

Tandem PV

PV Magazine USA Week

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A Startup Perspective:
Where Is Solar Going?

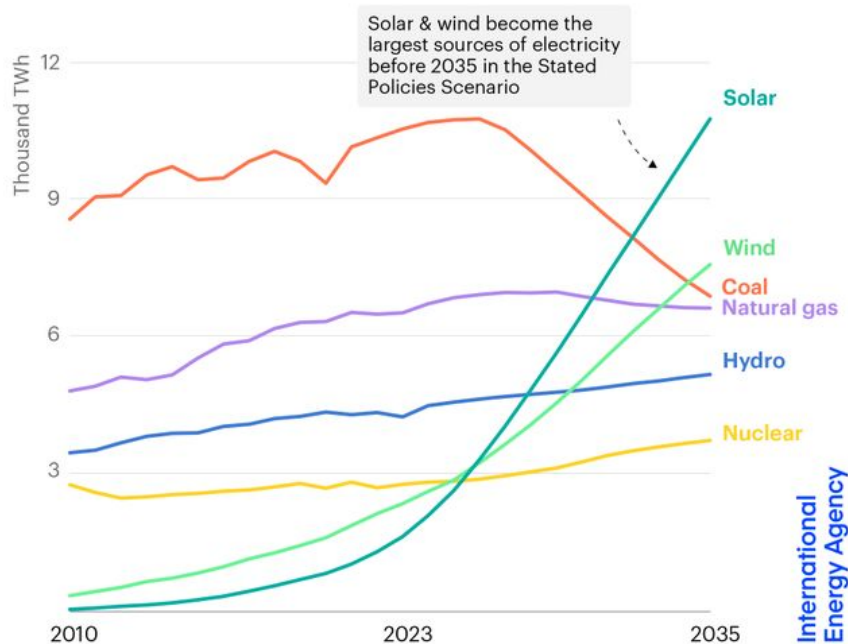
Scott Wharton, CEO

Solar + Wind to Dominate Electric Power Generation

From **last to 1st** in the next decade

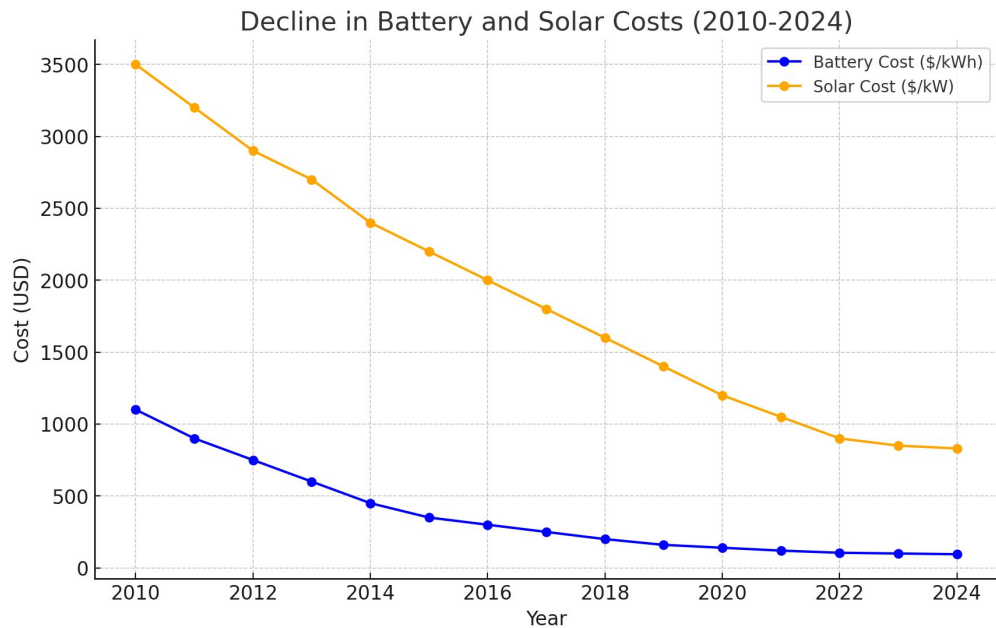
Under today's policy settings, both solar PV & wind surpass coal as the largest sources of electricity before 2035

