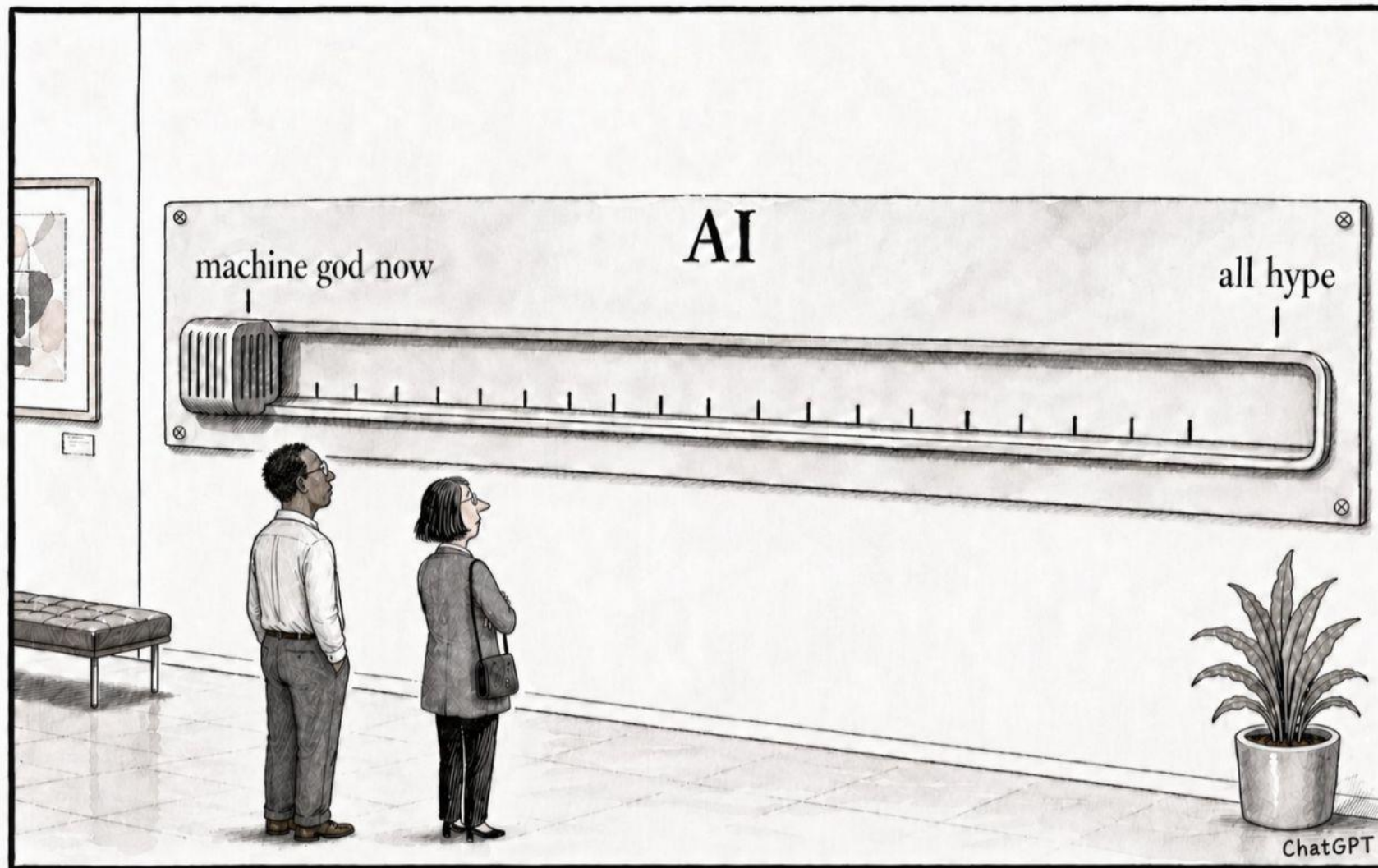

Risks, ethics, and sustainability of AI

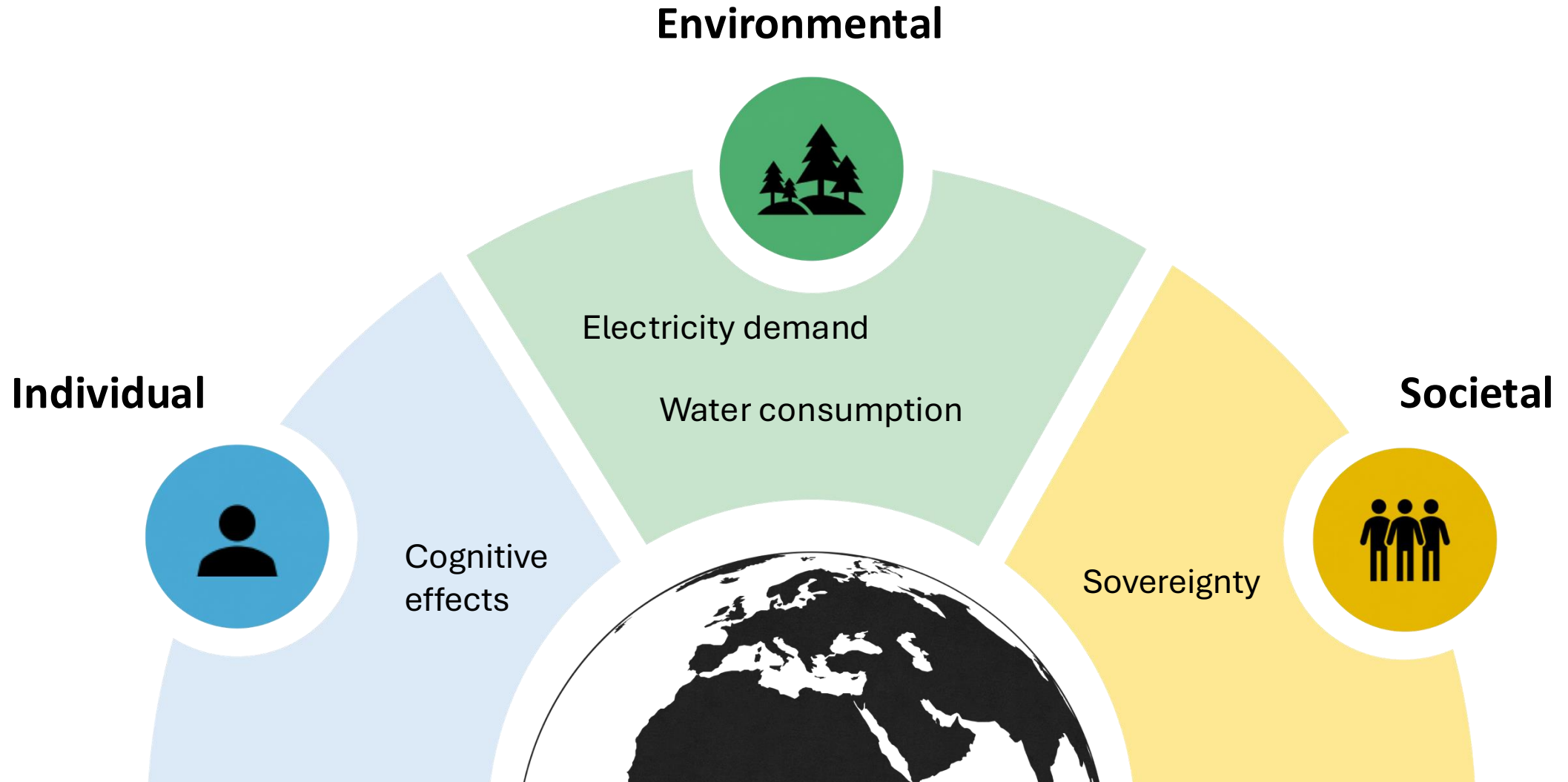
Suze Roostee, PhD





*“at least there are only two positions, otherwise
we might need to consider a range of possible
benefits and risks”*

Areas of impact



Cognitive effects

Or, how to maintain critical thinking



Cognitive effects



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AI chatbots could be making you stupider

20 April 2026

Melissa Hogenboom

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The Guardian Eur ▾

We all know a lack of exercise is bad for our bodies. So what is relying on AI doing to our brains?

