Energiemarkt: Mythen, Fakten und Wandel

Prof. Dr. Christian Stöcker / HAW Hamburg / DER SPIEGEL

H2 Convention Linz 2025

»Wir machen weiter bis zum letzten Mann, jedes Molekül Kohlenwasserstoff wird herausgeholt.«

Abdulaziz bin Salman, der saudische Energieminister, 2021

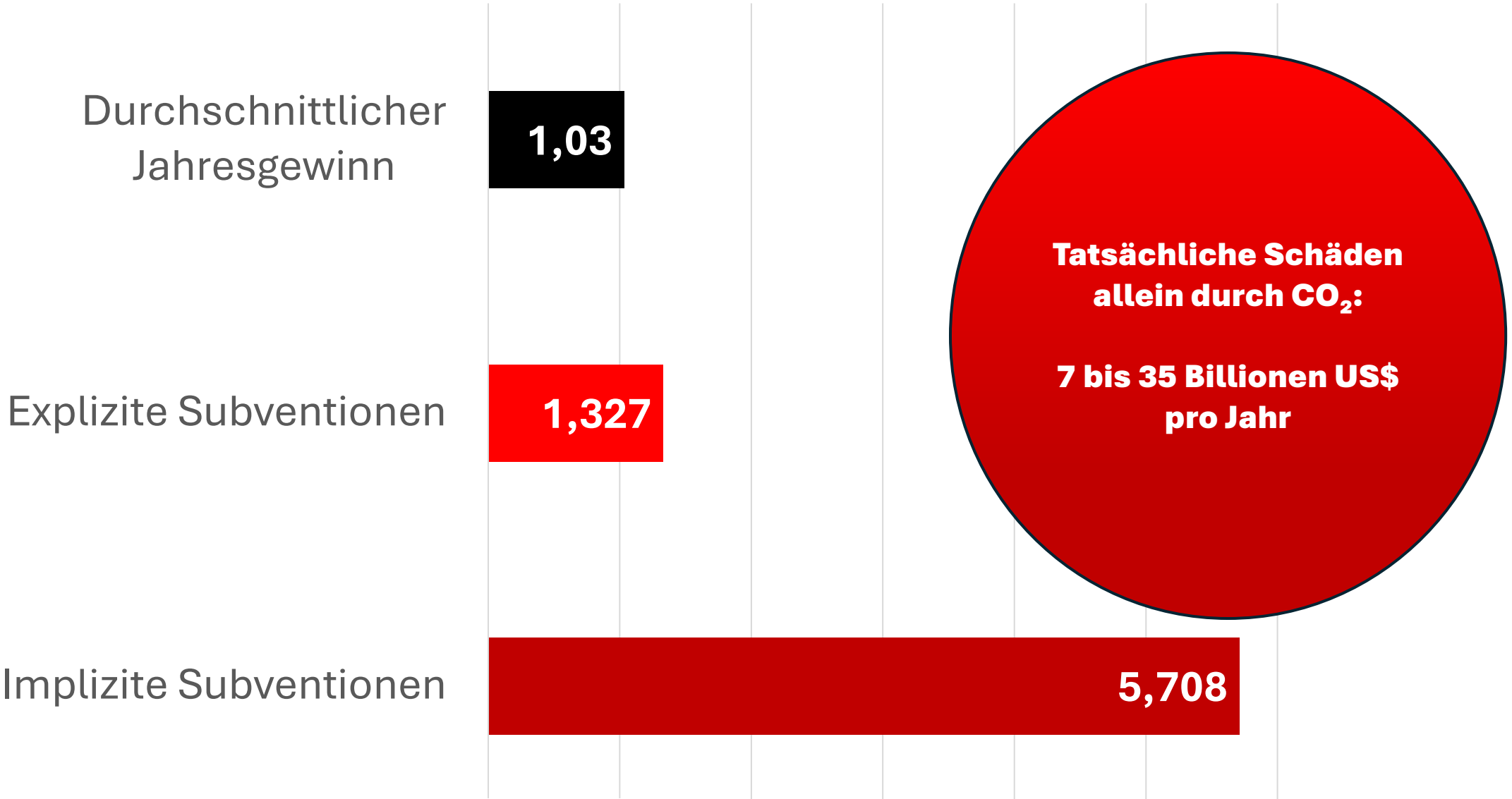
“Haben wir Teile der wissenschaftlichen Erkenntnisse aggressiv bekämpft? Ja.”

“Haben wir uns einigen der verdeckten Gruppen angeschlossen, die frühe Anstrengungen [für Klimaschutz] bekämpft haben? Ja, das stimmt.”

Keith McCoy, ehemaliger Top-Lobbyist von ExxonMobile in Washington, in einem 2021 heimlich aufgezeichneten Gespräch

Mythos 1:
„Alternative Energietechnologien werden viel zu stark subventioniert.“

Gewinne aus fossilen Brennstoffen und Subventionen (2022) für fossile Brennstoffe (nur Öl und Gas) in Billionen US$

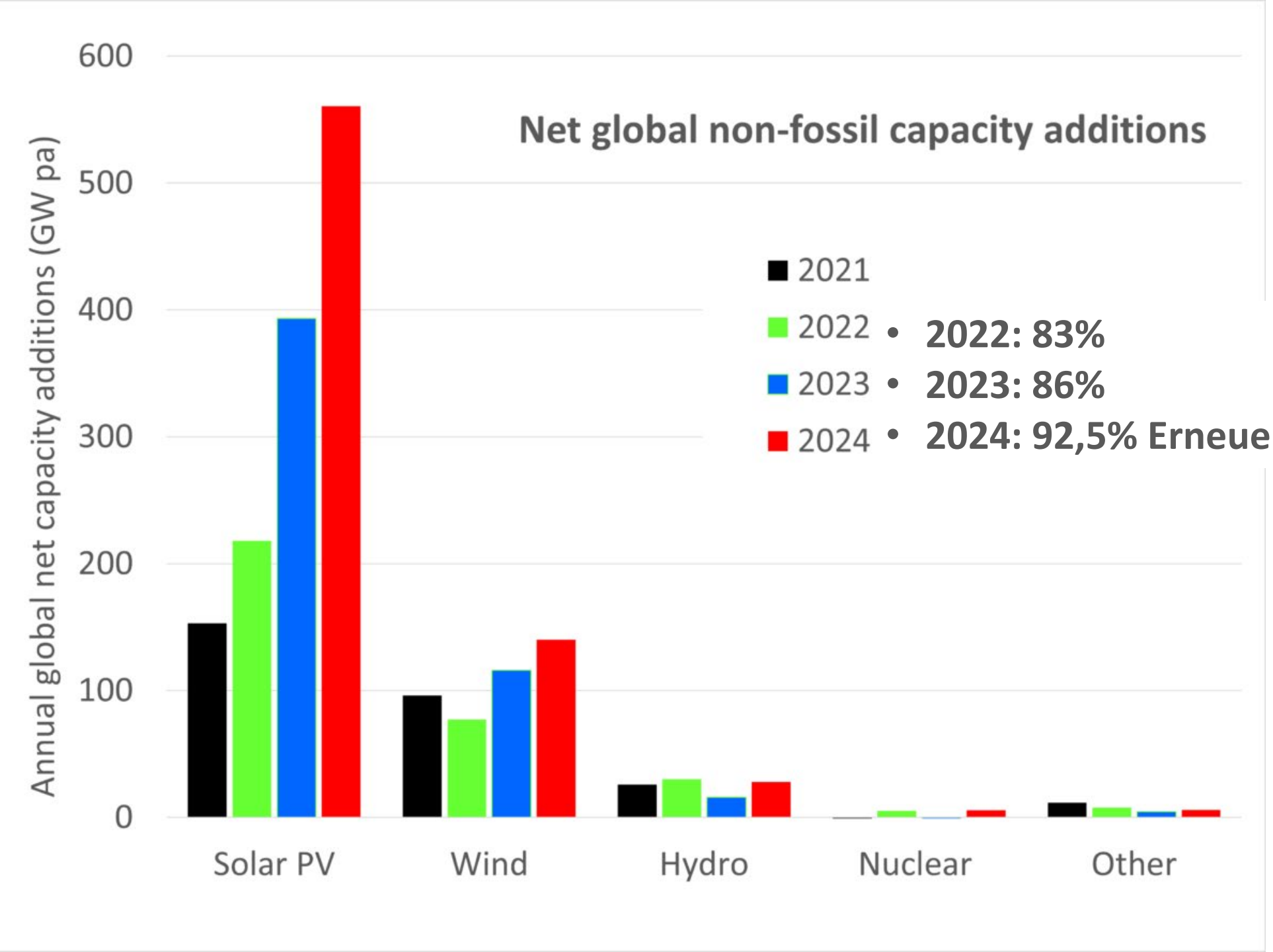


Quellen: Verbruggen (IJSEPM, 2022), 2022, IWF, Statistisches Bundesamt, Rennert et a. (Nature 2022), Umweltbundesamt


30 Meter


1.073.733
Kilometer

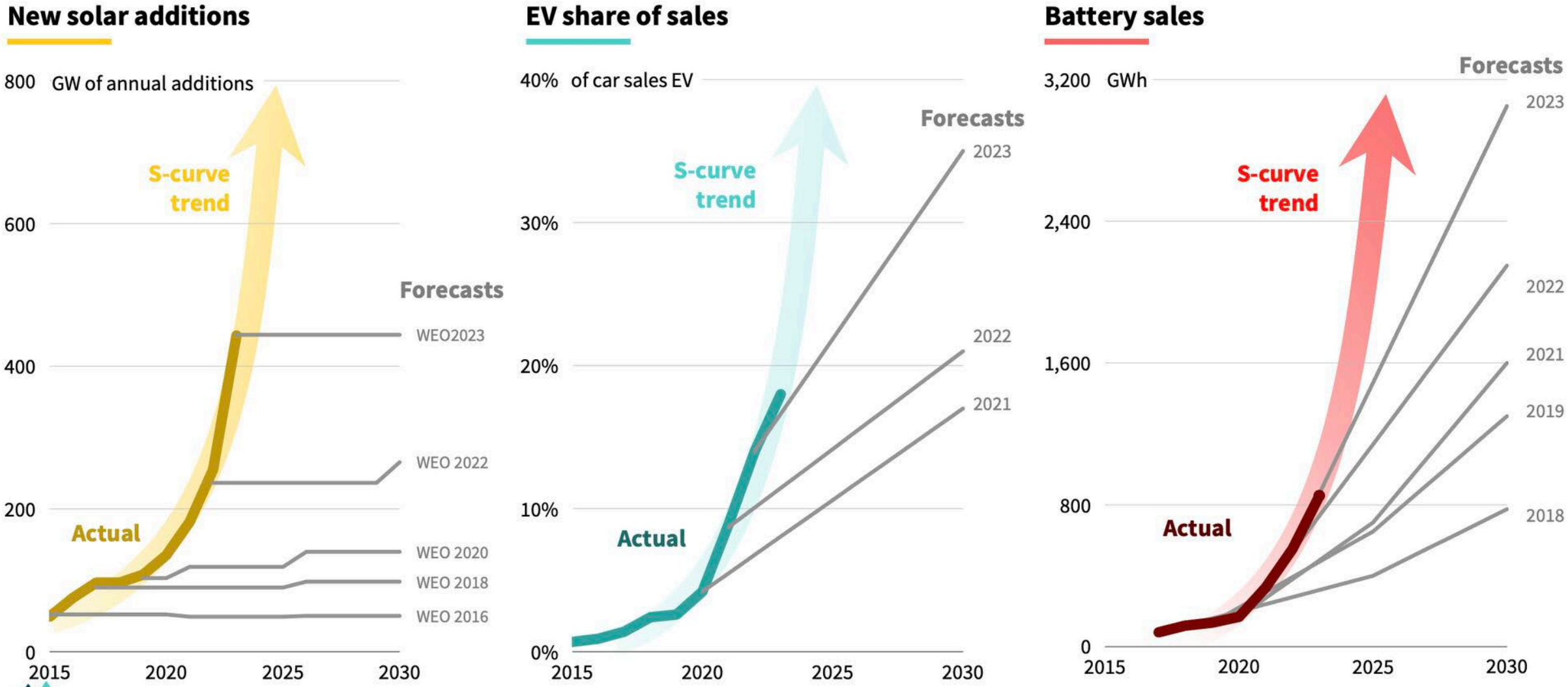
Mythos 2: „Erneuerbare Energien sind ein europäischer Alleingang.“