World electricity generation in the Stated Policies Scenario, 2010-2035



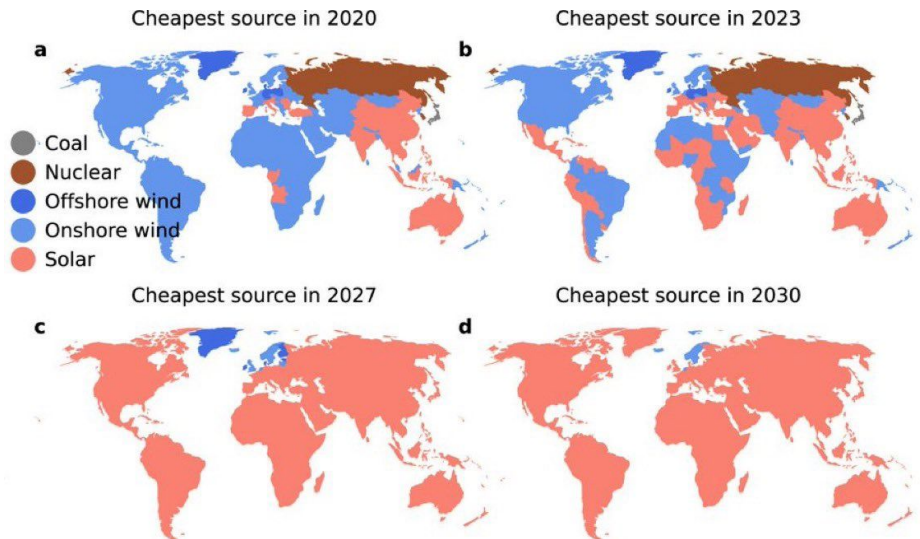
Solar + Batteries Costs Dropping

And continuing to drop
based on **Wright's Law**



Solar Cheapest Source in 2030

Everywhere. Even in places without abundant sun

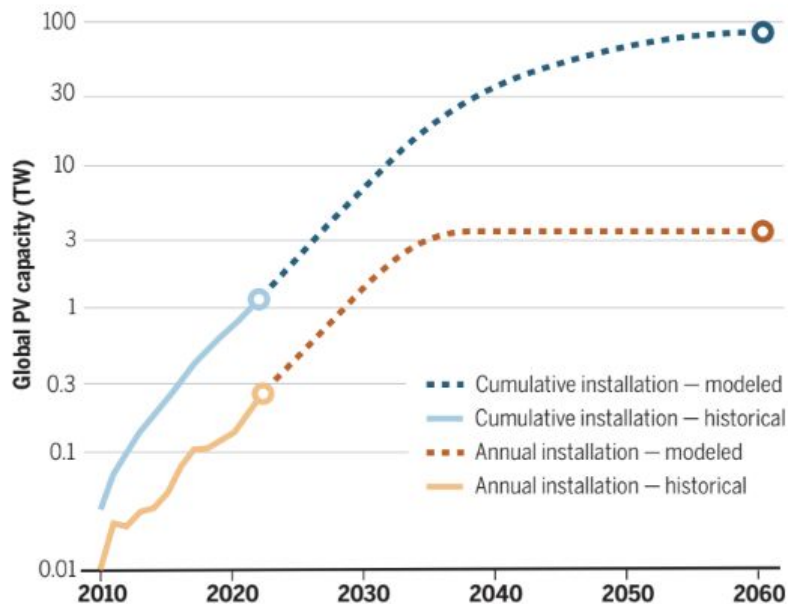


TOTAL MARKET OPPORTUNITY

Targeting a **\$1 Trillion/yr**
total addressable market
that's quickly growing

PV installations and growth toward 75 TW by 2050

Modeled cumulative capacity going forward is based on sustaining 25% production rate growth over the next 7 years and then reducing slowly to steady state. Replacement needs are included by simple subtraction of installations 25 years before the modeled date.