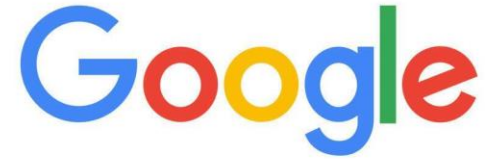
Teknologi

Filosof advarer om vores forhold til AI: 'Vi skal genoptræne evnen til at tænke selv'

Effects of other technologies

Internet

- Memorisation
- Attention span
- Cognitive overload

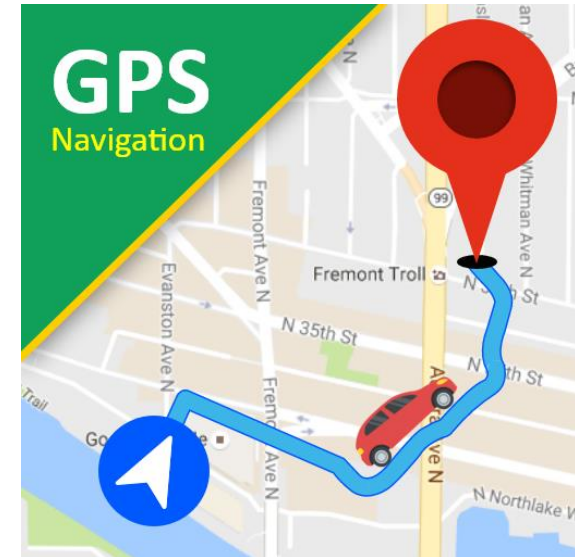
The Google logo, consisting of the word "Google" in its characteristic multi-colored font.

Google Search

I'm Feeling Lucky

GPS

- Spatial awareness



Cognitive effects

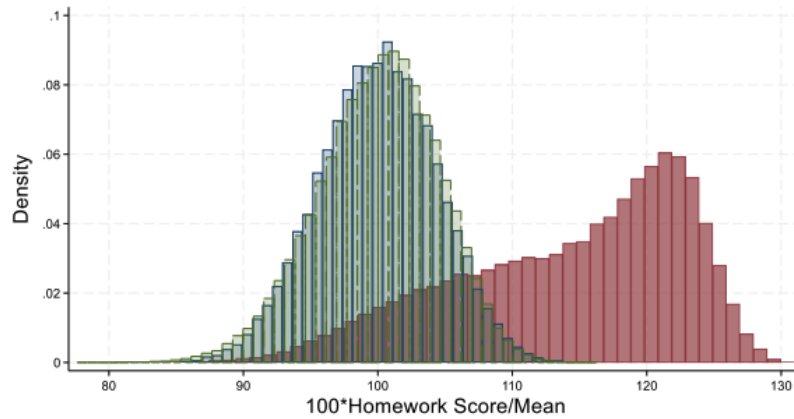
- Never-skilling
- Deskilling
- Mis-skilling
- Automation bias
- Upskilling



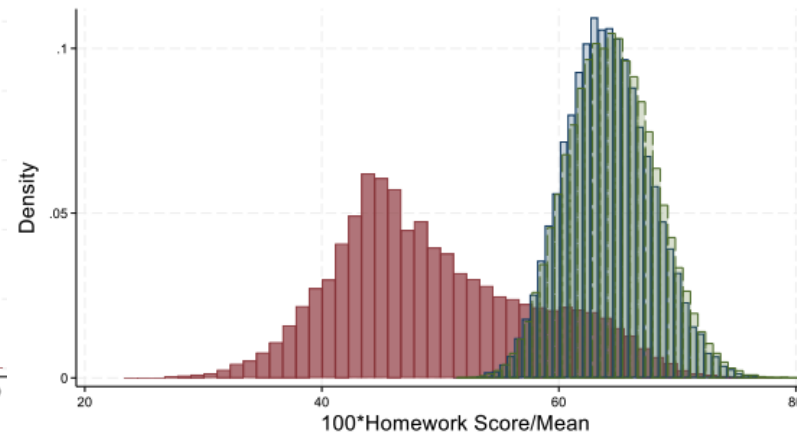
Never-skilling

In a learning context

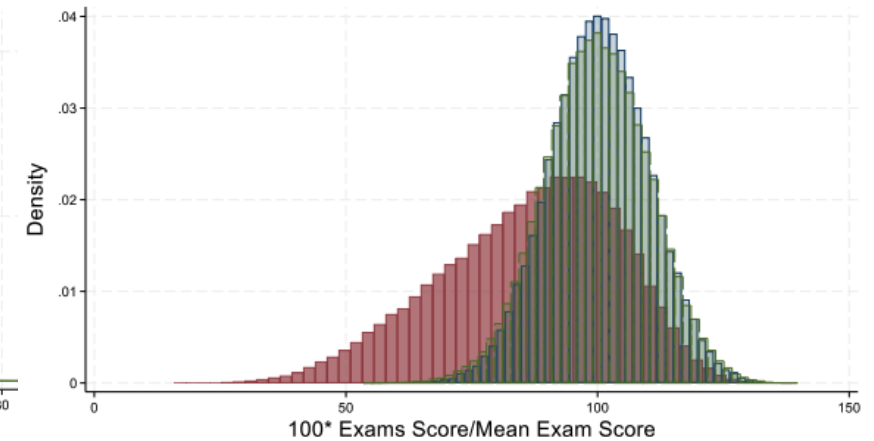
Performance homework



Time spent homework



Performance exam



Stromberg, David and Lei, Victor and Wu, Yanhui, **The Generative AI Learning Penalty: Evidence from Chinese Secondary Education** (June 02, 2026).

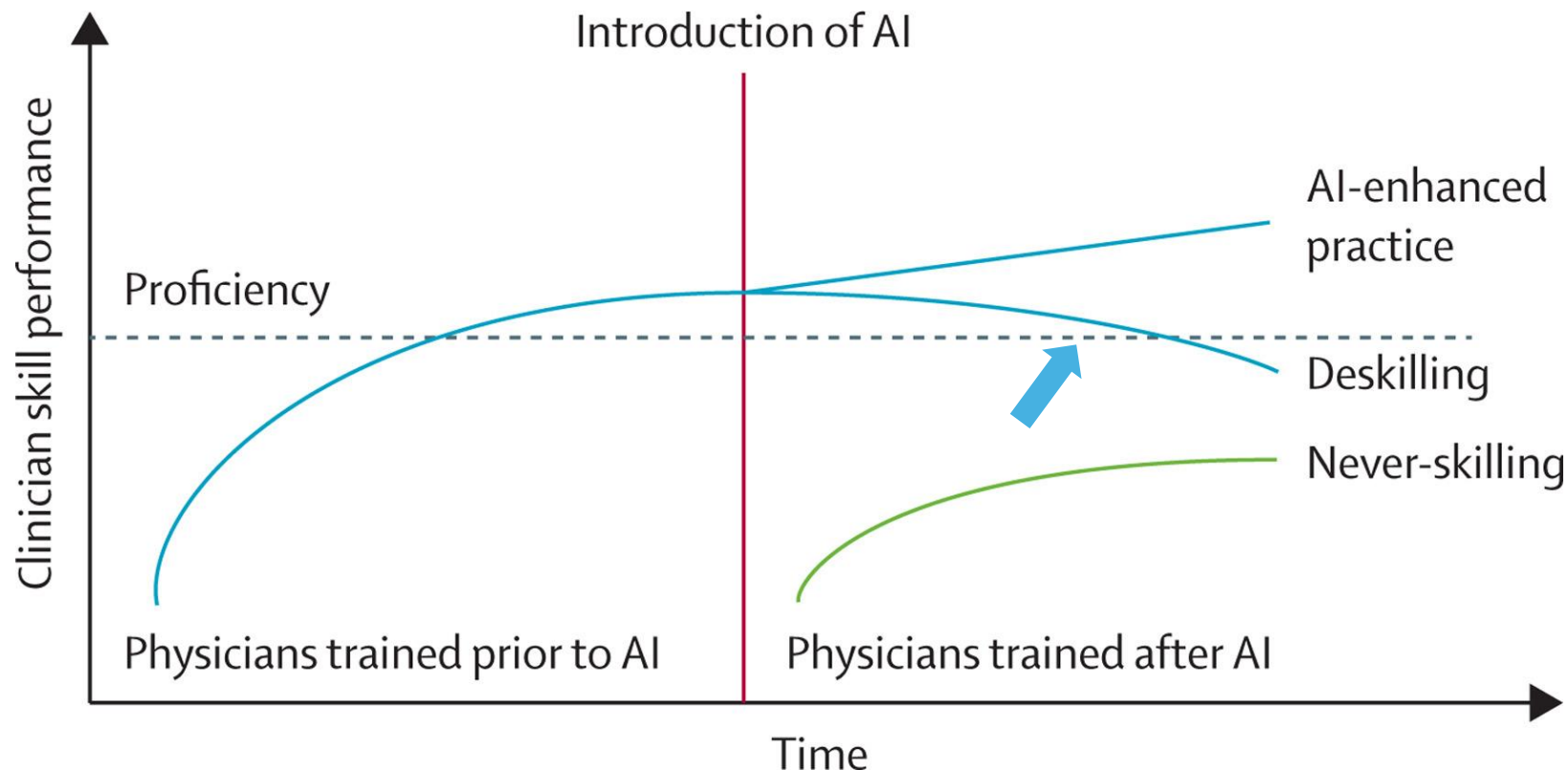
<http://dx.doi.org/10.2139/ssrn.6868618>