- **2022: 83%**
- **2023: 86%**
- **2024: 92,5% Erneuerbare**

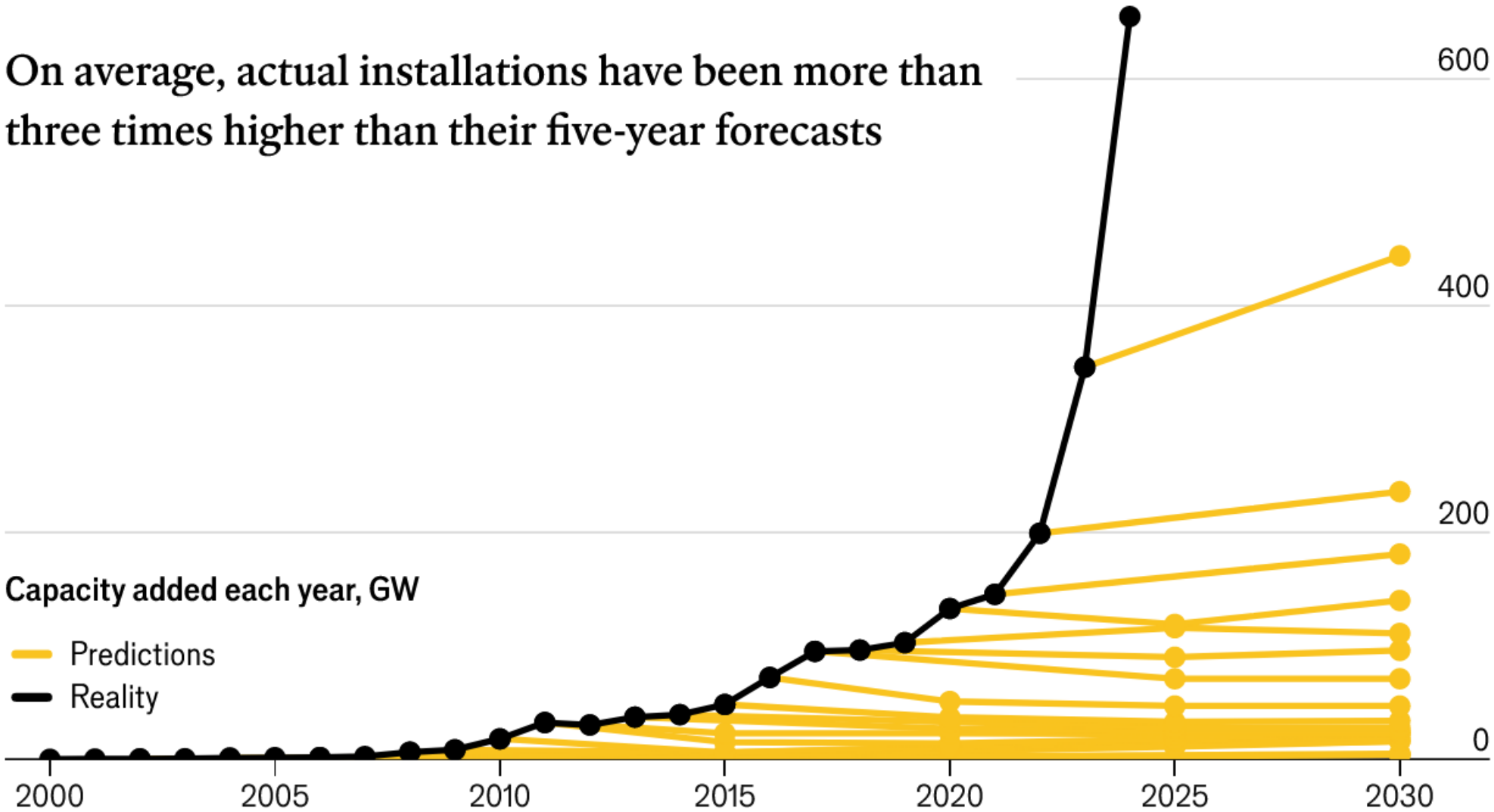
Incumbents have underestimated the speed of change

Even neutral actors modeled in **linear** terms. But change has been exponential



Source: BNEF (solar and battery actuals), IEA STEPS for WEO forecasts , RMI annotation.

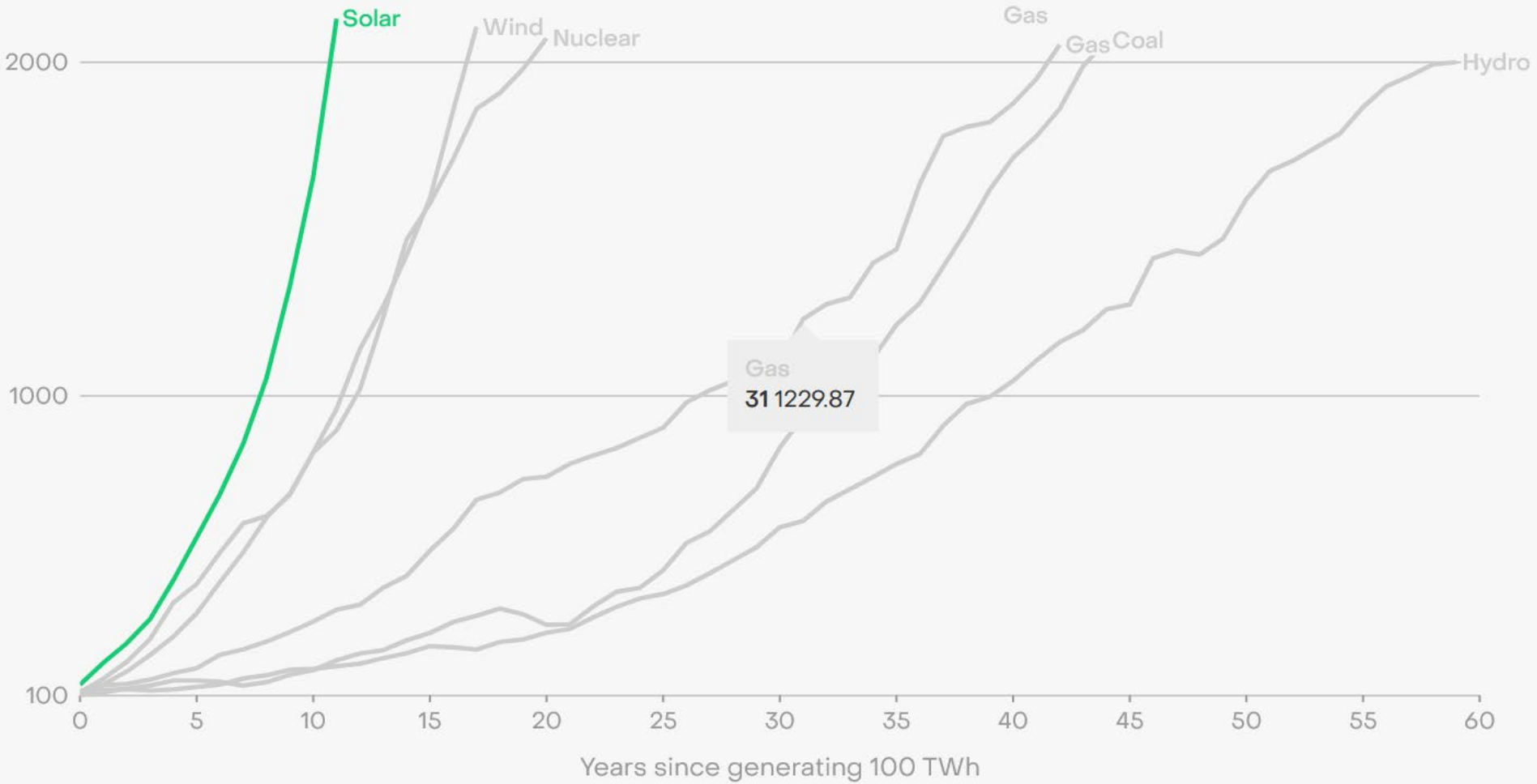
↓ EASY PV *how solar outgrew expectations*



Sources: IEA; Energy Institute; BloombergNEF

It took 8 years for solar to go from 100 TWh to 1,000 TWh of power – and then just 3 years to pass 2,000 TWh

Global electricity generation per source, by years since passing 100 TWh*



Source: Wind and solar generation data from Ember's yearly electricity data. Nuclear, gas, coal and hydro data from Pinto et al. (2023)
This graphic is based on a chart by Nat Bullard https://www.nathanielbullard.com/presentations
*Data only shown until the point where each source generated just over 2,000 TWh

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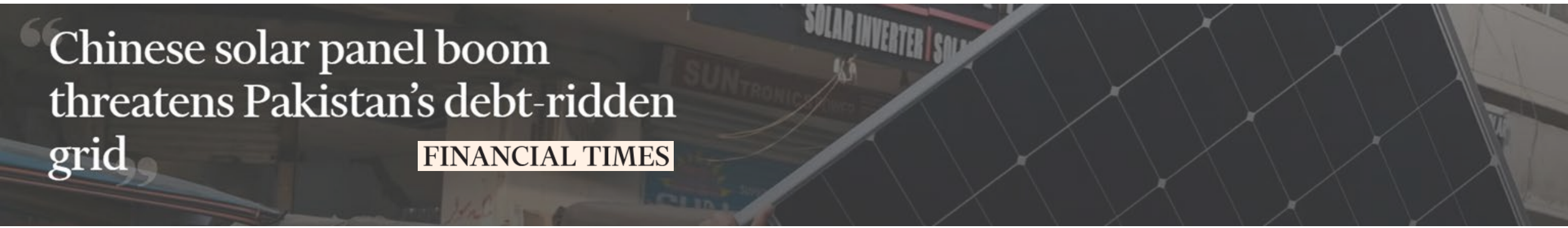
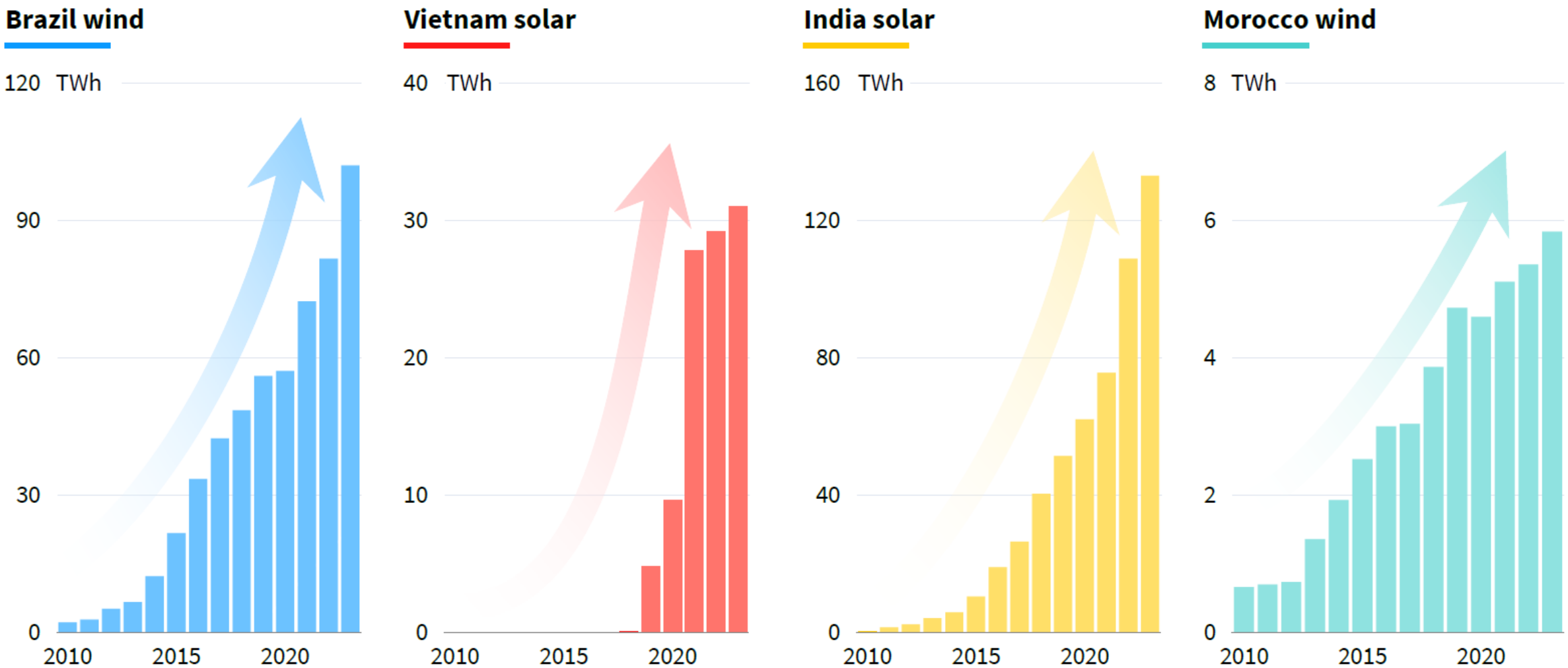


Chinese solar panel boom threatens Pakistan's debt-ridden grid

FINANCIAL TIMES

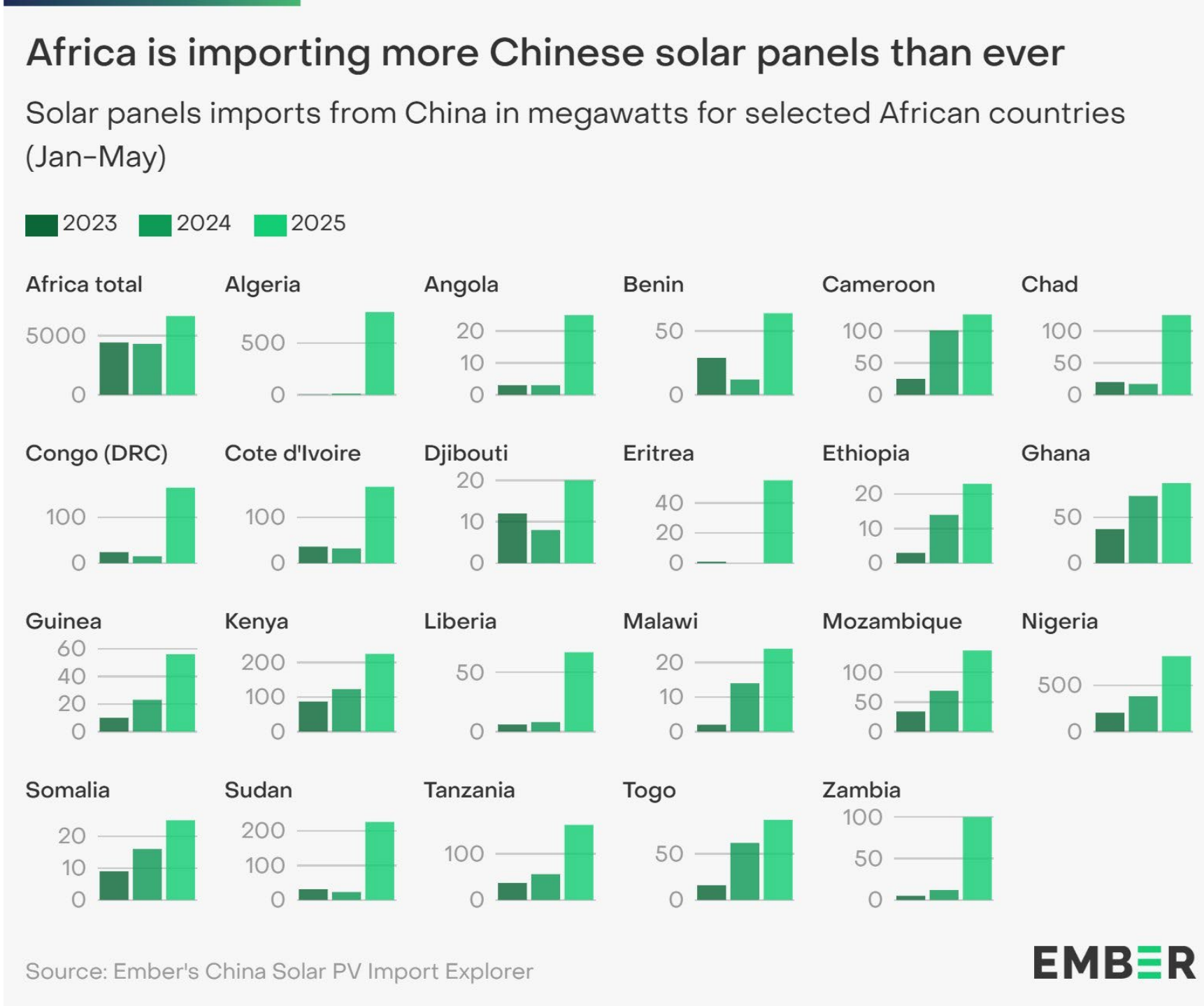
Exponential growth in emerging economies

