# CATF: Powering a Realistic “Energy Transition”

August 2023

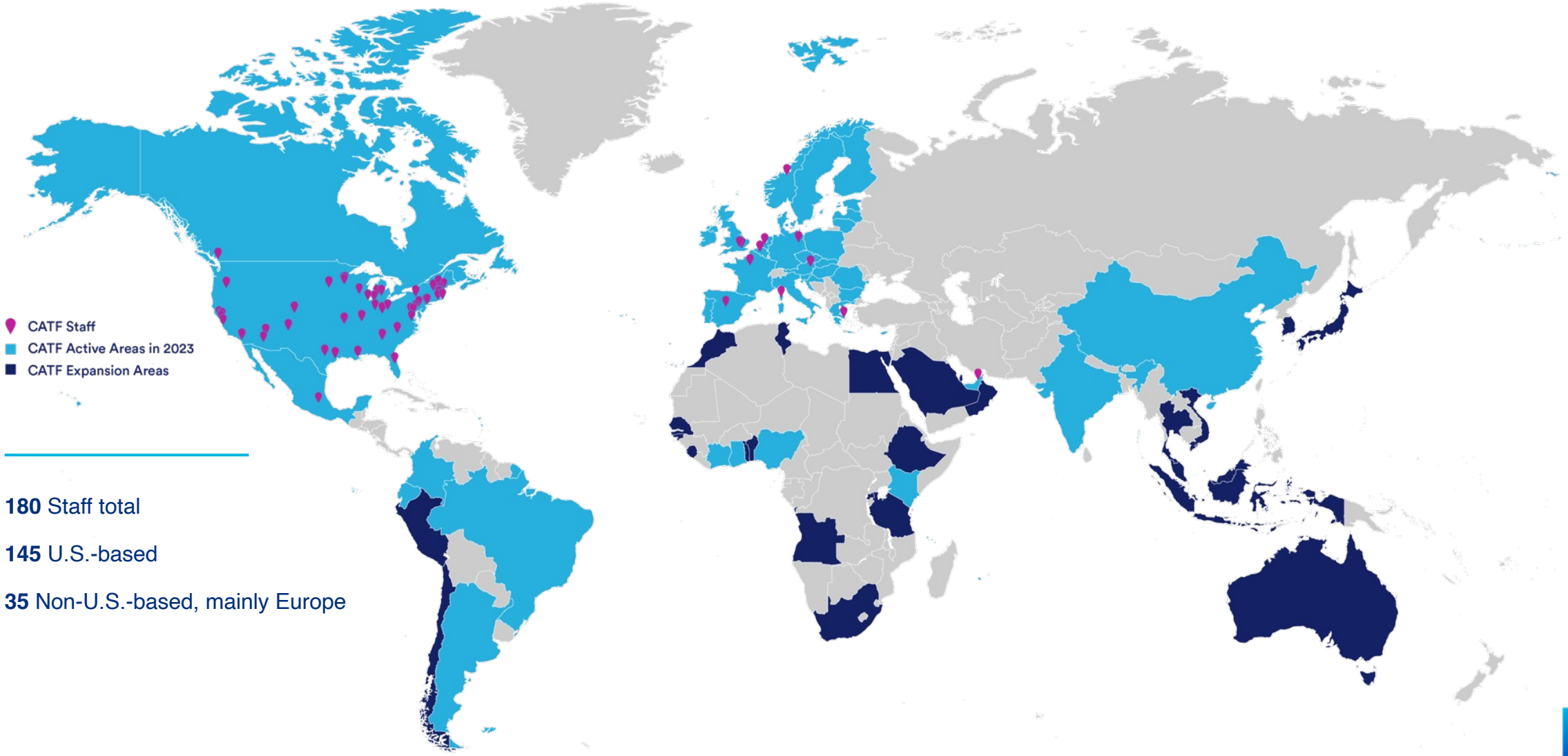
CLEAN AIR TASK FORCE

# CATF at a Glance

- **Founded in 1996** in Boston.
- **180 global staff:** analysts, advocates, engineers, community organizers, MBAs, lawyers, and more.
- **$56 MM budget** for FY 2023, 100% funded by philanthropic donations.

Mission: Research and advocate for policies and private sector actions to manage climate change for a high-energy planet

# CATF at a Glance

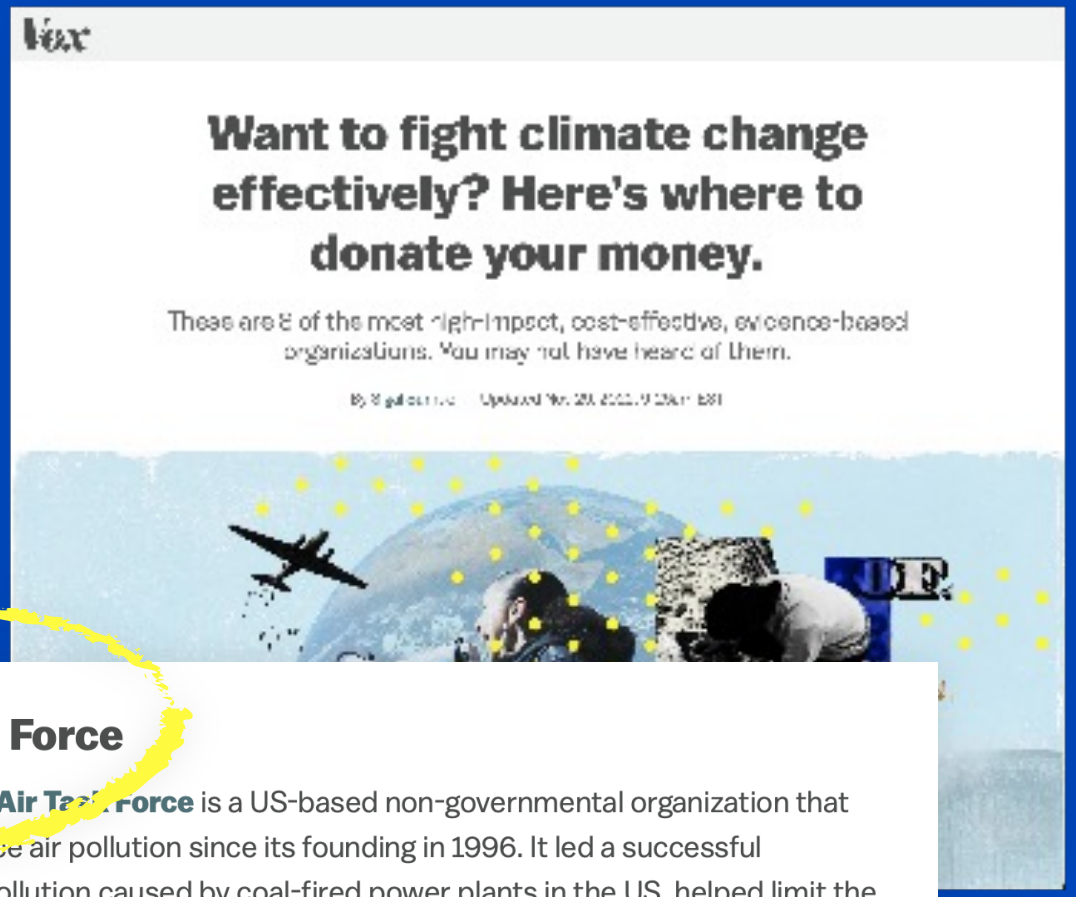



**180** Staff total

**145** U.S.-based

**35** Non-U.S.-based, mainly Europe

# Vox names CATF #1 organization fighting climate change!


Vox

Want to fight climate change effectively? Here's where to donate your money.

These are 8 of the most high-impact, cost-effective, evidence-based organizations. You may not have heard of them.

## 1) Clean Air Task Force

**What it does:** The **Clean Air Task Force** is a US-based non-governmental organization that has been working to reduce air pollution since its founding in 1996. It led a successful campaign to reduce the pollution caused by coal-fired power plants in the US, helped limit the US power sector's CO2 emissions, and helped establish regulations of diesel, shipping, and methane emissions. CATF also advocates for the adoption of neglected low- and zero-carbon technologies, from **advanced nuclear power** to **super-hot rock geothermal energy**. (Disclosure: I donated to CATF in 2021.)

