

Prospects for Tripling Renewable Energy: **The Drastic Decrease in the Cost of Solar PV is Changing the World**

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Renewable Energy Institute

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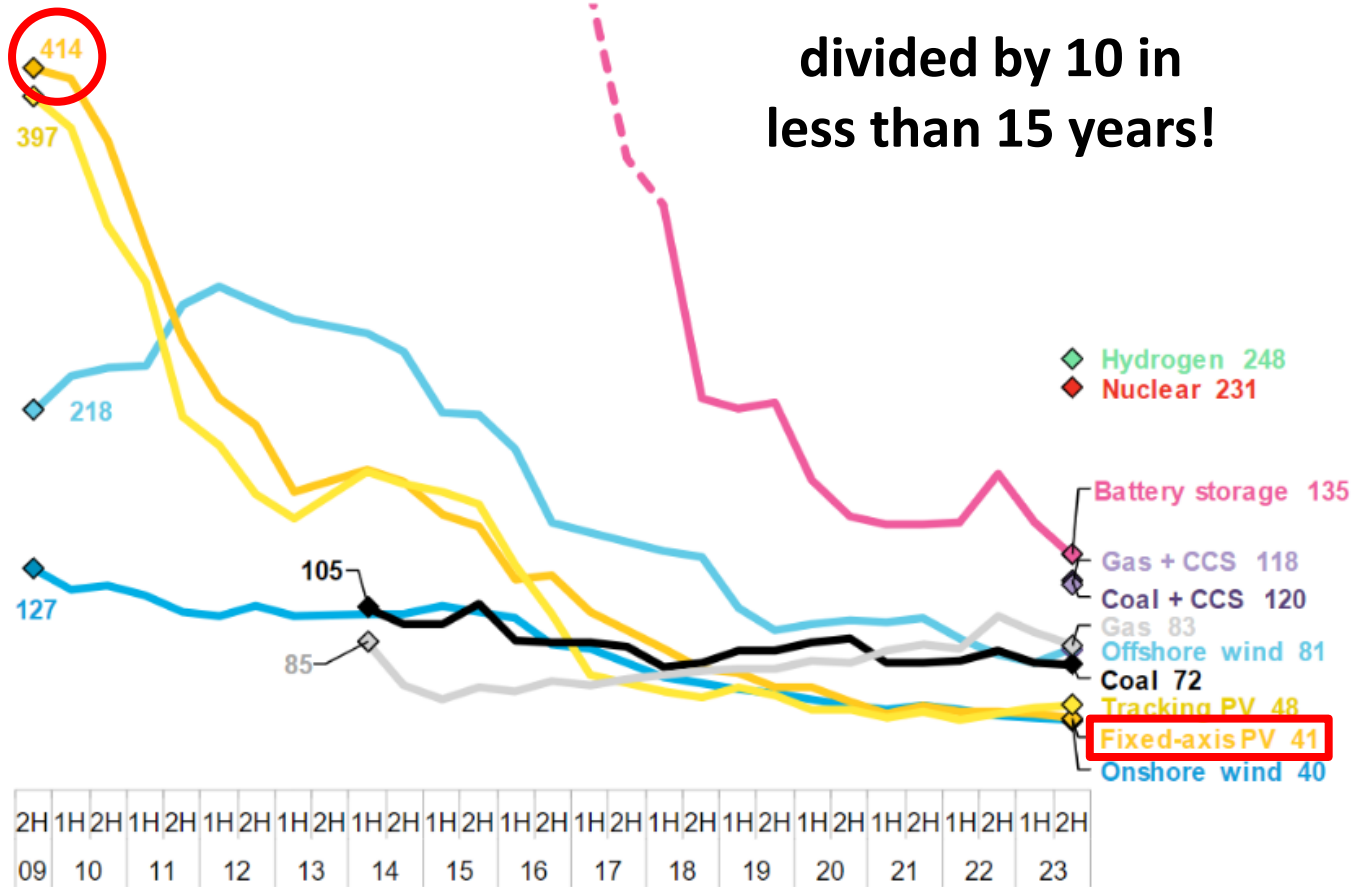
KEY FINDINGS

- (1) Solar PV cost competitiveness is quasi-unrivaled.
- (2) Solar PV domination on the power sector has already started, and it will soon be overwhelming.
- (3) Stable power supply can be ensured with existing solutions.
- (4) Geopolitics of energy are redrawn, with China playing a more important role.