The adoption of superior technology is not confined to the Global North



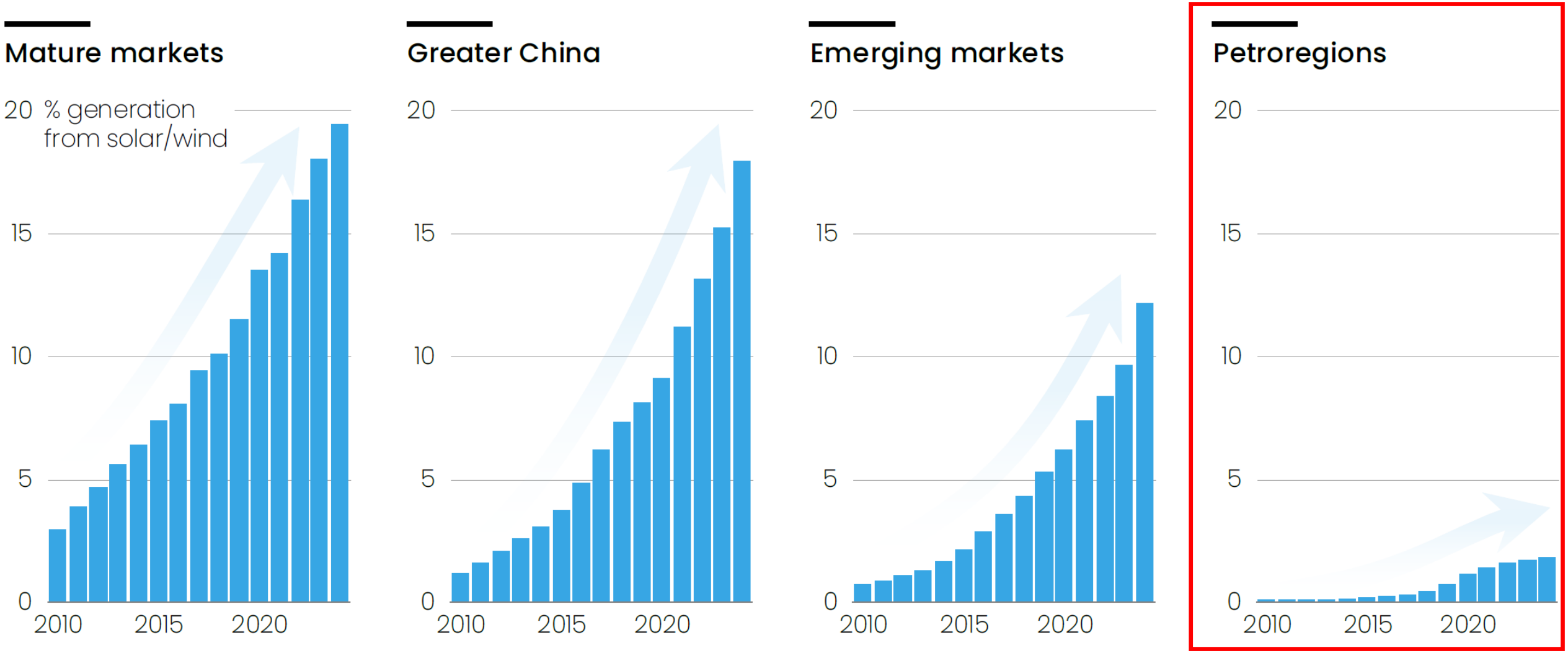
Source: IEA.

Afrika 2025: Lauter Pakistans



Solar and wind deployment is a global story

From mature economies to emerging markets



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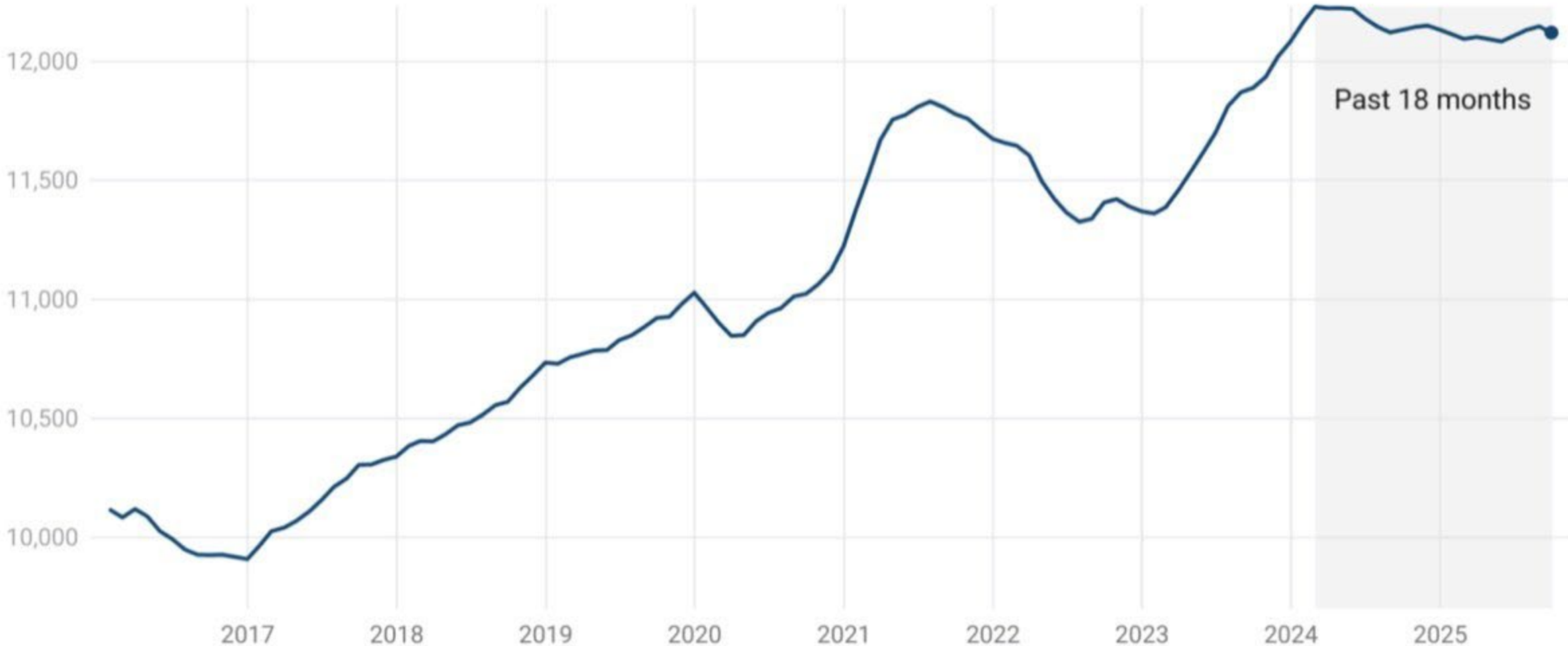
China's CO2 emissions have now been flat or falling for 18 months

Emissions from fossil fuels and cement, MtCO2, rolling 12-month totals



Source: Analysis for Carbon Brief by Lauri Myllyvirta

CarbonBrief
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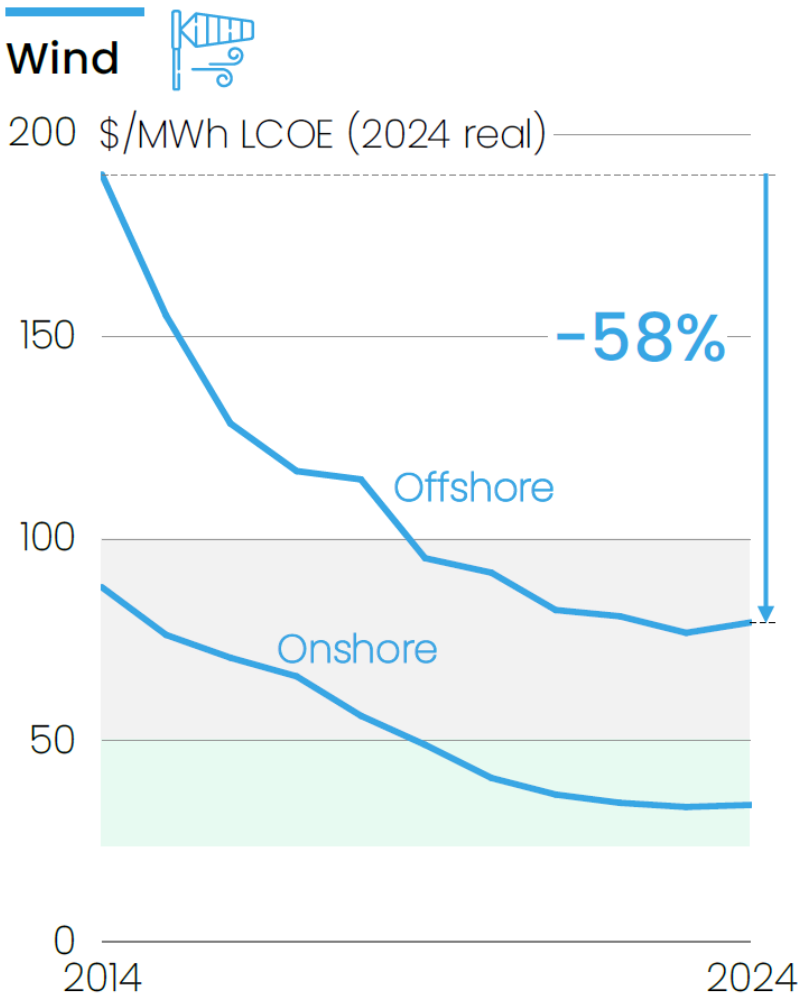
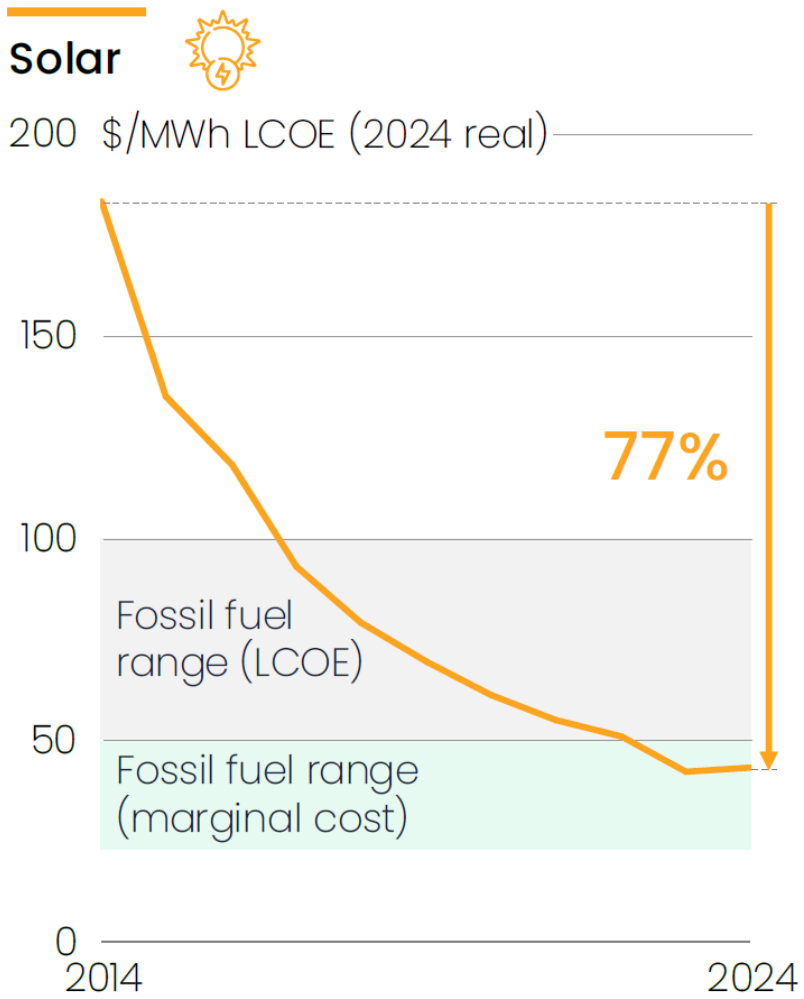
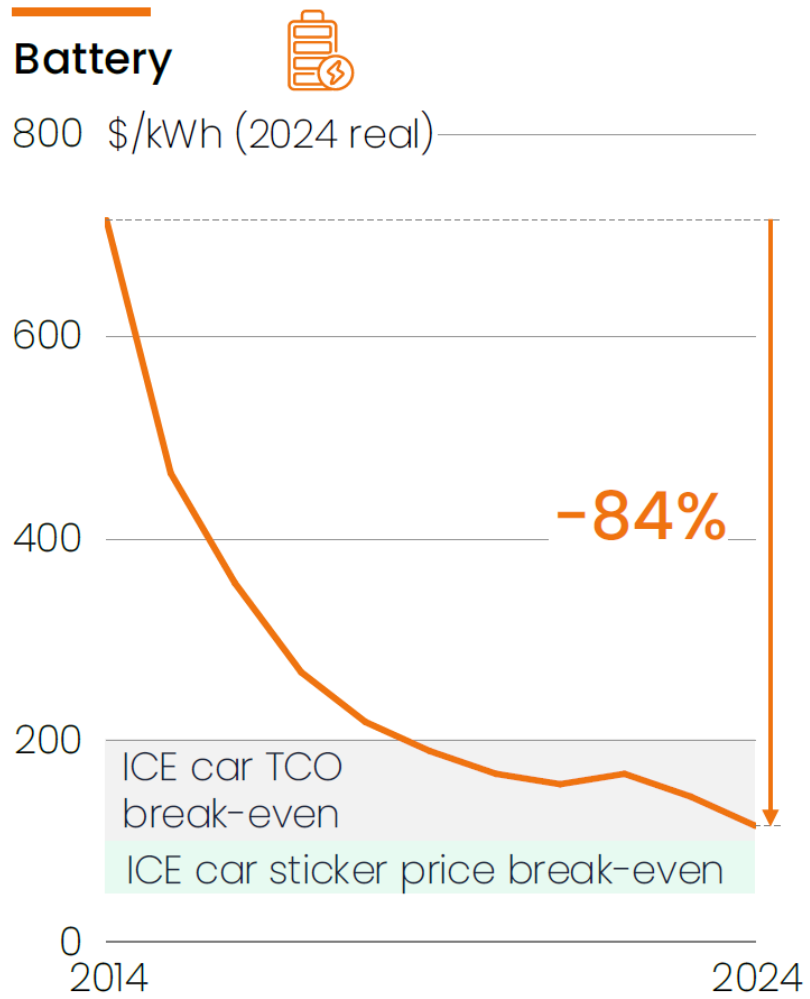
Mythos 3:
„Erneuerbare Energien sind zu teuer.“