# Major historic accomplishments

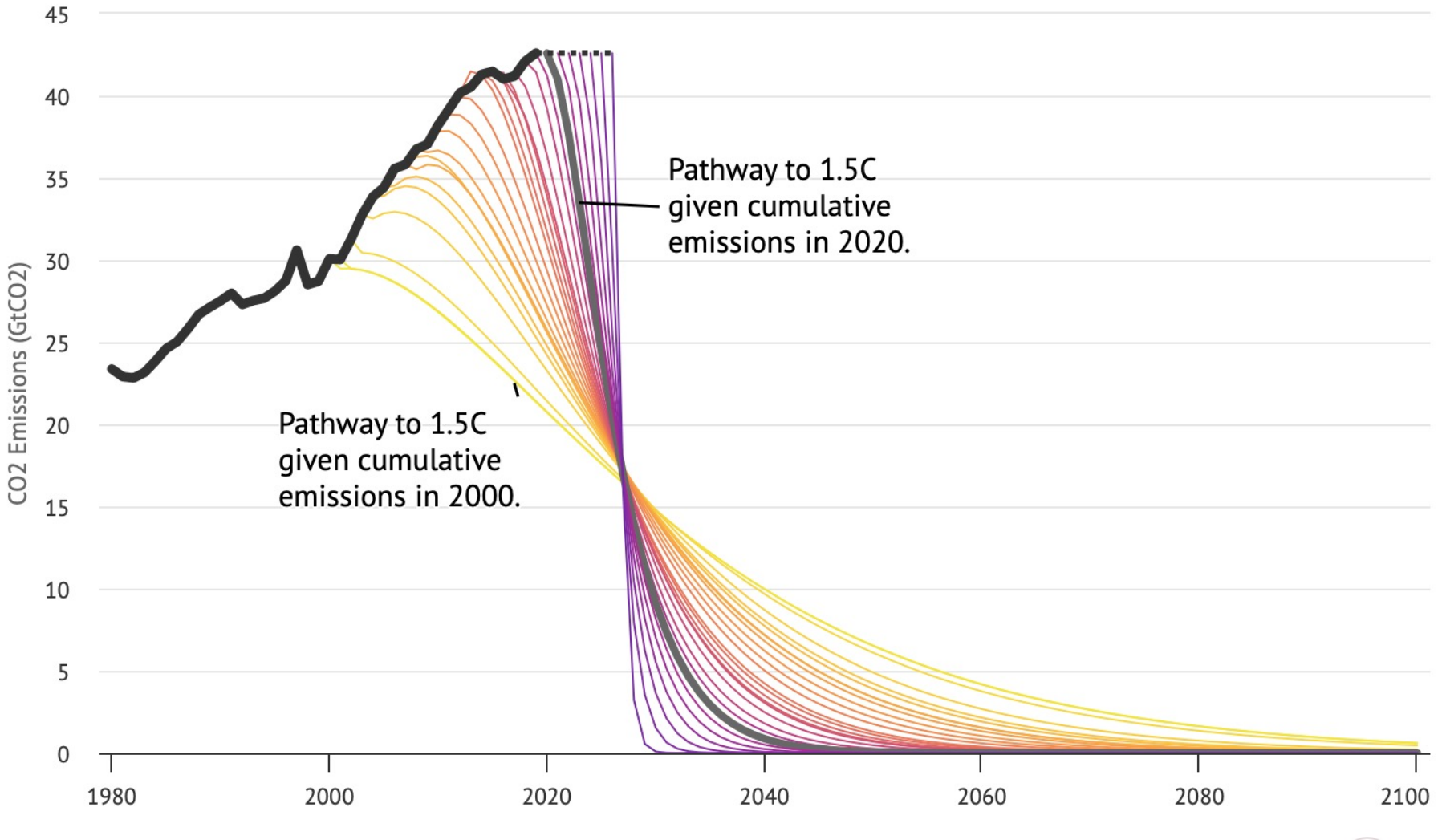
- Focused the USA's attention, and the world's, on coal
- Launched first global effort to manage methane
- Mainstreamed CCS in the climate discourse
- Put nuclear power back on the green agenda
- Turned the goal from "100% renewable" to "100% carbon free"
- First NGO to highlight need for zero carbon fuels
- Initiated unique catalytic efforts on superhot rock geothermal and fusion energy

# Recent accomplishments

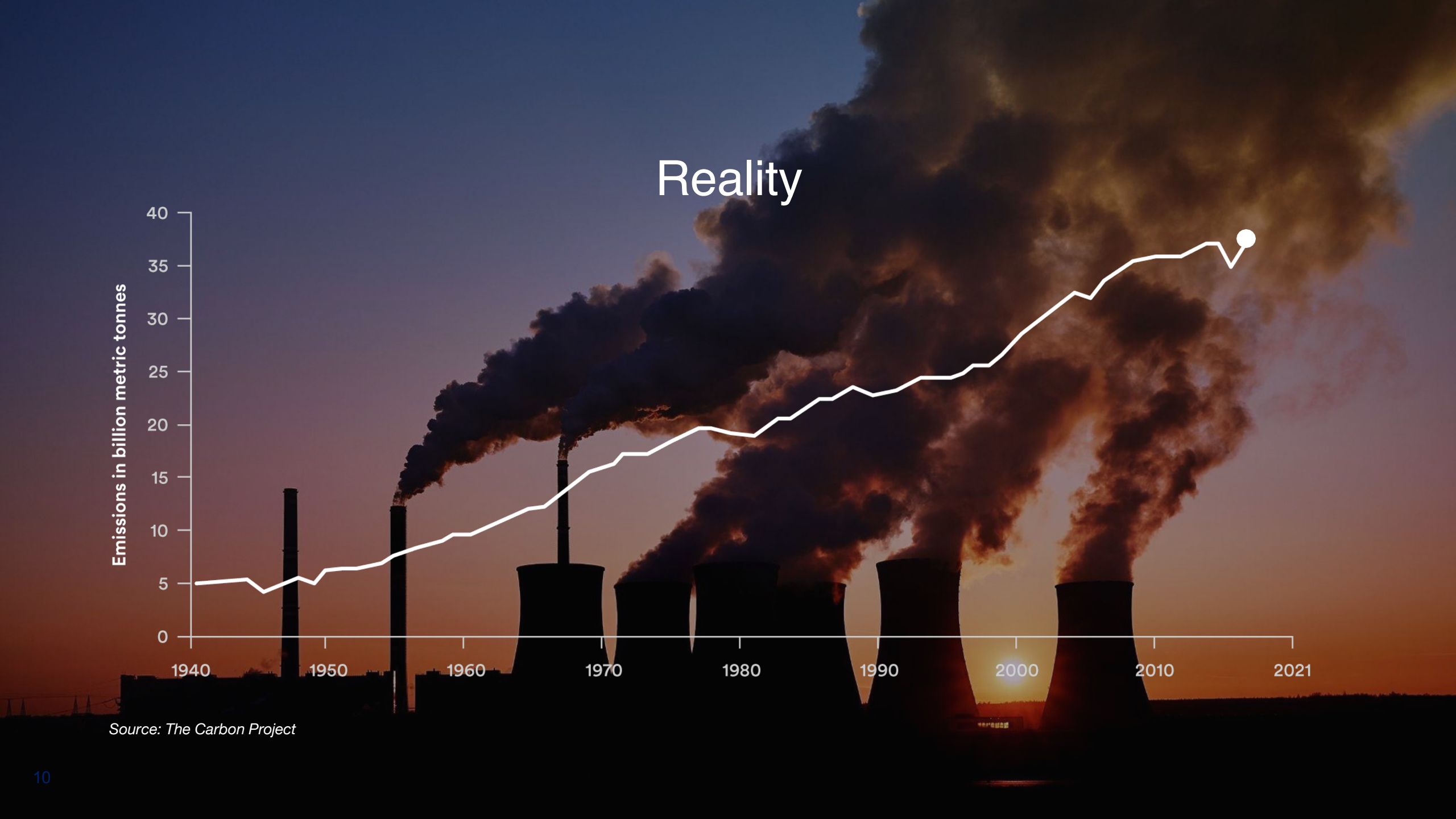
- Played major role in designing and enacting the largest climate technology spend in history (US IRA - $1 Trillion + IIJA)
- CATF vision for industrial carbon capture adopted by the EU
- Extended life of California's last nuclear plant, setting a global example
- CATF proposal for first-ever carbon limits on power plants adopted by US EPA
- Methane reduction policies driven by CATF cover 38% of natural gas production and cover 27% of total oil and gas methane emissions, and CATF-pushed methane import standards will cover 45% of globally traded gas.

# What are some basic understandings and principles necessary for a realistic energy transition?

# The path to 1.5 degrees



# Reality




*Source: The Carbon Project*

# CATF View of the “Energy Transition”

## Conventional view:
**it’s simple, just need willpower**

- Flatten or reduce demand globally
- Electrify everything
- Decarbonize power with ~ 100% renewable (wind + solar + batteries)
- Remaining fuels mostly “green hydrogen”
- Demand conforms to supply
- It’s a straight line to 1.5 degrees and only requires “political will"

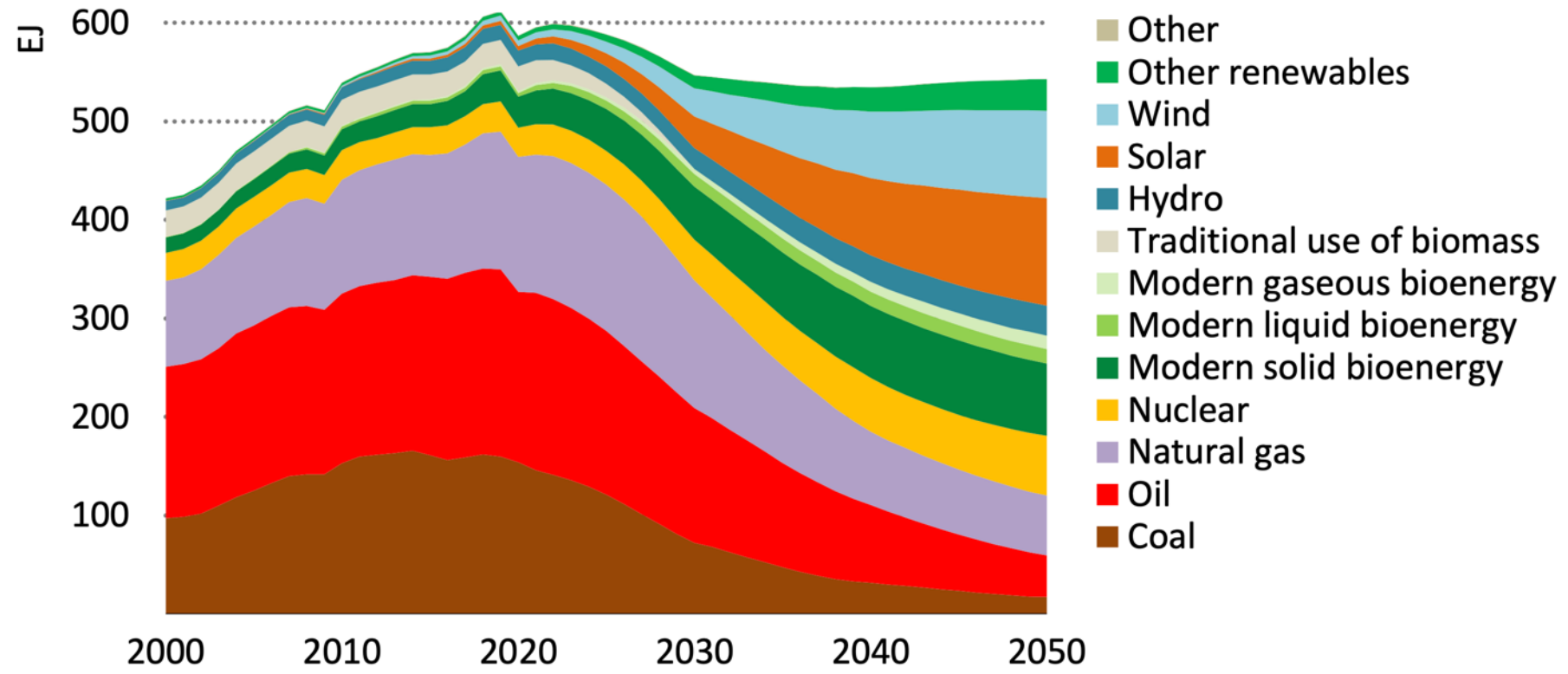
## CATF view:
**it’s complicated and uncertain**