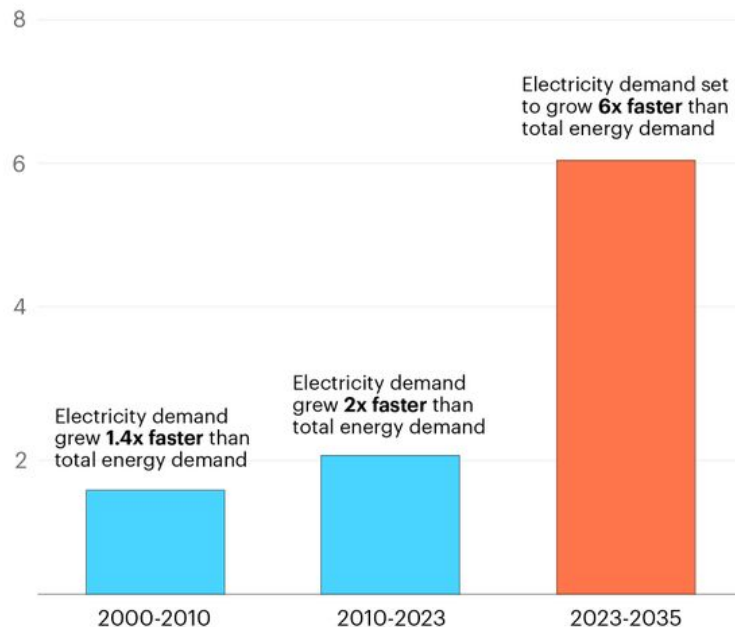


But... We are Starting “The Age of Electricity”

Electricity demand accelerating from 1.4x total energy demand to **6x. This might be understated. We need more power.**

The world is set to move at speed into the **Age of Electricity**, adding the equivalent of Japan's demand to global electricity use each year

Ratio of electricity demand growth to total energy demand growth, historical and projected under today's policy settings



Nuclear is Not the Answer

Total US Small Modular Reactors (SMRs) announcements total ~1GW; **too little, too late...**

No US SMR projects have begun construction

SMR capacity by status (GW)