Deskilling

In a work context

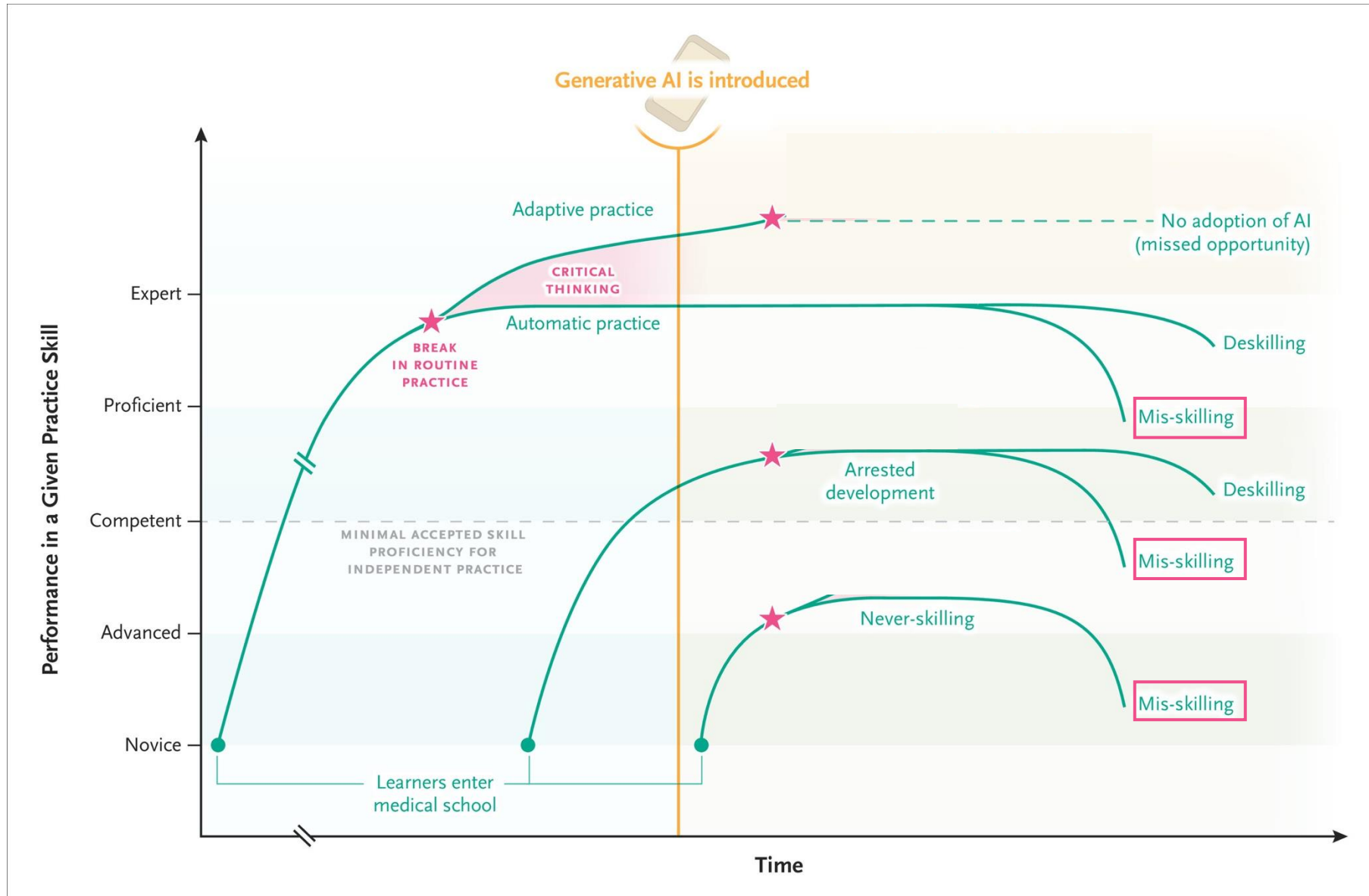
Experienced
colonoscopists & genAI

Potential effects of AI on clinical skills over time

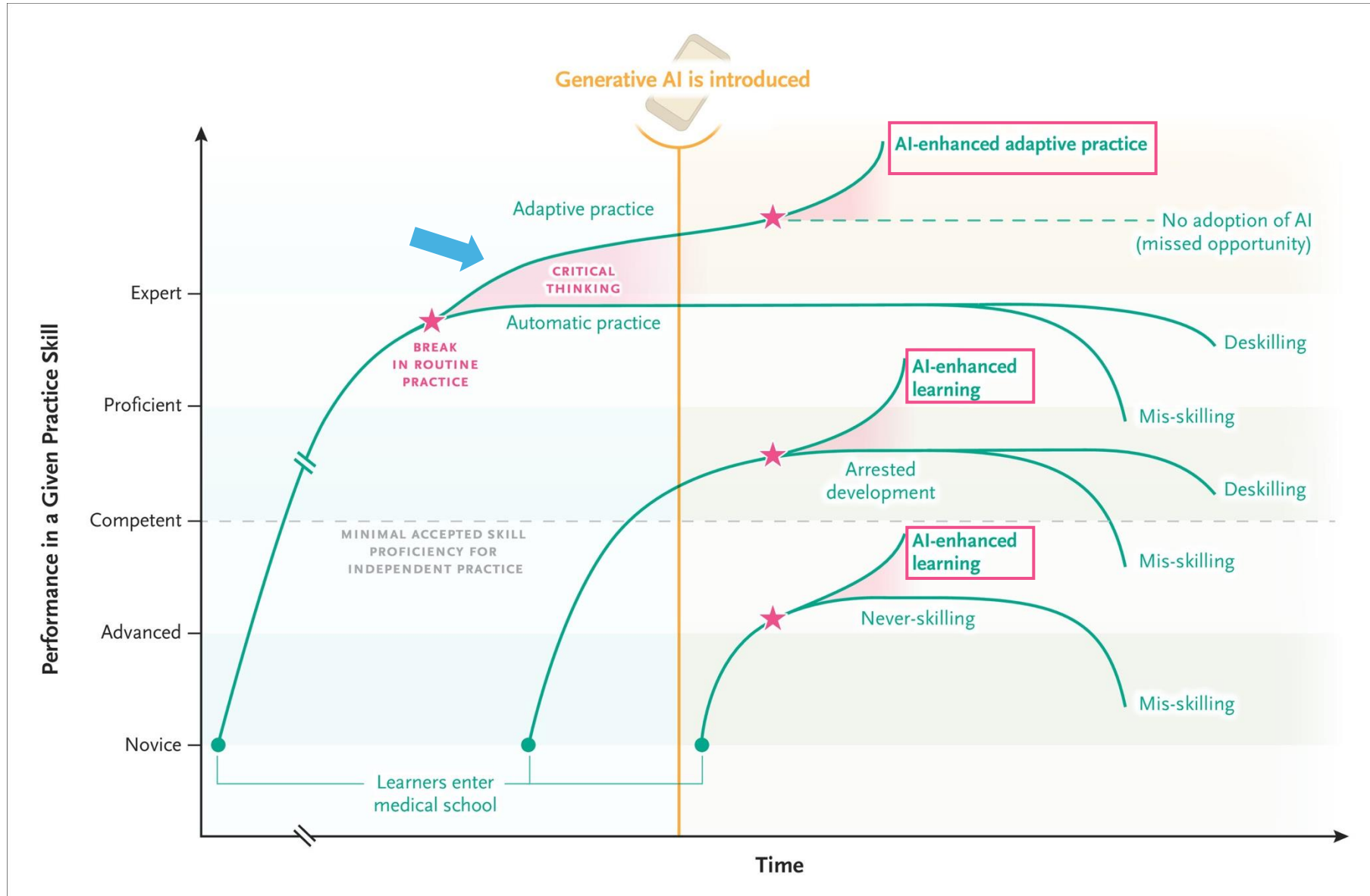


From Berzin T, Topol E, **Preserving clinical skills in the age of AI assistance**,
DOI: 10.1016/S0140-6736(25)02075-6