- Demand could increase with developing world growth
- Electrification will be difficult in key sectors
- Very high renewables constrained by seasonality, cost, climate impacts, land, materials
- Demand patterns are sticky
- There are real financial constraints – we need to drive zero carbon **systems** as close as possible to “fossil fuel parity”
- It’s a very wiggly line, outcomes are highly uncertain
- 1.5 degrees is out of view – we are now playing a much longer game
- Technology humility and pathway diversification and optionality is the best strategy

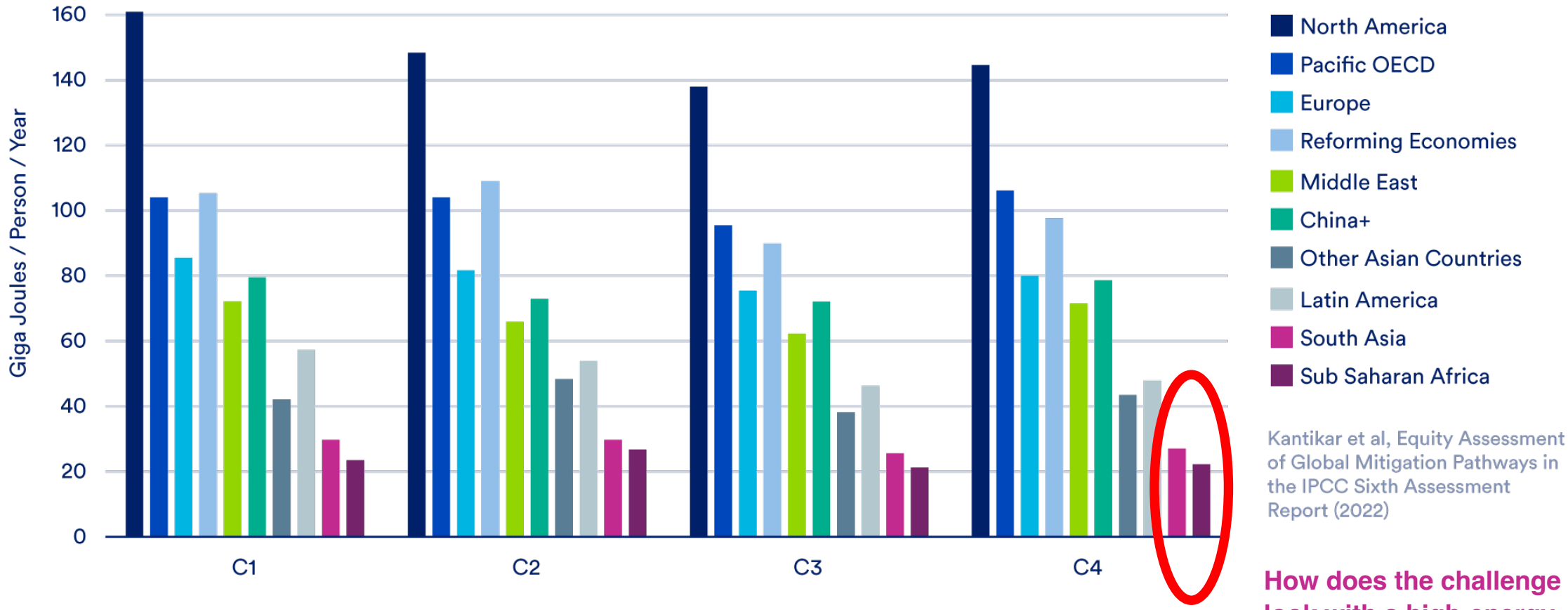
# Demand and electrification assumptions

# The transition models assume **global demand reduction** rather than growth

**Figure 2.5** ▷ **Total energy supply in the NZE**



# Models rely on energy poverty in Global South, likely underestimating challenge




The figure above shows the projected average per capita energy consumption across regions in each category. These values are weighted averages across the models.

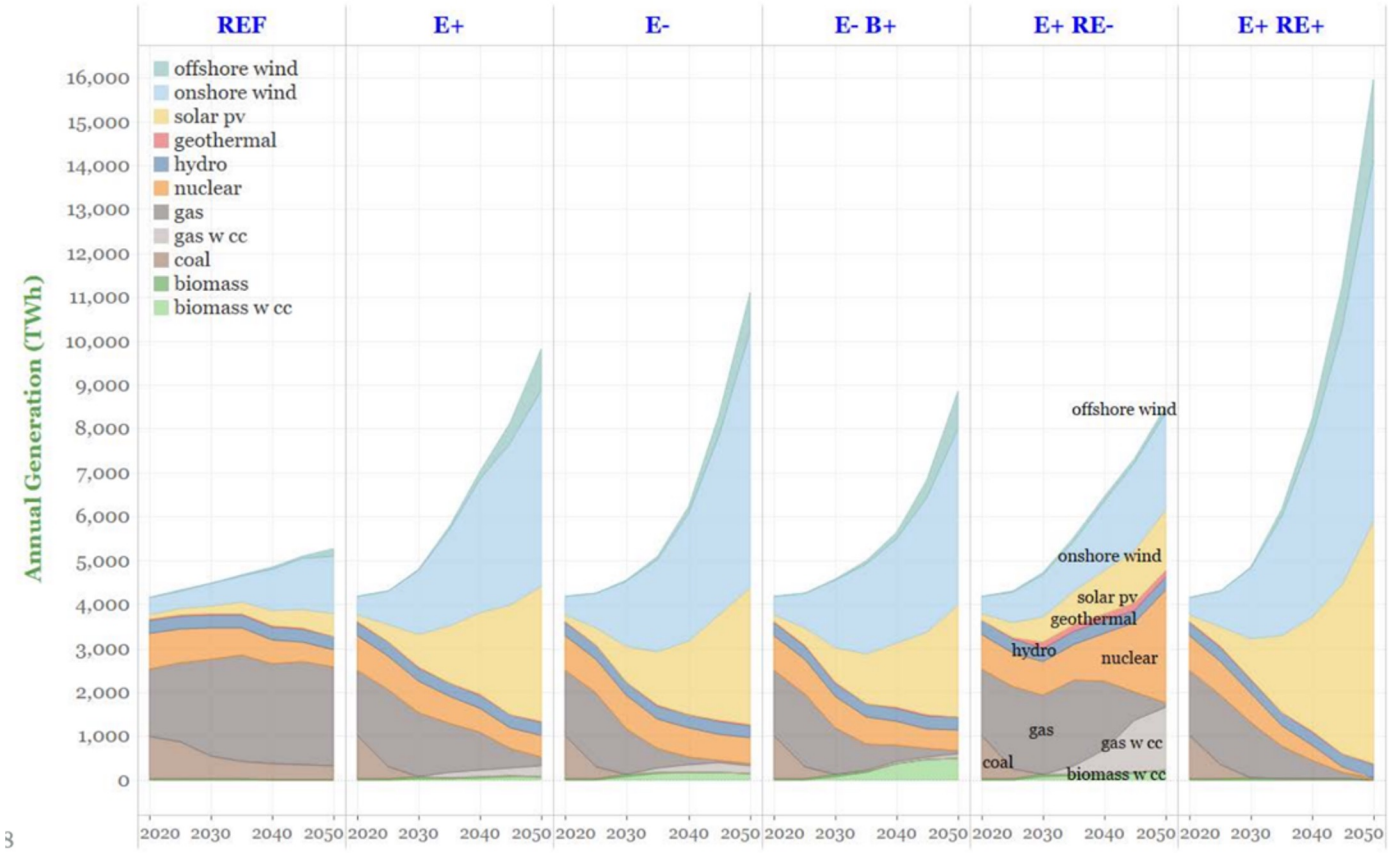
Kantikar et al, Equity Assessment of Global Mitigation Pathways in the IPCC Sixth Assessment Report (2022)

**How does the challenge look with a high-energy Global South?**

# Risks in the renewables-dominant transition supply vision

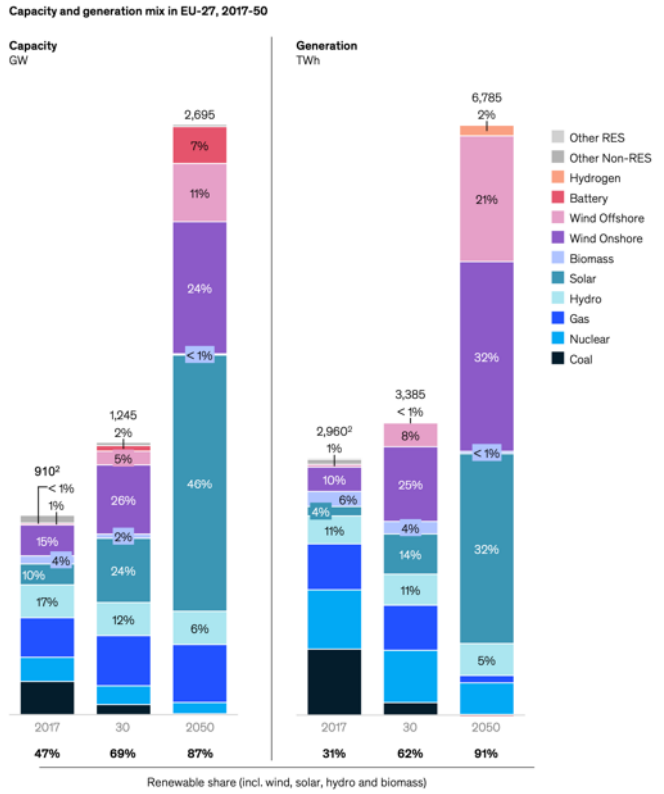
# Models assume a renewable dominant future