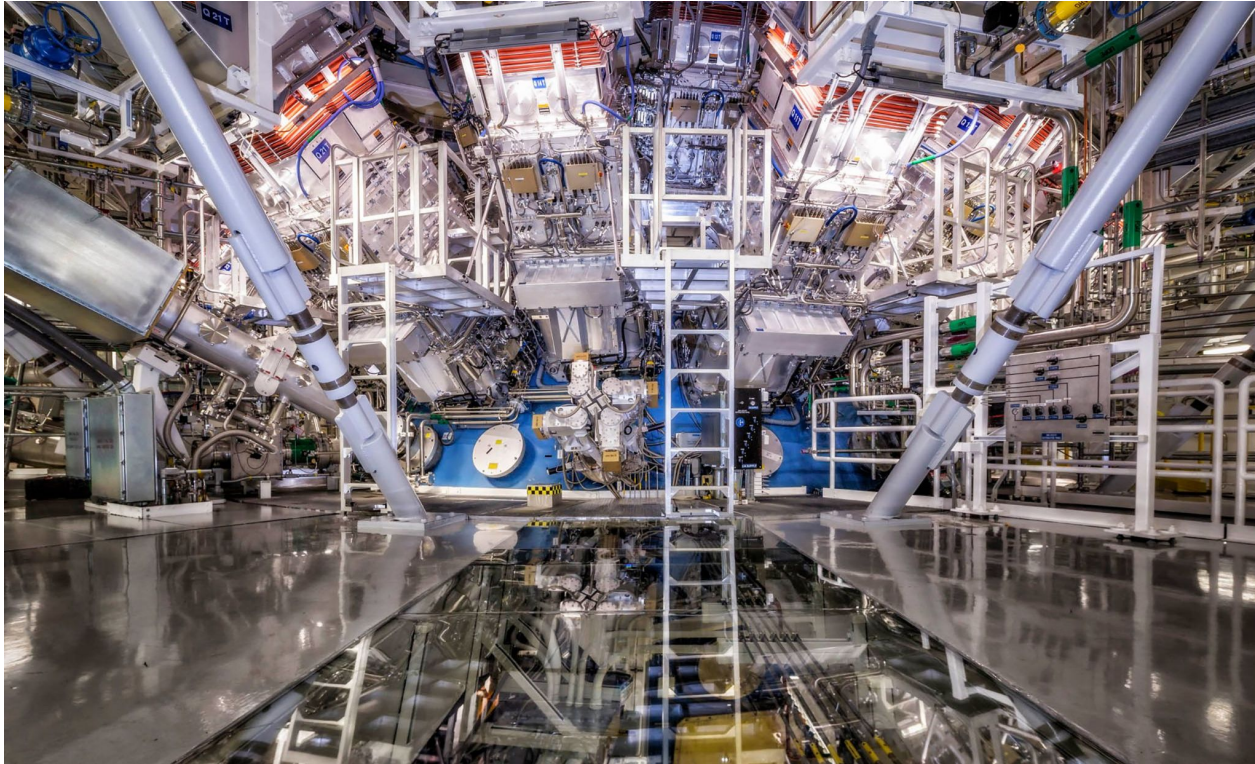


Source: Wood Mackenzie

Three Mile Island is a One-Off



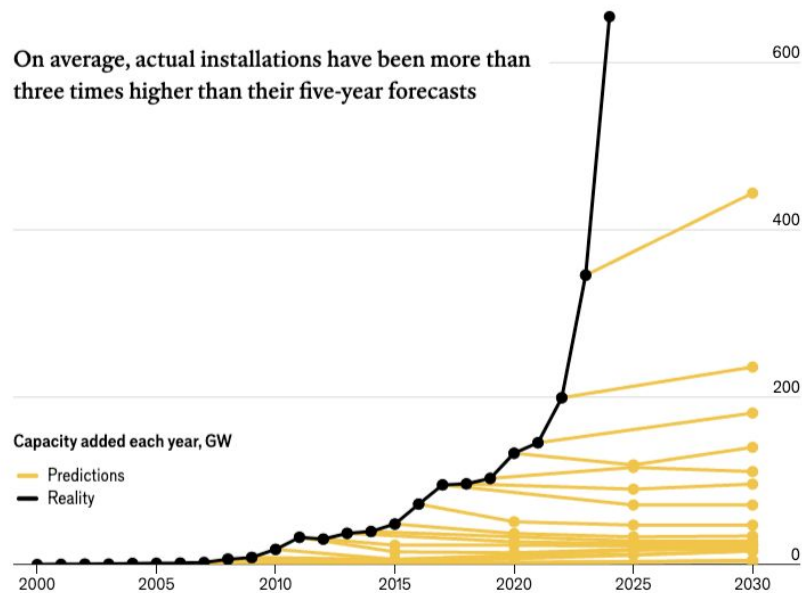
Fusion Power is a Decade Away (And Who Knows What It Will Cost)



Solar Forecasts Consistently Wrong

Unlike most analyst forecasts, these are actually **way underforecasted**

↓ **EASY PV** *how solar outgrew expectations*

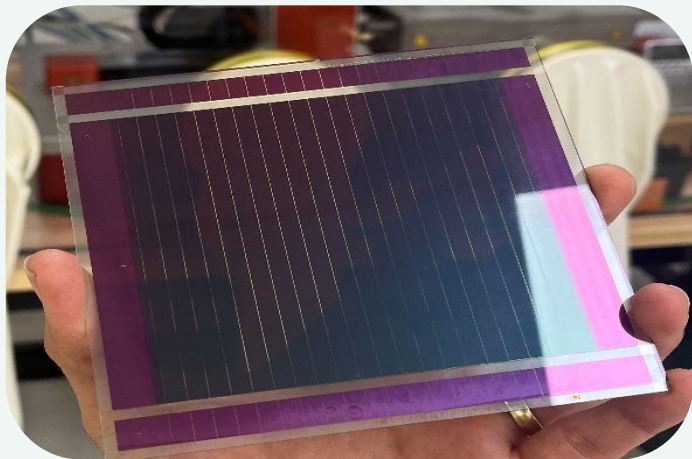


Installations for 2024 are an estimate from BloombergNEF for direct current solar capacity
Sources: IEA; Energy Institute; BloombergNEF