Cheap enough to challenge incumbents

After decades of cost innovation electrotech is now cheaper than fossils







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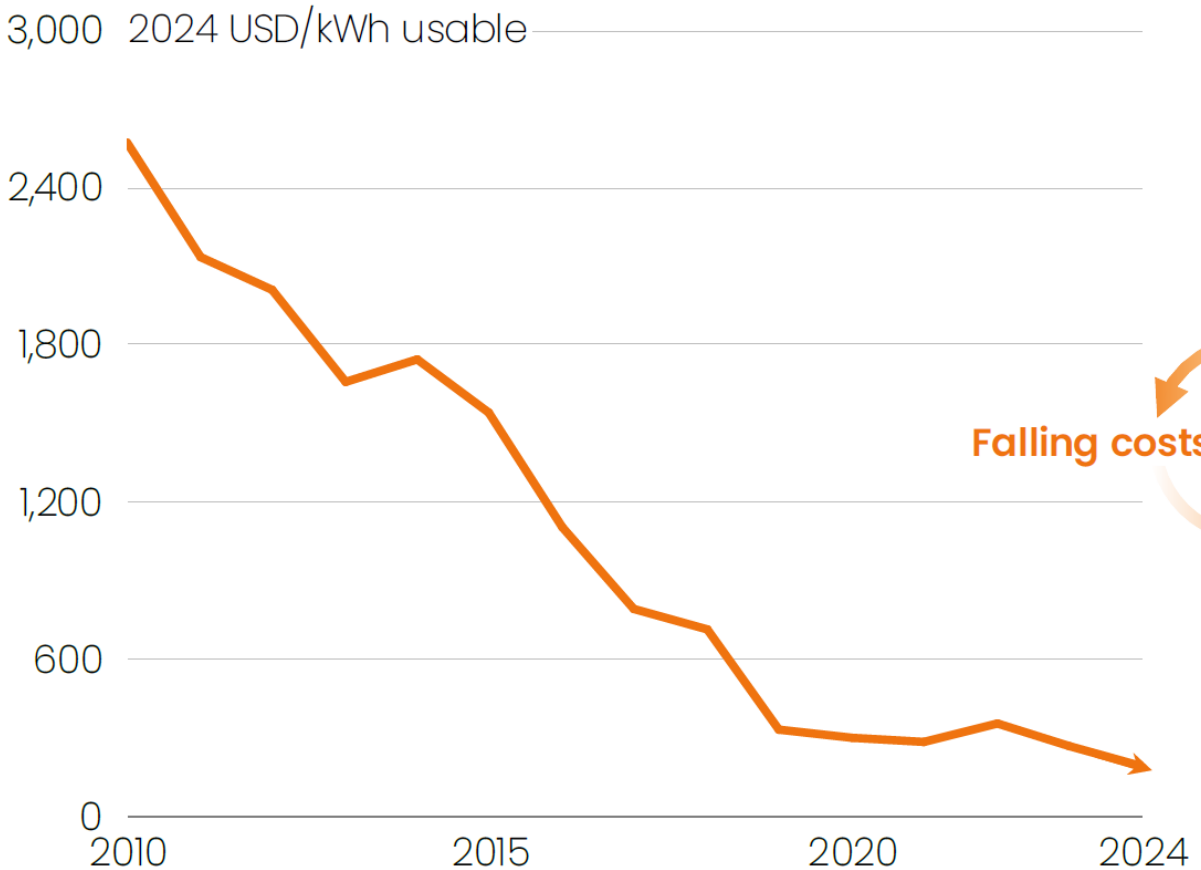
The cheaper it gets, the faster it goes

The virtuous cycle between cost and volume is self-sustaining

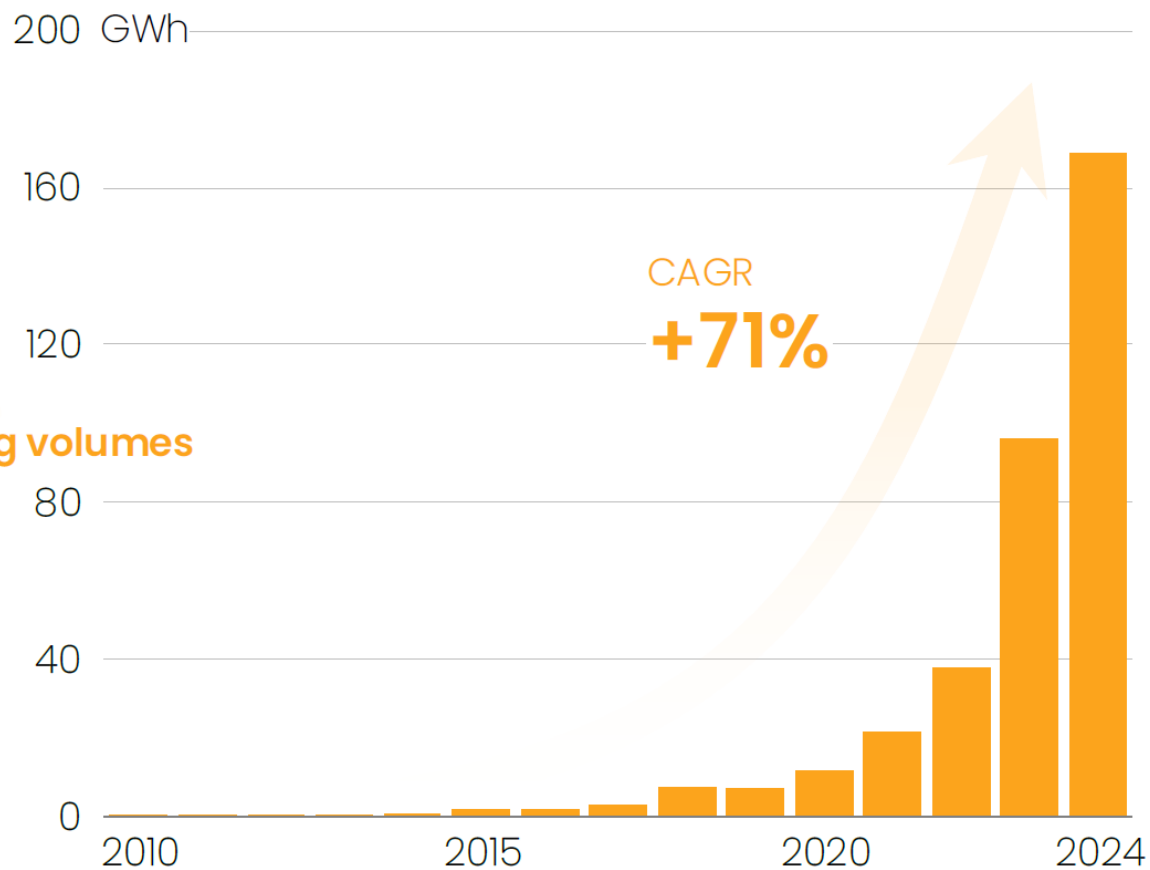
Utility-scale energy storage cost, global



Falling costs

Rising volumes

Utility-scale energy storage sales, global



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Deutsches Wirtschafsministerium, März 2024:
„Der aktuelle Netzentwicklungsplan Strom geht für 2037 von etwa **67 GW Batterie-Kleinspeichern** und etwa **24 GW Großbatterien** aus.“

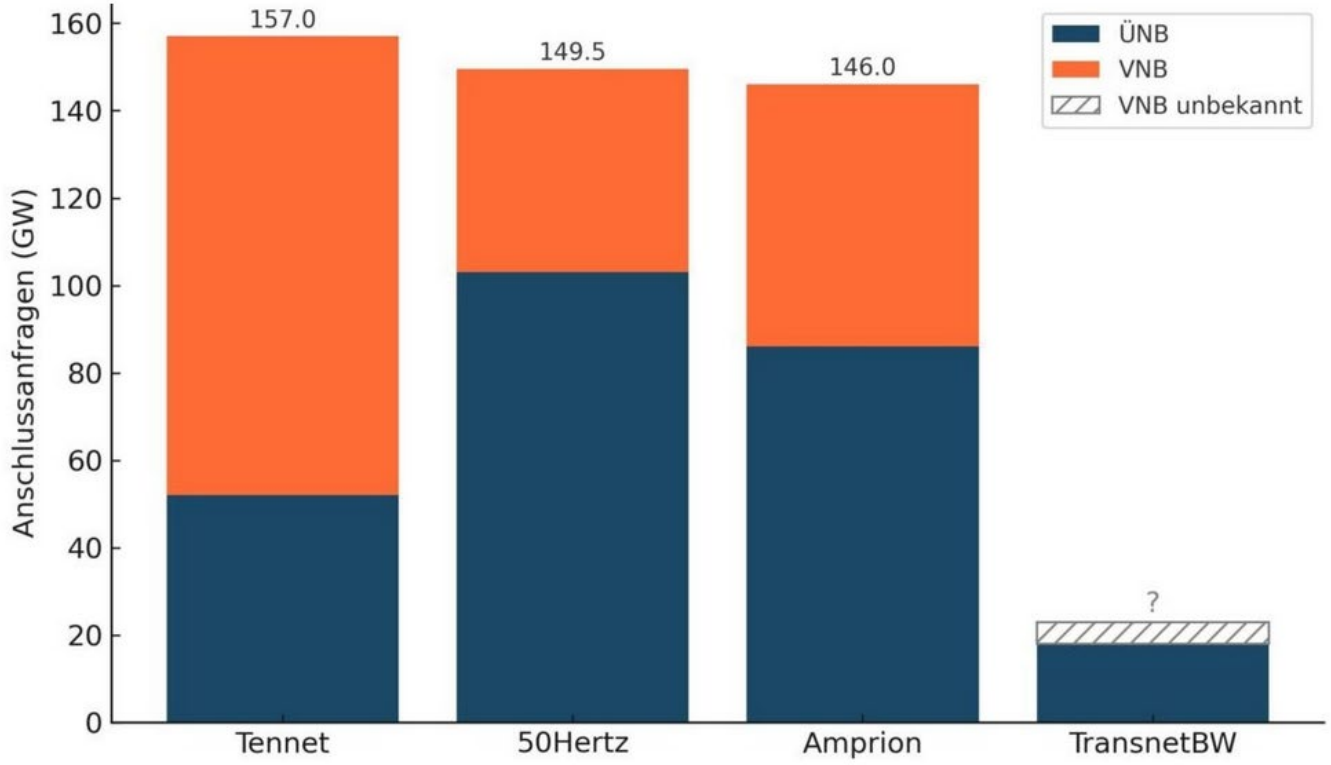
„**Großbatteriespeicher** werden nun ausdrücklich eigenständig im Außenbereich **privilegiert und bauplanungsrechtlich erleichtert zugelassen**.“ (13.11.2025)

Mittlerweile mehr als 500 Gigawatt Netzanschlussfragen für große Batteriespeicher

Die Plattform „Regelleistung-Online“ hat erneut Zahlen bei Netzbetreibern abgefragt und kommt allein bei sieben Beteiligten auf 470,5 Gigawatt. Die Netzanschlussanfragen seien kein realistischer Indikator für den Markthochlauf von Batteriespeichern, sondern Ausdruck eines fehlgeleiteten Genehmigungssystems, so die Einschätzung.

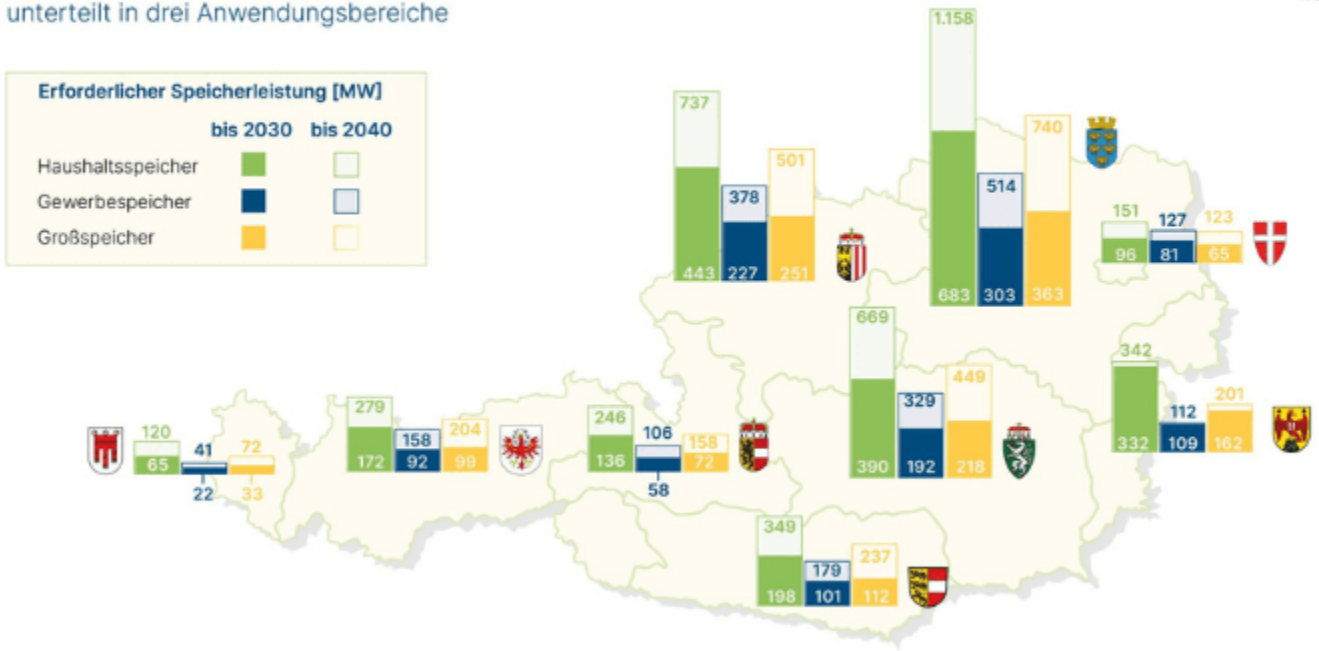
29. AUGUST 2025 SANDRA ENKHARDT

HIGHLIGHTS DER WOCHE | SPEICHER | DEUTSCHLAND



Batteriespeicher in Österreich

Erforderliche Speicherleistung bis 2030 und 2040 in den Bundesländern - unterteilt in drei Anwendungsbereiche