Cost collapse

Global LCOE benchmarks, 2009-23

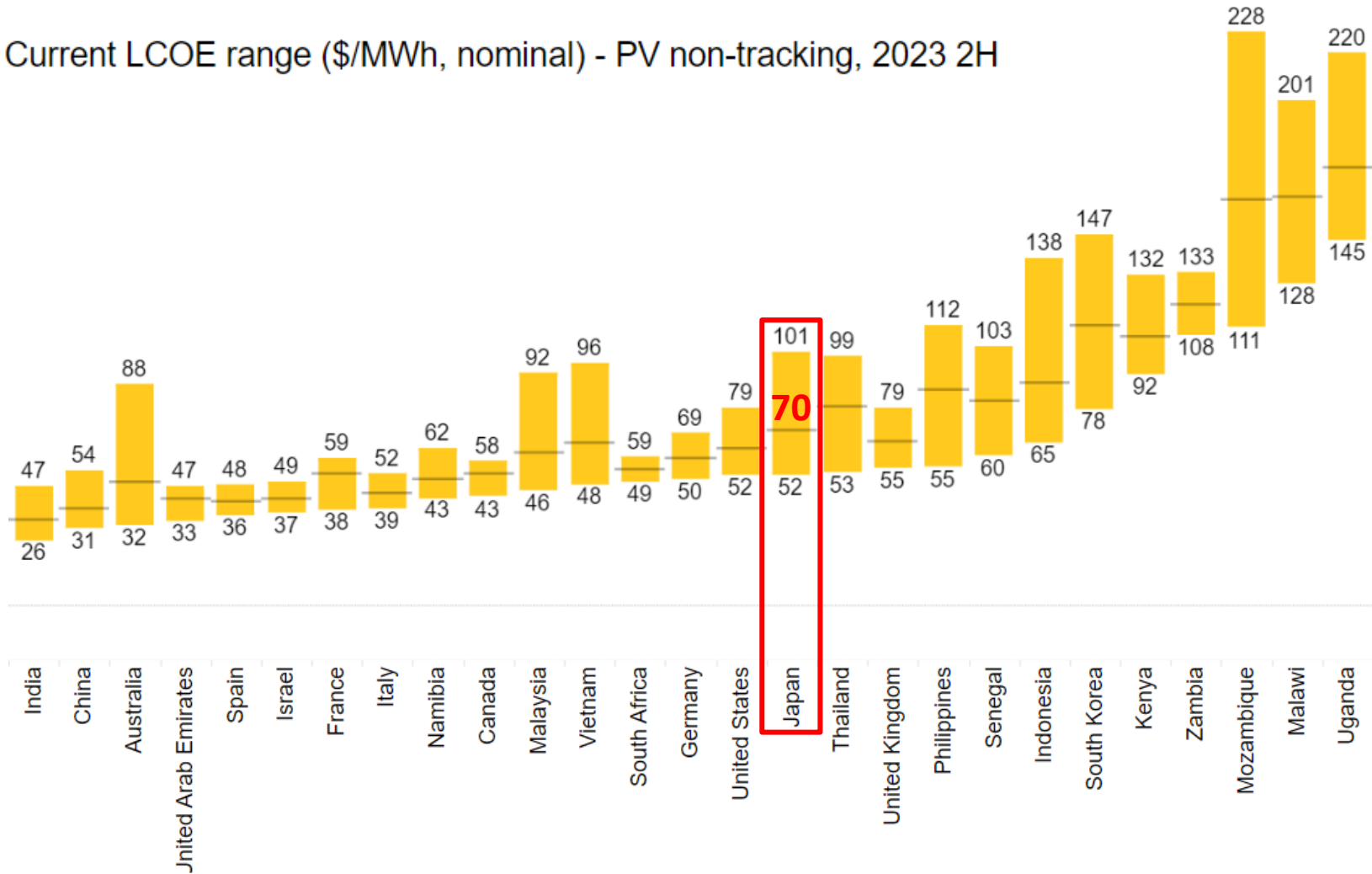
\$/MWh (real 2022)