## Modeling of United States



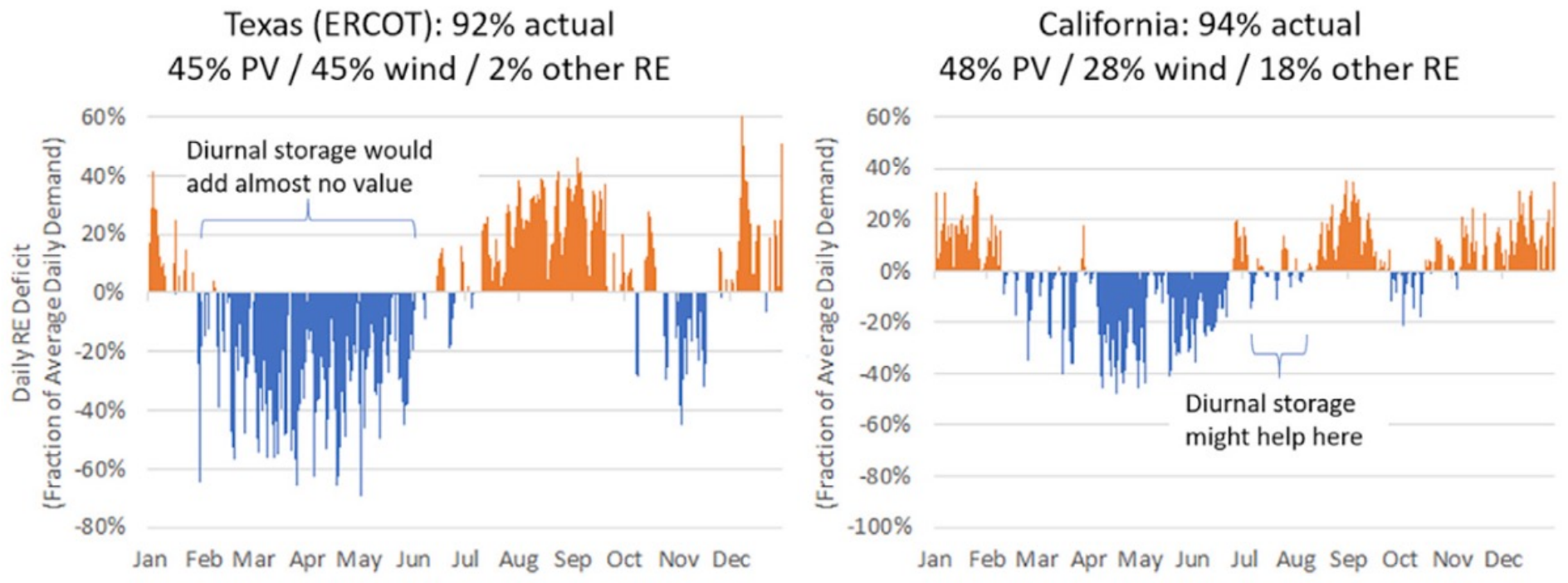

*Source: Net-Zero America.*

## Modeling of EU




*Source: ??*

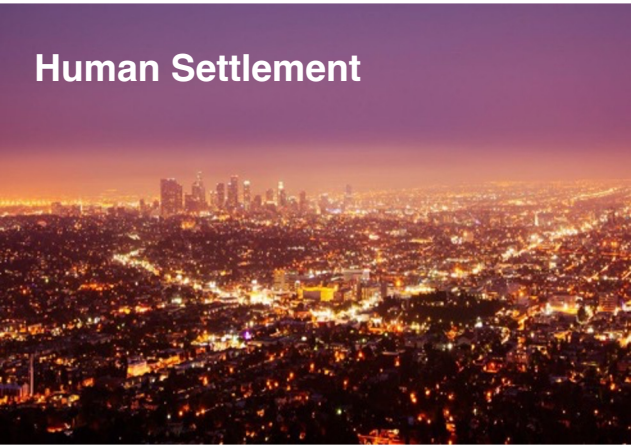
# But renewable weekly, monthly, and seasonal patterns **lack cost-effective solutions**



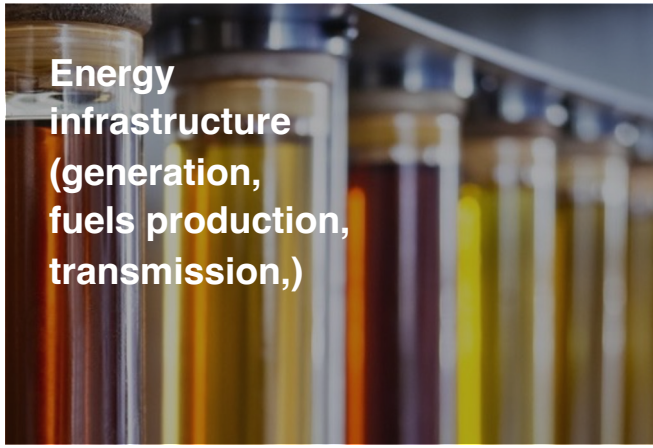

*Source: Ref: Denholm et al., The challenges of achieving a 100% renewable electricity system in the United States, Joule (2021), https://doi.org/10.1016/j.joule.2021.03.028*

# Land will be a significant constraint

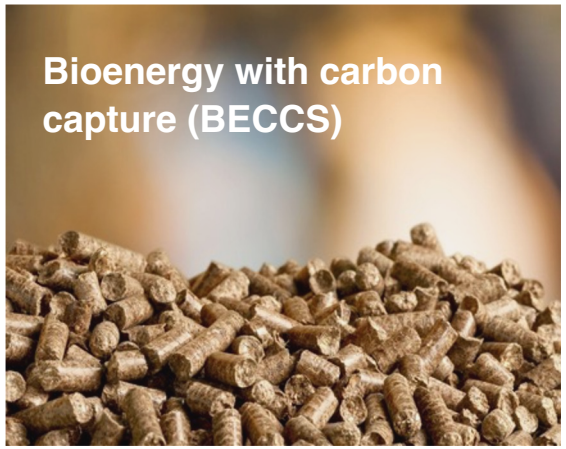
# Land-use challenges remain underappreciated – **it's a crowded world**