Quelle: APG, PV Austria, TU Graz, d-fine (Hrsg.). 2025. Flexibilitäts- und Speicherbedarf im österreichischen Energiesystem. Grafik: PV Austria

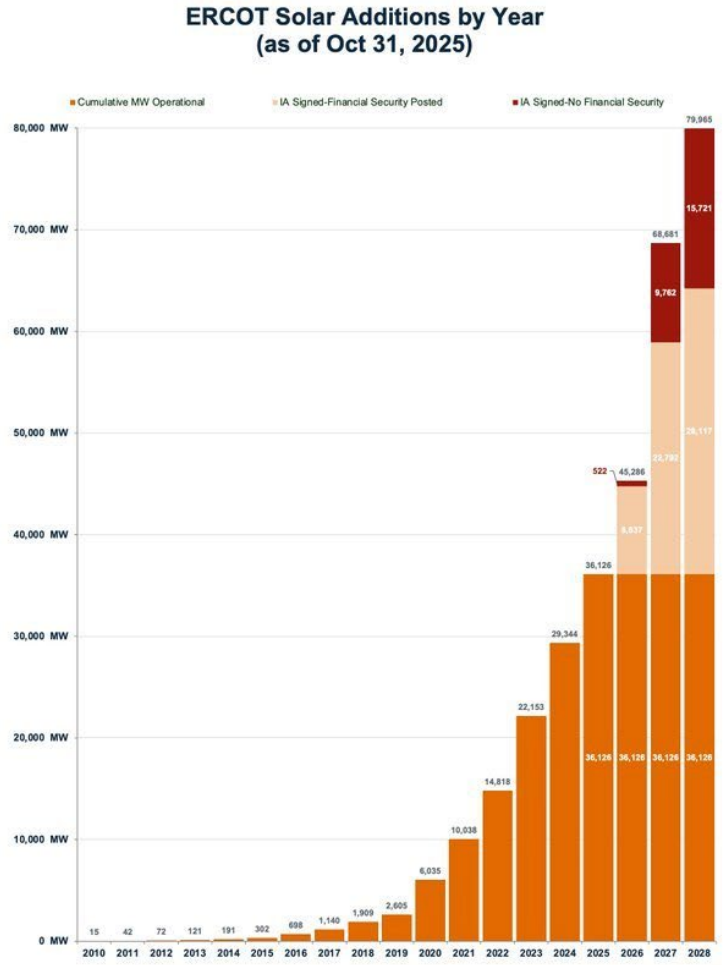
„Der Batteriespeicherbedarf wird sich bis 2040 auf 8,7 GW verachtfachen:

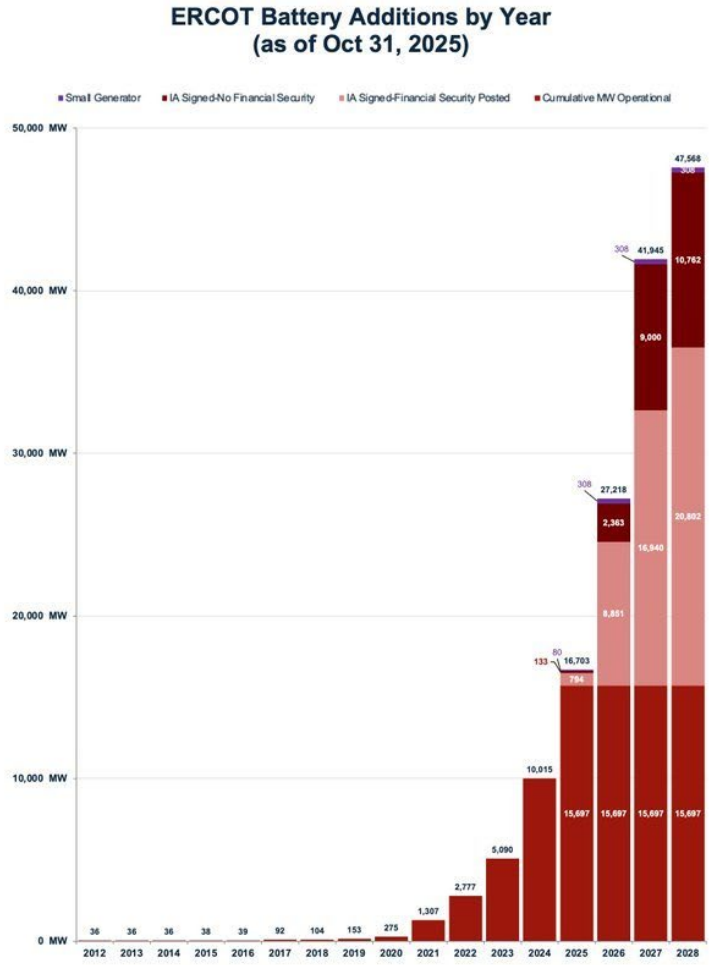
- 5,1 GW im Jahr 2030: 3,7 GW Kleinspeicher (Haushalt/Gewerbe) und **1,4 GW Großspeicher**
- 8,7 GW im Jahr 2040: 6,0 GW Kleinspeicher **und 2,7 GW Großspeicher**."

„Allein im Versorgungsgebiet von Netz Niederösterreich liegen derzeit Anfragen im Umfang von **etwa 7.500 Megawatt (MW) Leistung** auf – das ist fast das Fünffache der derzeitigen niederösterreichischen Spitzenlast von rund 1.600 MW."

Texas:

„ 91% of New U.S. Electrical Generating Capacity in the First Half of 2025 Was Solar + Wind. Solar Has Held the Lead for 22 Consecutive Months as Renewables Continue to Grow.“

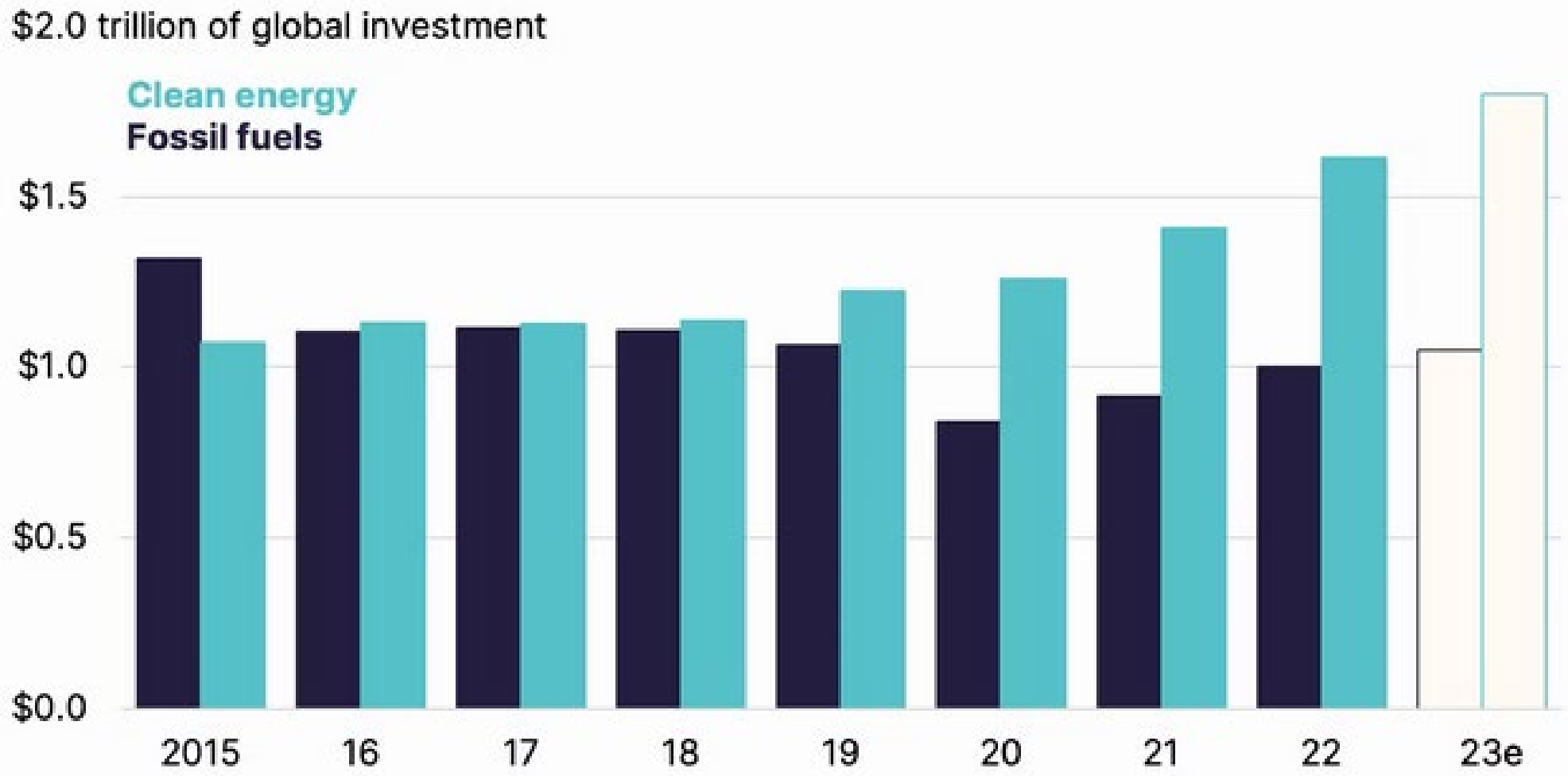




Mythos 4: „Der Markt will das nicht.“

Clean tops fossil

Clean energy investment has exceeded fossil fuel investment for the past eight years