Source: BloombergNEF

Japan has largely caught up with the rest of the world

Current LCOE range (\$/MWh, nominal) - PV non-tracking, 2023 2H

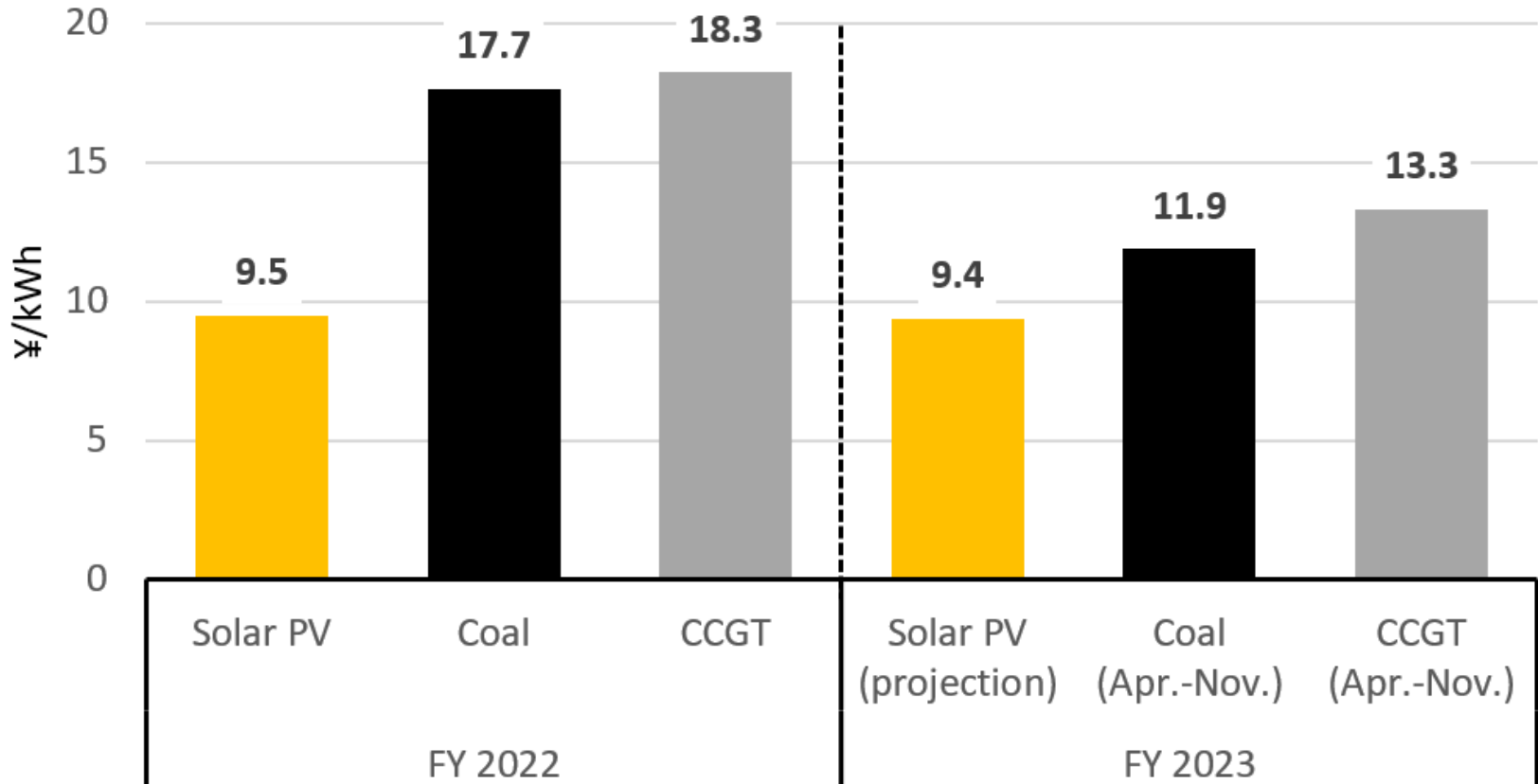


Source: BloombergNEF

New solar PV outcompetes existing fossil power in Japan

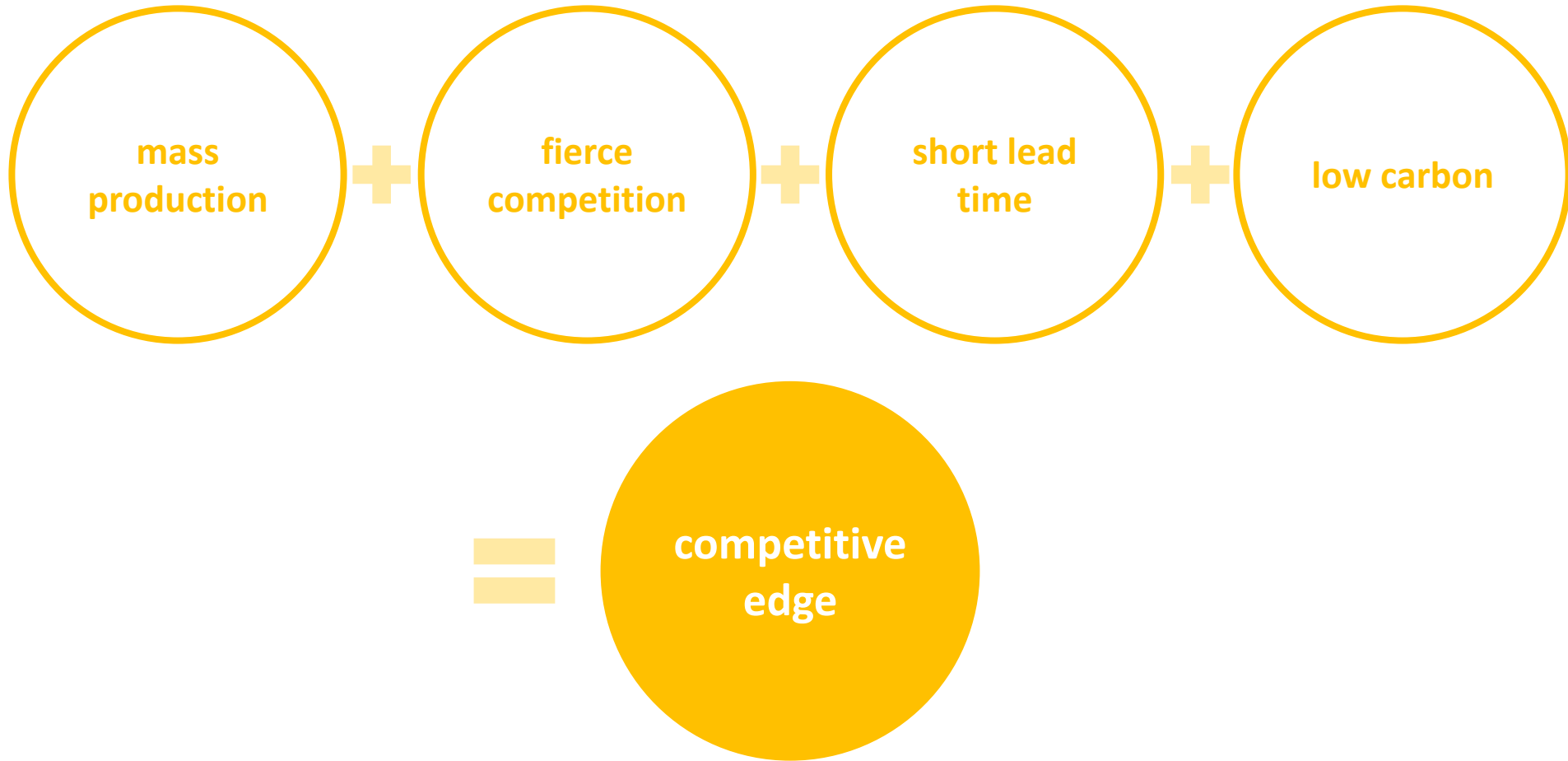


Japan - Solar PV (LCOE) VS. Fossil Power (min. operating cost)
FY 2022 and FY 2023



