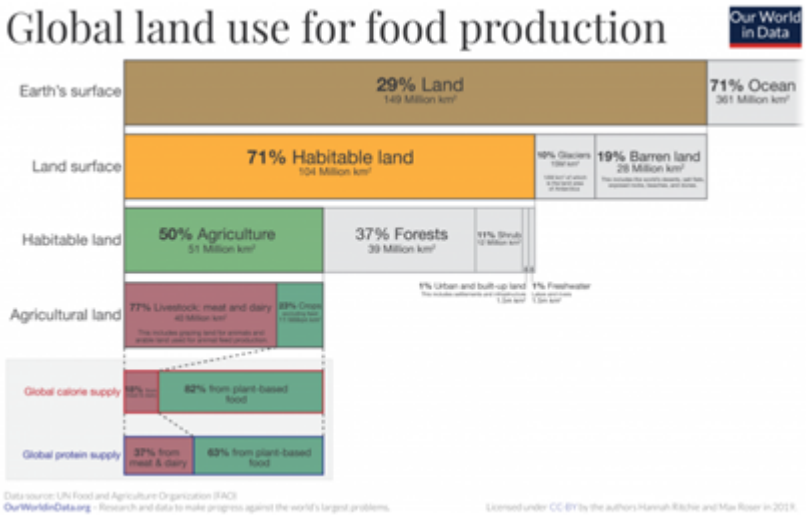
2) Assume solar cells on just 1/5th of the remaining 4%

3) Complain that production of solar panels takes a lot of energy
https://t.co/tQUHLEHFnw

About 1) (available land)

Discarding 96% of land seems pretty extreme:
30% of the world's land is barren
40% of the world's land is used for meat

I think we could find more than 4% if we tried
(but we don't have to: we need less than 1%)
https://t.co/rJZiNWcu7F



About 2) (using 1/5th of available land)

If cells are expensive and land is dirt cheap, covering 20% with solar cells is logical

But with cheap cells you maximize land use: 80% is easily possible

New paper headline:
"Global available solar energy over 10 times what we need"

Traditional south facing covers less than 40%

East-west configuration: cover over 80%

About 3) (20% of energy is needed for production)

This is something @MLiebreich and I often complain about:

If you get more energy out than you put it, that's FINE
If you get five times more energy out, that's GREAT

EROI is a USELESS metric. Let's STOP using it. At all.

I think the energy production numbers are very conservative (predicting 2030 and beyond based on 2013 Chinese production numbers?? - no learning curves??) but I won't go into that because EROI is a USELESS metric

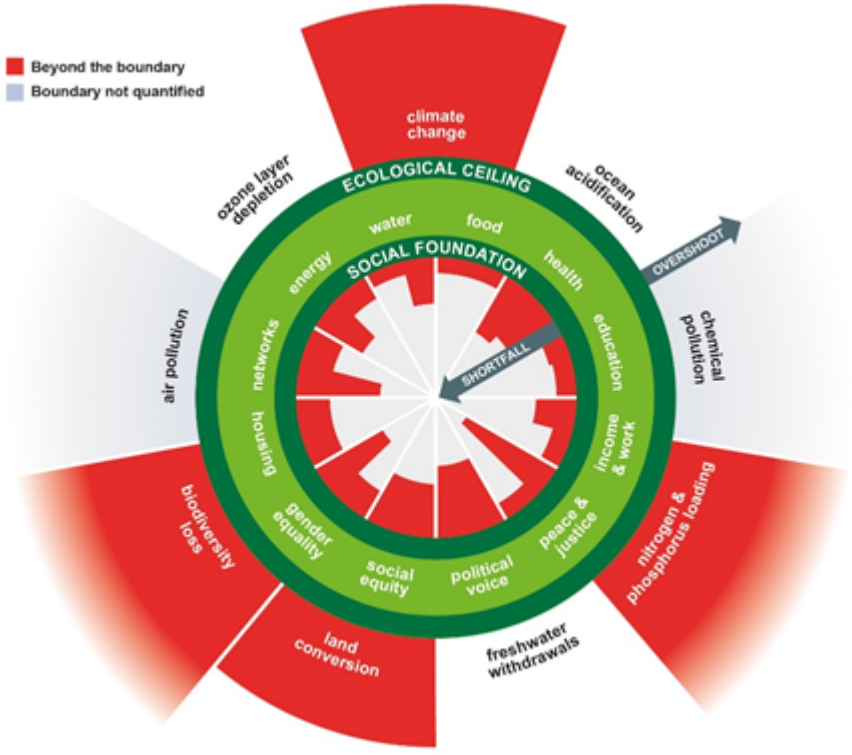
I think that use of EROI stems from the misconception (still held by many) that the second law of thermodynamics implies that have limited energy here on earth

What they forget is that the massive influx of solar energy invalidates that argument
https://t.co/wiM76rNq2b

Of course there are other constraints. Like costs (but solar is cheap) and raw materials

Most sensible people have heard about planetary constraints. And of @KateRaworth and Doughnut Economics

So let's use THOSE and STOP using EROI
Because it's a USELESS metric



The EROI paper also suggest that it might be a good idea to add wind to the mix and to do more research into storage needed on an hourly basis. You think??

People like @mzjacobson, @ChristianOnRE, @nworbmot (and me: https://t.co/9A5qlC8nIS) have been doing that for ages
WAKE UP!

Anyhow, let's take heart from knowing that even EROI pessimists cannot make solar energy a limited resource

So let's get to work because there are many problems to be solved. But let's stop polluting the debate with irrelevant metrics conceived based on a misconception

Imho/end