Mis-skilling & Automation Bias



Upskilling & AI-enhanced performance



Maintaining cognitive skills



Cyborg



Centaur

What:

Mix between user & AI for each task
Integrated approach

Suitable for:

Lower risk tasks with well-defined use-cases

More risk of never-skilling etc

What:

Divide tasks between user & AI
Critical oversight by user

Suitable for:

Higher risk tasks, allocation based on strengths and capabilities

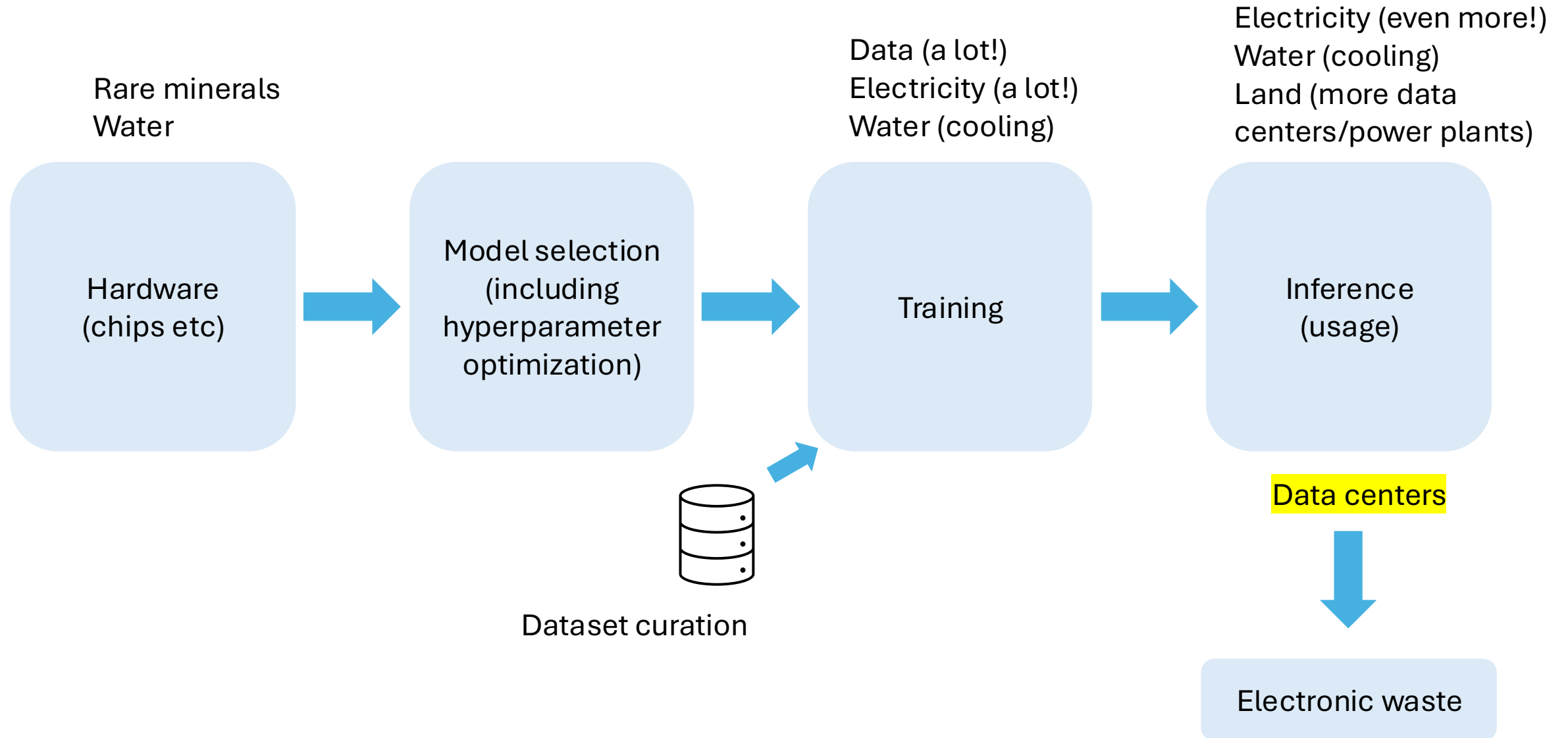
Best for upskilling

Environmental impact

Increased consumption in the age of electricity



AI lifecycle



Data centers

NEWS > TECHNOLOGY

EU launches €30B push to build 7 massive AI data centers

Germany, Greece, Portugal, Italy and Spain are backing plans to build the largest hubs.

Google to buy nuclear power for AI datacentres in 'world first' deal

Tech company orders six or seven small nuclear reactors from California's Kairos Power

● [Business live - latest updates](#)



Google hopes the deal will provide a low-carbon solution to power datacentres. Photograph: Mike Blake/Reuters

Trump EPA aims to exempt datacenters from disclosing air pollution, advocates warn

Trump administration proposes new rule to dismantle requirement for datacenters to publicly report air pollution



Demonstrators hold up "Stop Data Centers" signs as US President Donald Trump speaks at the General Motors Proving Ground testing facility in Milford, Michigan, US, on Monday, July 27, 2026. Photograph: Sarah Roca/Bloomberg via Getty Images

TECH

Denmark faces data center reckoning as power grid overwhelmed by surging demand

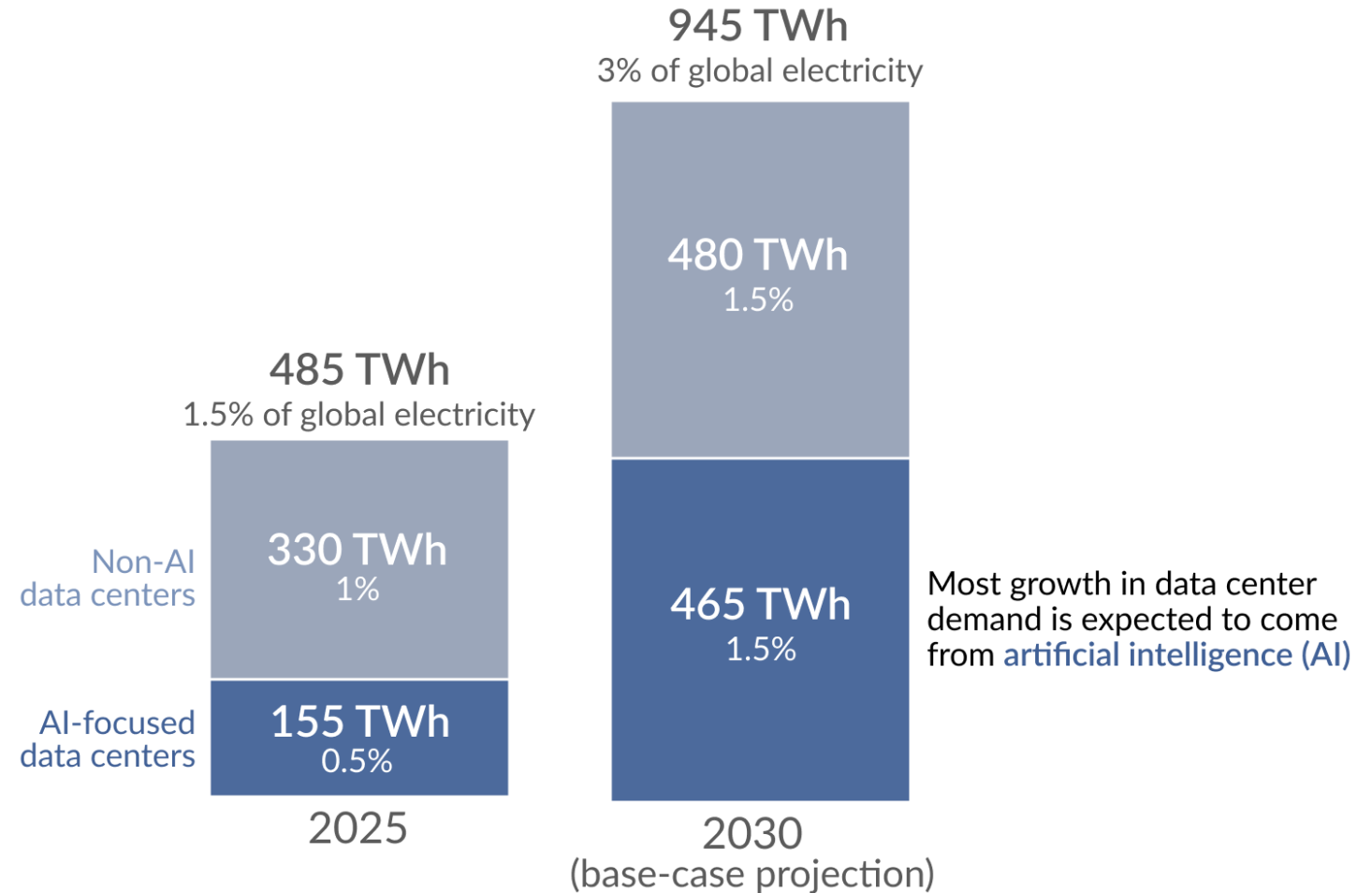
PUBLISHED MON, MAY 4 2026 1:00 AM EDT | UPDATED MON, MAY 11 2026 8:36 AM EDT