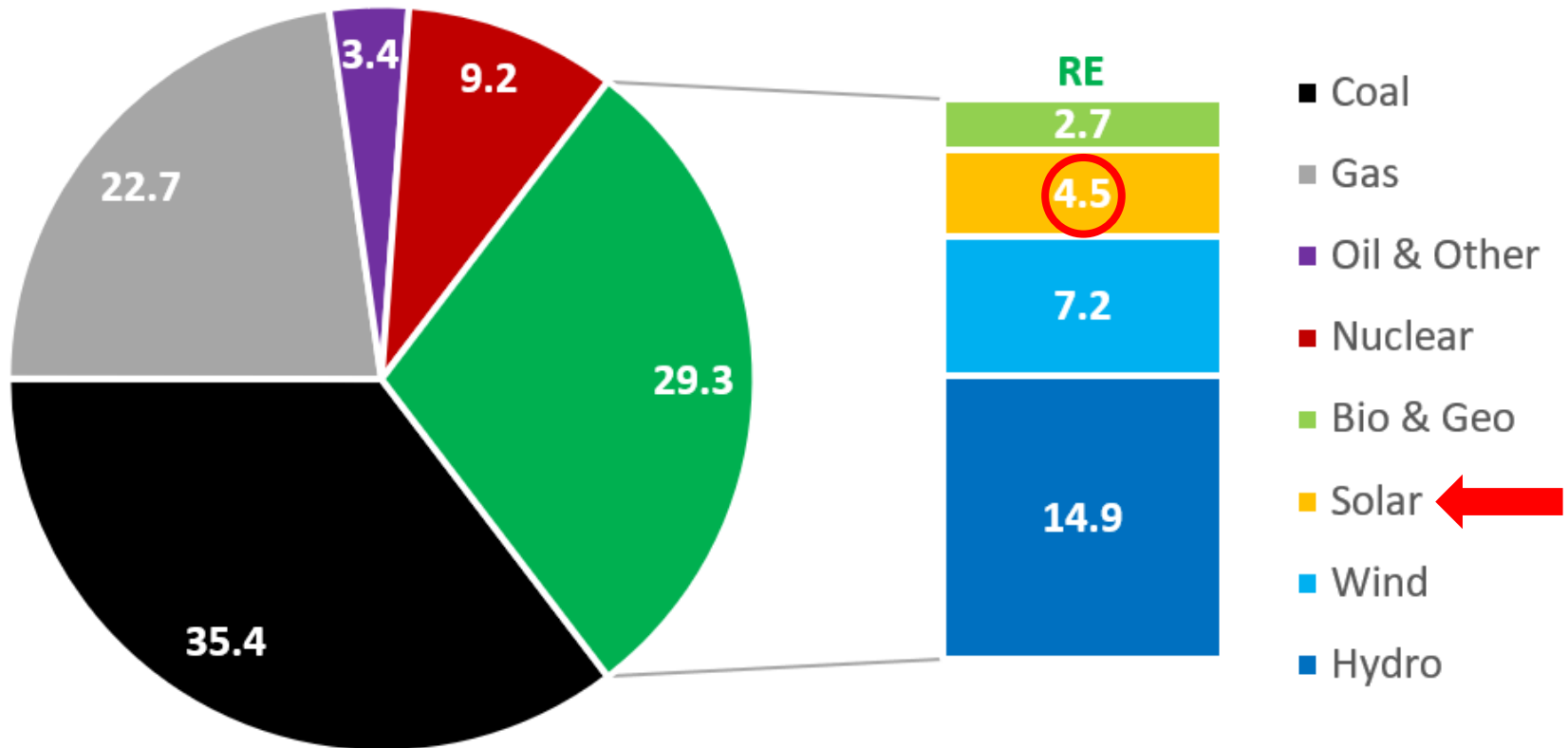
Sources: RTS (solar PV), Japan MoF (coal and CCGT fuel costs) and IEA (coal and CCGT O&M costs)

Recipe for success



The share of solar PV is still small

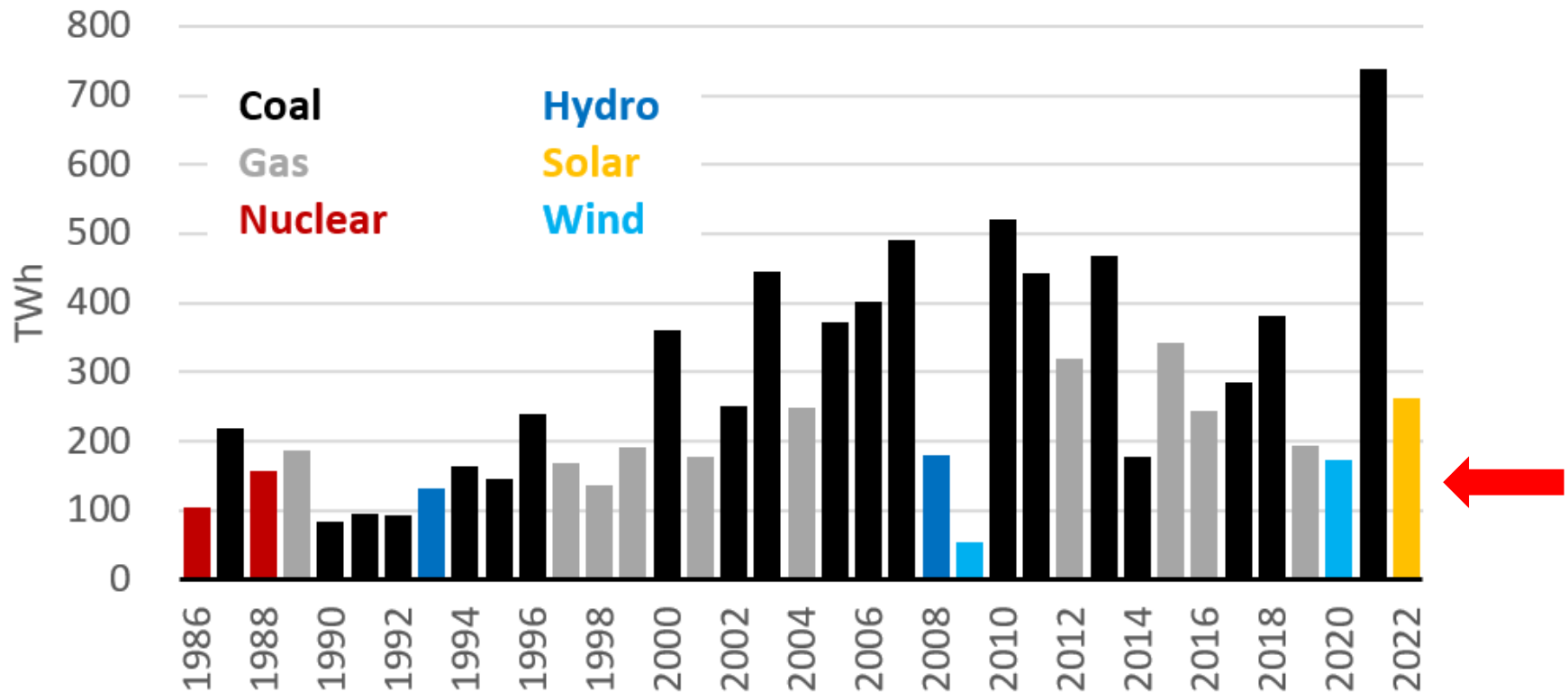
World - Electricity Generation Mix 2022 (%)