Perovskites - Better, Cheaper Solar

A more cost-effective and higher efficiency approach

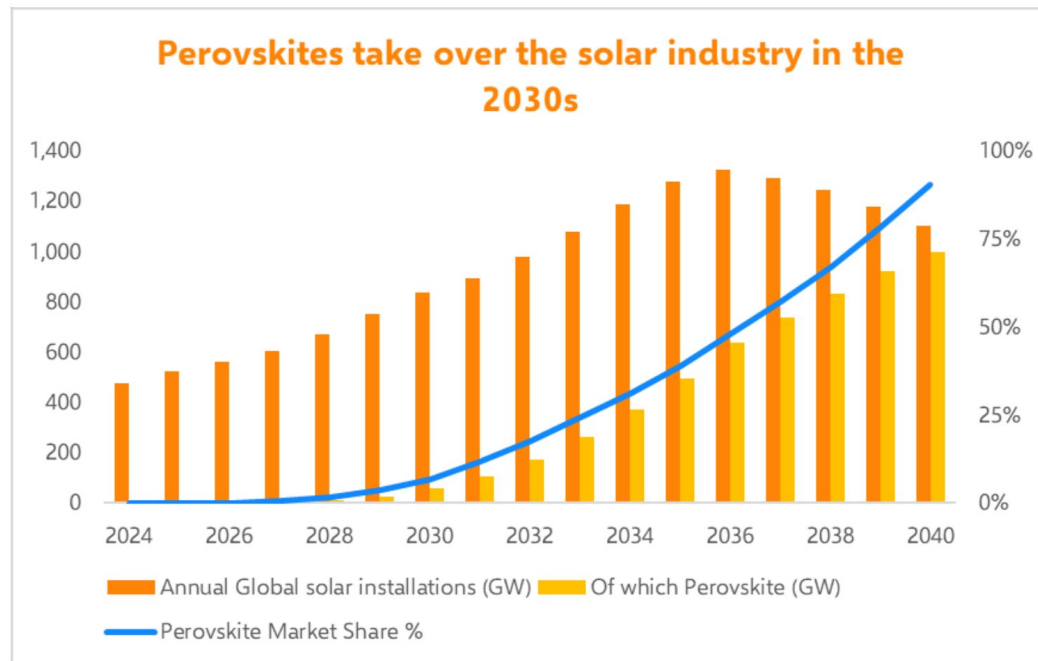
Perovskite Tandem



- ✓ ~200x thinner (much lower costs)
- ✓ Easier to manufacture (thin film printing vs. semiconductors)
- ✓ Higher efficiency (~27% vs. ~21%) soon > 30%
- ✓ Strong TCO w/land, labor savings
- ✓ Durability demonstrated for decades
- ✓ Complementary to existing silicon tech

Perovskites to Dominate Solar

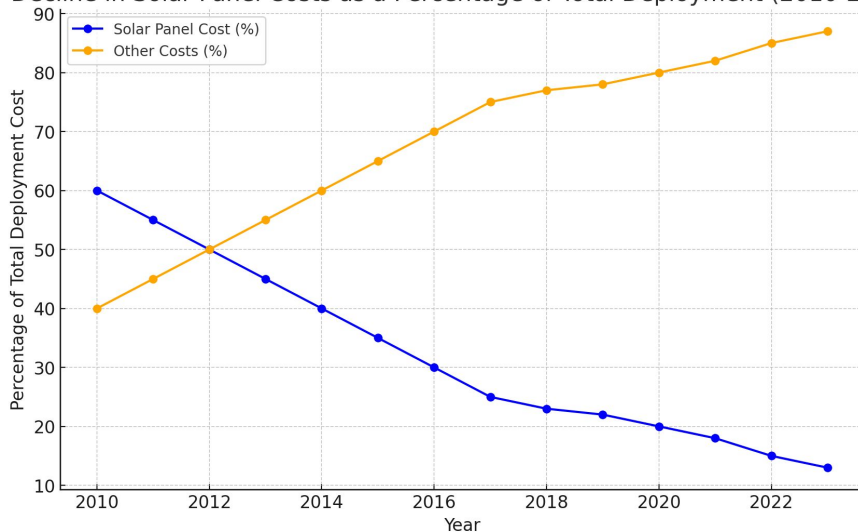
Perovskites to be 10% of solar in 2030; **90% of market by 2040**