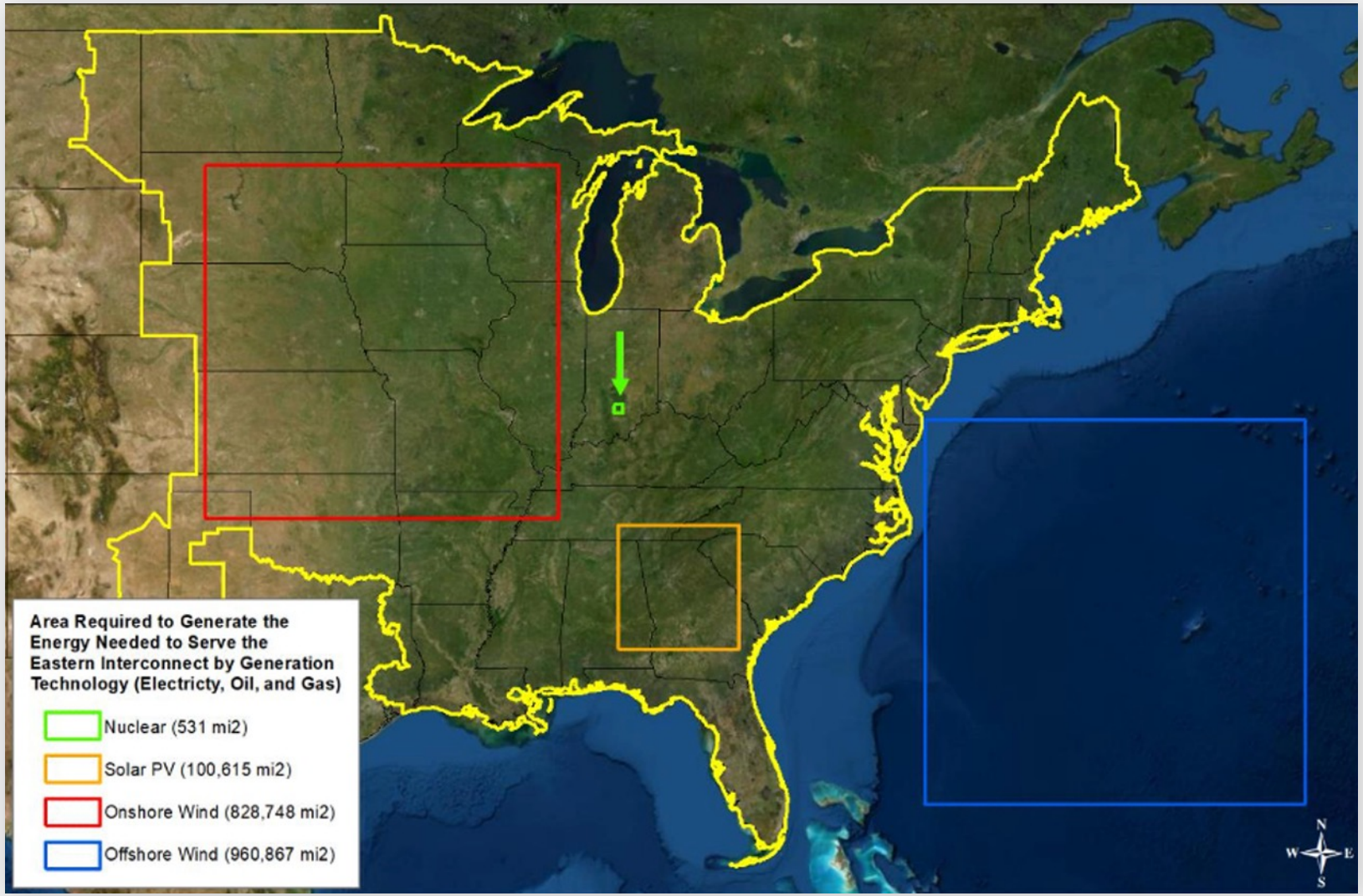




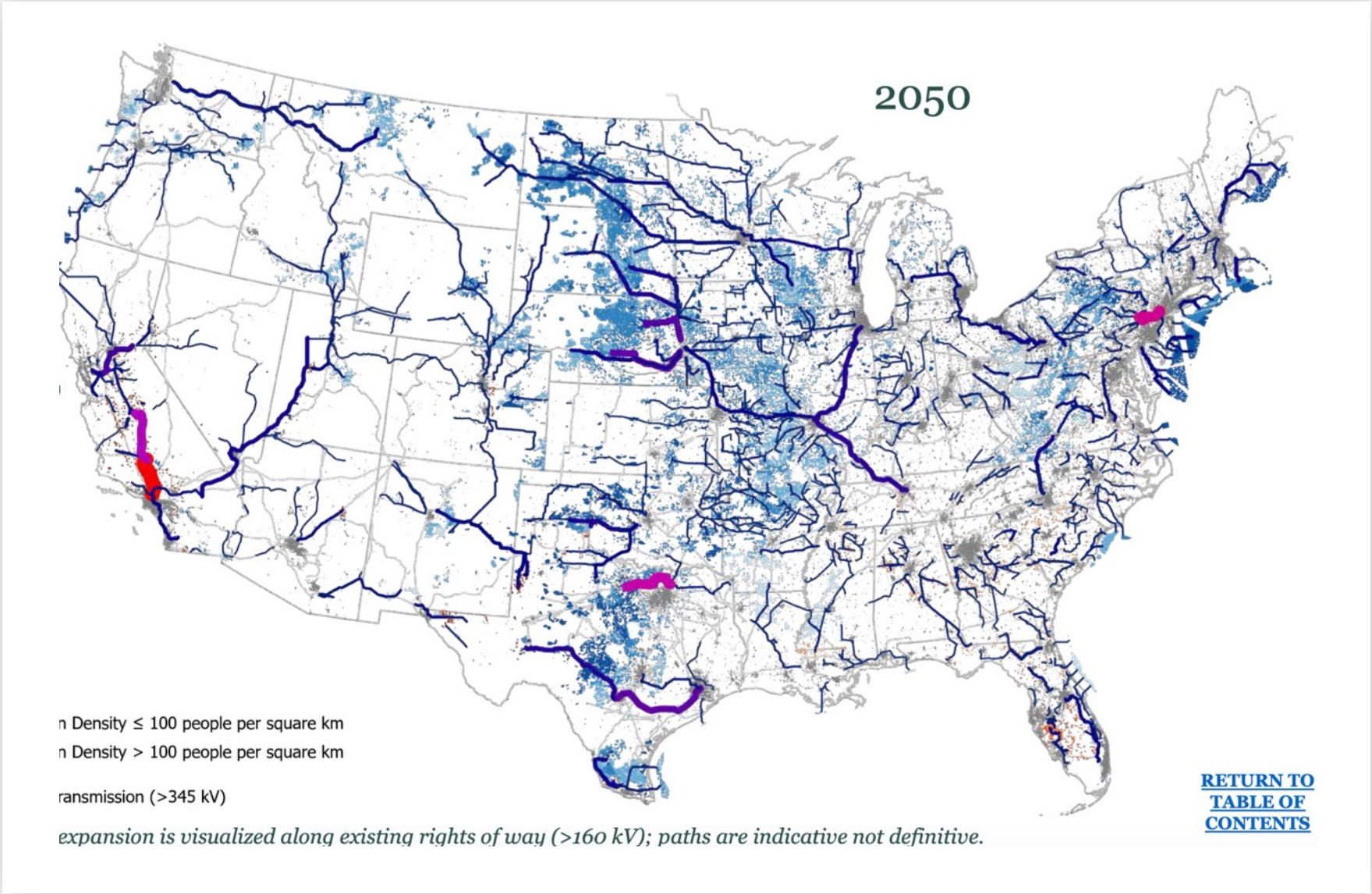




# Renewables are land-consuming



The U.S. high renewables buildout as modelled



# A European example

## Land Use Intensity of Energy

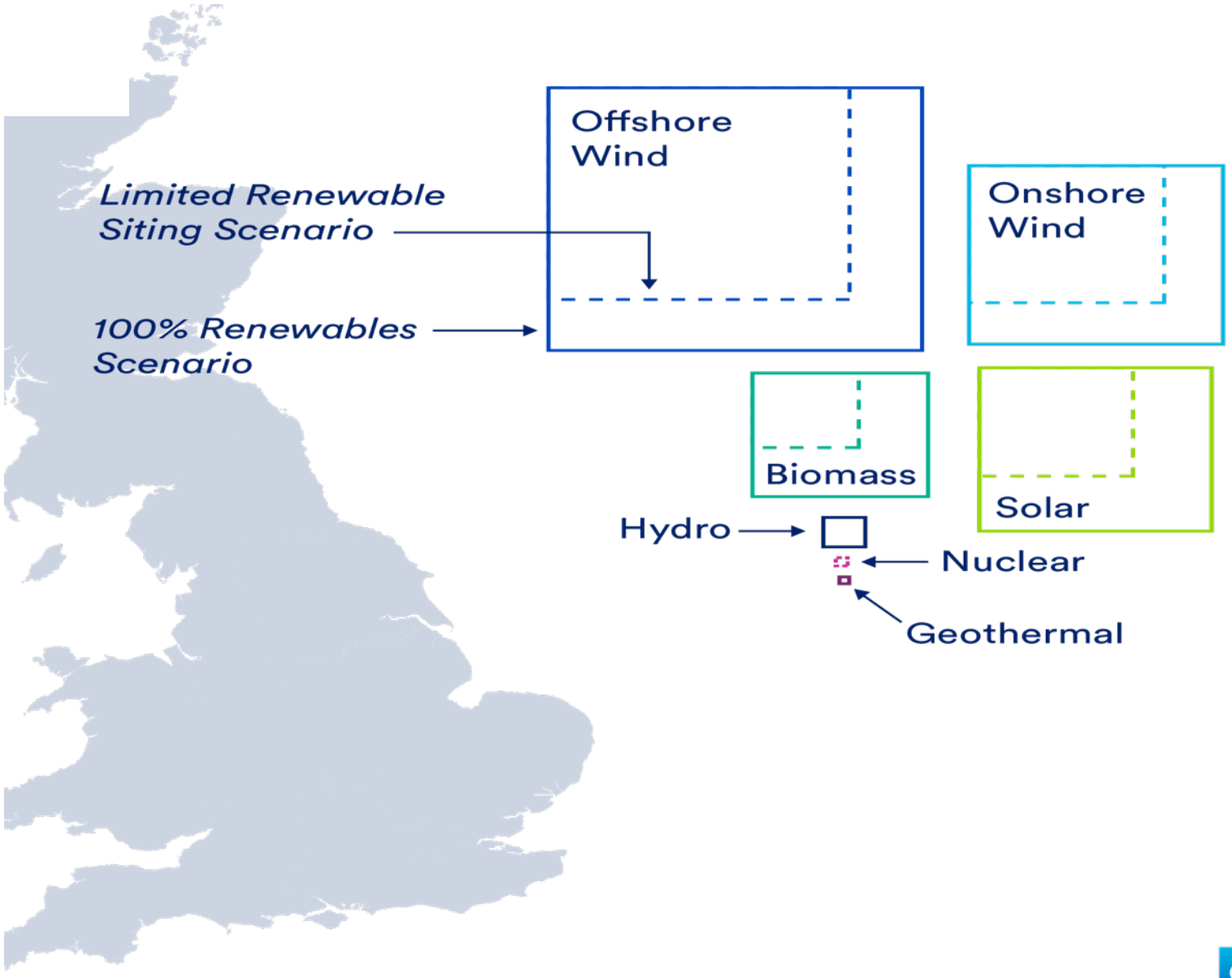
Carbon-Free Europe
2050 UK Electric Capacity

**Limited Renewable Siting**

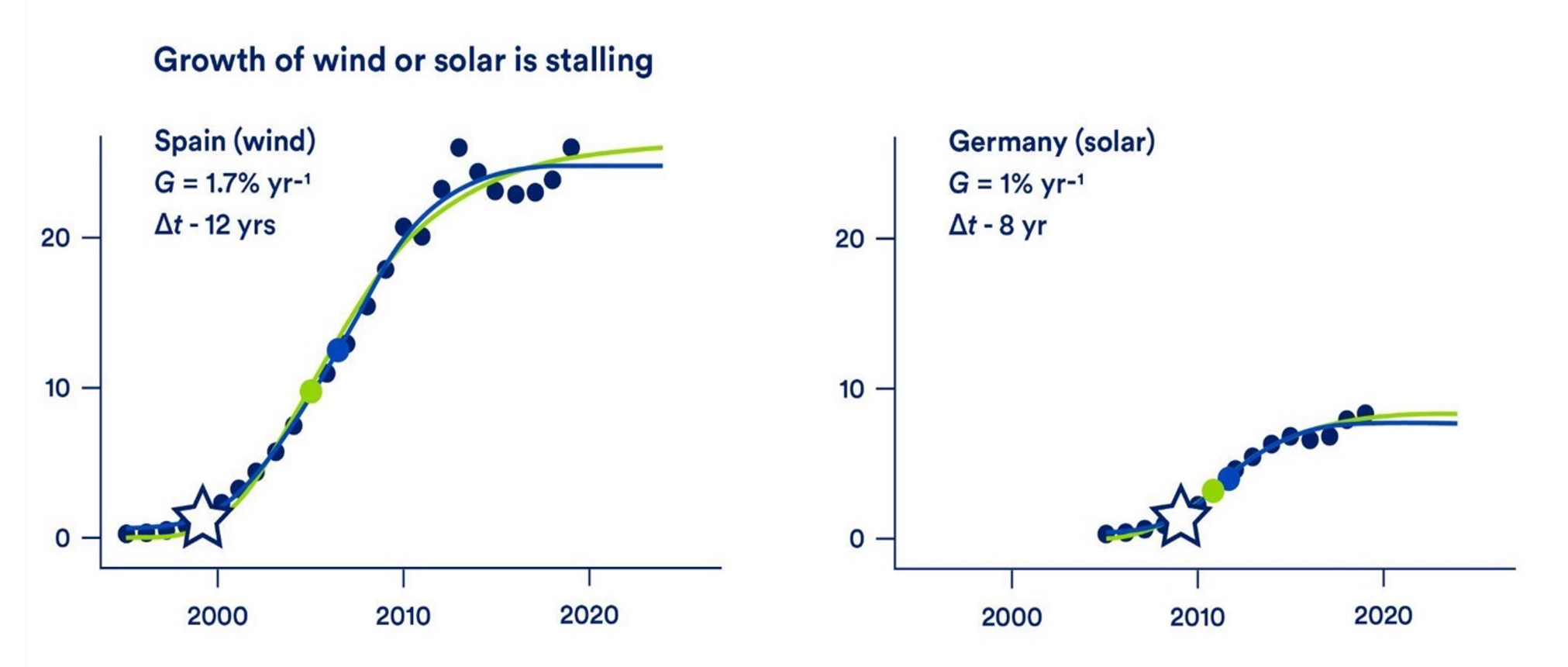
- Biomass – 8,446 km²
- Conv. Geothermal – 0.32 km²
- Hydroelectric – 1,317 km²
- Nuclear – 89 km²
- Offshore Wind – 66,938 km²
- Onshore Wind – 29,010 km²
- Solar PV – 17,750 km²