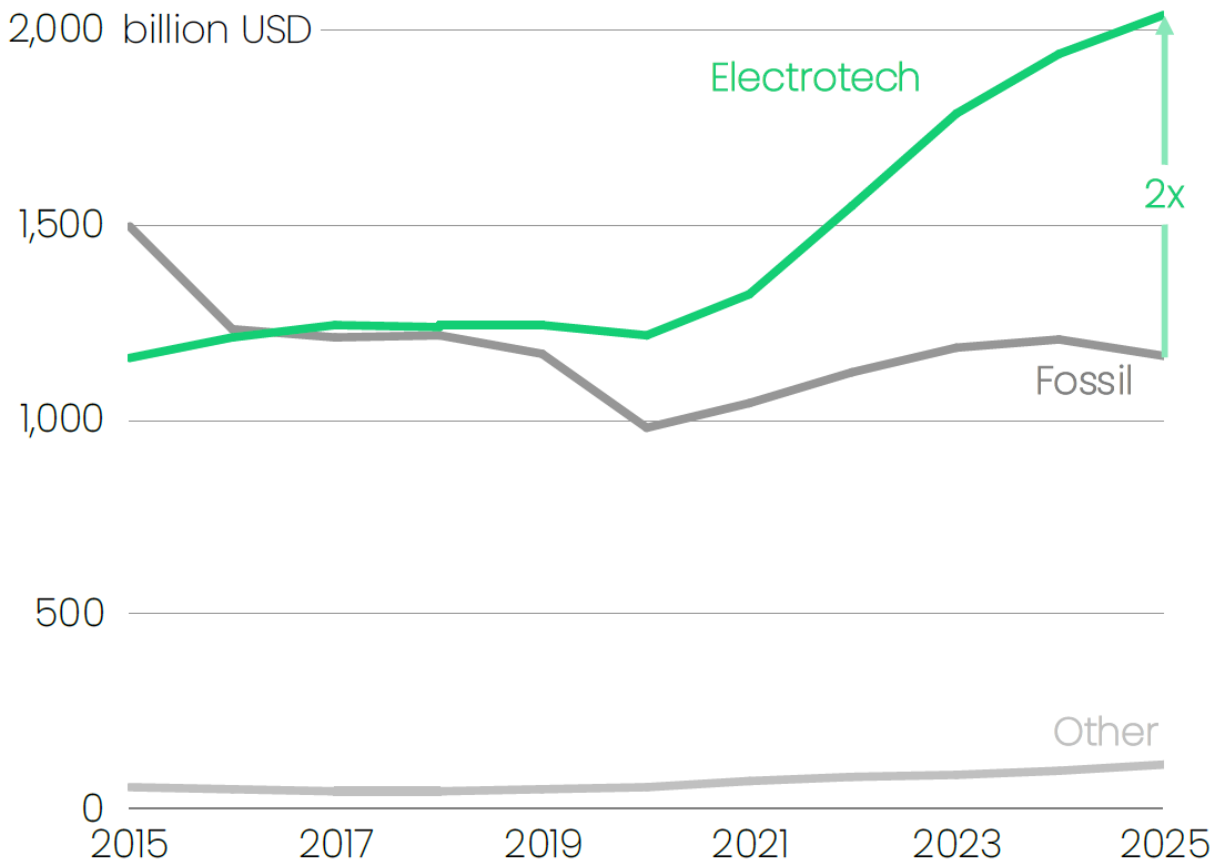


January 2024

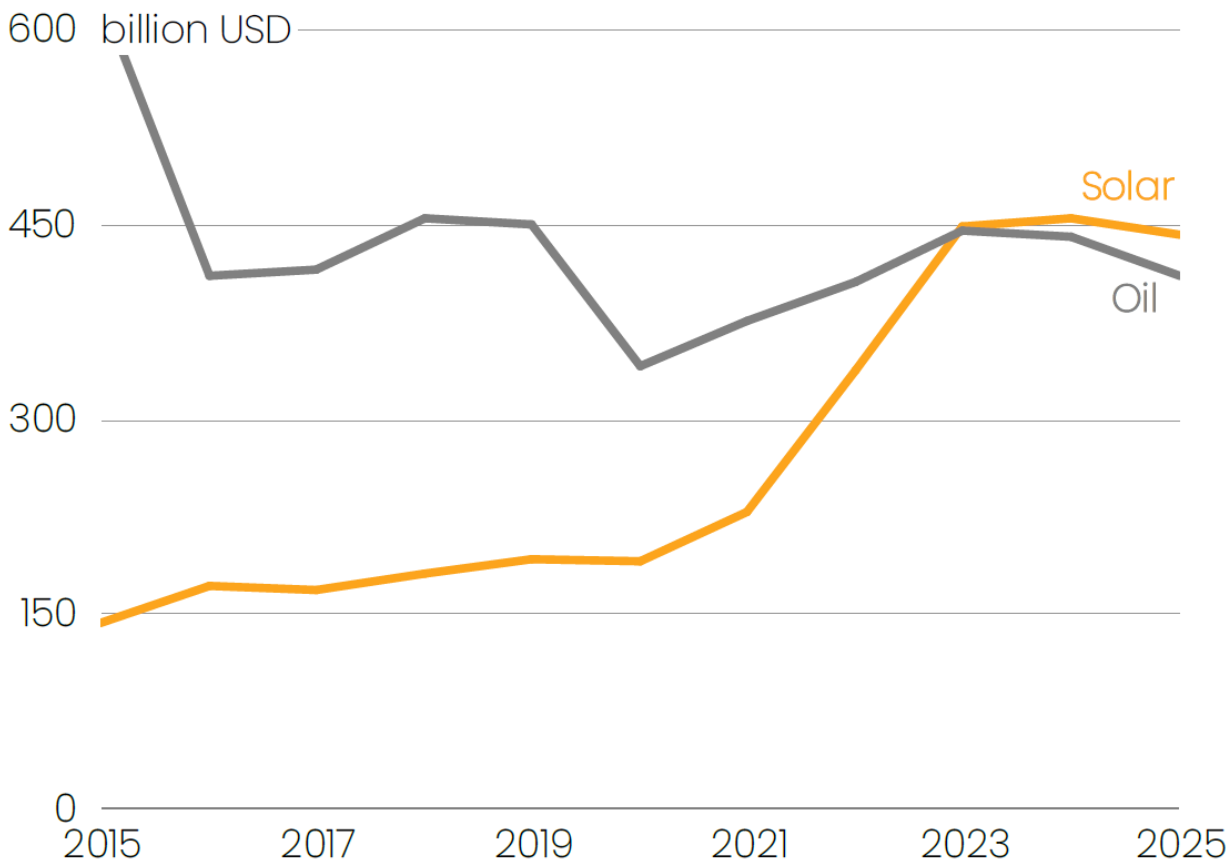
Electrotech investment is twice as big as fossils

And we spend more on solar capex than on oil

Energy investment by category



Solar and oil investment



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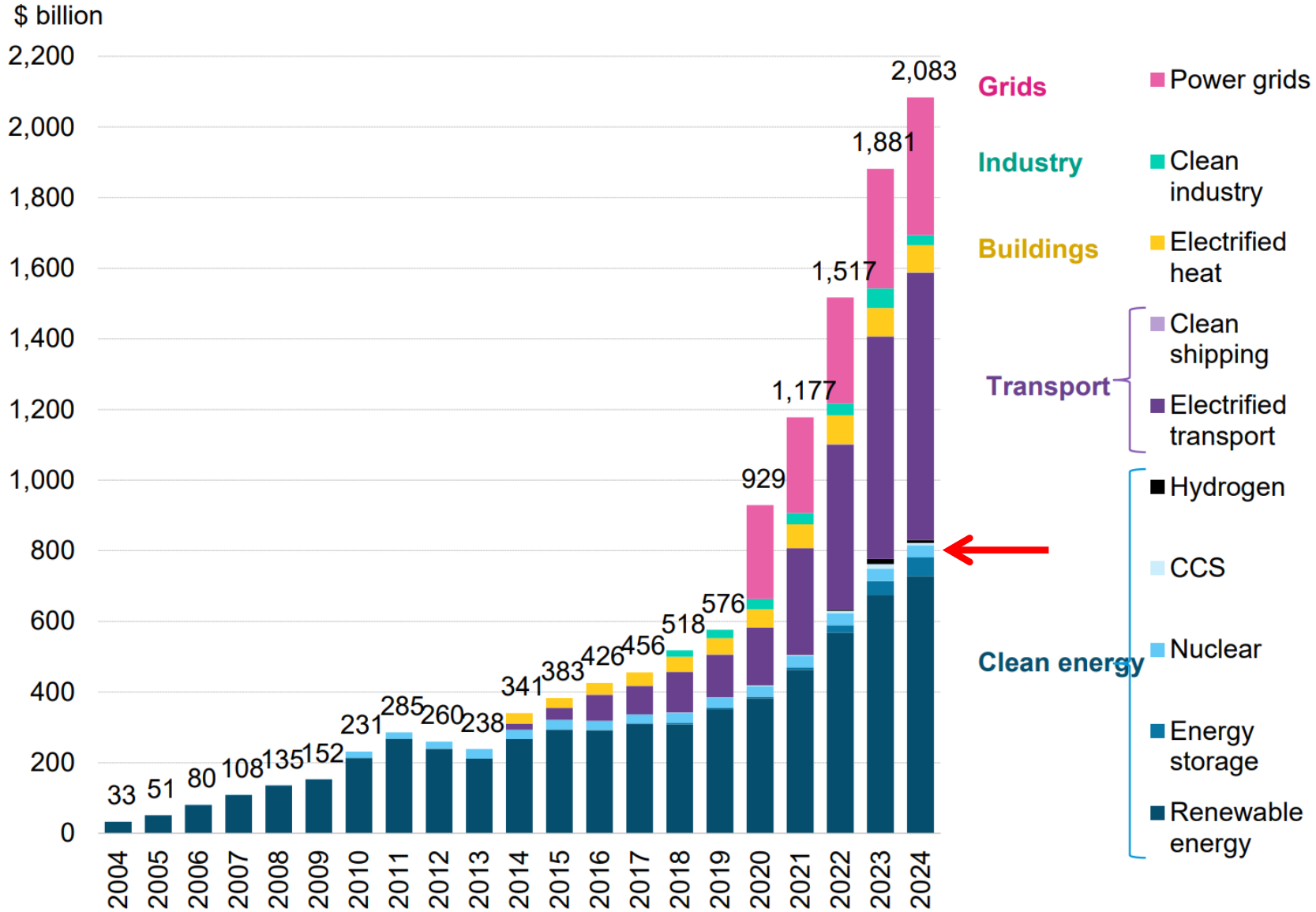
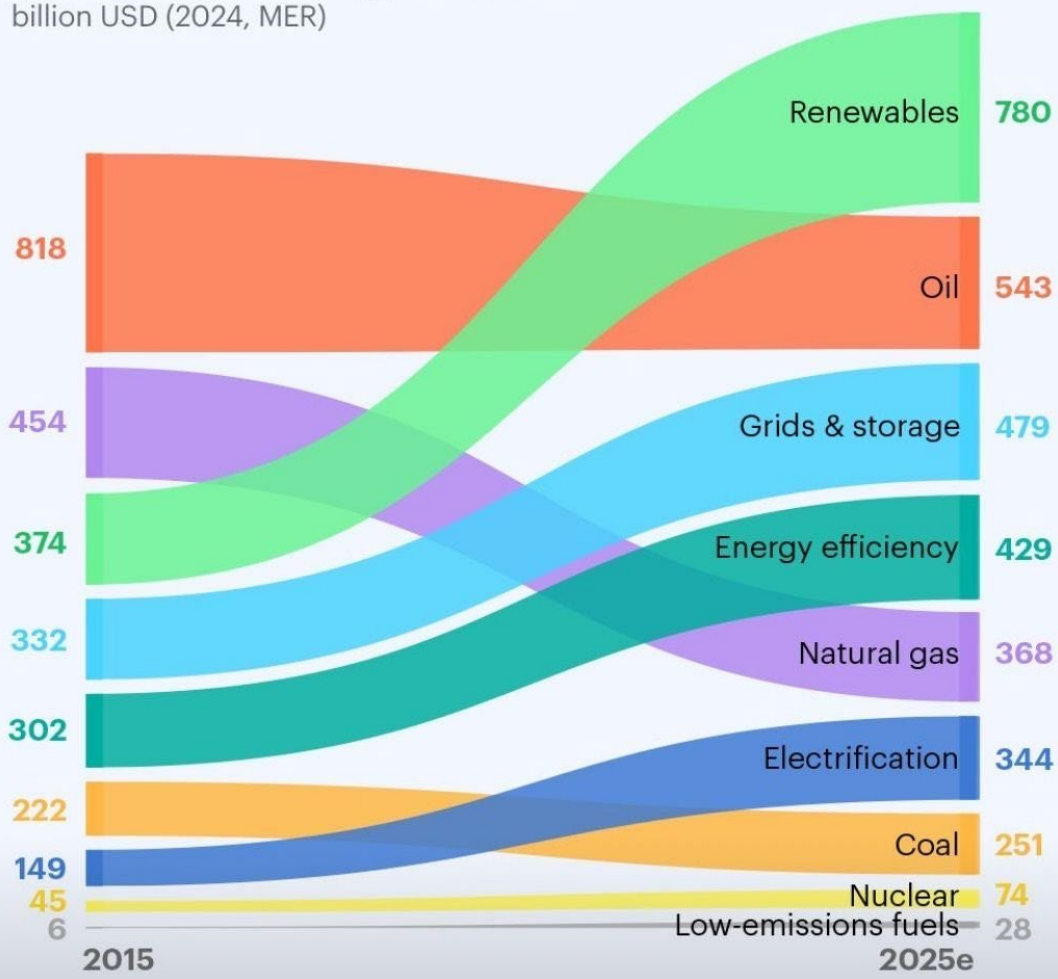
Global investment in energy transition, by sector



Source: BloombergNEF. Note: Start years differ by sector but all sectors are present from 2020 onwards; see Methodology for more detail. Most notably, nuclear figures start in 2015 and power grids in 2020. CCS refers to carbon capture and storage.

The energy investment landscape is changing

Evolution of global energy investment
billion USD (2024, MER)

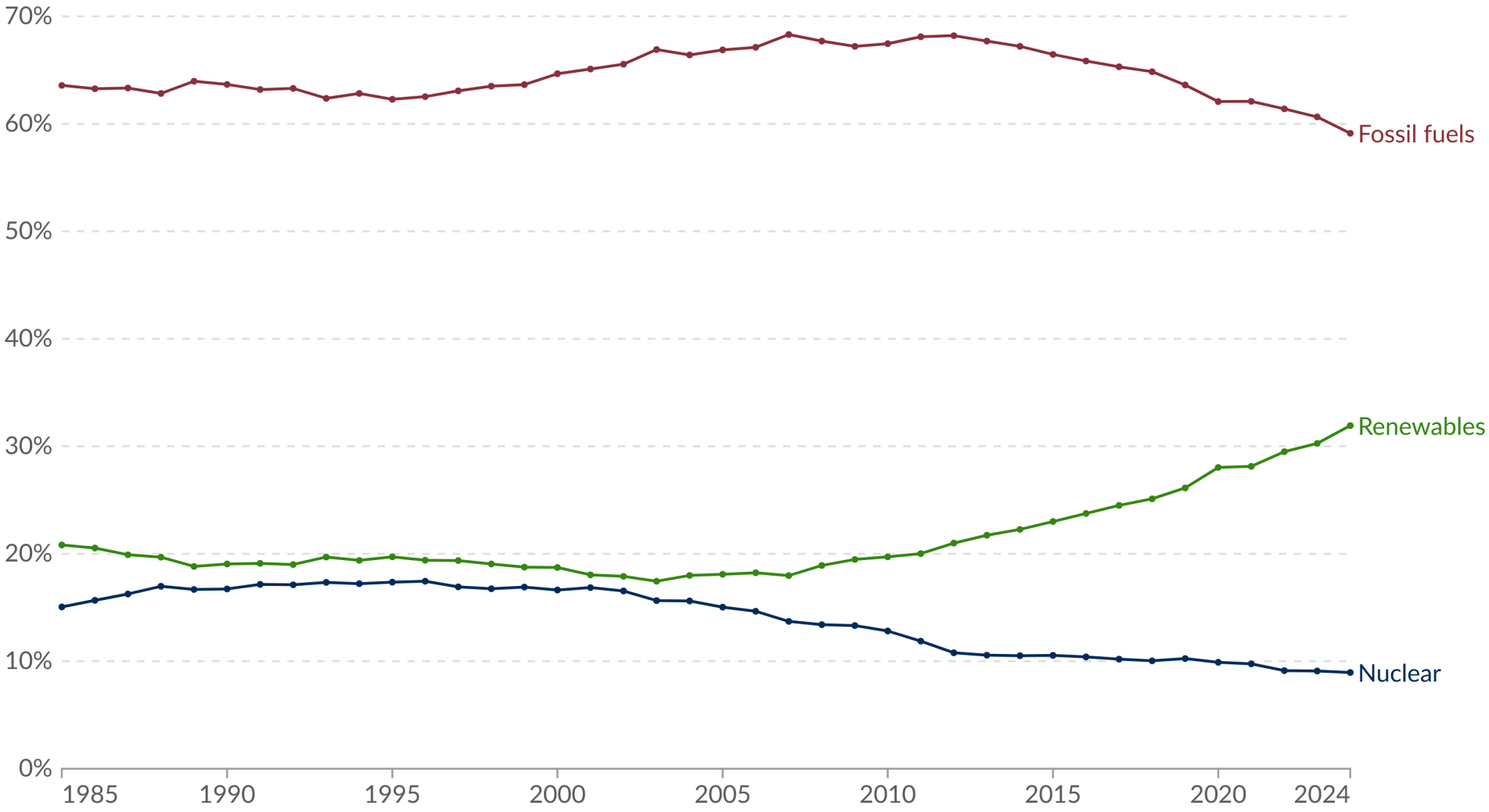


Note: e = estimate

Share of electricity generation from fossil fuels, renewables and nuclear, World

Our World in Data

Measured as a percentage of total electricity produced in the country or region. Fossil fuels include coal, oil, and gas. Renewables include solar, wind, hydropower, bioenergy, geothermal, wave, and tidal.