Source: Energy Institute

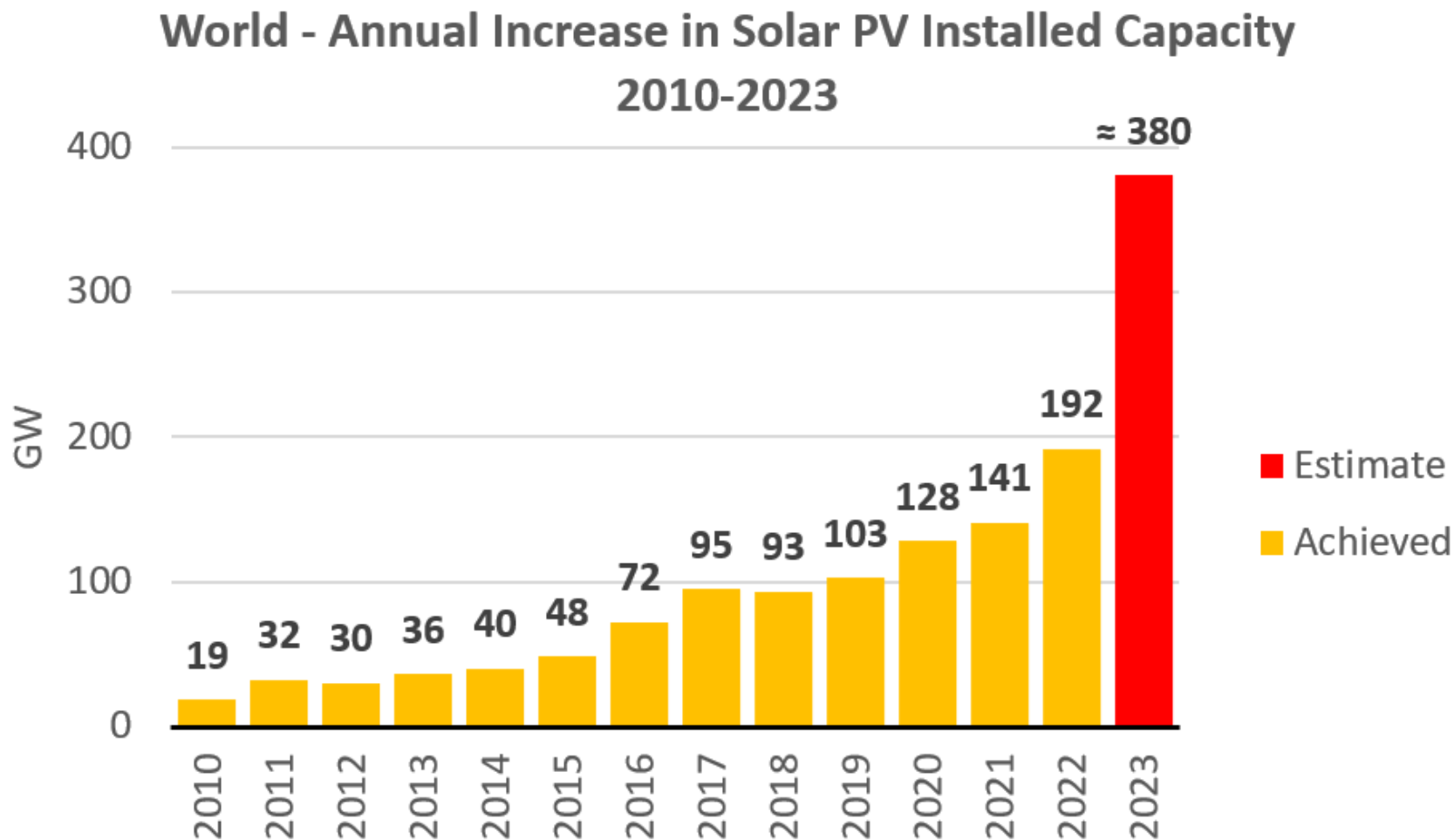
But solar PV domination has already started

World - Largest Annual Increase in Electricity Generation
Leading Technology by Year 1986-2022