**100% Renewables**

- Biomass – 23,053 km²
- Conv. Geothermal – 65 km²
- Hydroelectric – 1,314 km²
- Offshore Wind – 102,518 km²
- Onshore Wind – 48,132 km²
- Solar PV – 40,194 km²



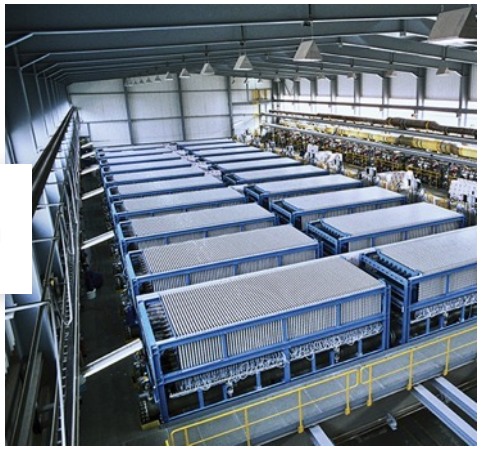
As a result, **renewable deployment rate has declined**
(even before latest macroeconomic headwinds)



”Green hydrogen” for steel Direct Iron Reduction will take **substantial additional renewable, storage and electrolyzer capacity**


**2.5 GW offshore wind (Largest offshore wind facilities today ~ 1 GW)**

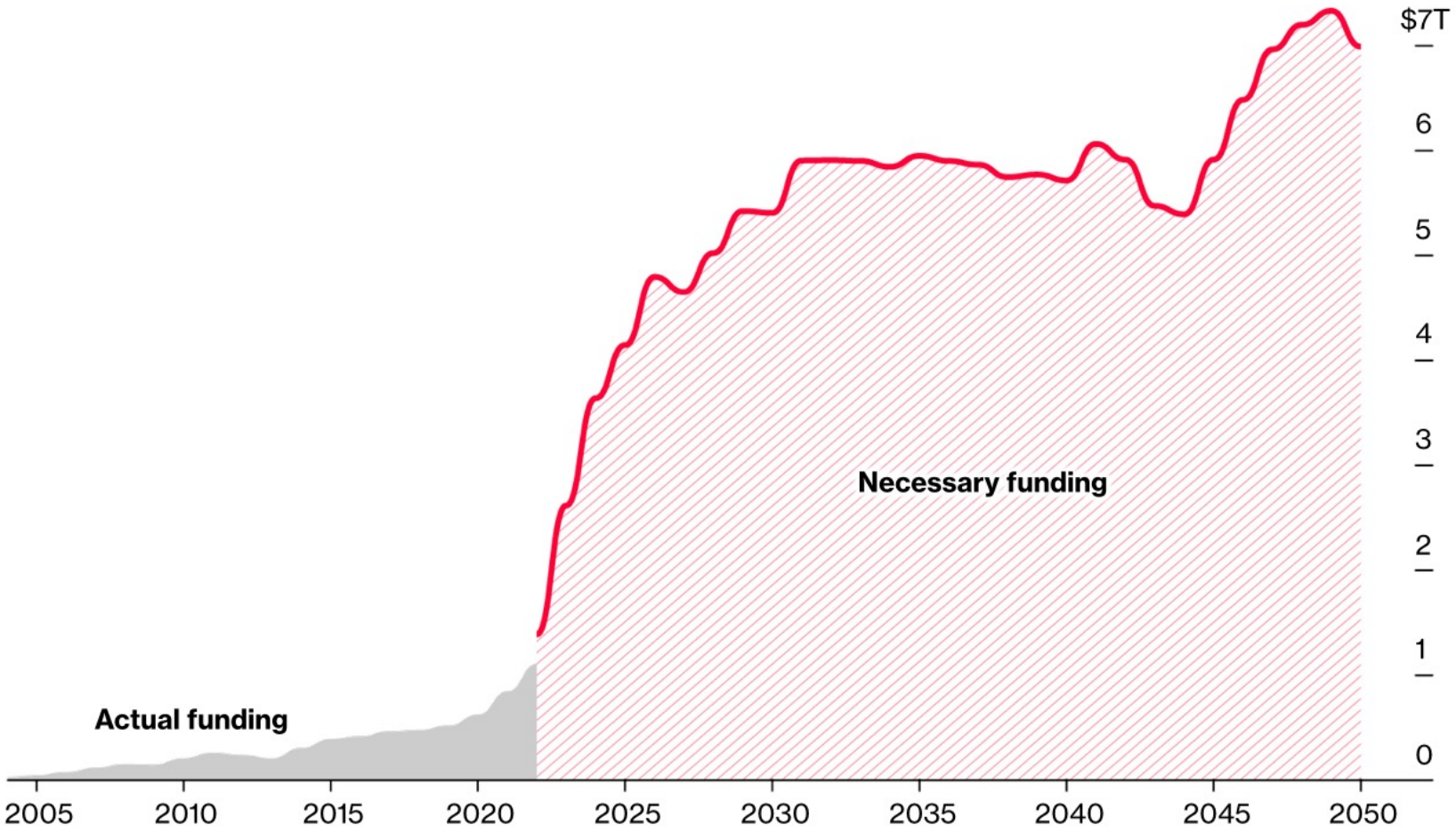
**300 MW storage**



**1.5GW electrolyzer (€2.5 - €3 Billion)**

There are likely to be
real financial constraints

# Total net annual global capital formation



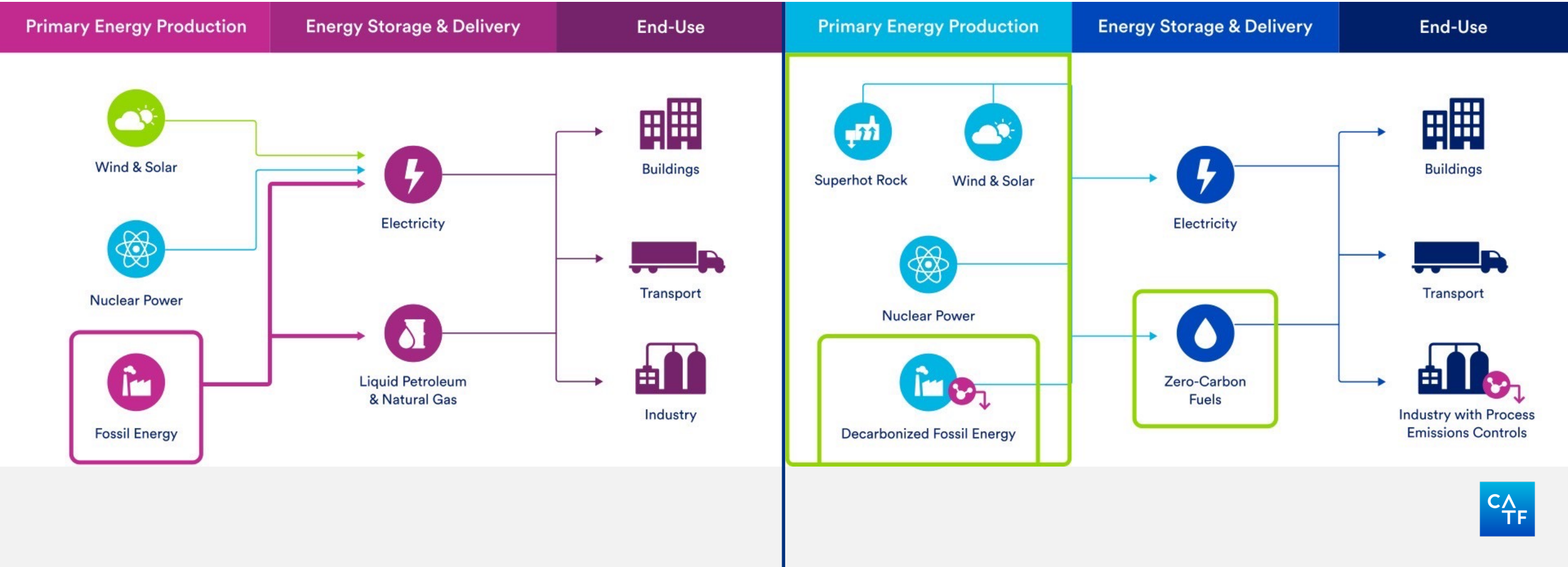

Source: BNEF


The Economist
Wargaming European energy
What will Lula do?
Big tech falls to earth
China's Taiwan-ready generals
NOVEMBER 5TH–11TH 2022
SAY GOODBYE TO 1.5°C
Why climate policy is off target