Danish Parliament adopts "emergency plan" for electricity grid, puts data centers at the back of queue

Data centers

Global electricity use for data centers

Measured in terawatt-hours (TWh). Estimates for 2025; base-case projections for 2030 from the International Energy Agency (IEA).



Note: Projections for 2030 are very uncertain, but shown here to reflect expectations that most data center growth will come from AI-focused ones.

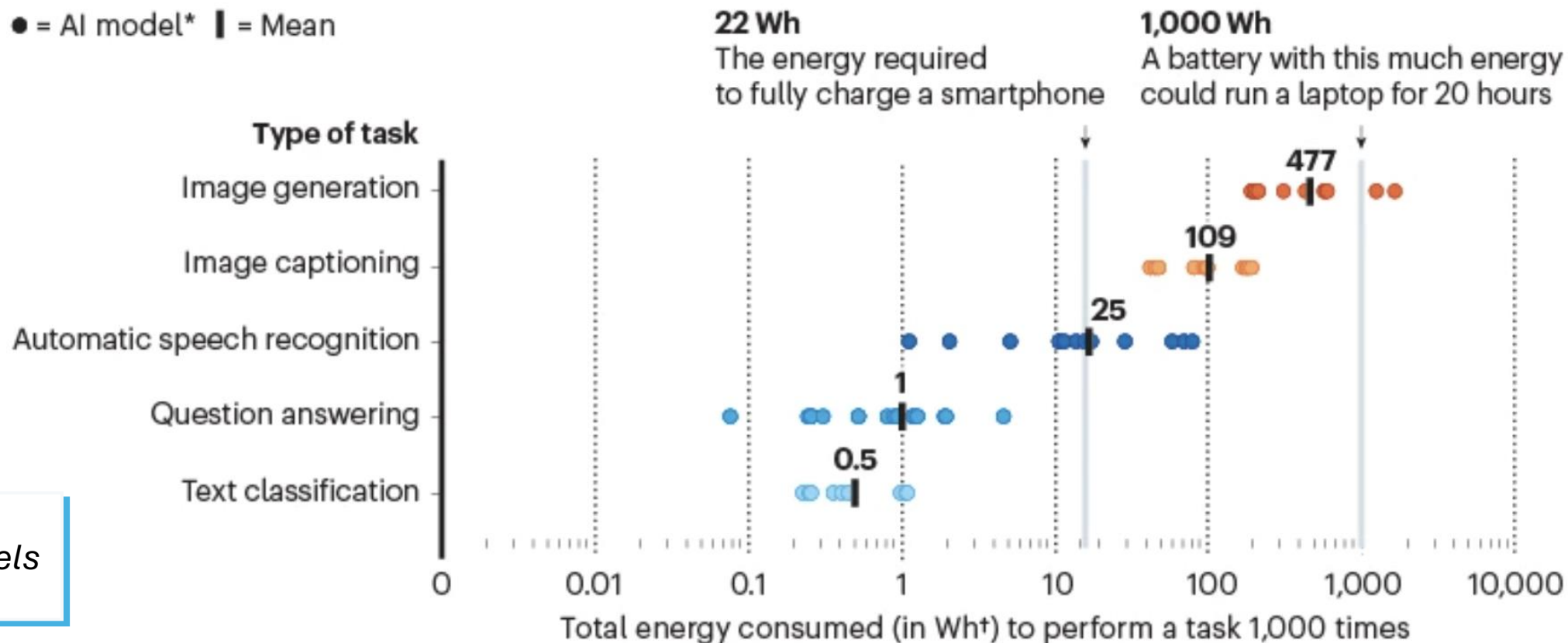
Data source: IEA (2026). Key Questions on Energy and AI.

Electricity use

AI'S ENERGY FOOTPRINT

The power consumed by artificial intelligence (AI) tools varies greatly depending on the task. An AI model that provides answers to queries is much less energy-intensive than one that generates images from text prompts, for example. And the data show that even AI models of the same type can vary widely in energy consumption.

● = AI model* | = Mean



Open-source models

*Tests conducted on 20 popular open-source models. Each dot represents one model;

†1 Watt-hour represents power consumption of 1 W extended over 1 hour.

©nature

Electricity footprint



CARBON

Carbon Footprint (g CO₂e per kWh)

- 1  Indonesia
682
- 2  India
635
- 3  Hong Kong (SAR)
604
- 4  Malaysia
543
- 5  China
510



WATER

Water Footprint (L per kWh)

- 1  Brazil
29
- 2  Canada
21
- 3  Switzerland
21
- 4  Sweden
21
- 5  United Kingdom
20



LAND

Land Footprint (cm² per kWh)

- 1  United Kingdom
718
- 2  Germany
515
- 3  Brazil
445
- 4  Sweden
350
- 5  Italy
332

Electricity use



Global

- Increased pressure on global electricity production
- Greenhouse gas emissions up
- Increased freshwater consumption



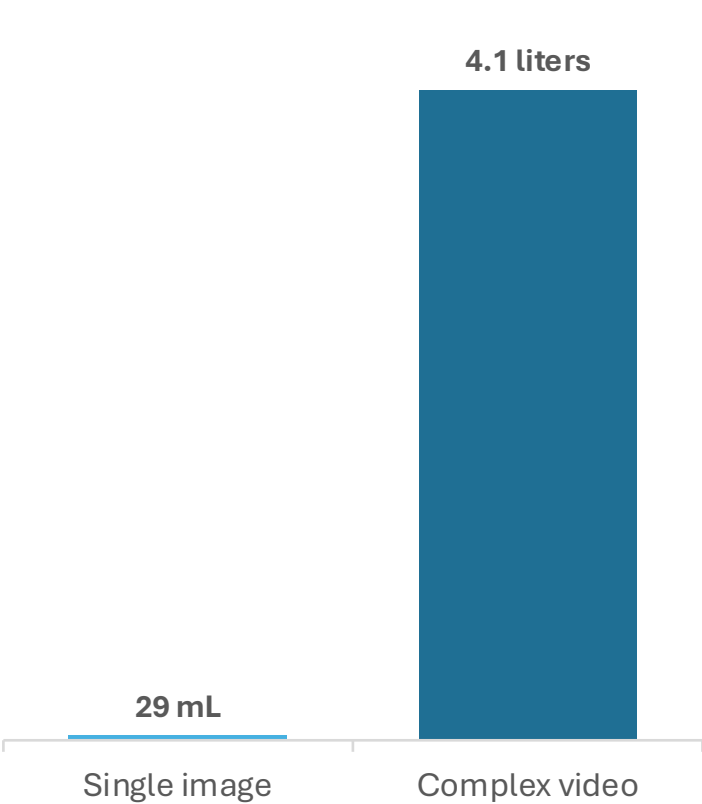
Local

- Overloaded powergrid
- Strop for new buildings/households
- More pressure on freshwater reserves
- Competition with local residents