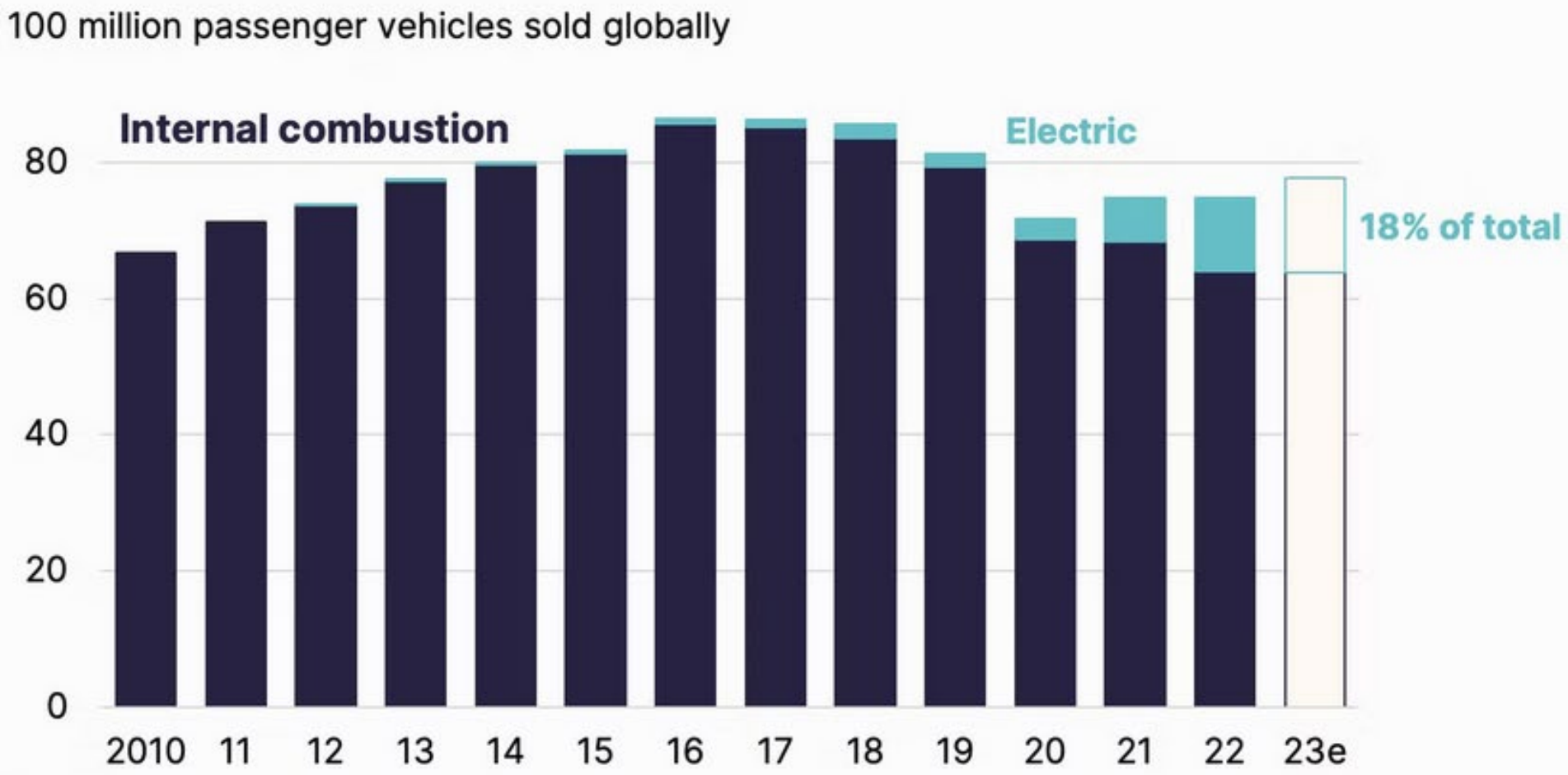


Data source: Ember (2025); Energy Institute - Statistical Review of World Energy (2025)

Mythos 5: „Einbruch der Elektromobilität.“

Der Markt für Verbrennungsmotoren schrumpft seit 2017

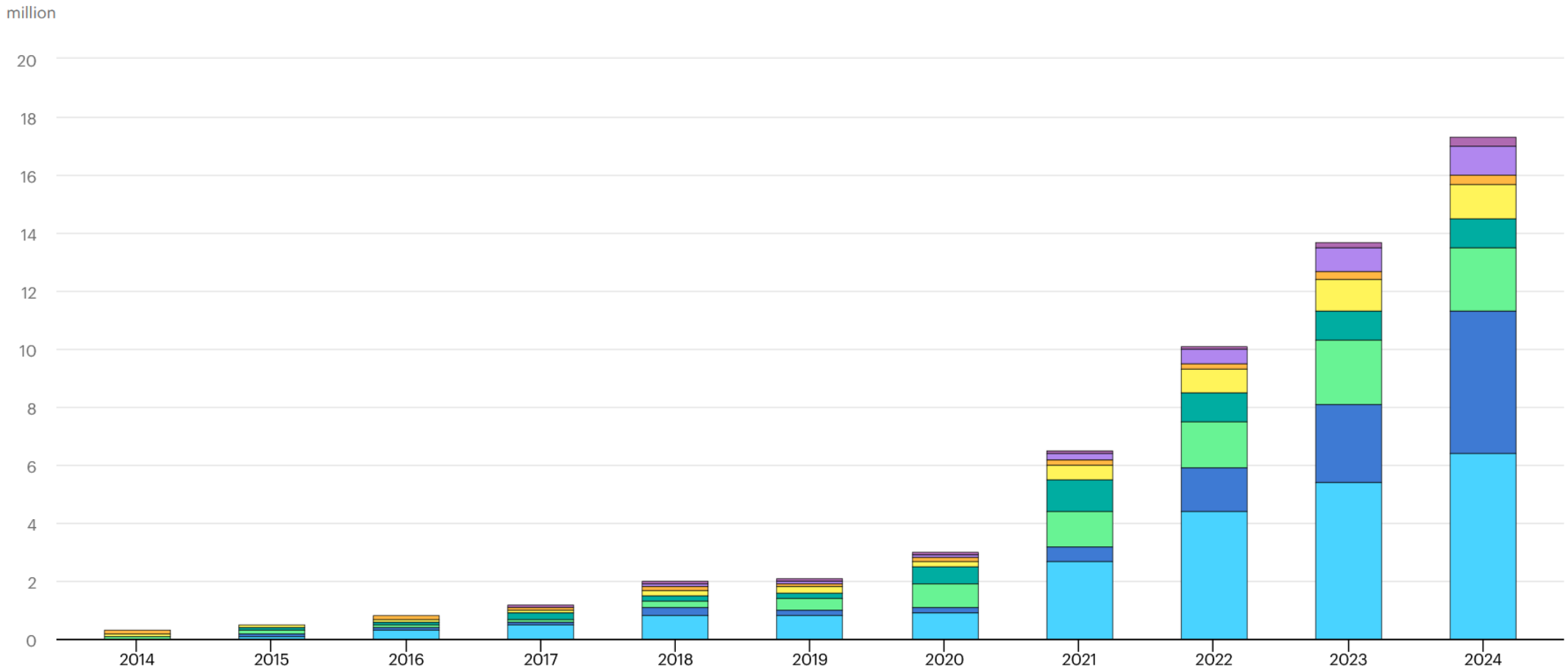
Electric vehicles were the only growth in global auto sales for the seventh year in a row



Note:
2023 is
estimated

NAT BULLARD

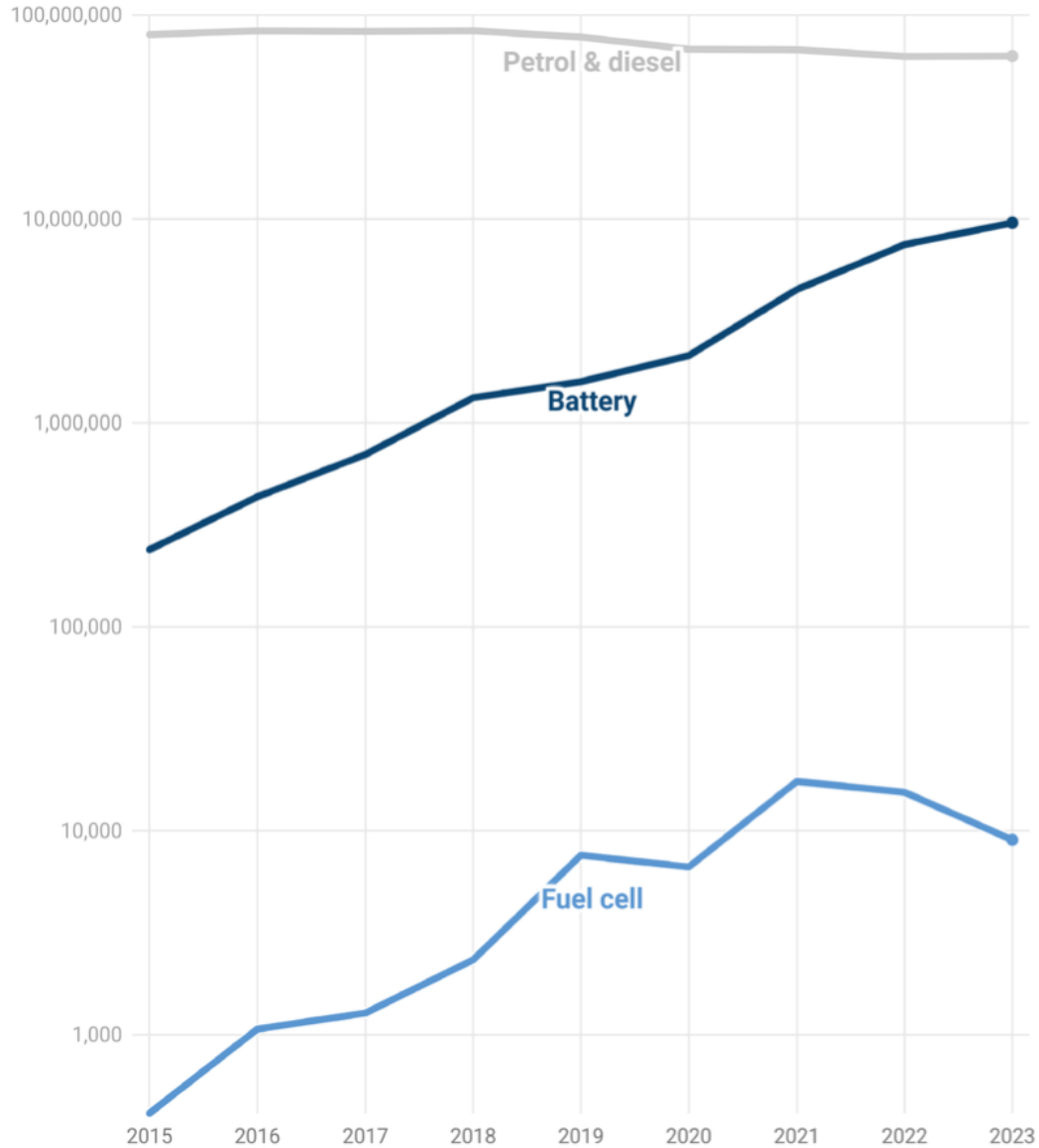
Elektromobilität wächst weiter rasant

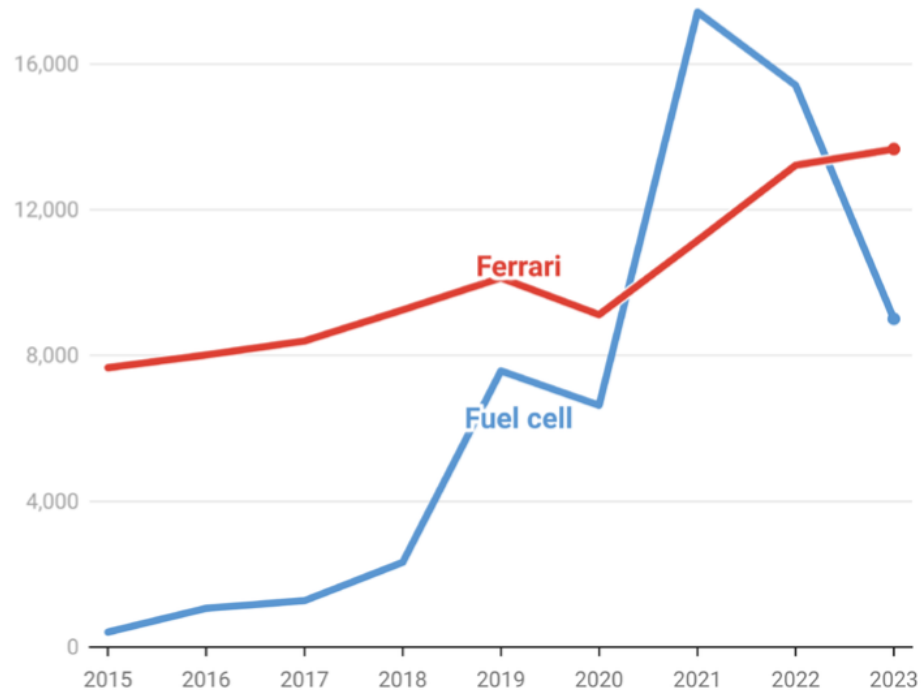


China BEV · China PHEV · Europe BEV · Europe PHEV · United States BEV · United States PHEV · Rest of World BEV · Rest of World PHEV

Hydrogen fuel-cell vehicle sales are now so low they are being outsold by Ferraris

Global vehicle sales by type, logscale





Source: Johnson et al. (2025)