Source: Energy Institute

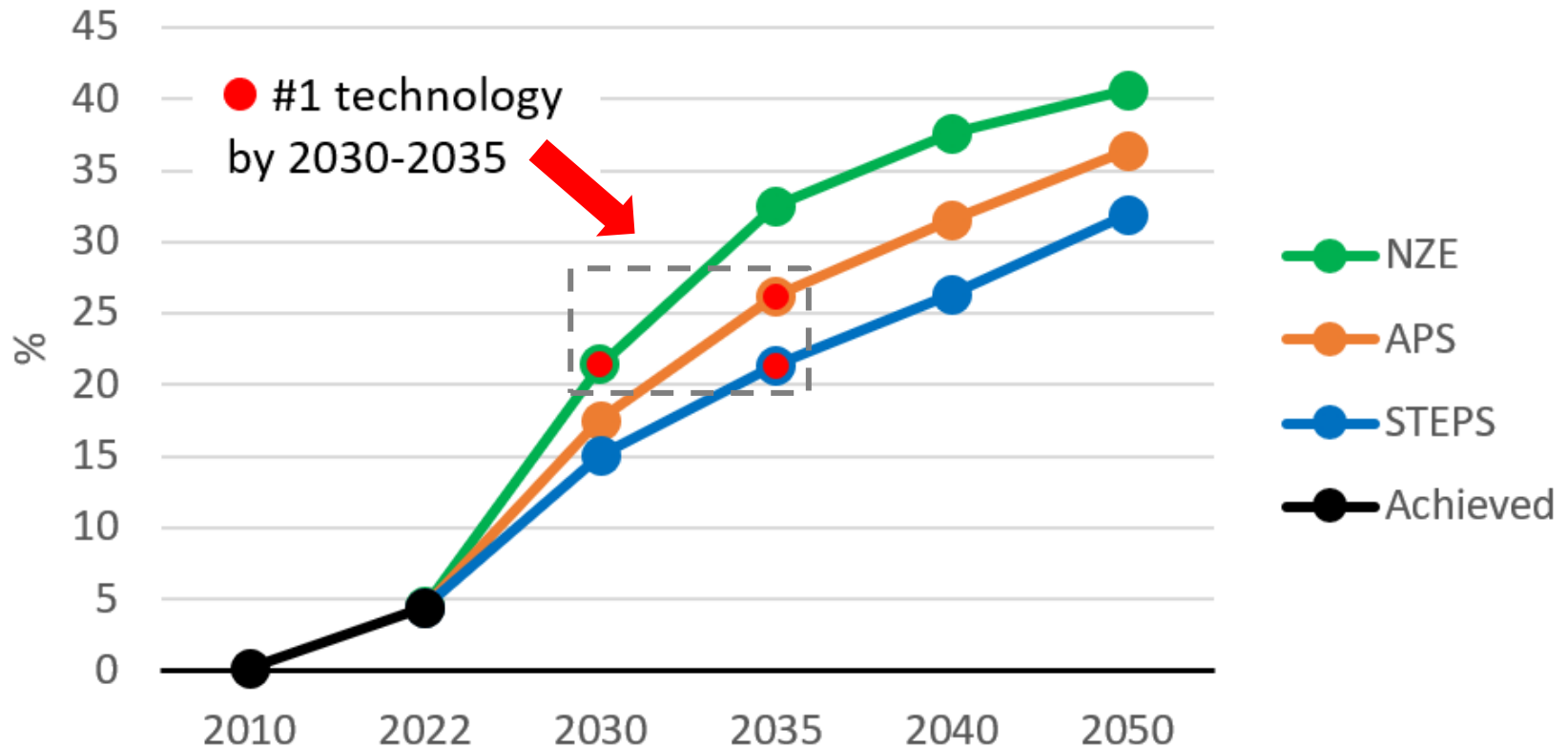
Blowing away past records



Sources: Energy Institute (achieved) and IEA (estimate)

Solar PV will soon be the leading technology

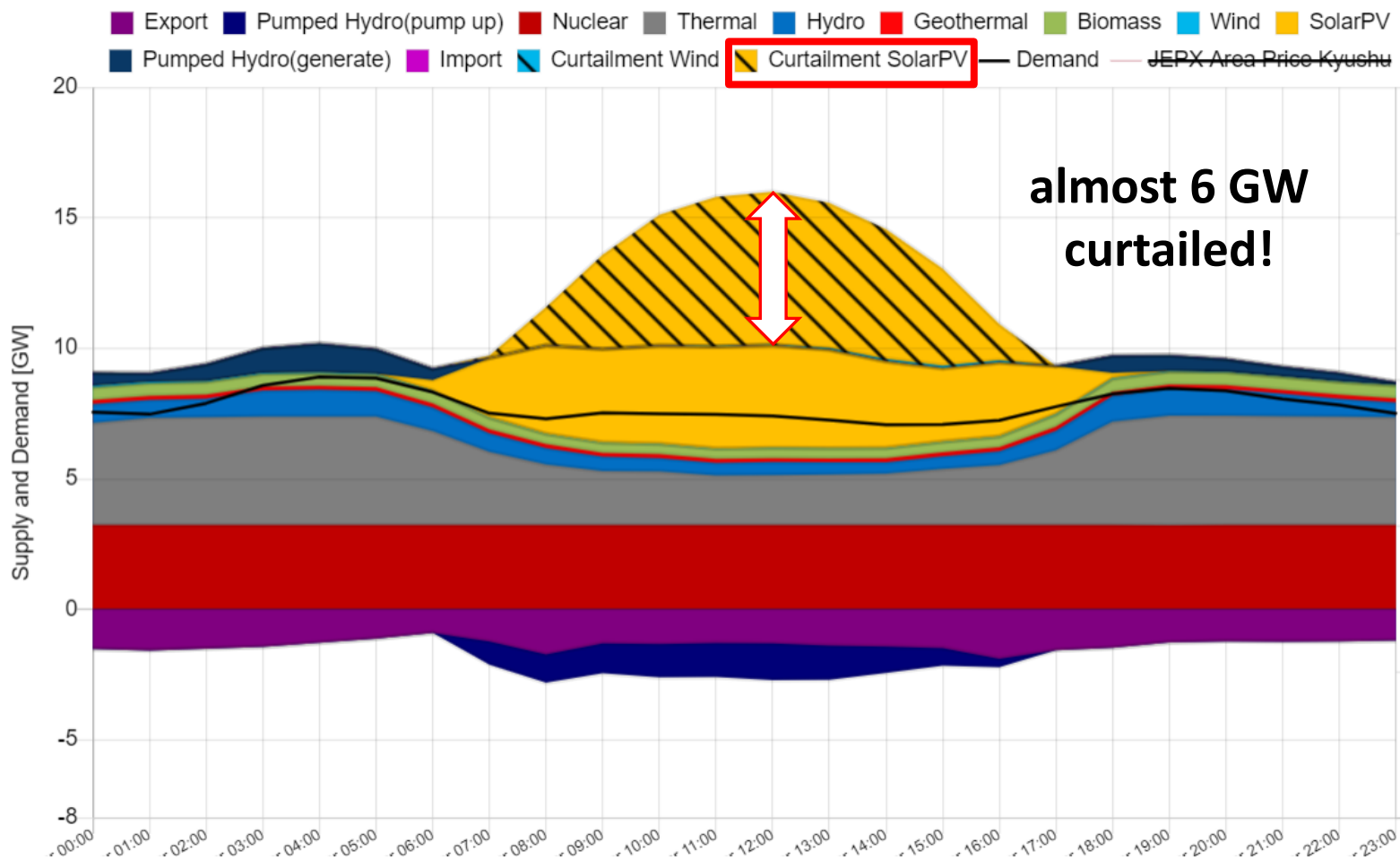
World - Solar PV Share in Electricity Generation
WEO 2023 Projections