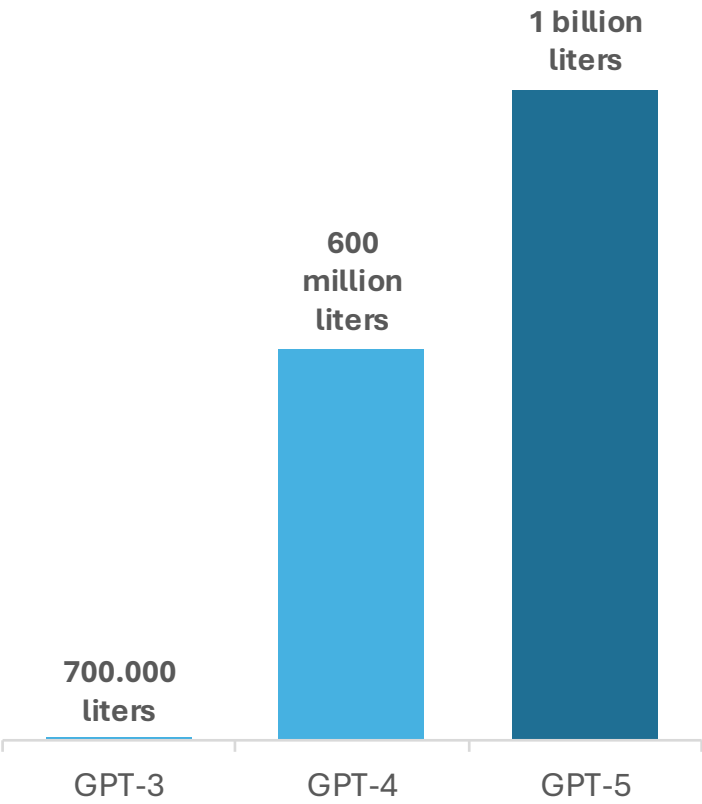
Water consumption

Estimates

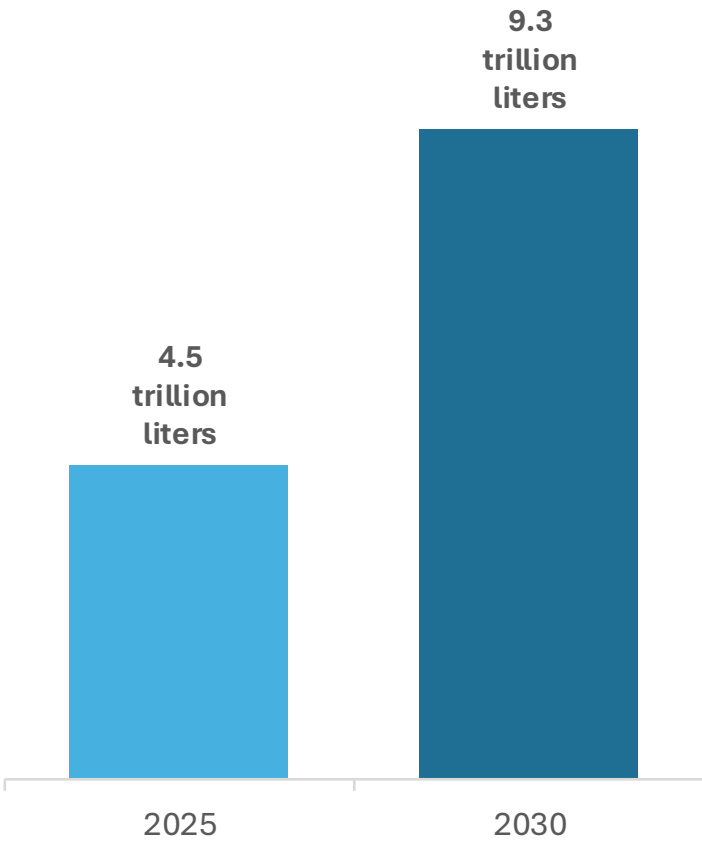
Per AI generation



Training a model



All data centers worldwide

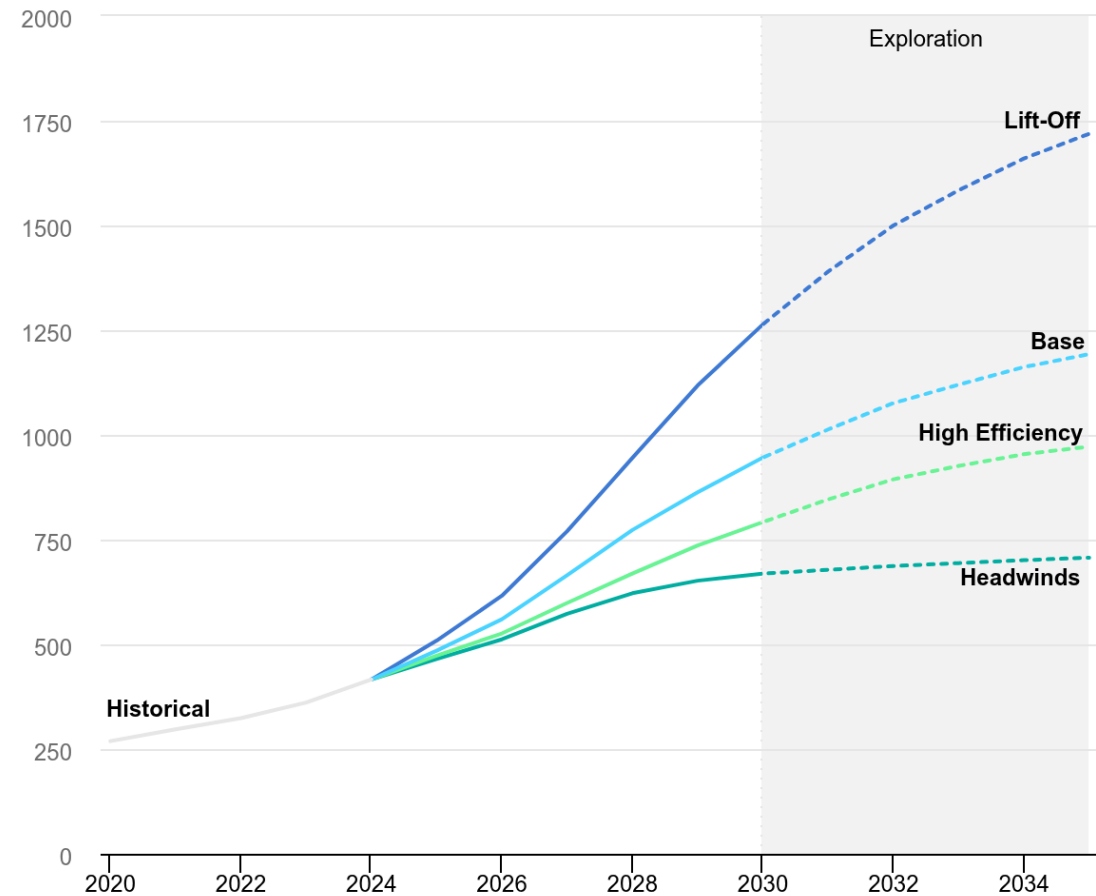
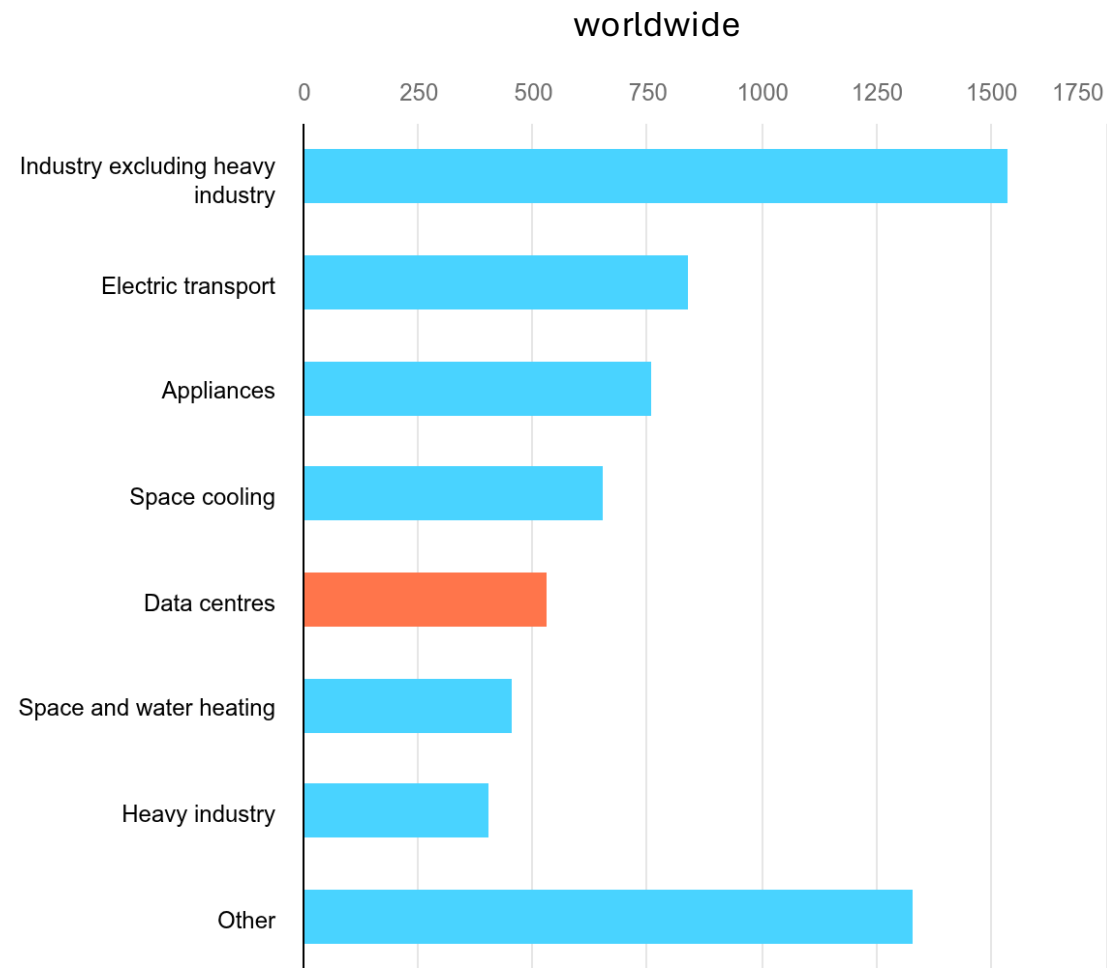