Solar Soft Costs Now Matter More

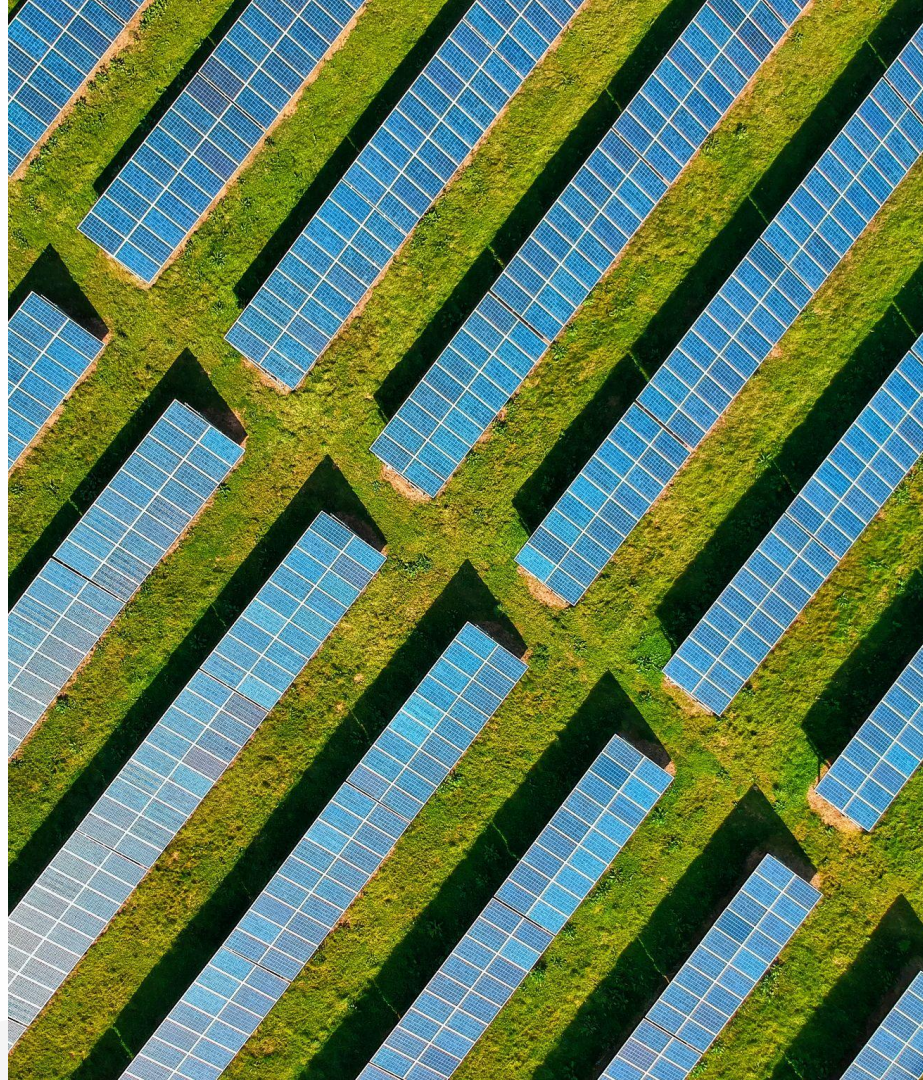
What's important is not just the absolute panel costs but the **total costs including labor, land, and balance of systems**

Decline in Solar Panel Costs as a Percentage of Total Deployment (2010-2024)



SUMMARY

- Solar is **winning the battle** in the transition to a clean energy system
- It's the cheapest solution and getting cheaper
- Batteries will help with baseline output
- BUT... **transitioning is not enough - we need to grow our electricity output 6x faster**
- Perovskites are the future of solar - better, cheaper
- **Perovskites key** to solving and accelerating move to Net Zero





Tandem PV

Questions?

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