Source: IEA

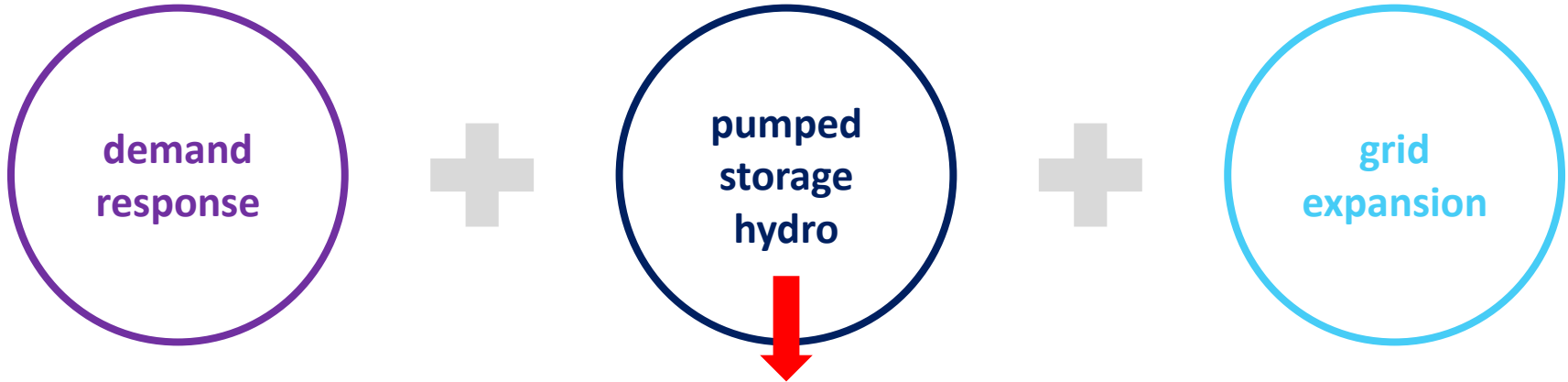
Power system operations can be improved...

Power Supply & Demand Chart: Kyushu Area(From 9/Apr/2023 to 9/Apr/2023)

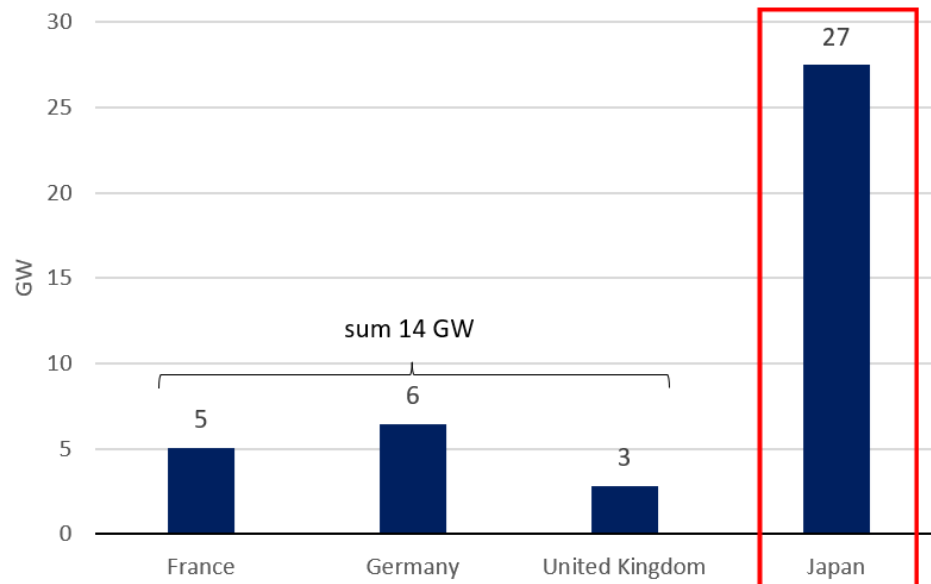


Source: REI

with existing solutions (1)



**France, Germany, United Kingdom, and Japan
Pumped Storage Hydro Installed Capacity 2022**

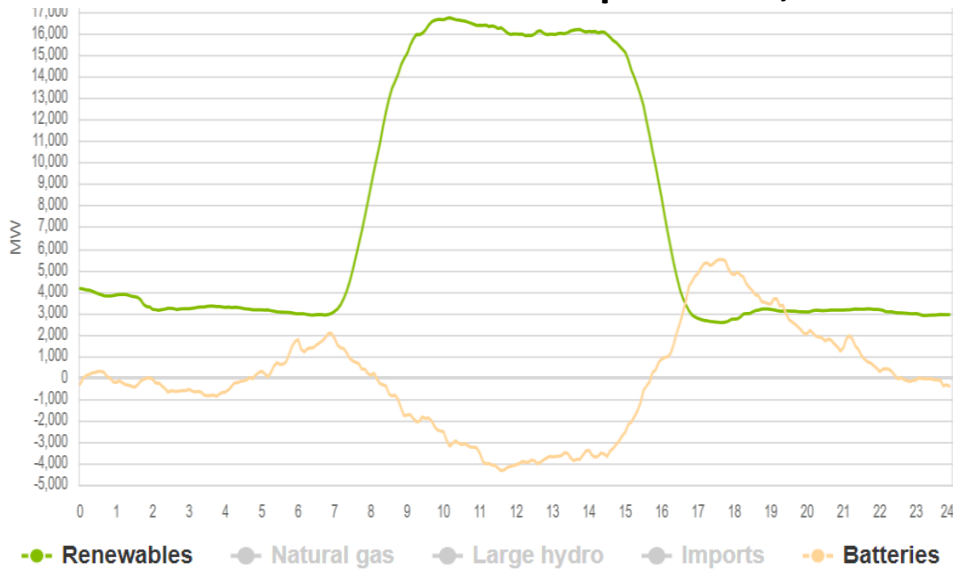


Source: IHA

with existing solutions (2)