Pengfei Li, Jianyi Yang, Mohammad A. Islam, and Shaolei Ren. 2025. Making AI Less 'Thirsty'. Commun. ACM 68, 7 (July 2025), 54–61. <https://doi.org/10.1145/3724499>

Aczel M., Chamanara S., Matin M., Farsi A., Marwala T., Madani K. (2026), Environmental Cost of AI's Energy Use: Carbon, Water and Land Footprints, United Nations University Institute for Water, Environment and Health (UNU-INWEH), Richmond Hill, Ontario, Canada, doi:10.53328/INR26RMA002

In perspective

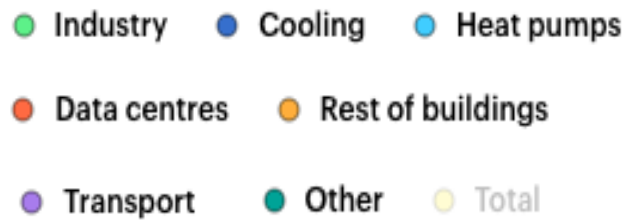
Increase in electricity demand by sector, Base Case, 2024-2030



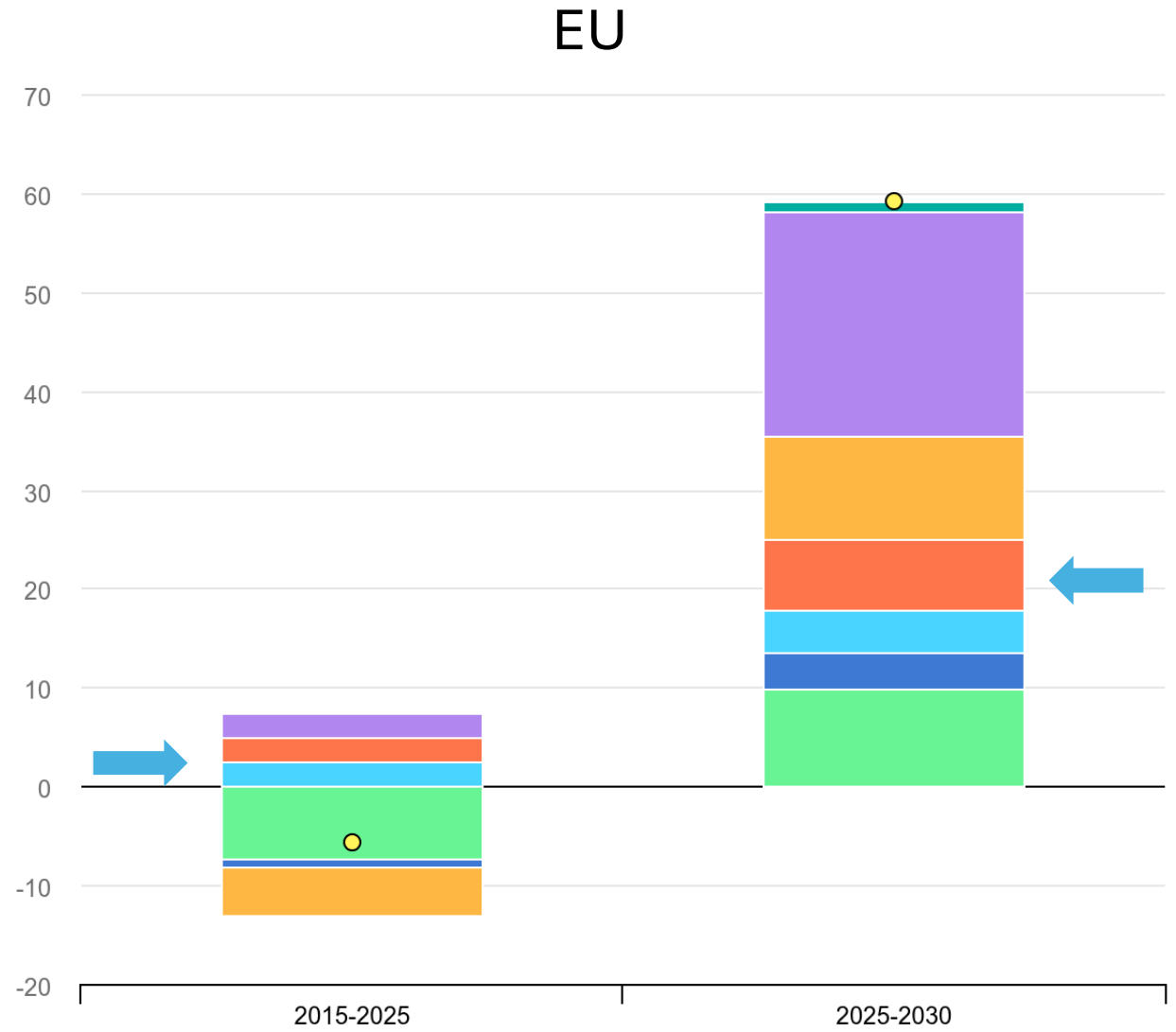
<https://www.iea.org/reports/energy-and-ai/energy-demand-from-ai>
<https://www.iea.org/reports/electricity-2026/demand>

Data: International Energy Agency (IEA)