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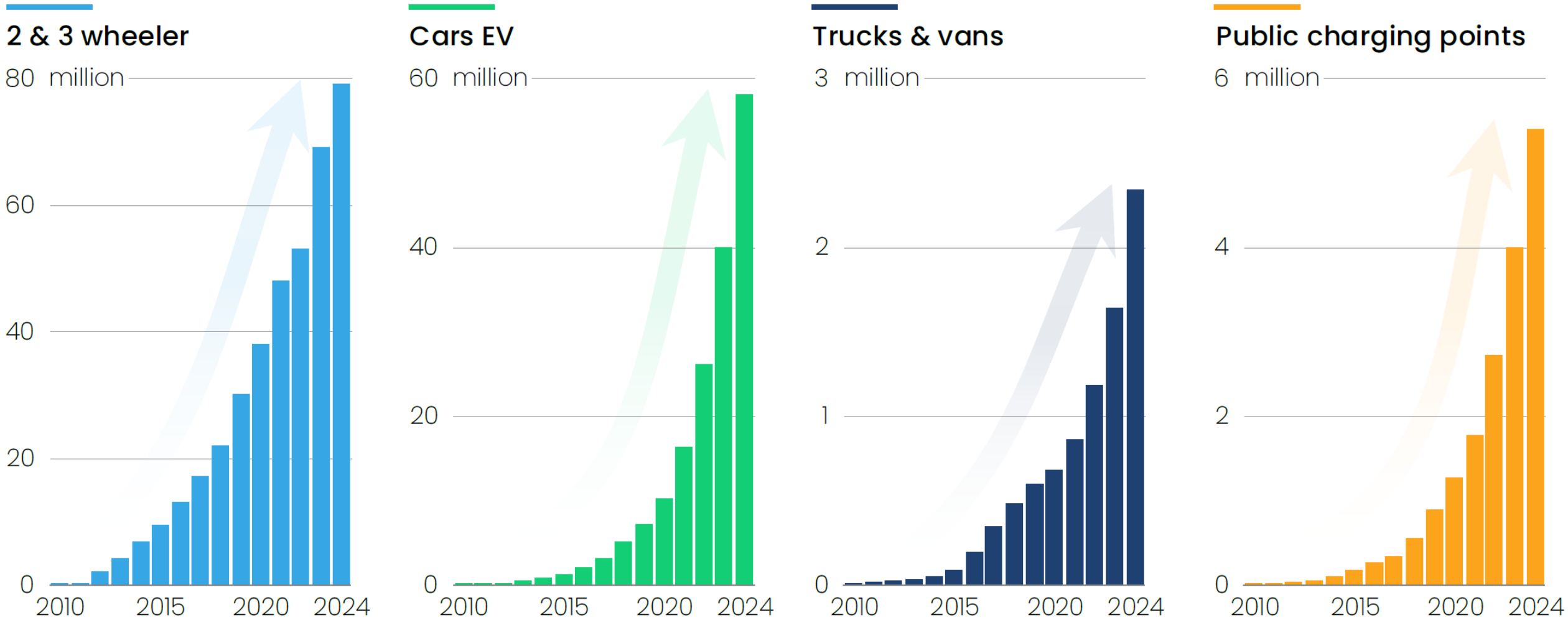
The EV revolution is taking off

Electric mobility is growing exponentially across vehicle sizes



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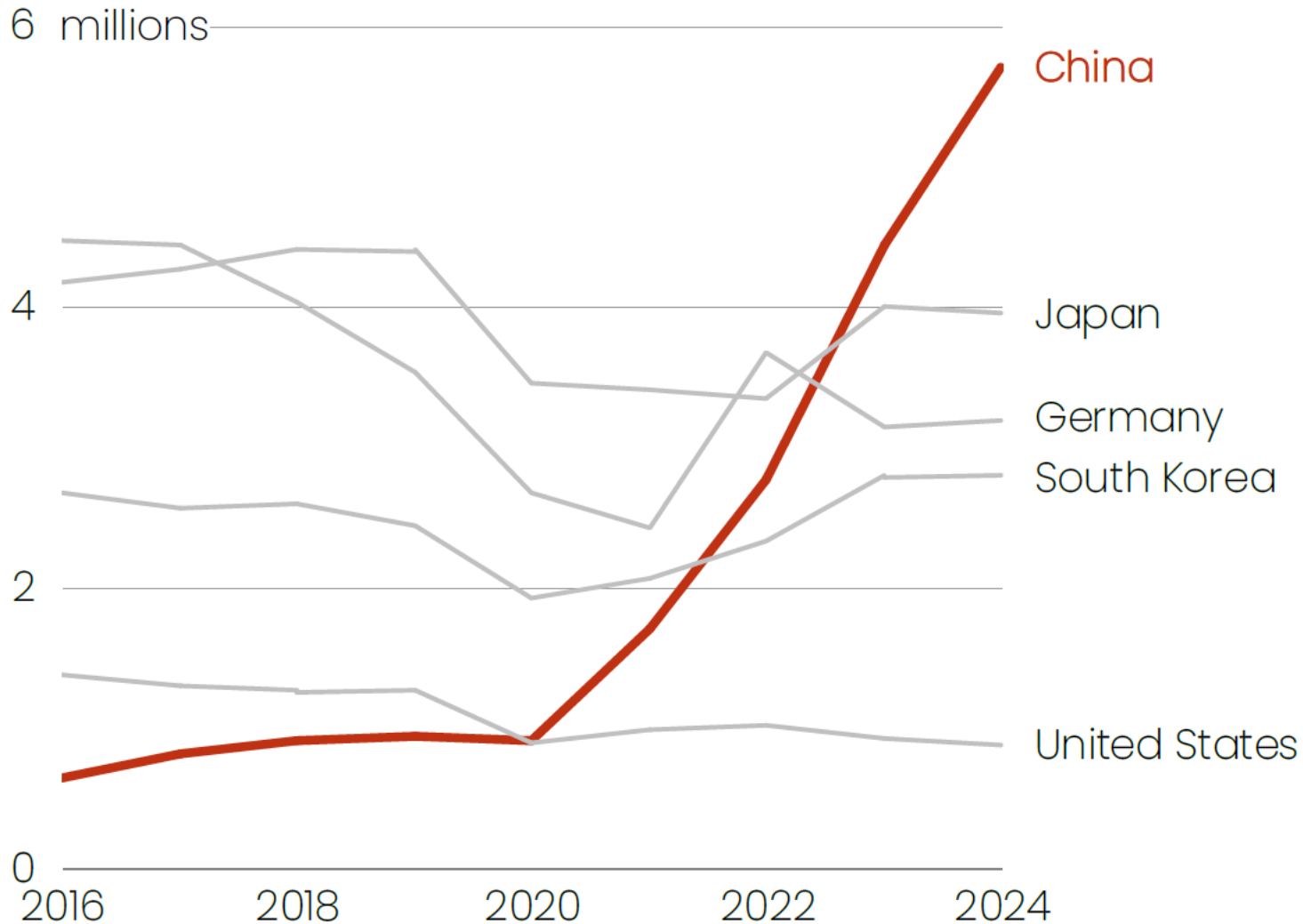
Car exports: China is taking over, enabled by EVs



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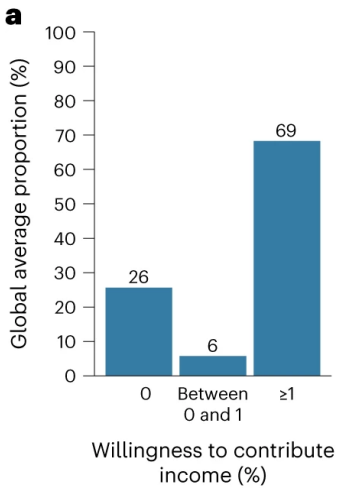
Mythos 6:
„Den Rest der Welt interessiert das nicht.“

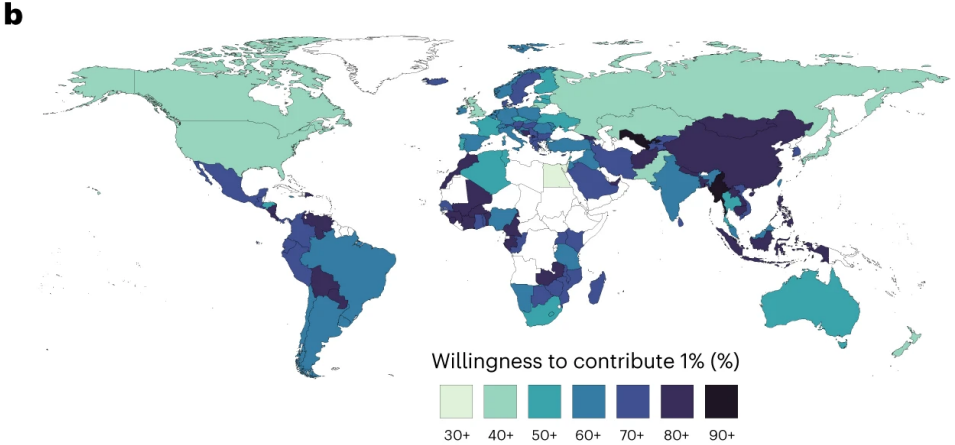
Article | Open access | Published: 09 February 2024

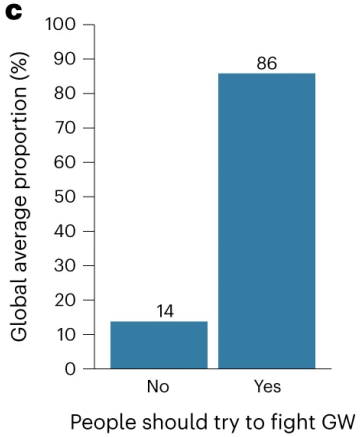
Globally representative evidence on the actual and perceived support for climate action

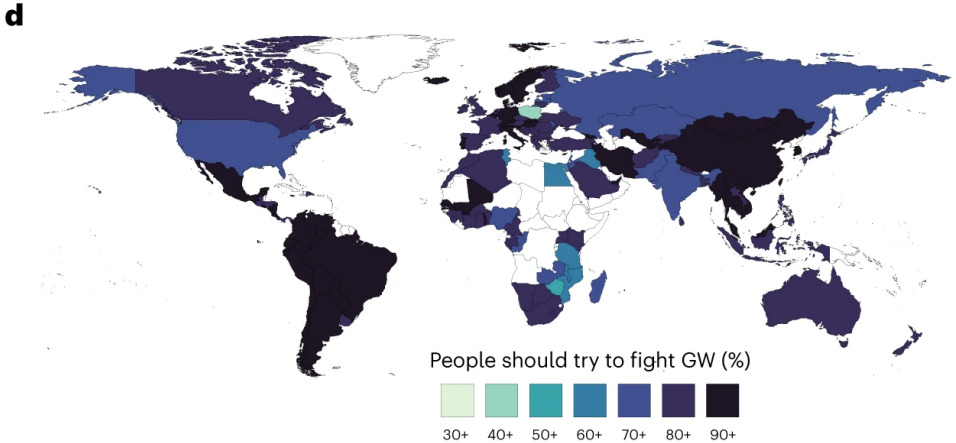
Peter Andre, Teodora Boneva, Felix Chopra & Armin Falk

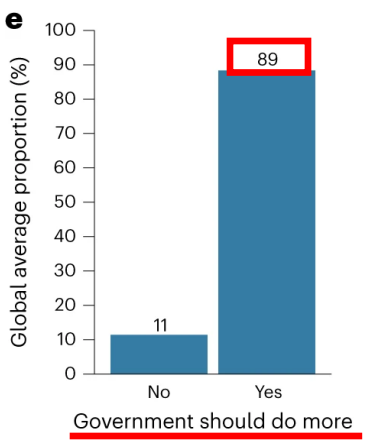
“Raising awareness about the broad global support for climate action becomes critically important in promoting a unified response to climate change.”

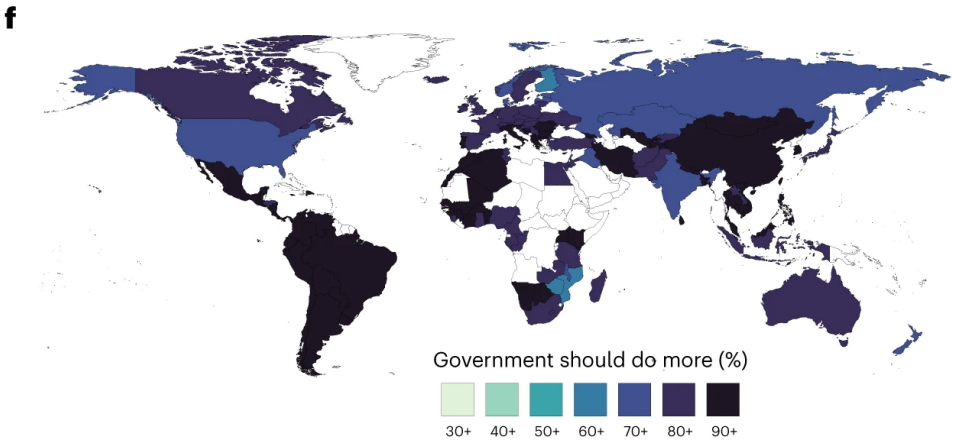








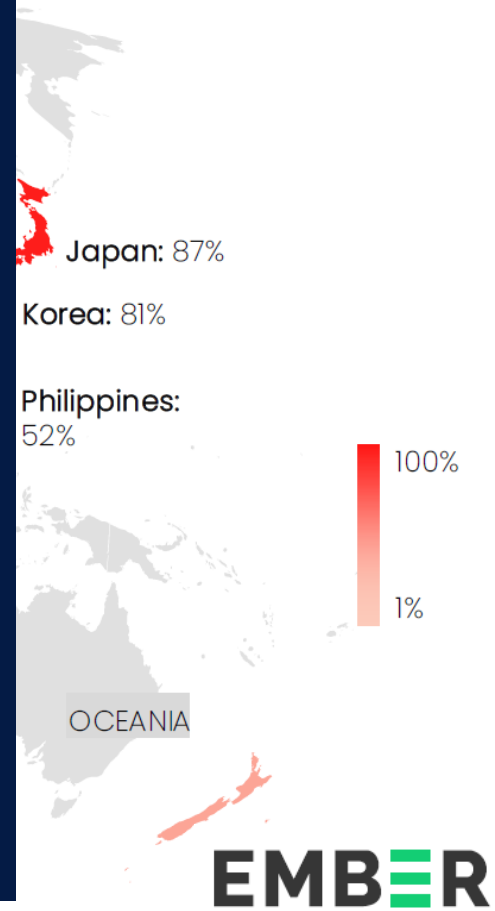




Fossil import dependency is widespread

Over 50 countries import more than half their primary energy as fossil fuels

Fossil net imports



EMBER

Die Transformation ist unausweichlich, sie ist längst überall im Gang, sie ist populär, sie ist nicht aufzuhalten, sie beschleunigt sich weiterhin, aber sie ist noch zu langsam. Fossile Technologien sind in Wahrheit immer noch hochsubventioniert.

Deshalb manipulieren und lobbyieren die Fossilbranchen jetzt umso intensiver

Zum Weiterlesen:

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