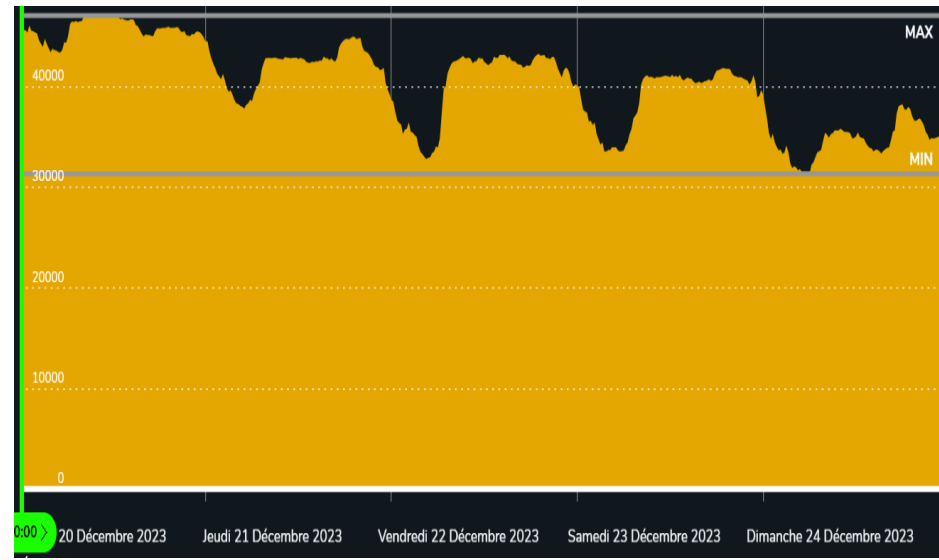


CAISO RE and Batteries Output Jan. 8, 2024



Source: CAISO

France Nuclear Power Output Dec. 20-24, 2023

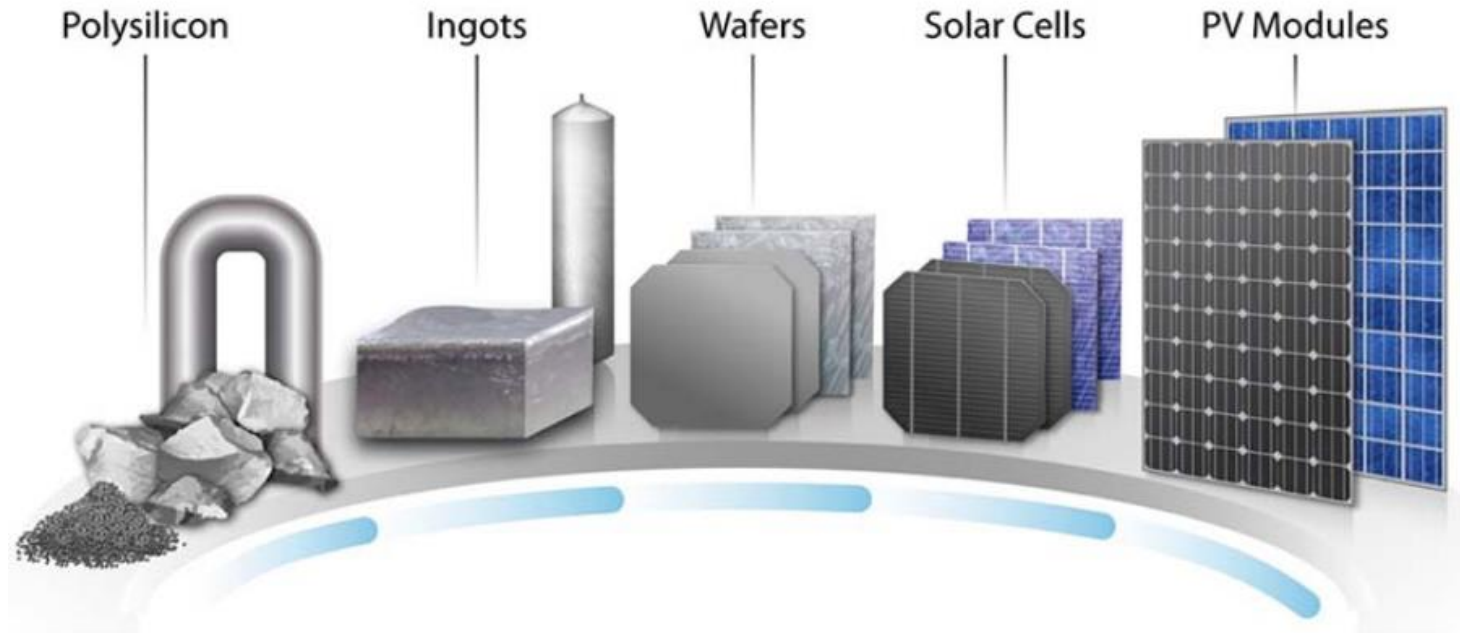


Source: RTE

China is the hub of the solar PV industry



Key Stages of the Solar PV Supply Chain

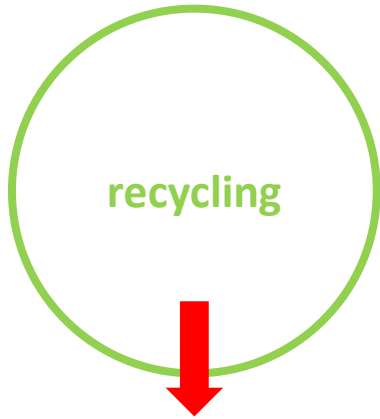


China's share in global manufacturing capacity (as of March 2023):

Commissioned	83%	98%	97%	86%	81%
Under construction	99%	92%	87%	95%	84%

Sources: NREL (illustration) and BloombergNEF (data)

Solutions not to excessively rely on China

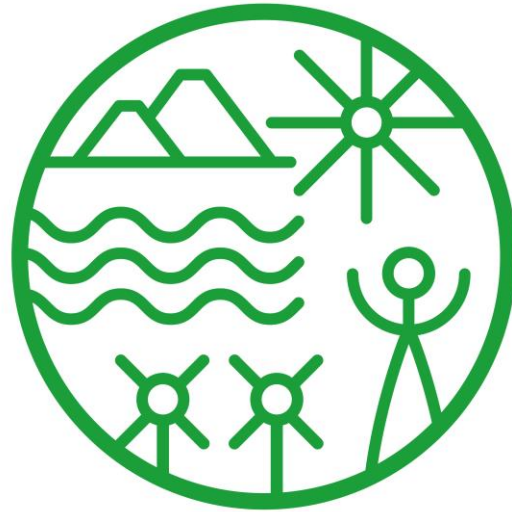


15% \rightarrow >20% \rightarrow >30%
2010 today tomorrow



- EU Solar Energy Strategy
- US Inflation Reduction Act





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