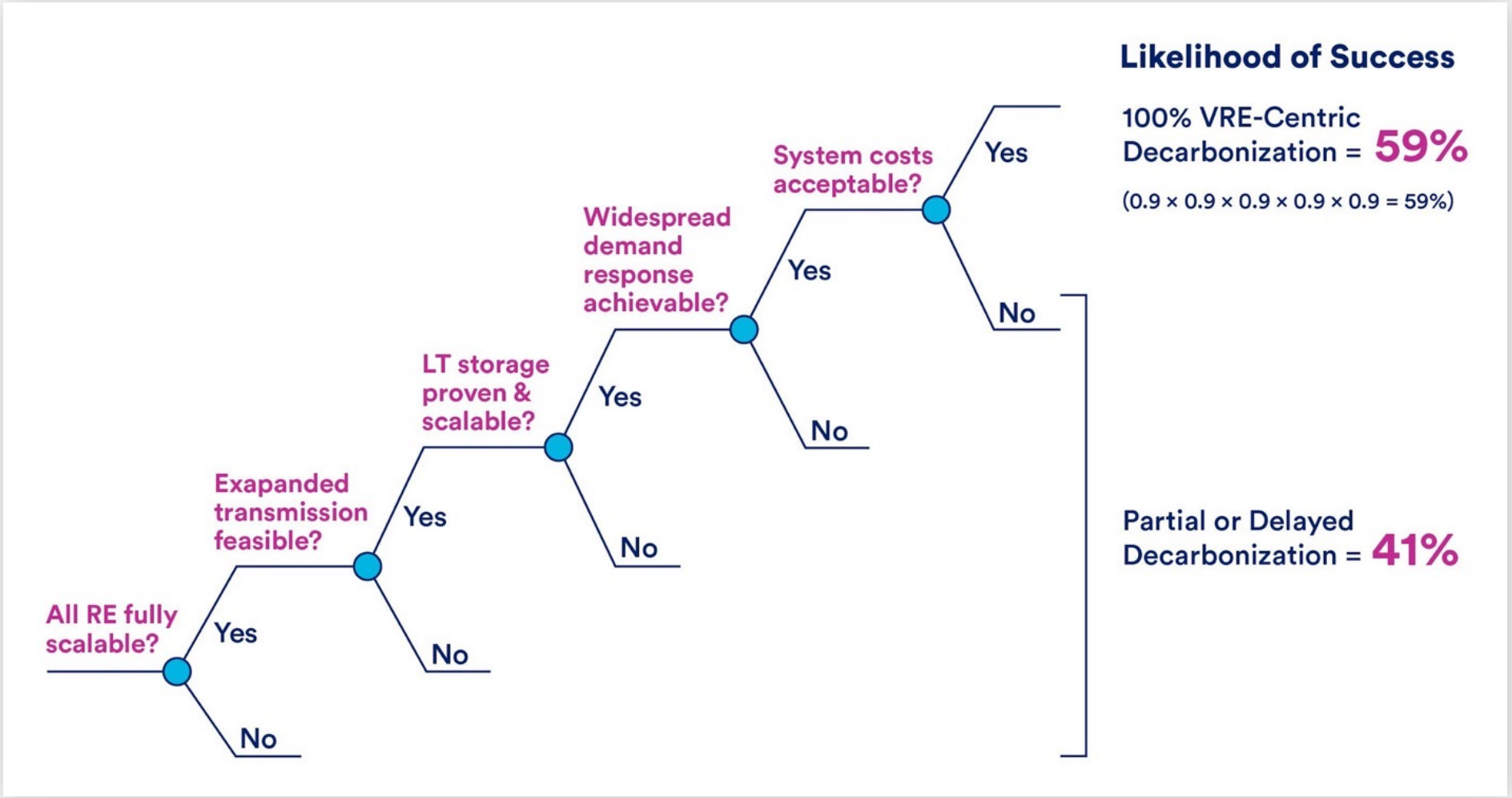
# CATF's approach:
# humility, diversity, optionality, long game strategy

# What we need to do

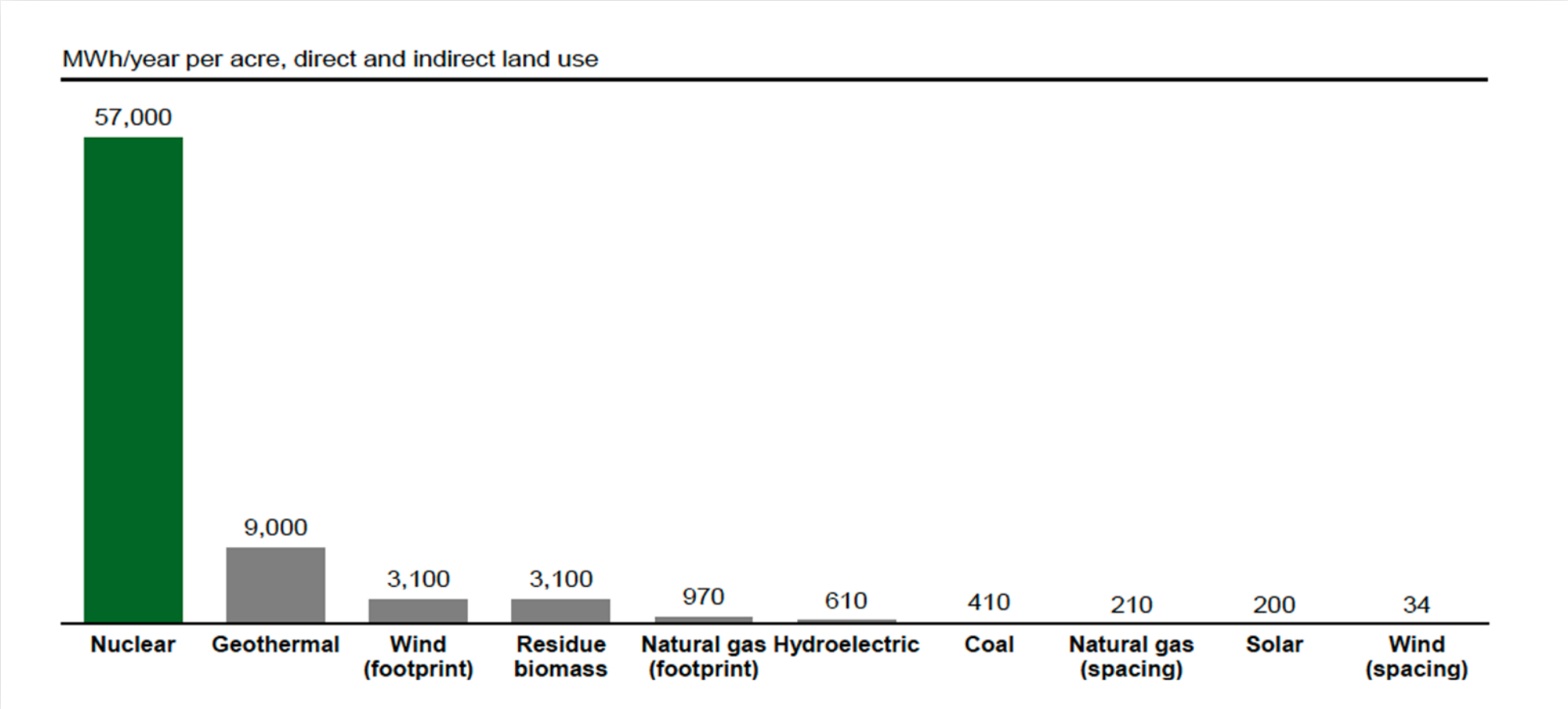
**Carbon Intensive Energy System** → **Decarbonized Energy System**



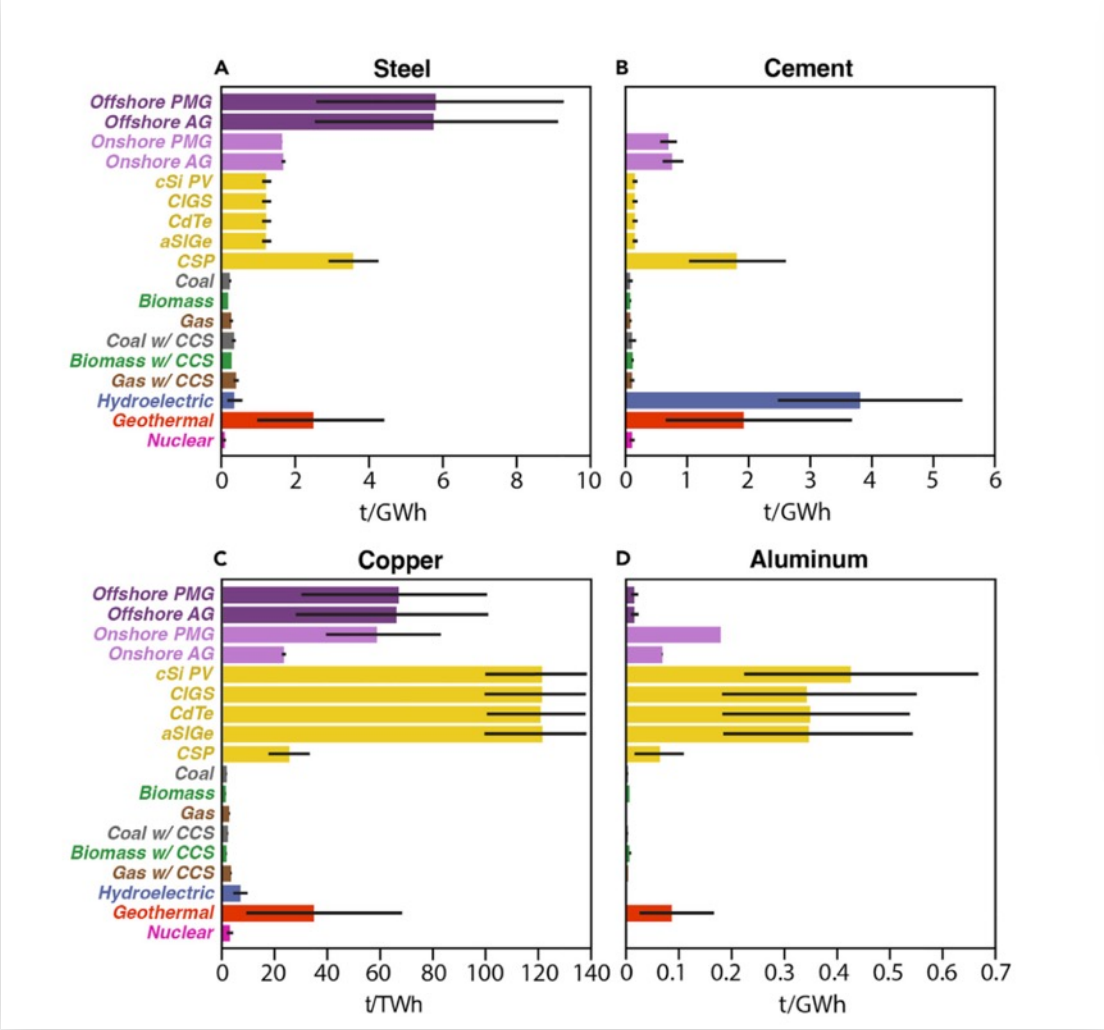
# Expanding options **increases likelihood of success**