In perspective

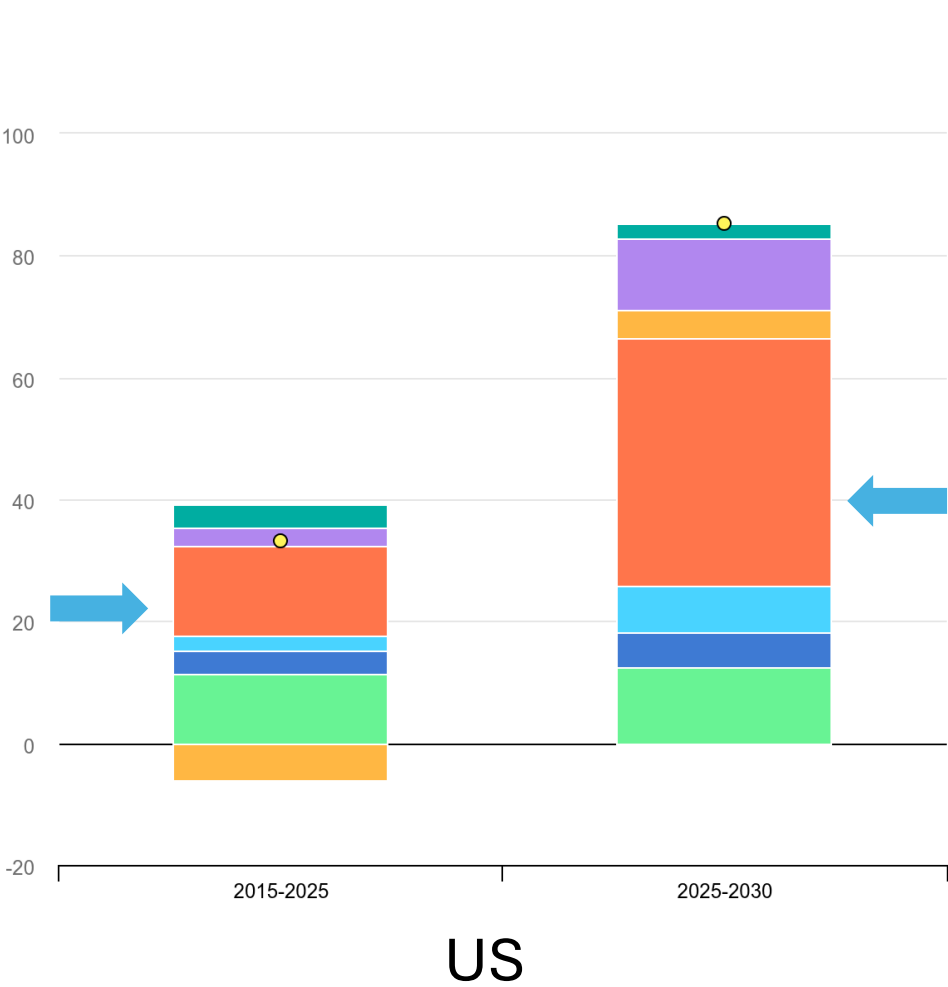


Electricity demand growth by sector and end-use, 2015-2030

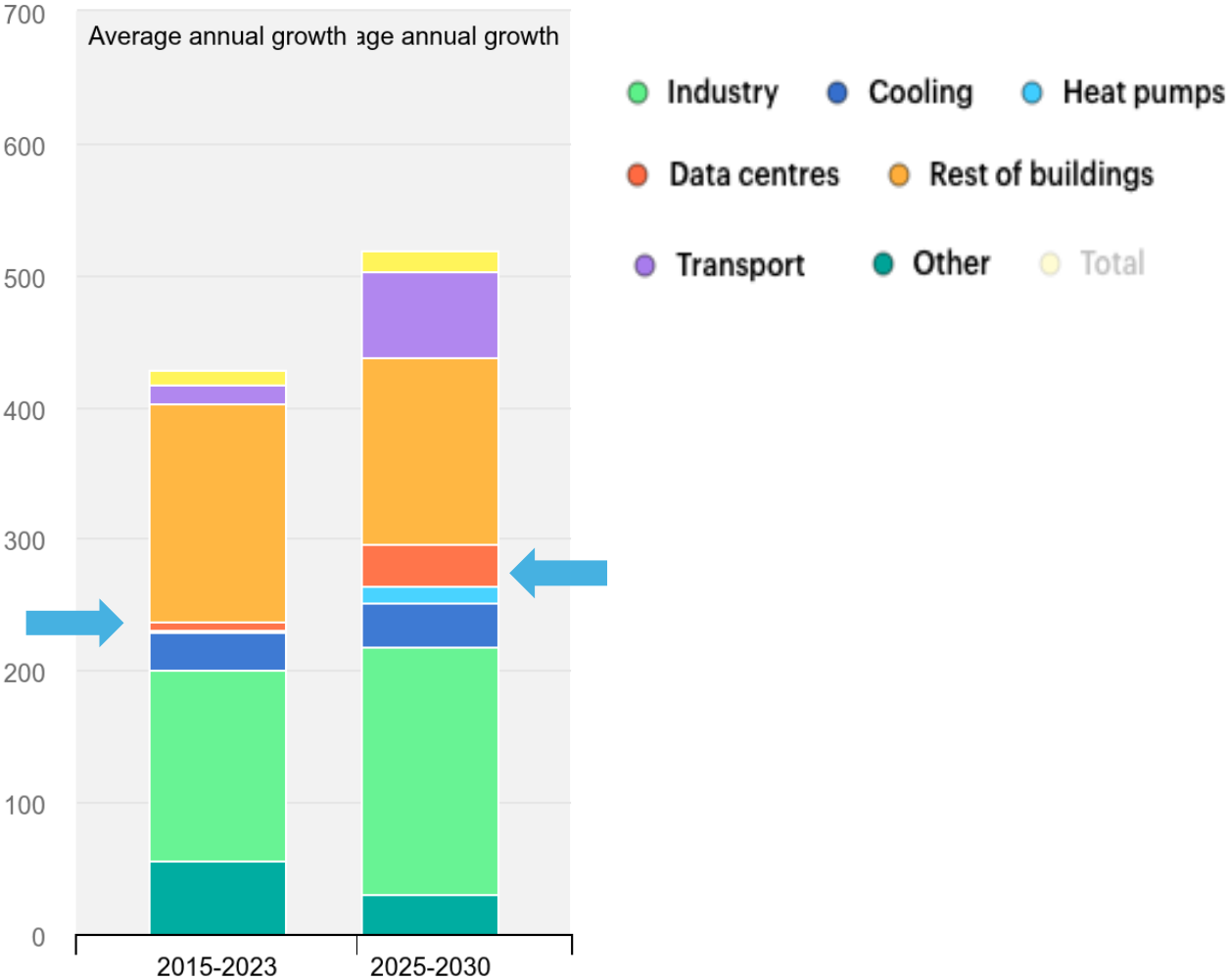


In perspective

Electricity demand growth by sector and end-use, 2015-2030



US



China

<https://www.iea.org/reports/energy-and-ai/energy-demand-from-ai>

<https://www.iea.org/reports/electricity-2026/demand>

What can you do?

- Use AI intelligently (user)
- Use renewable electricity sources (organisation/developer)
- Make the invisible visible (developer)

More transparency needed

Societal impact

International dependency



Sovereignty

- Tools / workflows depends on specific (often non-EU) models
- Strategic industry, access not guaranteed
- Reproducibility
- Alternatives

Open & proprietary models

Open-source

WHAT IS OPEN

- ✓ Training data
- ✓ Architecture
- ✓ Model weights

EXAMPLES

OpenEuroLLM, OLMo, K2 (LLM360)

DEPLOYMENT

Run locally, inspect & retrain

Open-weight

WHAT IS OPEN

- ✗ Training data
- ✗ Architecture
- ✓ Model weights

EXAMPLES

DeepSeek, Qwen, GLM, Llama, Gemma, Mistral

DEPLOYMENT

Run locally, fine-tune

Proprietary

WHAT IS OPEN

- ✗ Training data
- ✗ Architecture
- ✗ Model weights

EXAMPLES

ChatGPT, Claude, Gemini

DEPLOYMENT

No local deployment; paid access via the provider

Open models: ~90% of closed-model performance at release, ~87% cheaper to run; the gap closes in ~13 weeks

~80% of usage, yet users pay ~6× more*

Take home