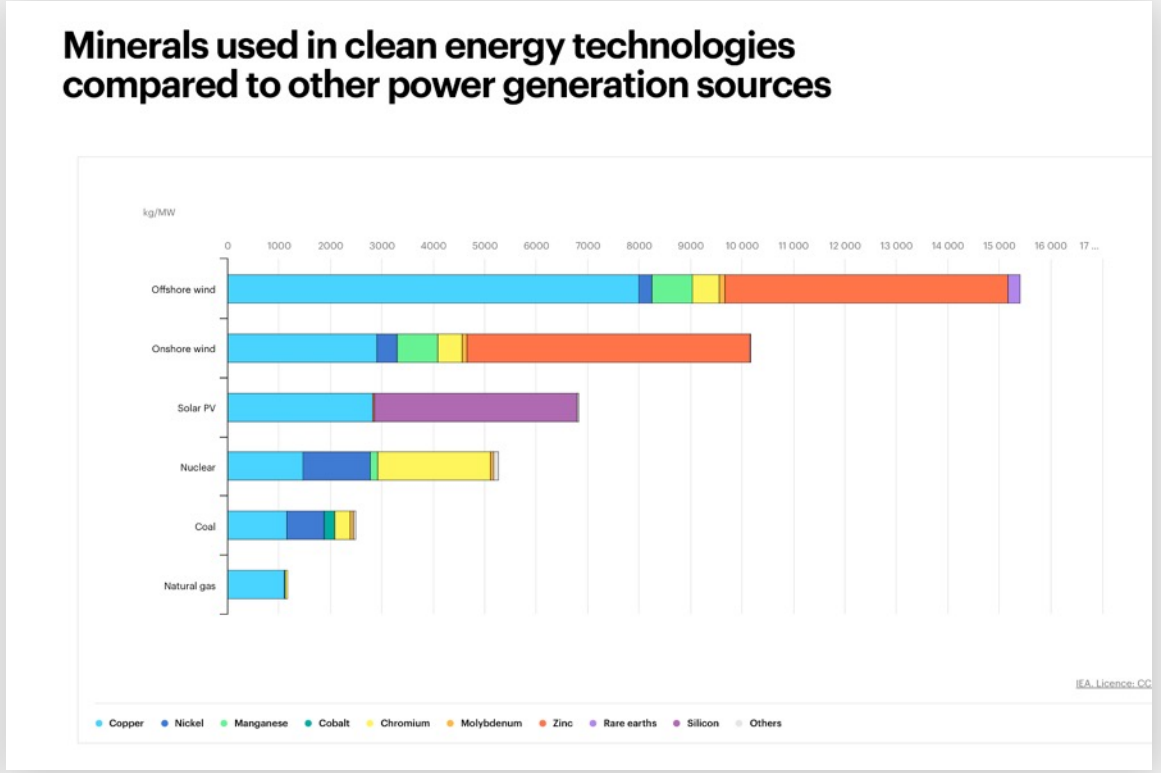


# Clean firm technologies **significantly reduce** land-use needs for generation…



# Clean firm technologies also significantly reduce critical mineral needs

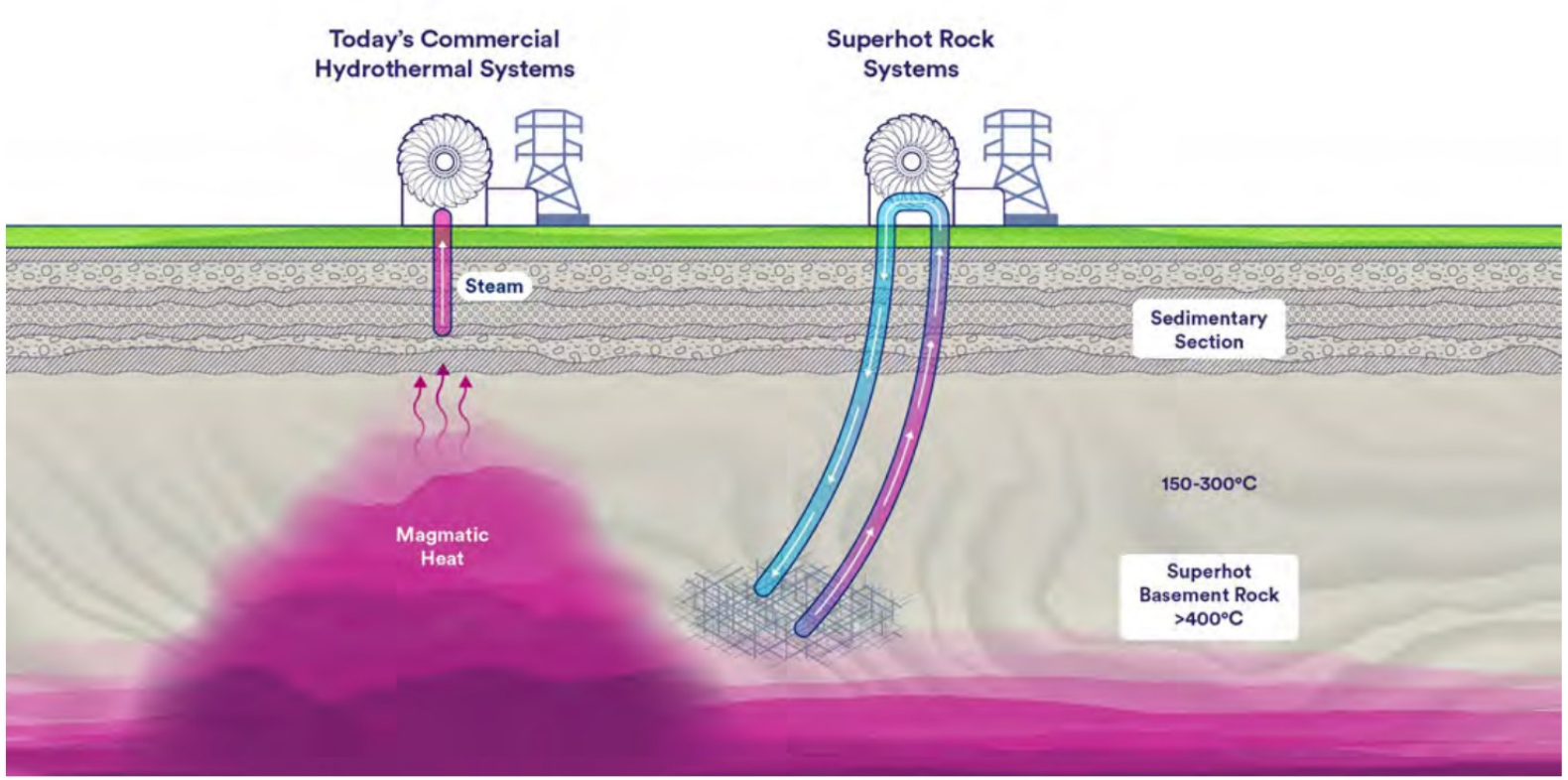



*Sources: IEA, 2022. Seaver Wang et al., Future demand for electricity generation materials under different climate mitigation scenarios, 7 Joule 309 (2023), https://www.sciencedirect.com/science/article/abs/pii/S2542435123000016.*

## CCS can address a substantial portion of heavy industry

## Important to nurture emerging technologies with potential high impact



# Clean Air Task Force: How we work

**Change the Narrative:** to communicate the size of the problem and totality of solution requirements.

**Change Technology:** to have the full suite of options, including affordable and safe nuclear energy and decarbonized fossil fuels.

**Change Business Models:** to include modular, manufacturable energy systems that can be deployed anywhere quickly.

**Change Policy:** to develop, demonstrate, and scale the technologies and systems needed to achieve zero emissions by mid-century.

# Our building blocks for impact

**Deep research and analysis, systems thinking**

**Policy development and technical assistance to government**

**Commercial assessment and support (aka "industrial acupuncture")**

**Public education, advocacy and shaping the political table**

**Coalition-building**

**Rulemaking and litigation**

# Building unlikely coalitions

The New York Times

***House Passes Sweeping Climate, Tax and Health Care Package***

The passage of the bill, which appeared dead just weeks ago, caps a Democratic effort to deliver on major components of President Biden's agenda.

July 6 2021

**OPEN LETTER FROM 27 LEADERS IN INDUSTRY, ACADEMIA, AND CIVIL SOCIETY ON THE NEED TO INCLUDE $CO_2$ STORAGE AND MULTIPLE TRANSPORT MODALITIES IN TEN-E REGULATION**

DECARB AMERICA

Nuclear Hydrogen Initiative

CARBON CAPTURE COALITION

**Transportation Deep Decarbonization Initiative Synthesis**

Options and Strategies Identified by a Roundtable of Experts from Industry, Academia, and Environmental Advocacy

Los Angeles Times

CALIFORNIA

Lawmakers approve $1.4-billion loan for PG&E to keep Diablo Canyon nuclear plant open

LETTER

Open Letter on Climate Innovation in Germany

July 25, 2022

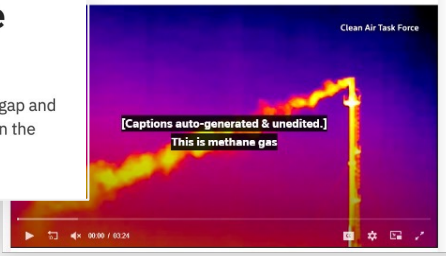
Carbon Gap

REUTERS

Environment

**EXCLUSIVE: Gas infrastructure across Europe leaking planet-warming methane**

By Kate Abnett and Shadia Nasralla




**Europe risks 50% CCS storage shortfall in 2030**

Carbon capture and storage (CCS) could face a €10bn funding gap and 50% storage deficit by 2030, warns environmental organisation the Clean Air Task Force.

By Energy Monitor Staff


Carbon Free California

# New initiatives (examples)

- **A demand-driven, growth-supporting climate strategy for African power sector**
- **Aggregate large aggregated global demand for nuclear power to enable a scalable, commoditized, learning industry**
- **Drive new approaches to siting clean energy infrastructure, beyond “acceptance”**
- **Grounding and dimensioning CDR with scientific understanding**
- **Bringing scientific rigor to the carbon “offset” market**
- **Engaging oil and gas industry on constructive low carbon pathways**
- **Deconstructing “climate finance” – whether, where and how we might raise $7.5 Trillion a year**
- **Providing an alternative climate policy debate space to the Conference of the Parties**